From:	Tom Wilcox
To:	Poole, Andrea
Cc:	phillipHoskins@savageservices.com
Subject:	CORPs Info
Date:	Thursday, December 15, 2022 3:24:47 PM
Attachments:	2020 USACE Arid West Regional Plant List.pdf Final_Arid_West_Supplemental_Manual 2008.pdf 2020.10.29-Section 106 Submittal Guidelines.pdf 2021-NWP-14 Linear Transportation Projects.pdf USACE Minimum Delineation Report Standards_JAN2016.pdf Minimum Standards_Final_Map_Drawing_Standards_USACE_06August2012.pdf 2022-NWP-Process Flow Chart.pdf Attach.2-Final_2021_NWP_NV_UT_Regional_Conditions.pdf

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Andrea – Good afternoon. Savage's wetland consultant sent Phillip the attached documents related to Corps wetland permitting matters, so we thought we would pass them on to you and the team in case you might find them to be useful in your NEPA document preparation. Call or email me if you have any questions.

Regards,
Tom

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Scientific Name	AW	Common Name
Abies amabilis	FACU	Pacific Silver Fir
Abies bifolia	FACU	Rocky Mountain Alpine Fir
Abies grandis	FACU	Grand Fir
Abies lasiocarpa	FACU	Subalpine Fir
Abies procera	FACU	Noble Fir
Abutilon theophrasti	UPL	Velvetleaf
Acanthomintha ilicifolia	FAC	San Diego Thorn-Mint
Acer circinatum	FAC	Vine Maple
Acer glabrum	FAC	Rocky Mountain Maple
Acer grandidentatum	FACU	Canyon Maple
Acer macrophyllum	FAC	Big-Leaf Maple
Acer negundo	FACW	Ash-Leaf Maple
Acer platanoides	UPL	Norway Maple
Acer saccharinum	FAC	Silver Maple
Acer saccharum	FACU	Sugar Maple
Achillea millefolium	FACU	Common Yarrow
Achillea ptarmica	FACU	Pearl Yarrow
Achnatherum diegoense	FACW	San Diego Rice Grass
Achnatherum hymenoides	UPL	Indian Rice Grass
Achnatherum nelsonii	FACU	Nelson's Rice Grass
Achnatherum richardsonii	UPL	Richardson's Rice Grass
Achyrachaena mollis	FAC	Blow-Wives
Acmispon americanus	UPL	American Deerweed
Aconitum columbianum	FACW	Columbian Monkshood
Aconitum infectum	FACW	Arizona Monkshood
Aconogonon phytolaccifolium	FAC	Alpine Fleeceflower
Acorus americanus	OBL	Several-Vein Sweetflag
Acorus calamus	OBL	Single-Vein Sweetflag
Actaea rubra	FAC	Red Baneberry
Adiantum aleuticum	FAC	Aleutian Maidenhair
Adiantum capillus-veneris	FACW	Southern Maidenhair
Adiantum jordanii	FAC	California Maidenhair
Adoxa moschatellina	FAC	Muskroot
Aegopodium podagraria	FAC	Bishop's Goutweed
Agalinis calycina	OBL	Leoncita False Foxglove
Agalinis tenuifolia	FACW	Slender-Leaf False Foxglove
Agastache urticifolia	FACU	Nettle-Leaf Giant-Hyssop
Agave americana	UPL	American Century-Plant
Agave sisalana	UPL	Sisal-Hemp
Ageratina adenophora	FACU	Crofton Weed
Ageratum conyzoides	FACU	Tropical Whiteweed
Ageratum houstonianum	FACU	Bluemink
Agoseris X agrestis	FAC	_?_
Agoseris X elata	FAC	_?_
Agoseris aurantiaca	FAC	Orange-Flower Goat-Chicory

Agoseris glauca	**FACU**	**Pale Goat-Chicory**
Agoseris monticola	**FAC**	**_?_**
Agoseris parviflora	**FACU**	**Small-Flower Goat-Chicory**
Agrimonia gryposepala	**FAC**	**Tall Hairy Grooveburr**
Agrimonia parviflora	**FAC**	**Harvestlice**
Agrimonia striata	**FACU**	**Woodland Grooveburr**
Agrostis capillaris	**FAC**	**Colonial Bent**
Agrostis elliottiana	**FACU**	**Elliott's Bent**
Agrostis exarata	**FACW**	**Spiked Bent**
Agrostis gigantea	**FACW**	**Black Bent**
Agrostis hendersonii	**FACW**	**Henderson's Bent**
Agrostis hyemalis	**FACW**	**Winter Bent**
Agrostis idahoensis	**FACW**	**Idaho Bent**
Agrostis lacuna-vernalis	**FACW**	**_?_**
Agrostis mertensii	**FACU**	**Northern Bent**
Agrostis microphylla	**FACW**	**Small-Leaf Bent**
Agrostis oregonensis	**FACW**	**Oregon Bent**
Agrostis pallens	**FACU**	**Seashore Bent**
Agrostis pauzhetica	**FACU**	**Thermal Bent**
Agrostis perennans	**FAC**	**Upland Bent**
Agrostis rossiae	**FAC**	**Ross' Bent**
Agrostis scabra	**FAC**	**Rough Bent**
Agrostis stolonifera	**FACW**	**Spreading Bent**
Ailanthus altissima	**FACU**	**Tree-of-Heaven**
Aira caryophyllea	**FACU**	**Common Silver-Hair Grass**
Aletris farinosa	**FAC**	**White Colicroot**
Alhagi maurorum	**FAC**	**Camelthorn**
Aliciella pinnatifida	**FACU**	**Sticky Cheat Gily-Flower**
Alisma gramineum	**OBL**	**Narrow-Leaf Water-Plantain**
Alisma lanceolatum	**OBL**	**Lance-Leaf Water-Plantain**
Alisma triviale	**OBL**	**Northern Water-Plantain**
Allenrolfea occidentalis	**FACW**	**Iodinebush**
Alliaria petiolata	**FACU**	**Garlic-Mustard**
Allium bisceptrum	**FACU**	**Aspen Onion**
Allium cernuum	**FACU**	**Nodding Onion**
Allium douglasii	**FAC**	**Douglas' Onion**
Allium geyeri	**FACU**	**Geyer's Onion**
Allium hickmanii	**FACU**	**Hickman's Onion**
Allium hyalinum	**FACU**	**Glassy Onion**
Allium lemmonii	**FACU**	**Claybank Onion**
Allium madidum	**OBL**	**Swamp Onion**
Allium schoenoprasum	**FACW**	**Wild Chives**
Allium validum	**OBL**	**Tall Swamp Onion**
Allium vineale	**FACU**	**Crow Garlic**
Allolepis texana	**FAC**	**Texas-Salt**
Allophyllum gilioides	**FAC**	**Dense False Gily-Flower**
Almutaster pauciflorus	**FACW**	**Marsh-Aster**

Alnus glutinosa	**FACW**	**European Alder**
Alnus incana	**FACW**	**Speckled Alder**
Alnus oblongifolia	**FACW**	**Arizona Alder**
Alnus rhombifolia	**FACW**	**White Alder**
Alnus rubra	**FACW**	**Red Alder**
Alnus viridis	**FACW**	**Sitka Alder**
Alocasia macrorrhizos	**FACW**	**Giant Taro**
Alopecurus aequalis	**OBL**	**Short-Awn Meadow-Foxtail**
Alopecurus arundinaceus	**FAC**	**Creeping Meadow-Foxtail**
Alopecurus carolinianus	**FACW**	**Tufted Meadow-Foxtail**
Alopecurus geniculatus	**OBL**	**Marsh Meadow-Foxtail**
Alopecurus magellanicus	**FACW**	**Alpine Meadow-Foxtail**
Alopecurus myosuroides	**FACW**	**Slender Meadow-Foxtail**
Alopecurus pratensis	**FACW**	**Field Meadow-Foxtail**
Alopecurus saccatus	**OBL**	**Pacific Meadow-Foxtail**
Alternanthera philoxeroides	**OBL**	**Alligator-Weed**
Amaranthus acanthochiton	**FACU**	**Greenstripe**
Amaranthus albus	**FACU**	**Tumbleweed**
Amaranthus arenicola	**FACU**	**Sandhill Amaranth**
Amaranthus blitoides	**FACU**	**Mat Amaranth**
Amaranthus blitum	**FAC**	**Purple Amaranth**
Amaranthus californicus	**FACW**	**California Amaranth**
Amaranthus crassipes	**FAC**	**Spreading Amaranth**
Amaranthus obcordatus	**FACU**	**Trans-Pecos Amaranth**
Amaranthus palmeri	**FACU**	**Careless Weed**
Amaranthus retroflexus	**FACU**	**Red-Root**
Amaranthus spinosus	**FACU**	**Spiny Amaranth**
Amaranthus tuberculatus	**FACW**	**Rough-Fruit Amaranth**
Amaranthus viridis	**FAC**	**Slender Amaranth**
Amaranthus watsonii	**FACW**	**Watson's Amaranth**
Amblyopappus pusillus	**FACW**	**Dwarf Coastweed**
Ambrosia artemisiifolia	**FACU**	**Annual Ragweed**
Ambrosia monogyra	**UPL**	**Needle-Leaf Burrobush**
Ambrosia psilostachya	**FACU**	**Perennial Ragweed**
Ambrosia pumila	**FACU**	**Dwarf Burr-Ragweed**
Ambrosia trifida	**FAC**	**Great Ragweed**
Amelanchier alnifolia	**FACU**	**Saskatoon Service-Berry**
Amelanchier arborea	**FACU**	**Downy Service-Berry**
Amelanchier cusickii	**FACU**	**Cusick's Service-Berry**
Amelanchier utahensis	**FACU**	**Utah Service-Berry**
Ammannia auriculata	**OBL**	**Eared Redstem**
Ammannia coccinea	**OBL**	**Valley Redstem**
Ammannia robusta	**OBL**	**Grand Redstem**
Ammophila arenaria	**FACU**	**European Beach Grass**
Ammophila breviligulata	**FACU**	**American Beach Grass**
Amorpha californica	**FAC**	**California Indigo-Bush**
Amorpha fruticosa	**FACW**	**False Indigo-Bush**

Amorpha nana	FACU	Fragrant Indigo-Bush
Ampelopsis arborea	FAC	Peppervine
Ampelopsis cordata	FAC	Heart-Leaf Peppervine
Amphicarpaea bracteata	FACW	American Hog-Peanut
Amsinckia spectabilis	FACU	Woolly-Breeches
Anaphalis margaritacea	FACU	Pearly-Everlasting
Andromeda polifolia	OBL	Bog-Rosemary
Andropogon gerardii	FACU	Big Bluestem
Andropogon glomeratus	FACW	Bushy Bluestem
Andropogon virginicus	FAC	Broom-Sedge
Androsace chamaejasme	FACU	Sweet-Flower Rock-Jasmine
Androsace filiformis	FACW	Slender-Stem Rock-Jasmine
Androsace occidentalis	FACU	Western Rock-Jasmine
Androsace septentrionalis	FACU	Pygmy-Flower Rock-Jasmine
Anemone canadensis	FAC	Round-Leaf Thimbleweed
Anemone narcissiflora	FAC	Narcissus-Flower Thimbleweed
Anemone oregana	FACU	Blue Windflower
Anemone parviflora	FACW	Small-Flower Thimbleweed
Anemone piperi	FACU	Piper's Windflower
Anemopsis californica	OBL	Yerba-Mansa
Angelica ampla	FACW	Giant Angelica
Angelica arguta	FACW	Lyall's Angelica
Angelica dawsonii	FACW	Dawson's Angelica
Angelica genuflexa	FACW	Kneeling Angelica
Angelica kingii	FACW	Basin Angelica
Angelica lucida	FAC	Seacoast Angelica
Angelica pinnata	FACW	Small-Leaf Angelica
Anoda cristata	FAC	Crested Anoda
Antennaria alpina	FACU	Alpine Pussytoes
Antennaria arcuata	FACW	Meadow Pussytoes
Antennaria corymbosa	FAC	Flat-Top Pussytoes
Antennaria media	FAC	Rocky Mountain Pussytoes
Antennaria neglecta	FACU	Field Pussytoes
Antennaria pulchella	FAC	Sierran Pussytoes
Antennaria pulcherrima	FACU	Showy Pussytoes
Antennaria umbrinella	FACU	Brown-Bract Pussytoes
Anthemis cotula	FACU	Stinking Chamomile
Anthoxanthum hirtum	FACW	Northern Sweet Vernal Grass
Anthoxanthum odoratum	FAC	Large Sweet Vernal Grass
Anticlea elegans	FACU	Mountain False Deathcamas
Anticlea occidentalis	FACW	Western False Deathcamas
Anticlea vaginata	FAC	Sheathed False Deathcamas
Anticlea virescens	FACU	Green False Deathcamas
Antigonon leptopus	FAC	Queen's-Jewels
Apiastrum angustifolium	UPL	Mock Parsley
Aplectrum hyemale	FAC	Adam-and-Eve
Apocynum androsaemifolium	UPL	Spreading Dogbane

Apocynum cannabinum	**FAC**	**Indian-Hemp**
Aponogeton distachyos	**OBL**	**Cape-Pondweed**
Aquilegia caerulea	**FACU**	**Colorado Blue Columbine**
Aquilegia chrysantha	**FAC**	**Golden Columbine**
Aquilegia eximia	**OBL**	**Van Houtte's Columbine**
Aquilegia formosa	**FAC**	**Crimson Columbine**
Aquilegia longissima	**FACW**	**Long-Spur Columbine**
Arabidopsis lyrata	**FACU**	**Lyre-Leaf Thalecress**
Arabis crucisetosa	**FAC**	**Cross-Hair Eared Rockcress**
Arabis eschscholtziana	**FACU**	**Pacific-Coast Eared Rockcress**
Arabis pycnocarpa	**FACU**	**Hairy Eared Rockcress**
Aralia californica	**FACW**	**California Spikenard**
Aralia nudicaulis	**FACU**	**Wild Sarsaparilla**
Aralia racemosa	**FAC**	**American Spikenard**
Arctium minus	**FACU**	**Lesser Burrdock**
Arctostaphylos uva-ursi	**FACU**	**Red Bearberry**
Arctous ruber	**FAC**	**Red Torpedoberry**
Arenaria lanuginosa	**FACU**	**Spreading Sandwort**
Arenaria paludicola	**OBL**	**Marsh Sandwort**
Arenaria serpyllifolia	**FACU**	**Thyme-Leaf Sandwort**
Arida arizonica	**FACU**	**Common Desert Tansy-Aster**
Arida carnosa	**OBL**	**Shrubby Alkali Desert Tansy-Aster**
Aristida dichotoma	**FACU**	**Church-Mouse Three-Awn**
Armeria maritima	**FACU**	**Sea Thrift**
Arnica chamissonis	**FACW**	**Leafy Leopardbane**
Arnica fulgens	**FACU**	**Shining Leopardbane**
Arnica lanceolata	**FACW**	**Lance-Leaf Leopardbane**
Arnica latifolia	**FAC**	**Daffodil Leopardbane**
Arnica longifolia	**FACW**	**Spear-Leaf Leopardbane**
Arnica mollis	**FAC**	**Cordilleran Leopardbane**
Arnica ovata	**FACW**	**Sticky-Leaf Leopardbane**
Arrhenatherum elatius	**UPL**	**Tall Oat Grass**
Artemisia annua	**UPL**	**Annual Wormwood**
Artemisia biennis	**FACW**	**Biennial Wormwood**
Artemisia campestris	**UPL**	**Pacific Wormwood**
Artemisia cana	**FACU**	**Coaltown Sagebrush**
Artemisia douglasiana	**FAC**	**Douglas' Wormwood**
Artemisia dracunculus	**FACU**	**Chicken-Sage**
Artemisia ludoviciana	**FACU**	**White Sagebrush**
Artemisia norvegica	**FACU**	**Boreal Sagebrush**
Artemisia papposa	**FACU**	**Fuzzy Sagebrush**
Artemisia potentilloides	**FAC**	**Five-Finger Chicken-Sage**
Artemisia suksdorfii	**FACU**	**Coastal Wormwood**
Artemisia tilesii	**FACU**	**Tilesius' Wormwood**
Artemisia vulgaris	**UPL**	**Common Wormwood**
Arthrocnemum subterminale	**FACW**	**Parish's Glasswort**
Aruncus dioicus	**FACU**	**Bride's-Feathers**

Arundo donax	**FACW**	**Giant-Reed**
Asarum caudatum	**FAC**	**Long-Tail Wild Ginger**
Asarum lemmonii	**OBL**	**Lemmon's Wild Ginger**
Asclepias curassavica	**FAC**	**Bloodflower**
Asclepias fascicularis	**FAC**	**Narrow-Leaf Milkweed**
Asclepias incarnata	**OBL**	**Swamp Milkweed**
Asclepias oenotheroides	**FACU**	**Zizotes Milkweed**
Asclepias pumila	**UPL**	**Low Milkweed**
Asclepias speciosa	**FAC**	**Showy Milkweed**
Asclepias subverticillata	**FACU**	**Horsetail Milkweed**
Asclepias syriaca	**FACU**	**Common Milkweed**
Asclepias texana	**FACU**	**Texas Milkweed**
Asclepias verticillata	**FACU**	**Whorled Milkweed**
Asparagus officinalis	**FACU**	**Asparagus**
Asperugo procumbens	**UPL**	**German-Madwort**
Asplenium adiantum-nigrum	**FACU**	**Black Spleenwort**
Asplenium platyneuron	**FACU**	**Ebony Spleenwort**
Asplenium trichomanes	**FAC**	**Maidenhair Spleenwort**
Astragalus agrestis	**FAC**	**Cock's-Head**
Astragalus alpinus	**FAC**	**Alpine Milk-Vetch**
Astragalus americanus	**FAC**	**American Milk-Vetch**
Astragalus argophyllus	**FACW**	**Silver-Leaf Milk-Vetch**
Astragalus bodinii	**FACW**	**Bodin's Milk-Vetch**
Astragalus canadensis	**FAC**	**Canadian Milk-Vetch**
Astragalus clevelandii	**FAC**	**Cleveland's Milk-Vetch**
Astragalus diaphanus	**FACU**	**Transparent Milk-Vetch**
Astragalus diphysus	**UPL**	**Speckle-Pod Milk-Vetch**
Astragalus diversifolius	**FAC**	**Meadow Milkvetch**
Astragalus eucosmus	**FACU**	**Elegant Milk-Vetch**
Astragalus hornii	**FAC**	**Horn's Milk-Vetch**
Astragalus lemmonii	**FACW**	**Lemmon's Milk-Vetch**
Astragalus lentiginosus	**UPL**	**Freckled Milk-Vetch**
Astragalus leptaleus	**OBL**	**Park Milk-Vetch**
Astragalus limnocharis	**OBL**	**Cedar-Breaks Milk-Vetch**
Astragalus phoenix	**FACU**	**Ash Meadows Milk-Vetch**
Astragalus pycnostachyus	**OBL**	**Marsh Milk-Vetch**
Astragalus robbinsii	**FAC**	**Robbins' Milk-Vetch**
Astragalus tener	**FACW**	**Alkali Milk-Vetch**
Athyrium americanum	**FAC**	**American Alpine Lady Fern**
Athyrium angustum	**FAC**	**Northern Lady Fern**
Athyrium cyclosorum	**FAC**	**Western Lady Fern**
Atriplex amnicola	**FAC**	**Swamp Saltbush**
Atriplex argentea	**FAC**	**Silverscale**
Atriplex bonnevillensis	**FACW**	**Bonneville Saltbush**
Atriplex cordulata	**FAC**	**Heartscale**
Atriplex coronata	**FACW**	**Crown Saltbush**
Atriplex coulteri	**FACU**	**Coulter's Saltbush**

Atriplex depressa	**FAC**	**Rhomboid-Bract Saltbush**
Atriplex dioica	**FAC**	**Saline Saltbush**
Atriplex fruticulosa	**FACW**	**Ball Saltbush**
Atriplex gmelinii	**FACW**	**Gmelin's Saltbush**
Atriplex griffithsii	**FACU**	**Griffiths' Saltbush**
Atriplex hillmanii	**FACU**	**Hillman's Silverscale**
Atriplex hortensis	**FAC**	**Garden Orache**
Atriplex lentiformis	**FACU**	**Quailbush**
Atriplex leucophylla	**FAC**	**Beach Saltbush**
Atriplex minuscula	**FACU**	**Lesser Saltbush**
Atriplex mucronata	**FACU**	**Crested Saltbush**
Atriplex pacifica	**FACU**	**Davidson's Saltbush**
Atriplex parishii	**FAC**	**Brittlescale**
Atriplex parryi	**FAC**	**Parry's Saltbush**
Atriplex patula	**FACW**	**Halberd-Leaf Orache**
Atriplex persistens	**FACW**	**Sacramento Saltbush**
Atriplex phyllostegia	**FACW**	**Arrow Saltbush**
Atriplex polycarpa	**FACU**	**Cattle-Spinach**
Atriplex prostrata	**FACW**	**Hastate Orache**
Atriplex pusilla	**FAC**	**Smooth Saltbush**
Atriplex rosea	**FACU**	**Tumbling Orache**
Atriplex semibaccata	**FAC**	**Australian Saltbush**
Atriplex serenana	**FAC**	**Bracted Saltbush**
Atriplex spinifera	**FAC**	**Spinescale**
Atriplex suberecta	**FACU**	**Peregrine Saltbush**
Atriplex torreyi	**FACU**	**Torrey's Saltbush**
Atriplex tridentata	**FACW**	**Basin Saltbush**
Atriplex truncata	**FACU**	**Wedge-Leaf Orache**
Atriplex tularensis	**FAC**	**Bakersfield Saltbush**
Atriplex vallicola	**FACW**	**Lost Hills Saltbush**
Atriplex watsonii	**FACW**	**Watson's Saltbush**
Atriplex welshii	**FACU**	**Welsh's Saltbush**
Avena sativa	**UPL**	**Oat**
Avicennia marina	**OBL**	**Gray Mangrove**
Axonopus compressus	**FACW**	**Broad-Leaf Carpet Grass**
Axonopus fissifolius	**FAC**	**Narrow-Leaf Carpet Grass**
Azolla cristata	**OBL**	**Crested Mosquito Fern**
Azolla filiculoides	**OBL**	**Large Mosquito Fern**
Azolla microphylla	**OBL**	**Mexican Mosquito Fern**
Baccharis glutinosa	**FACW**	**Douglas' False Willow**
Baccharis neglecta	**FAC**	**Roosevelt-Weed**
Baccharis salicifolia	**FAC**	**Mule's-Fat**
Baccharis salicina	**FACW**	**Great Plains False Willow**
Baccharis sarothroides	**FACU**	**Rosinbush**
Baccharis sergiloides	**FACU**	**Squaw's False Willow**
Baccharis wrightii	**FACU**	**Wright's False Willow**
Bacopa eisenii	**OBL**	**Gila River Water-Hyssop**

Bacopa monnieri	**OBL**	**Herb-of-Grace**
Bacopa repens	**OBL**	**Creeping Water-Hyssop**
Bacopa rotundifolia	**OBL**	**Disk Water-Hyssop**
Bambusa vulgaris	**FACU**	**Feathery Bamboo**
Barbarea orthoceras	**FACW**	**American Yellow-Rocket**
Barbarea vulgaris	**FAC**	**Garden Yellow-Rocket**
Barkleyanthus salicifolius	**FAC**	**Barkley's-Ragwort**
Bassia hirsuta	**OBL**	**Hairy Smotherweed**
Bassia hyssopifolia	**FACU**	**Five-Horn Smotherweed**
Bassia scoparia	**FAC**	**Mexican-Fireweed**
Batis maritima	**OBL**	**Turtleweed**
Beckmannia syzigachne	**OBL**	**American Slough Grass**
Berberis thunbergii	**FACU**	**Japanese Barberry**
Berberis vulgaris	**FACU**	**European Barberry**
Bergia texana	**OBL**	**Texas Bergia**
Berula erecta	**OBL**	**Cut-Leaf-Water-Parsnip**
Besseya alpina	**FACW**	**Alpine Coraldrops**
Besseya plantaginea	**FAC**	**White River Coraldrops**
Betula X sandbergii	**OBL**	**_?_**
Betula glandulosa	**OBL**	**Resin Birch**
Betula occidentalis	**FACW**	**Water Birch**
Betula papyrifera	**FAC**	**Paper Birch**
Betula pendula	**FACU**	**European Weeping Birch**
Betula pubescens	**FAC**	**Downy Birch**
Betula pumila	**OBL**	**Bog Birch**
Bidens aurea	**OBL**	**Arizona Beggarticks**
Bidens beckii	**OBL**	**Beck's Water-Marigold**
Bidens bigelovii	**FACW**	**Bigelow's Beggarticks**
Bidens bipinnata	**FAC**	**Spanish-Needles**
Bidens cernua	**OBL**	**Nodding Burr-Marigold**
Bidens frondosa	**FACW**	**Devil's-Pitchfork**
Bidens laevis	**OBL**	**Smooth Beggarticks**
Bidens leptocephala	**FAC**	**Few-Flower Beggarticks**
Bidens pilosa	**FAC**	**Hairy Beggarticks**
Bidens tenuisecta	**FAC**	**Slim-Lobe Beggarticks**
Bidens tripartita	**OBL**	**Three-Lobe Beggarticks**
Bidens vulgata	**FACW**	**Tall Beggarticks**
Bistorta bistortoides	**FACW**	**American Bistort**
Bistorta vivipara	**FAC**	**Serpent-Grass**
Blechnum spicant	**FAC**	**Deer Fern**
Blennosperma bakeri	**OBL**	**Baker's Stickyseed**
Blennosperma nanum	**FACW**	**Common Stickyseed**
Bloomeria clevelandii	**FACU**	**San Diego Goldenstars**
Boechera collinsii	**FACU**	**_?_**
Boechera divaricarpa	**FACU**	**_?_**
Boechera goodrichii	**FACU**	**Goodrich Rockcress**
Boechera grahamii	**FACU**	**Boivin's Rockcress**

Boechera lemmonii	**FACU**	**Soldier Rockcress**
Boechera stricta	**FACU**	**Canadian Rockcress**
Boehmeria cylindrica	**OBL**	**Small-Spike False Nettle**
Boerhavia erecta	**FACU**	**Erect Spiderling**
Bolandra californica	**FACW**	**Sierran False Coolwort**
Bolandra oregana	**FACW**	**Northern False Coolwort**
Boltonia asteroides	**OBL**	**White Doll's Daisy**
Borrichia frutescens	**FACW**	**Bushy Seaside-Tansy**
Bothriochloa barbinodis	**UPL**	**Cane Beard Grass**
Bothriochloa bladhii	**FACU**	**Australian Beard Grass**
Botrychium ascendens	**FAC**	**Triangle-Lobe Moonwort**
Botrychium crenulatum	**FACW**	**Scalloped Moonwort**
Botrychium hesperium	**FACU**	**Western Moonwort**
Botrychium lanceolatum	**FACW**	**Lance-Leaf Moonwort**
Botrychium lunaria	**FAC**	**Common Moonwort**
Botrychium pinnatum	**FACU**	**Northeastern Moonwort**
Botrychium simplex	**FAC**	**Least Moonwort**
Botrypus virginianus	**FAC**	**Rattlesnake Fern**
Bouteloua dactyloides	**FACU**	**Buffalo Grass**
Bowlesia incana	**FACU**	**Hoary Bowlesia**
Boykinia major	**FACW**	**Mountain Brookfoam**
Boykinia occidentalis	**FAC**	**Coastal Brookfoam**
Boykinia rotundifolia	**FACW**	**Round-Leaf Brookfoam**
Brasenia schreberi	**OBL**	**Watershield**
Brassica juncea	**FACU**	**Chinese Mustard**
Brassica rapa	**FACU**	**Rape**
Braya glabella	**FAC**	**Smooth Northern-Rockcress**
Braya humilis	**UPL**	**Alpine Northern-Rockcress**
Brickellia californica	**FACU**	**California Brickellbush**
Brickellia greenei	**FACU**	**Mountain Brickellbush**
Briza media	**FAC**	**Perennial Quaking Grass**
Briza minor	**FAC**	**Lesser Quaking Grass**
Brodiaea coronaria	**FAC**	**Harvest Cluster-Lily**
Brodiaea elegans	**FACU**	**Elegant Cluster-Lily**
Brodiaea filifolia	**FAC**	**Thread-Leaf Cluster-Lily**
Brodiaea orcuttii	**OBL**	**Orcutt's Cluster-Lily**
Brodiaea pallida	**FACW**	**Chinese Camp Cluster-Lily**
Brodiaea rosea	**FAC**	**Indian Valley Cluster-Lily**
Bromidium tandilense	**OBL**	**Kennedy's Tropical Bent**
Bromus arvensis	**FACU**	**Field Brome**
Bromus briziformis	**UPL**	**Rattlesnake Brome**
Bromus ciliatus	**FAC**	**Fringed Brome**
Bromus hordeaceus	**FACU**	**Soft Brome**
Bromus inermis	**FACU**	**Smooth Brome**
Bromus madritensis	**UPL**	**Compact Brome**
Bromus pubescens	**FACU**	**Hairy Woodland Brome**
Bromus richardsonii	**FACU**	**Richardson's Brome**

Bromus vulgaris	**FACU**	**Colombian Brome**
Broussonetia papyrifera	**FACU**	**Paper-Mulberry**
Browallia eludens	**FACW**	**Bush-Violet**
Buchnera americana	**FAC**	**American Bluehearts**
Buddleja davidii	**FACU**	**Orange-Eye Butterfly-Bush**
Bulbostylis barbata	**FACU**	**Water-Grass**
Bulbostylis capillaris	**FACU**	**Dense-Tuft Hair Sedge**
Bulbostylis funckii	**FACW**	**Funck's Hair Sedge**
Bulbostylis juncoides	**FACW**	**Rush Hair Sedge**
Butomus umbellatus	**OBL**	**Greater Flowering-Rush**
Cabomba caroliniana	**OBL**	**Carolina Fanwort**
Cakile edentula	**FACU**	**American Searocket**
Cakile maritima	**FAC**	**European Searocket**
Calamagrostis bolanderi	**FACW**	**Bolander's Reed Grass**
Calamagrostis breweri	**FACW**	**Short-Hair Reed Grass**
Calamagrostis canadensis	**FACW**	**Bluejoint**
Calamagrostis nutkaensis	**FACW**	**Nootka Reed Grass**
Calamagrostis scopulorum	**FAC**	**Ditch Reed Grass**
Calamagrostis stricta	**FACW**	**Slim-Stem Reed Grass**
Calamagrostis tweedyi	**FAC**	**Cascade Reed Grass**
Calandrinia ciliata	**FACU**	**Fringed Redmaids**
Calibrachoa parviflora	**FACW**	**Seaside-Petunia**
Callisia repens	**FACU**	**Creeping-Inchplant**
Callitriche fassettii	**OBL**	**Fassett's Water-Starwort**
Callitriche hermaphroditica	**OBL**	**Autumn Water-Starwort**
Callitriche heterophylla	**OBL**	**Greater Water-Starwort**
Callitriche longipedunculata	**OBL**	**Long-Stock Water-Starwort**
Callitriche marginata	**OBL**	**Winged Water-Starwort**
Callitriche palustris	**OBL**	**Vernal Water-Starwort**
Callitriche stagnalis	**OBL**	**Pond Water-Starwort**
Callitriche stenoptera	**OBL**	**Narrow-Wing Water-Starwort**
Callitriche trochlearis	**OBL**	**Effluent Water-Starwort**
Callitropsis nootkatensis	**FAC**	**Alaska-Cedar**
Calochortus excavatus	**FACU**	**Inyo Mariposa-Lily**
Calochortus longebarbatus	**FAC**	**Long-Beard Mariposa-Lily**
Calochortus minimus	**FAC**	**Sierran Mariposa-Lily**
Calochortus monanthus	**FAC**	**Shasta River Mariposa-Lily**
Calochortus nudus	**FAC**	**Naked Mariposa-Lily**
Calochortus palmeri	**FACW**	**Palmer's Mariposa-Lily**
Calochortus striatus	**FACW**	**Alkali Mariposa-Lily**
Calochortus uniflorus	**FACW**	**Monterey Mariposa-Lily**
Caltha leptosepala	**OBL**	**White Marsh-Marigold**
Caltha palustris	**OBL**	**Yellow Marsh-Marigold**
Calycanthus occidentalis	**FAC**	**Western Sweetshrub**
Calypso bulbosa	**FAC**	**Fairy-Slipper Orchid**
Calyptocarpus vialis	**FAC**	**Straggler Daisy**
Calyptridium roseum	**FACU**	**_?_**

Calystegia sepium	FAC	Hedge False Bindweed
Camassia leichtlinii	FACW	Large Camas
Camassia quamash	FACW	Small Camas
Camelina alyssum	FACU	Madwort False Flax
Camelina microcarpa	FACU	Little-Pod False Flax
Camelina sativa	FACU	Gold-of-Pleasure
Campanula aparinoides	OBL	Marsh Bellflower
Campanula californica	OBL	Swamp Bellflower
Campanula parryi	FACU	Parry's Bellflower
Campanula rotundifolia	FACU	Bluebell-of-Scotland
Campanula scouleri	FACU	Pale Bellflower
Campanula uniflora	FAC	Arctic Bellflower
Campanula wilkinsiana	FACW	Wilkins' Bellflower
Campsis radicans	FACU	Trumpet-Creeper
Canadanthus modestus	FACW	Canada-Aster
Canna flaccida	OBL	Bandanna-of-the-Everglades
Capsella bursa-pastoris	FACU	Shepherd's-Purse
Cardamine angulata	FACW	Seaside Bittercress
Cardamine bellidifolia	FAC	Alpine Bittercress
Cardamine breweri	FACW	Sierran Bittercress
Cardamine constancei	FAC	Constance's Bittercress
Cardamine cordifolia	FACW	Large Mountain Bittercress
Cardamine flexuosa	FACU	Woodland Bittercress
Cardamine hirsuta	FACU	Hairy Bittercress
Cardamine macrocarpa	FAC	Large-Seed Bittercress
Cardamine nuttallii	FAC	Nuttall's Toothwort
Cardamine occidentalis	FACW	Big Western Bittercress
Cardamine oligosperma	FAC	Little Western Bittercress
Cardamine pachystigma	FAC	Serpentine Bittercress
Cardamine parviflora	FACW	Sand Bittercress
Cardamine pensylvanica	FACW	Quaker Bittercress
Cardamine umbellata	FACW	Umbell's Bittercress
Cardiospermum halicacabum	FAC	Love-in-a-Puff
Carduus nutans	FACU	Nodding Plumeless-Thistle
Carex X physocarpoides	OBL	_?_
Carex aboriginum	OBL	Indian Valley Sedge
Carex abrupta	FAC	Abrupt-Beak Sedge
Carex albonigra	FACU	Black-and-White-Scale Sedge
Carex alma	OBL	Sturdy Sedge
Carex amplifolia	OBL	Big-Leaf Sedge
Carex angustata	FACW	Many-Fruit Sedge
Carex aperta	FACW	Columbian Sedge
Carex aquatilis	OBL	Leafy Tussock Sedge
Carex arcta	OBL	Northern Cluster Sedge
Carex atherodes	OBL	Wheat Sedge
Carex athrostachya	FACW	Slender-Beak Sedge
Carex atrosquama	FACU	Lesser Black-Scale Sedge

Carex aurea	**OBL**	**Golden-Fruit Sedge**
Carex barbarae	**FAC**	**Santa Barbara Sedge**
Carex bebbii	**OBL**	**Bebb's Sedge**
Carex bella	**FACU**	**Southwestern Showy Sedge**
Carex blanda	**FAC**	**Eastern Woodland Sedge**
Carex bolanderi	**FAC**	**Bolander's Sedge**
Carex brevior	**FAC**	**Short-Beak Sedge**
Carex brunnescens	**OBL**	**Brownish Sedge**
Carex buxbaumii	**OBL**	**Brown Bog Sedge**
Carex californica	**FACW**	**California Sedge**
Carex canescens	**OBL**	**Hoary Sedge**
Carex capillaris	**FACW**	**Hair-Like Sedge**
Carex capitata	**FAC**	**Capitate Sedge**
Carex chordorrhiza	**OBL**	**Rope-Root Sedge**
Carex comosa	**OBL**	**Bearded Sedge**
Carex concinna	**FAC**	**Low Northern Sedge**
Carex conoidea	**FACW**	**Open-Field Sedge**
Carex crawei	**FACW**	**Crawe's Sedge**
Carex crawfordii	**FAC**	**Crawford's Sedge**
Carex cusickii	**OBL**	**Cusick's Sedge**
Carex davyi	**FACW**	**Davy's Sedge**
Carex densa	**OBL**	**Dense Sedge**
Carex deweyana	**FACU**	**Dewey's Sedge**
Carex diandra	**OBL**	**Lesser Tussock Sedge**
Carex disperma	**OBL**	**Soft-Leaf Sedge**
Carex divulsa	**FAC**	**Grassland Sedge**
Carex douglasii	**FAC**	**Douglas' Sedge**
Carex echinata	**OBL**	**Star Sedge**
Carex egglestonii	**FACU**	**Eggleston's Sedge**
Carex elynoides	**FAC**	**Black-Root Sedge**
Carex emoryi	**OBL**	**Emory's Sedge**
Carex exsiccata	**OBL**	**Western Inflated Sedge**
Carex feta	**FACW**	**Green-Sheath Sedge**
Carex fissuricola	**FACW**	**Cleft Sedge**
Carex flava	**OBL**	**Yellow-Green Sedge**
Carex foenea	**FACU**	**Bronze-Head Oval Sedge**
Carex fracta	**FAC**	**Fragile-Sheath Sedge**
Carex frankii	**OBL**	**Frank's Sedge**
Carex fuliginosa	**FACU**	**Short-Leaf Sedge**
Carex garberi	**FACW**	**Elk Sedge**
Carex gravida	**FACW**	**Heavy Sedge**
Carex gynocrates	**OBL**	**Northern Bog Sedge**
Carex gynodynama	**FAC**	**Olney's Hairy Sedge**
Carex hallii	**FACW**	**Deer Sedge**
Carex harfordii	**OBL**	**Harford's Sedge**
Carex hassei	**FACW**	**Hasse's Sedge**
Carex haydeniana	**FAC**	**Hayden's Sedge**

Carex hendersonii	**FAC**	**Henderson's Sedge**
Carex heteroneura	**FAC**	**Different-Nerve Sedge**
Carex hirtissima	**OBL**	**Fuzzy Sedge**
Carex hoodii	**FAC**	**Hood's Sedge**
Carex hystericina	**OBL**	**Porcupine Sedge**
Carex idahoa	**FACW**	**Idaho Sedge**
Carex illota	**FACW**	**Small-Head Sedge**
Carex incurviformis	**FAC**	**Coastal-Sand Sedge**
Carex infirminervia	**FAC**	**_?_**
Carex integra	**OBL**	**Smooth-Beak Sedge**
Carex interior	**OBL**	**Inland Sedge**
Carex interrupta	**OBL**	**Green-Fruit Sedge**
Carex jonesii	**FACW**	**Jones' Sedge**
Carex kelloggii	**OBL**	**Kellogg's Sedge**
Carex klamathensis	**OBL**	**Klamath Sedge**
Carex lachenalii	**OBL**	**Arctic Hare-Foot Sedge**
Carex laeviculmis	**FACW**	**Smooth-Stem Sedge**
Carex lasiocarpa	**OBL**	**Woolly-Fruit Sedge**
Carex lemmonii	**OBL**	**Lemmon's Sedge**
Carex lenticularis	**OBL**	**Lakeshore Sedge**
Carex leporina	**FACW**	**Oval Sedge**
Carex leporinella	**FACW**	**Sierran Hare Sedge**
Carex leptalea	**OBL**	**Bristly-Stalk Sedge**
Carex leptopoda	**FAC**	**Taper-Fruit Short-Scale Sedge**
Carex limosa	**OBL**	**Mud Sedge**
Carex livida	**OBL**	**Livid Sedge**
Carex longii	**FACW**	**Long's Sedge**
Carex luzulifolia	**FACW**	**Little-Leaf Sedge**
Carex luzulina	**OBL**	**Woodrush Sedge**
Carex lyngbyei	**OBL**	**Lyngbye's Sedge**
Carex macloviana	**FACW**	**Falkland Island Sedge**
Carex macrochaeta	**FACW**	**Alaska Long-Awn Sedge**
Carex magellanica	**OBL**	**Boreal-Bog Sedge**
Carex mariposana	**FACW**	**Mariposa Sedge**
Carex mckittrickensis	**FACW**	**Guadalupe Mountain Sedge**
Carex meadii	**OBL**	**Mead's Sedge**
Carex media	**FACW**	**Montana Sedge**
Carex mendocinensis	**FACW**	**Mendocino Sedge**
Carex mertensii	**FAC**	**Mertens' Sedge**
Carex microdonta	**FAC**	**Little-Tooth Sedge**
Carex microglochin	**OBL**	**False Uncinia Sedge**
Carex micropoda	**FAC**	**Pyrenean Sedge**
Carex microptera	**FAC**	**Small-Wing Sedge**
Carex molesta	**FAC**	**Troublesome Sedge**
Carex nardina	**FACU**	**Nard Sedge**
Carex nebrascensis	**OBL**	**Nebraska Sedge**
Carex nelsonii	**FAC**	**Nelson's Sedge**

Carex nervina	**FACW**	**Sierran Sedge**
Carex neurophora	**FACW**	**Alpine Nerve Sedge**
Carex nigricans	**FACW**	**Black Alpine Sedge**
Carex nova	**FAC**	**New Sedge**
Carex nudata	**FACW**	**Torrent Sedge**
Carex obispoensis	**FACW**	**San Luis Obispo Sedge**
Carex obnupta	**OBL**	**Slough Sedge**
Carex pachystachya	**FAC**	**Thick-Head Sedge**
Carex pallescens	**FAC**	**Pale Sedge**
Carex pansa	**FACU**	**Sand-Dune Sedge**
Carex parryana	**FAC**	**Parry's Sedge**
Carex pauciflora	**OBL**	**Few-Flower Sedge**
Carex paysonis	**FACU**	**Payson's Sedge**
Carex pellita	**OBL**	**Woolly Sedge**
Carex pelocarpa	**FAC**	**Dusky-Seed Sedge**
Carex pendula	**FAC**	**Pendulous Sedge**
Carex petasata	**FAC**	**Liddon Sedge**
Carex phaeocephala	**FACU**	**Mountain Hare Sedge**
Carex podocarpa	**FAC**	**Short-Stalk Sedge**
Carex praeceptorum	**OBL**	**Teacher's Sedge**
Carex praegracilis	**FACW**	**Clustered Field Sedge**
Carex praticola	**FACW**	**Northern Meadow Sedge**
Carex preslii	**FACU**	**Presl's Sedge**
Carex raynoldsii	**FACU**	**Raynolds' Sedge**
Carex retrorsa	**OBL**	**Retrorse Sedge**
Carex rosea	**FAC**	**Rosy Sedge**
Carex rostrata	**OBL**	**Swollen Beaked Sedge**
Carex rupestris	**FACU**	**Curly Sedge**
Carex saliniformis	**FACW**	**Santa Cruz Sedge**
Carex sartwelliana	**OBL**	**Yosemite Sedge**
Carex sartwellii	**OBL**	**Sartwell's Sedge**
Carex saxatilis	**OBL**	**Russet Sedge**
Carex scabriuscula	**FACW**	**Cascade Sedge**
Carex schottii	**OBL**	**Schott's Sedge**
Carex scirpoidea	**FAC**	**Canadian Single-Spike Sedge**
Carex scoparia	**FACW**	**Pointed Broom Sedge**
Carex scopulorum	**FACW**	**Holm's Rocky Mountain Sedge**
Carex senta	**OBL**	**Western Rough Sedge**
Carex serratodens	**FACW**	**Saw-Tooth Sedge**
Carex sheldonii	**OBL**	**Sheldon's Sedge**
Carex siccata	**UPL**	**Dry-Spike Sedge**
Carex simulata	**OBL**	**Analogue Sedge**
Carex spectabilis	**FACW**	**Northwestern Showy Sedge**
Carex specuicola	**OBL**	**Navajo Sedge**
Carex spissa	**FAC**	**San Diego Sedge**
Carex sprengelii	**FAC**	**Long-Beak Sedge**
Carex stevenii	**FAC**	**Steven's Sedge**

Carex stipata	OBL	Stalk-Grain Sedge
Carex subbracteata	FACW	Small-Bract Sedge
Carex suberecta	OBL	Prairie Straw Sedge
Carex subfusca	FAC	Rusty Sedge
Carex subnigricans	FAC	Dark Mountain Sedge
Carex sychnocephala	FACW	Many-Head Sedge
Carex tenera	FACW	Quill Sedge
Carex tenuiflora	OBL	Sparse-Flower Sedge
Carex thurberi	FAC	Thurber's Sedge
Carex tiogana	FACW	Mono Sedge
Carex torreyi	FAC	Torrey's Sedge
Carex tumulicola	FACU	Foothill Sedge
Carex turbinata	FACU	Turban Sedge
Carex unilateralis	FACW	One-Sided Sedge
Carex utriculata	OBL	Northwest Territory Sedge
Carex vallicola	FAC	Valley Sedge
Carex vernacula	FAC	Native Sedge
Carex vesicaria	OBL	Lesser Bladder Sedge
Carex viridula	OBL	Little Green Sedge
Carex vulpinoidea	OBL	Common Fox Sedge
Carpobrotus chilensis	FACU	Baby Sun-Rose
Cartrema americana	FAC	Devilwood
Carum carvi	FACU	Caraway
Carya illinoinensis	FAC	Pecan
Cassiope mertensiana	FACU	Western Moss-Heather
Cassiope tetragona	FACU	White Arctic Mountain-Heather
Castilleja ambigua	FACW	Johnnynip
Castilleja campestris	FACW	Vernal-Pool Indian-Paintbrush
Castilleja lemmonii	FACW	Lemmon's Indian-Paintbrush
Castilleja lineata	FACW	Marsh-Meadow Indian-Paintbrush
Castilleja miniata	FACW	Great Red Indian-Paintbrush
Castilleja minor	OBL	Alkali Indian-Paintbrush
Castilleja mogollonica	FACW	Mogollon Indian-Paintbrush
Castilleja occidentalis	FAC	Pale-Yellow Indian-Paintbrush
Castilleja parviflora	FAC	Small-Flower Indian-Paintbrush
Castilleja rhexiifolia	FAC	Rosy Indian-Paintbrush
Castilleja salsuginosa	FAC	Monte Neva Indian-Paintbrush
Castilleja septentrionalis	FACU	Labrador Indian-Paintbrush
Castilleja suksdorfii	FACW	Suksdorf's Indian-Paintbrush
Castilleja tenuis	FAC	Hairy Indian-Paintbrush
Casuarina equisetifolia	FACU	Beach She-Oak
Catabrosa aquatica	OBL	Water Whorl Grass
Catalpa bignonioides	UPL	Southern Catalpa
Catalpa speciosa	FAC	Northern Catalpa
Catharanthus roseus	UPL	Madagascar-Periwinkle
Celastrus scandens	FACU	American Bittersweet
Celtis laevigata	FAC	Sugar-Berry

Celtis occidentalis	FAC	Common Hackberry
Celtis reticulata	FAC	Net-Leaf Hackberry
Cenchrus americanus	UPL	Pearl-Millet
Cenchrus ciliaris	UPL	Buffel Grass
Cenchrus clandestinus	FACU	Kikuyu Grass
Cenchrus echinatus	FACU	Southern Sandburr
Cenchrus longispinus	UPL	Innocent-Weed
Cenchrus myosuroides	FACU	Big Sandburr
Cenchrus polystachios	FAC	Mission Grass
Cenchrus purpureus	FACU	Elephant Grass
Centaurea X moncktonii	FACU	_?_
Centaurea cyanus	FACU	Garden Cornflower
Centaurea jacea	FACU	Brown-Ray Knapweed
Centaurium erythraea	FAC	European Centaury
Centaurium pulchellum	FACU	Branched Centaury
Centaurium tenuiflorum	FACW	Slender Centaury
Centipeda minima	FAC	Spreading-Sneezeweed
Centromadia fitchii	FACU	Fitch's False Tarplant
Centromadia parryi	FACW	Parry's False Tarplant
Centromadia pungens	FAC	Pungent False Tarplant
Cephalanthus occidentalis	OBL	Common Buttonbush
Cerastium arvense	FACU	Field Mouse-Ear Chickweed
Cerastium axillare	FACU	Trans-Pecos Mouse-Ear Chickweed
Cerastium beeringianum	FACU	Bering Sea Mouse-Ear Chickweed
Cerastium brachypodum	FAC	Short-Stalk Mouse-Ear Chickweed
Cerastium fontanum	FACU	Common Mouse-Ear Chickweed
Cerastium glomeratum	UPL	Sticky Mouse-Ear Chickweed
Cerastium nutans	FACU	Nodding Mouse-Ear Chickweed
Ceratophyllum demersum	OBL	Coon's-Tail
Ceratopteris thalictroides	OBL	Watersprite
Cercis canadensis	UPL	Redbud
Cestrum nocturnum	UPL	Night Flowering-Jassamine
Chaerophyllum tainturieri	FAC	Hairy-Fruit Chervil
Chamaecrista fasciculata	FACU	Sleepingplant
Chamaecyparis lawsoniana	FACU	Port Orford-Cedar
Chamaenerion angustifolium	FACU	Narrow-Leaf Fireweed
Chamaenerion latifolium	FACW	Broad-Leaf Fireweed
Chasmanthium latifolium	FAC	Indian Wood-Oats
Chelidonium majus	FACU	Greater Celandine
Chenopodium album	FACU	Lamb's-Quarters
Chenopodium chenopodioides	FACW	Low Goosefoot
Chenopodium foliosum	FACU	Leafy Goosefoot
Chenopodium fremontii	FACU	Fremont's Goosefoot
Chenopodium glaucum	FAC	Oak-Leaf Goosefoot
Chenopodium leptophyllum	FACU	Narrow-Leaf Goosefoot
Chenopodium macrospermum	FACW	Large-Seed Goosefoot
Chenopodium murale	FACU	Nettle-Leaf Goosefoot

Chenopodium rubrum	FACW	Red Goosefoot
Chilopsis linearis	FAC	Desert-Willow
Chionophila jamesii	FACU	Rocky Mountain Snowlover
Chloracantha spinosa	FAC	Mexican-Devilweed
Chloris gayana	FACU	Rhodes Grass
Chloris virgata	FACU	Feather Windmill Grass
Chloropyron maritimum	OBL	Saltmarsh Salt-Bird's-Beak
Chloropyron molle	OBL	Soft Salt-Bird's-Beak
Chloropyron palmatum	OBL	Palm-Bract Salt-Bird's-Beak
Chloropyron tecopense	FACW	Tecopa Salt-Bird's-Beak
Chrysosplenium glechomifolium	OBL	Pacific Golden-Saxifrage
Chrysosplenium tetrandrum	OBL	Northern Golden-Saxifrage
Cicendia quadrangularis	FAC	Oregon Timwort
Cichorium intybus	FACU	Chicory
Cicuta bulbifera	OBL	Bulblet-Bearing Water-Hemlock
Cicuta douglasii	OBL	Western Water-Hemlock
Cicuta maculata	OBL	Spotted Water-Hemlock
Cinna bolanderi	FACW	Bolander's Wood-Reed
Cinna latifolia	FACW	Slender Wood-Reed
Cinnamomum camphora	UPL	Camphortree
Circaea alpina	FAC	Small Enchanter's-Nightshade
Cirsium andrewsii	FAC	Franciscan Thistle
Cirsium arizonicum	FACU	Arizona Thistle
Cirsium arvense	FACU	Canadian Thistle
Cirsium crassicaule	OBL	Slough Thistle
Cirsium douglasii	OBL	Douglas' Thistle
Cirsium edule	FAC	Edible Thistle
Cirsium flodmanii	FAC	Flodman's Thistle
Cirsium foliosum	FAC	Elk Thistle
Cirsium fontinale	OBL	Fountain Thistle
Cirsium hydrophilum	OBL	Suisun Thistle
Cirsium mohavense	FACU	Mojave Thistle
Cirsium nuttallii	FAC	Nuttall's Thistle
Cirsium parryi	FACW	Parry's Thistle
Cirsium scariosum	FAC	Meadow Thistle
Cirsium tracyi	FACU	Tracy's Thistle
Cirsium undulatum	FACU	Wavy-Leaf Thistle
Cirsium vinaceum	OBL	Sacramento Mountain Thistle
Cirsium vulgare	FACU	Bull Thistle
Cirsium wrightii	OBL	Wright's Thistle
Cissus trifoliata	UPL	Sorrelvine
Cistanthe ambigua	FAC	Desert Pussypaws
Citrullus lanatus	UPL	Watermelon
Cladium californicum	OBL	California Saw-Grass
Cladium mariscus	OBL	Swamp Saw-Grass
Claytonia cordifolia	FAC	Heart-Leaf Springbeauty
Claytonia gypsophiloides	FACU	Gypsum Springbeauty

Claytonia lanceolata	**FAC**	**Lance-Leaf Springbeauty**
Claytonia megarhiza	**FACU**	**Alpine Springbeauty**
Claytonia multiscapa	**FAC**	**Many-Stem Springbeauty**
Claytonia nevadensis	**FAC**	**Sierran Springbeauty**
Claytonia palustris	**FACW**	**Jonesville Springbeauty**
Claytonia parviflora	**FACU**	**Streambank Springbeauty**
Claytonia perfoliata	**FAC**	**Miner's-Lettuce**
Claytonia sibirica	**FAC**	**Siberian Springbeauty**
Claytonia washingtoniana	**FACU**	**Washington Springbeauty**
Clematis crispa	**FACW**	**Swamp Leather-Flower**
Clematis ligusticifolia	**FAC**	**Deciduous Traveler's-Joy**
Clematis pitcheri	**FACU**	**Bluebill**
Clematis terniflora	**FACU**	**Sweet Autumn Virgin's-Bower**
Clematis vitalba	**FAC**	**Evergreen Traveler's-Joy**
Cleomella brevipes	**FACW**	**Short-Stalk Stinkweed**
Cleomella longipes	**FACU**	**Chiricahua Mountain Stinkweed**
Cleomella parviflora	**FACW**	**Small-Flower Stinkweed**
Cleomella plocasperma	**FACW**	**Alkali Stinkweed**
Clinopodium arkansanum	**FAC**	**Limestone Wild Basil**
Clinopodium douglasii	**FACU**	**Oregon-Tea**
Clitoria mariana	**FACU**	**Atlantic Pigeonwings**
Cocculus carolinus	**FACU**	**Carolina Coralbead**
Coeloglossum viride	**FAC**	**Long-Bract Frog Orchid**
Coix lacryma-jobi	**FACW**	**Job's-Tears**
Coleanthus subtilis	**OBL**	**Moss Grass**
Coleataenia rigidula	**FACW**	**Red-Top Cut-Throat Grass**
Collinsia tinctoria	**FACU**	**Tinctureplant**
Collomia linearis	**FACU**	**Narrow-Leaf Mountain-Trumpet**
Collomia rawsoniana	**FACU**	**Flaming Mountain-Trumpet**
Comandra umbellata	**UPL**	**Bastard-Toadflax**
Comarum palustre	**OBL**	**Purple Marshlocks**
Comastoma tenellum	**FACW**	**Samiland-Gentian**
Commelina benghalensis	**FACU**	**Jio**
Commelina communis	**FAC**	**Asiatic Dayflower**
Commelina erecta	**FACU**	**White-Mouth Dayflower**
Conioselinum pacificum	**FAC**	**Pacific Hemlock-Parsley**
Conioselinum scopulorum	**FACW**	**Rocky Mountain Hemlock-Parsley**
Conium maculatum	**FACW**	**Poison-Hemlock**
Conoclinium dissectum	**FACU**	**Pinked Mistflower**
Convolvulus equitans	**FACU**	**Texas Bindweed**
Cooperia chlorosolen	**FACU**	**Evening Rain-Lily**
Coptis laciniata	**FAC**	**Oregon Goldthread**
Corallorhiza maculata	**UPL**	**Summer Coralroot**
Corallorhiza striata	**FACU**	**Hooded Coralroot**
Corallorhiza trifida	**FAC**	**Yellow Coralroot**
Corallorhiza wisteriana	**FAC**	**Spring Coralroot**
Cordylanthus eremicus	**FACW**	**Desert Bird's-Beak**

Cordylanthus ramosus	**FACU**	**Bushy Bird's-Beak**
Coreopsis lanceolata	**FACU**	**Lance-Leaf Tickseed**
Coreopsis tinctoria	**FACU**	**Golden Tickseed**
Corispermum americanum	**FACU**	**American Bugseed**
Corispermum hyssopifolium	**FACU**	**Hyssop-Leaf Bugseed**
Corispermum welshii	**FACU**	**Welsh's Bugseed**
Cornus alba	**FACW**	**Red Osier**
Cornus canadensis	**FAC**	**Canadian Bunchberry**
Cornus glabrata	**FACW**	**Smooth-Leaf Dogwood**
Cornus nuttallii	**FACU**	**Pacific Flowering Dogwood**
Cornus sessilis	**FAC**	**Black-Fruit Dogwood**
Cortaderia jubata	**FACU**	**Uruguayan Pampas Grass**
Cortaderia selloana	**FACU**	**Selloa Pampus Grass**
Corydalis caseana	**FACW**	**Sierran Fumewort**
Corylus avellana	**FACU**	**Common Filbert**
Corylus cornuta	**FACU**	**Beaked Hazelnut**
Corymbia citriodora	**FACU**	**Lemon-Scented Ghost-Gum**
Cosmos bipinnatus	**FACW**	**Garden Cosmos**
Cosmos parviflorus	**FACU**	**Southwestern Cosmos**
Cosmos sulphureus	**FACU**	**Sulphur Cosmos**
Cotula australis	**FAC**	**Australian Water-Buttons**
Cotula coronopifolia	**OBL**	**Common Brassbuttons**
Cotula mexicana	**UPL**	**Mexican Brassbuttons**
Crassocephalum crepidioides	**FACU**	**Red-Flower Ragleaf**
Crassula aquatica	**OBL**	**Water Pygmyweed**
Crassula connata	**FAC**	**Sand Pygmyweed**
Crassula solieri	**OBL**	**Smooth-Seed Pygmyweed**
Crassula tillaea	**FACU**	**Moss Pygmyweed**
Crataegus douglasii	**FAC**	**Black Hawthorn**
Crataegus erythropoda	**FAC**	**Cerro Hawthorn**
Crataegus gaylussacia	**FAC**	**Suksdorf's Hawthorn**
Crataegus monogyna	**FAC**	**English Hawthorn**
Crataegus rivularis	**FAC**	**River Hawthorn**
Crataegus saligna	**FAC**	**Willow Hawthorn**
Crepis capillaris	**FACU**	**Smooth Hawk's-Beard**
Crepis runcinata	**FACU**	**Fiddle-Leaf Hawk's-Beard**
Cressa truxillensis	**FACW**	**Spreading Alkali-Weed**
Crocosmia X crocosmiiflora	**FACU**	**_?_**
Crotalaria capensis	**FACU**	**Cape Rattlebox**
Crypsis alopecuroides	**OBL**	**Fox-Tail Prickle Grass**
Crypsis schoenoides	**FACW**	**Swamp Prickle Grass**
Crypsis vaginiflora	**OBL**	**African Prickle Grass**
Cryptantha crinita	**FACU**	**Sacramento Cat's-Eye**
Cryptogramma stelleri	**FACU**	**Fragile Rockbrake**
Cyclachaena xanthiifolia	**FAC**	**Carelessweed**
Cycloloma atriplicifolium	**FACU**	**Winged-Pigweed**
Cyclospermum leptophyllum	**FACU**	**Marsh-Parsley**

Cynanchum laeve	**FAC**	**Honeyvine**
Cynodon dactylon	**FACU**	**Bermuda Grass**
Cynoglossum officinale	**FACU**	**Gypsy-Flower**
Cynosurus cristatus	**FACU**	**Crested Dog's-Tail Grass**
Cyperus acuminatus	**OBL**	**Taper-Tip Flat Sedge**
Cyperus aggregatus	**FAC**	**Inflated-Scale Flat Sedge**
Cyperus amabilis	**FACU**	**Foothill Flat Sedge**
Cyperus bipartitus	**OBL**	**Shining Flat Sedge**
Cyperus croceus	**FAC**	**Baldwin's Flat Sedge**
Cyperus difformis	**OBL**	**Variable Flat Sedge**
Cyperus elegans	**FACW**	**Royal Flat Sedge**
Cyperus eragrostis	**FACW**	**Tall Flat Sedge**
Cyperus erythrorhizos	**OBL**	**Red-Root Flat Sedge**
Cyperus esculentus	**FACW**	**Chufa**
Cyperus fendlerianus	**FAC**	**Fendler's Flat Sedge**
Cyperus flavescens	**OBL**	**Yellow Flat Sedge**
Cyperus flavicomus	**FAC**	**White-Edge Flat Sedge**
Cyperus fuscus	**FAC**	**Galingale**
Cyperus gracilis	**FAC**	**Slimjim Flat Sedge**
Cyperus hermaphroditus	**FAC**	**Hermaphrodite Flat Sedge**
Cyperus involucratus	**FACW**	**Alternate-Leaf Flat Sedge**
Cyperus iria	**FACW**	**Ricefield Flat Sedge**
Cyperus laevigatus	**FACW**	**Smooth Flat Sedge**
Cyperus lupulinus	**FACU**	**Great Plains Flat Sedge**
Cyperus mutisii	**FACU**	**Mutis' Flat Sedge**
Cyperus niger	**FACW**	**Black Flat Sedge**
Cyperus odoratus	**FACW**	**Rusty Flat Sedge**
Cyperus onerosus	**FACW**	**Plains Flat Sedge**
Cyperus owanii	**FAC**	**Owan's Flat Sedge**
Cyperus papyrus	**OBL**	**Papyrus Flat Sedge**
Cyperus parishii	**FACW**	**Parish's Flat Sedge**
Cyperus retrorsus	**FAC**	**Pine-Barren Flat Sedge**
Cyperus rotundus	**FAC**	**Purple Flat Sedge**
Cyperus schweinitzii	**FAC**	**Sand Flat Sedge**
Cyperus seslerioides	**FAC**	**Texas Flat Sedge**
Cyperus squarrosus	**OBL**	**Awned Flat Sedge**
Cyperus strigosus	**FACW**	**Straw-Color Flat Sedge**
Cyperus tetragonus	**FACU**	**Four-Angle Flat Sedge**
Cyperus virens	**FACW**	**Green Flat Sedge**
Cypripedium californicum	**OBL**	**California Lady's-Slipper**
Cypripedium fasciculatum	**FACU**	**Clustered Lady's-Slipper**
Cypripedium montanum	**FACU**	**Mountain Lady's-Slipper**
Cypripedium parviflorum	**FACW**	**Yellow Lady's-Slipper**
Cypselea humifusa	**FACW**	**Panal**
Cyrtorhyncha cymbalaria	**OBL**	**Alkali Buttercup**
Cyrtorhyncha ranunculina	**FACU**	**Tadpole Alkali Buttercup**
Cystopteris bulbifera	**FAC**	**Bulblet Bladder Fern**

Cystopteris fragilis	**FACU**	**Brittle Bladder Fern**
Cystopteris montana	**FAC**	**Mountain Bladder Fern**
Dactylis glomerata	**FACU**	**Orchard Grass**
Dalea leporina	**UPL**	**Fox-Tail Prairie-Clover**
Damasonium californicum	**OBL**	**Fringed-Water-Plantain**
Danthonia californica	**FAC**	**California Wild Oat Grass**
Danthonia decumbens	**FAC**	**Common Heath Grass**
Danthonia intermedia	**FACU**	**Timber Wild Oat Grass**
Darlingtonia californica	**OBL**	**Cobraplant**
Darmera peltata	**OBL**	**Indian-Rhubarb**
Dasiphora fruticosa	**FAC**	**Golden-Hardhack**
Datisca glomerata	**FACW**	**Durango-Root**
Datura wrightii	**UPL**	**Sacred Thorn-Apple**
Daucus carota	**UPL**	**Queen Anne's-Lace**
Deinandra fasciculata	**FACU**	**Clustered Moonshine-Daisy**
Deinandra paniculata	**FACU**	**San Diego Moonshine-Daisy**
Delairea odorata	**FAC**	**Cape Ivy**
Delosperma litorale	**FACU**	**Delosperma**
Delphinium X burkei	**FACU**	**_?_**
Delphinium X occidentale	**FACU**	**_?_**
Delphinium andesicola	**FACU**	**Chiricahua Mountain Larkspur**
Delphinium barbeyi	**FAC**	**Subalpine Larkspur**
Delphinium californicum	**FACU**	**California Coast Larkspur**
Delphinium geraniifolium	**FAC**	**Clark Valley Larkspur**
Delphinium glaucescens	**FACU**	**Electric Peak Larkspur**
Delphinium glaucum	**FACW**	**Tower Larkspur**
Delphinium hesperium	**FAC**	**Foothill Larkspur**
Delphinium multiplex	**FAC**	**Kittitas Larkspur**
Delphinium nuttallianum	**FAC**	**Two-Lobe Larkspur**
Delphinium nuttallii	**FACU**	**Upland Larkspur**
Delphinium polycladon	**FACW**	**Mountain-Marsh Larkspur**
Delphinium recurvatum	**FACU**	**Byron Larkspur**
Delphinium sapellonis	**FAC**	**Sapello Canyon Larkspur**
Delphinium scopulorum	**FAC**	**Rocky Mountain Larkspur**
Delphinium uliginosum	**OBL**	**Swamp Larkspur**
Deschampsia brevifolia	**FACW**	**Short-Leaf Hair Grass**
Deschampsia caespitosa	**FACW**	**Tufted Hair Grass**
Deschampsia danthonioides	**FACW**	**Annual Hair Grass**
Deschampsia elongata	**FACW**	**Slender Hair Grass**
Descurainia adenophora	**FACU**	**_?_**
Descurainia incana	**FACU**	**Mountain Tansy-Mustard**
Desmanthus illinoensis	**FACU**	**Prairie Bundle-Flower**
Desmanthus virgatus	**FACU**	**Wild Tantan**
Dianthus armeria	**UPL**	**Deptford Pink**
Dianthus deltoides	**FAC**	**Maiden Pink**
Dicentra formosa	**FACU**	**Pacific Bleedinghearts**
Dichanthelium acuminatum	**FAC**	**Tapered Rosette Grass**

Dichanthelium leucothrix	**FACW**	**Rough Rosette Grass**
Dichanthelium oligosanthes	**FACU**	**Heller's Rosette Grass**
Dichanthelium sphaerocarpon	**FACU**	**Round-Seed Rosette Grass**
Dichelostemma capitatum	**FACU**	**Bluedicks**
Dichondra micrantha	**FACW**	**Asian Pony's-Foot**
Dichondra sericea	**FACU**	**Silver-Leaf Pony's-Foot**
Didiplis diandra	**OBL**	**Water-Purslane**
Dieteria bigelovii	**FACW**	**Bigelow's False Tansy-Aster**
Dieteria canescens	**UPL**	**Hoar False Tansy-Aster**
Digitalis purpurea	**FACU**	**Purple Foxglove**
Digitaria ciliaris	**FACU**	**Southern Crab Grass**
Digitaria eriantha	**FACU**	**Pangola Grass**
Digitaria insularis	**UPL**	**Sour Grass**
Digitaria ischaemum	**FACU**	**Smooth Crab Grass**
Digitaria sanguinalis	**FACU**	**Hairy Crab Grass**
Dinebra nealleyi	**FACW**	**Nealley's Viper Grass**
Dinebra panicea	**FACW**	**Needle Viper Grass**
Dinebra viscida	**FACU**	**Sonoran Viper Grass**
Diodia teres	**FACU**	**Poorjoe**
Diodia virginiana	**FACW**	**Virginia Buttonweed**
Diospyros virginiana	**FAC**	**Common Persimmon**
Diphasiastrum alpinum	**FAC**	**Alpine Creeping-Cedar**
Diphasiastrum complanatum	**FAC**	**Trailing Creeping-Cedar**
Diplachne fusca	**FACW**	**Bearded Sprangletop**
Diplacus aurantiacus	**FACU**	**Orange Bush-Monkey-Flower**
Diplacus parviflorus	**FACU**	**Island Bush-Monkey-Flower**
Dipsacus fullonum	**FAC**	**Fuller's Teasel**
Dipsacus laciniatus	**FACU**	**Cut-Leaf Teasel**
Dirca occidentalis	**FAC**	**Western Leatherwood**
Distichlis littoralis	**OBL**	**Shore Grass**
Distichlis spicata	**FAC**	**Coastal Salt Grass**
Dodecatheon alpinum	**FACW**	**Alpine Shootingstar**
Dodecatheon conjugens	**FACU**	**Bonneville Shootingstar**
Dodecatheon dentatum	**FACW**	**White Shootingstar**
Dodecatheon jeffreyi	**FACW**	**Tall Mountain Shootingstar**
Dodecatheon poeticum	**FAC**	**Poet's Shootingstar**
Dodecatheon pulchellum	**FACW**	**Dark-Throat Shootingstar**
Dodecatheon redolens	**OBL**	**Scented Shootingstar**
Dodecatheon subalpinum	**FACU**	**Sierran Shootingstar**
Dodonaea viscosa	**FACU**	**Florida Hopbush**
Dopatrium junceum	**OBL**	**Horsefly's-Eye**
Downingia bacigalupii	**OBL**	**Bach's Calico-Flower**
Downingia bella	**OBL**	**Hoover's Calico-Flower**
Downingia bicornuta	**OBL**	**Double-Horn Calico-Flower**
Downingia concolor	**OBL**	**Maroon-Spot Calico-Flower**
Downingia cuspidata	**OBL**	**Toothed Calico-Flower**
Downingia elegans	**OBL**	**Elegant Calico-Flower**

Downingia insignis	**OBL**	**Harlequin Calico-Flower**
Downingia laeta	**OBL**	**Great Basin Calico-Flower**
Downingia montana	**OBL**	**Sierran Calico-Flower**
Downingia ornatissima	**OBL**	**Folded Calico-Flower**
Downingia pulchella	**OBL**	**Flat-Face Calico-Flower**
Downingia pulcherrima	**FACW**	**_?_**
Downingia pusilla	**OBL**	**Dwarf Calico-Flower**
Downingia willamettensis	**OBL**	**Willamette Calico-Flower**
Downingia yina	**OBL**	**Cascade Calico-Flower**
Draba albertina	**FAC**	**Slender Whitlow-Grass**
Draba aurea	**FACU**	**Golden Whitlow-Grass**
Draba helleriana	**FAC**	**Heller's Whitlow-Grass**
Draba lonchocarpa	**FACU**	**Lance-Pod Whitlow-Grass**
Draba paucifructa	**FAC**	**Charleston Mountain Whitlow-Grass**
Draba praealta	**FACU**	**Tall Whitlow-Grass**
Draba spectabilis	**FACU**	**Showy Whitlow-Grass**
Draba stenoloba	**FACU**	**Alaska Whitlow-Grass**
Dracocephalum parviflorum	**FACU**	**American Dragonhead**
Dracopis amplexicaulis	**FACW**	**Clasping-Coneflower**
Drosera X hybrida	**OBL**	**_?_**
Drosera X obovata	**OBL**	**_?_**
Drosera aliciae	**OBL**	**Australian Sundew**
Drosera anglica	**OBL**	**English Sundew**
Drosera capensis	**OBL**	**Cape Sundew**
Drosera intermedia	**OBL**	**Spoon-Leaf Sundew**
Drosera rotundifolia	**OBL**	**Round-Leaf Sundew**
Drosera tracyi	**OBL**	**Tracy's Sundew**
Dryas ajanensis	**UPL**	**Eight-Petal Mountain-Avens**
Dryas drummondii	**FACU**	**Yellow Mountain-Avens**
Drymaria pachyphylla	**FACU**	**Thick-Leaf Drymary**
Drymocallis arguta	**FACU**	**Tall Woodbeauty**
Drymocallis arizonica	**FAC**	**Arizona Woodbeauty**
Drymocallis campanulata	**FAC**	**John Day Valley Woodbeauty**
Drymocallis convallaria	**FACU**	**Cream Woodbeauty**
Drymocallis cuneifolia	**FAC**	**Wedge-Leaf Woodbeauty**
Drymocallis glabrata	**FAC**	**Idaho Woodbeauty**
Drymocallis glandulosa	**FAC**	**Sticky Woodbeauty**
Drymocallis hansenii	**FAC**	**Yosemite Woodbeauty**
Drymocallis lactea	**FAC**	**Sierran Woodbeauty**
Drymocallis micropetala	**FAC**	**Little-Petal Woodbeauty**
Drymocallis pseudorupestris	**FAC**	**_?_**
Drymocallis rhomboidea	**FAC**	**Sticky Woodbeauty**
Dryopteris carthusiana	**FAC**	**Spinulose Wood Fern**
Dryopteris cristata	**FACW**	**Crested Wood Fern**
Dryopteris expansa	**FACW**	**Spreading Wood Fern**
Dudleya variegata	**FACU**	**Variegated Live-Forever**
Dulichium arundinaceum	**OBL**	**Three-Way Sedge**

Dysphania ambrosioides	**FAC**	**Mexican-Tea**
Dysphania botrys	**FACU**	**Jerusalem-Oak**
Echinochloa colona	**FAC**	**Jungle-Rice**
Echinochloa crus-galli	**FACW**	**Large Barnyard Grass**
Echinochloa crus-pavonis	**FACW**	**Gulf Cock's-Spur Grass**
Echinochloa esculenta	**FACU**	**Japanese Water Grass**
Echinochloa frumentacea	**UPL**	**Japanese-Millet**
Echinochloa holciformis	**FACW**	**Decorative-Millet**
Echinochloa muricata	**FACW**	**Rough Barnyard Grass**
Echinochloa oryzicola	**FACW**	**Rice-Field Grass**
Echinochloa oryzoides	**OBL**	**Early Water Grass**
Echinochloa walteri	**OBL**	**Long-Awn Cock's-Spur Grass**
Echinocystis lobata	**FACU**	**Wild Cucumber**
Echinodorus berteroi	**OBL**	**Upright Burrhead**
Echinopepon wrightii	**FAC**	**Wild Balsam-Apple**
Eclipta prostrata	**FAC**	**False Daisy**
Egeria densa	**OBL**	**Brazilian-Waterweed**
Eichhornia crassipes	**OBL**	**Common Water-Hyacinth**
Elaeagnus angustifolia	**FAC**	**Russian-Olive**
Elaeagnus commutata	**FAC**	**American Silver-Berry**
Elatine ambigua	**OBL**	**Asian Waterwort**
Elatine brachysperma	**OBL**	**Short-Seed Waterwort**
Elatine californica	**OBL**	**California Waterwort**
Elatine chilensis	**OBL**	**Chilean Waterwort**
Elatine heterandra	**OBL**	**Mosquito Waterwort**
Elatine rubella	**OBL**	**Red-Stem Waterwort**
Eleocharis acicularis	**OBL**	**Needle Spike-Rush**
Eleocharis albida	**OBL**	**White Spike-Rush**
Eleocharis atropurpurea	**FACW**	**Purple Spike-Rush**
Eleocharis bella	**FACW**	**Delicate Spike-Rush**
Eleocharis bolanderi	**FACW**	**Bolander's Spike-Rush**
Eleocharis compressa	**FACW**	**Flat-Stem Spike-Rush**
Eleocharis cylindrica	**OBL**	**Cylinder Spike-Rush**
Eleocharis elliptica	**OBL**	**Elliptic Spike-Rush**
Eleocharis engelmannii	**OBL**	**Engelmann's Spike-Rush**
Eleocharis flavescens	**OBL**	**Yellow Spike-Rush**
Eleocharis geniculata	**OBL**	**Capitate Spike-Rush**
Eleocharis mamillata	**OBL**	**Soft-Stem Spike-Rush**
Eleocharis montana	**OBL**	**Mountain Spike-Rush**
Eleocharis montevidensis	**FACW**	**Sand Spike-Rush**
Eleocharis obtusa	**OBL**	**Blunt Spike-Rush**
Eleocharis pachycarpa	**OBL**	**Black-Sand Spike-Rush**
Eleocharis palustris	**OBL**	**Common Spike-Rush**
Eleocharis parishii	**FACW**	**Parish's Spike-Rush**
Eleocharis parvula	**OBL**	**Little-Head Spike-Rush**
Eleocharis quadrangulata	**OBL**	**Square-Stem Spike-Rush**
Eleocharis quinqueflora	**OBL**	**Few-Flower Spike-Rush**

Eleocharis radicans	**OBL**	**Rooted Spike-Rush**
Eleocharis rostellata	**OBL**	**Beaked Spike-Rush**
Eleocharis suksdorfiana	**OBL**	**Suksdorf's Spike-Rush**
Eleocharis torticulmis	**OBL**	**Twist-Stem Spike-Rush**
Eleusine indica	**UPL**	**Indian Goose Grass**
Elionurus tripsacoides	**FAC**	**Pan-American Balsamscale**
Ellisia nyctelea	**FACU**	**Aunt Lucy**
Elodea bifoliata	**OBL**	**Two-Leaf Waterweed**
Elodea callitrichoides	**OBL**	**South American Waterweed**
Elodea canadensis	**OBL**	**Canadian Waterweed**
Elodea nuttallii	**OBL**	**Western Waterweed**
Elymus alaskanus	**UPL**	**Alaska Wild Rye**
Elymus canadensis	**FAC**	**Nodding Wild Rye**
Elymus curvatus	**FAC**	**Awnless Wild Rye**
Elymus elymoides	**FACU**	**Western Bottle-Brush Grass**
Elymus glaucus	**FACU**	**Blue Wild Rye**
Elymus lanceolatus	**UPL**	**Streamside Wild Rye**
Elymus repens	**FAC**	**Creeping Wild Rye**
Elymus trachycaulus	**FACU**	**Slender Wild Rye**
Elymus villosus	**FACU**	**Hairy Wild Rye**
Elymus virginicus	**FACW**	**Virginia Wild Rye**
Elymus wawawaiensis	**FACU**	**Wawawai Wild Rye**
Emilia fosbergii	**UPL**	**Florida Tassel-Flower**
Emilia sonchifolia	**UPL**	**Lilac Tassel-Flower**
Empetrum nigrum	**FAC**	**Black Crowberry**
Enchylaena tomentosa	**UPL**	**Ruby-Saltbush**
Epilobium anagallidifolium	**FACU**	**Pimpernel Willowherb**
Epilobium brachycarpum	**FAC**	**Willowherb**
Epilobium campestre	**OBL**	**Smooth Willowherb**
Epilobium ciliatum	**FACW**	**Fringed Willowherb**
Epilobium clavatum	**FACU**	**Talus Willowherb**
Epilobium cleistogamum	**OBL**	**Selfing Willowherb**
Epilobium densiflorum	**FACW**	**Dense-Flower Willowherb**
Epilobium glaberrimum	**FACW**	**Glaucous Willowherb**
Epilobium hallianum	**FACW**	**Glandular Willowherb**
Epilobium hirsutum	**FACW**	**Codlins-and-Cream**
Epilobium hornemannii	**FACW**	**Hornemann's Willowherb**
Epilobium howellii	**FACW**	**Yuba Pass Willowherb**
Epilobium lactiflorum	**FACW**	**White-Flower Willowherb**
Epilobium leptocarpum	**FACW**	**Slender-Fruit Willowherb**
Epilobium leptophyllum	**FACW**	**Bog Willowherb**
Epilobium luteum	**FACW**	**Yellow Willowherb**
Epilobium minutum	**FACU**	**Chaparral Willowherb**
Epilobium obcordatum	**FACU**	**Rockfringe**
Epilobium oreganum	**OBL**	**Grants Pass Willowherb**
Epilobium oregonense	**OBL**	**Oregon Willowherb**
Epilobium pallidum	**FAC**	**Large-Flower Willowherb**

Epilobium palustre	**OBL**	**Marsh Willowherb**
Epilobium saximontanum	**FACW**	**Rocky Mountain Willowherb**
Epilobium siskiyouense	**FACW**	**Siskiyou Willowherb**
Epilobium suffruticosum	**FACU**	**Shrubby Willowherb**
Epilobium torreyi	**FACW**	**Brook Willowherb**
Epipactis gigantea	**OBL**	**Giant Helleborine**
Epipactis helleborine	**FACU**	**Helleborine**
Equisetum X ferrissii	**FACW**	**_?_**
Equisetum X litorale	**OBL**	**_?_**
Equisetum X mackaii	**FACW**	**_?_**
Equisetum X nelsonii	**FACW**	**_?_**
Equisetum arvense	**FAC**	**Field Horsetail**
Equisetum fluviatile	**OBL**	**Water Horsetail**
Equisetum hyemale	**FACW**	**Tall Scouring-Rush**
Equisetum laevigatum	**FACW**	**Smooth Scouring-Rush**
Equisetum myriochaetum	**OBL**	**Mexican Giant Horsetail**
Equisetum palustre	**FACW**	**Marsh Horsetail**
Equisetum scirpoides	**FAC**	**Dwarf Scouring-Rush**
Equisetum sylvaticum	**FAC**	**Woodland Horsetail**
Equisetum telmateia	**FACW**	**Giant Horsetail**
Equisetum variegatum	**FACW**	**Variegated Scouring-Rush**
Eragrostis amabilis	**FAC**	**Feather Love Grass**
Eragrostis cilianensis	**FACU**	**Stink Grass**
Eragrostis ciliaris	**FACU**	**Gopher-Tail Love Grass**
Eragrostis frankii	**FACW**	**Sandbar Love Grass**
Eragrostis hypnoides	**OBL**	**Teal Love Grass**
Eragrostis lugens	**FACU**	**Mourning Love Grass**
Eragrostis lutescens	**FACU**	**Six-Weeks Love Grass**
Eragrostis mexicana	**FACU**	**Mexican Love Grass**
Eragrostis pectinacea	**FAC**	**Purple Love Grass**
Eragrostis pilosa	**FACU**	**Indian Love Grass**
Eragrostis reptans	**OBL**	**Creeping Love Grass**
Eragrostis secundiflora	**UPL**	**Red Love Grass**
Eragrostis spectabilis	**UPL**	**Petticoat-Climber**
Eremochloa ciliaris	**FACU**	**Fringed Centipede Grass**
Eremogone capillaris	**FACU**	**Slender Mountain Matted Sandwort**
Erigeron acris	**FACU**	**Bitter Fleabane**
Erigeron annuus	**FACU**	**Eastern Daisy Fleabane**
Erigeron bonariensis	**FACU**	**Asthmaweed**
Erigeron canadensis	**FACU**	**Canadian Horseweed**
Erigeron coulteri	**FACW**	**Large Mountain Fleabane**
Erigeron elatior	**FAC**	**Tall Fleabane**
Erigeron flagellaris	**FACU**	**Trailing Fleabane**
Erigeron formosissimus	**UPL**	**Beautiful Fleabane**
Erigeron glabellus	**FAC**	**Streamside Fleabane**
Erigeron glacialis	**FAC**	**Glacier Fleabane**
Erigeron glaucus	**FACU**	**Seaside Fleabane**

Erigeron humilis	**FACW**	**Arctic Alpine Fleabane**
Erigeron kachinensis	**OBL**	**Kachina Fleabane**
Erigeron karvinskianus	**FAC**	**Latin American Fleabane**
Erigeron lanatus	**FACU**	**Woolly Fleabane**
Erigeron lonchophyllus	**FACW**	**Short-Ray Fleabane**
Erigeron melanocephalus	**FAC**	**Black-Head Fleabane**
Erigeron nivalis	**FAC**	**Scotter's Fleabane**
Erigeron philadelphicus	**FACU**	**Philadelphia Fleabane**
Erigeron strigosus	**FACU**	**Prairie Fleabane**
Eriobotrya japonica	**UPL**	**Loquat**
Eriocaulon cinereum	**OBL**	**Ashy Pipewort**
Eriocaulon microcephalum	**OBL**	**Small-Head Pipewort**
Eriochloa acuminata	**FACW**	**Taper-Tip Cup Grass**
Eriochloa aristata	**FACW**	**Bearded Cup Grass**
Eriochloa contracta	**FAC**	**Prairie Cup Grass**
Eriochloa fatmensis	**FAC**	**Tropical Cup Grass**
Eriogonum ampullaceum	**FACU**	**Mono Wild Buckwheat**
Eriogonum argophyllum	**FACW**	**Sulphur Hot Springs Wild Buckwheat**
Eriogonum ovalifolium	**FACU**	**Cushion Wild Buckwheat**
Eriophorum angustifolium	**OBL**	**Tall Cotton-Grass**
Eriophorum callitrix	**FACW**	**Arctic Cotton-Grass**
Eriophorum chamissonis	**OBL**	**Chamisso's Cotton-Grass**
Eriophorum crinigerum	**OBL**	**Meadow's Cotton-Grass**
Eriophorum gracile	**OBL**	**Slender Cotton-Grass**
Eriophorum scheuchzeri	**OBL**	**White Cotton-Grass**
Eriophorum viridicarinatum	**OBL**	**Tassel Cotton-Grass**
Erodium botrys	**FACU**	**Long-Beak Stork's-Bill**
Eryngium alismifolium	**FACW**	**Modoc Eryngo**
Eryngium aristulatum	**OBL**	**California Eryngo**
Eryngium armatum	**FACW**	**Coastal Eryngo**
Eryngium articulatum	**OBL**	**Bee-Thistle**
Eryngium castrense	**OBL**	**Great Valley Eryngo**
Eryngium constancei	**OBL**	**Loch Lomond Eryngo**
Eryngium heterophyllum	**FACW**	**Wright's Eryngo**
Eryngium jepsonii	**OBL**	**Jepson's Eryngo**
Eryngium lemmonii	**FAC**	**Chiricahua Mountain Eryngo**
Eryngium mathiasiae	**OBL**	**Mathias' Eryngo**
Eryngium nasturtiifolium	**FACW**	**Hierba-Del-Sapo**
Eryngium petiolatum	**OBL**	**Rush-Leaf Eryngo**
Eryngium phyteumae	**OBL**	**Huachuca Mountain Eryngo**
Eryngium pinnatisectum	**OBL**	**Tuolumne Eryngo**
Eryngium racemosum	**OBL**	**Delta Eryngo**
Eryngium sparganophyllum	**OBL**	**Arizona Eryngo**
Eryngium spinosepalum	**FACW**	**Spiny-Sepal Eryngo**
Eryngium vaseyi	**FACW**	**Coyote-Thistle**
Erysimum cheiranthoides	**FACU**	**Worm-Seed Wallflower**
Erythronium grandiflorum	**FACU**	**Yellow Avalanche-Lily**

Erythronium revolutum	**FAC**	**Mahogany Fawn-Lily**
Eucalyptus camaldulensis	**FAC**	**River Red Gum**
Euonymus occidentalis	**FACW**	**Western Wahoo**
Euphorbia cyathophora	**UPL**	**Fire-on-the-Mountain**
Euphorbia heterophylla	**UPL**	**Mexican-Fireplant**
Euphorbia hirta	**FACU**	**Pill-Pod Sandmat**
Euphorbia hooveri	**OBL**	**Hoover's Sandmat**
Euphorbia hypericifolia	**FACU**	**Graceful Sandmat**
Euphorbia hyssopifolia	**FACU**	**Hyssop-Leaf Sandmat**
Euphorbia maculata	**UPL**	**Spotted Sandmat**
Euphorbia marginata	**UPL**	**Snow-on-the-Mountain**
Euphorbia nutans	**FACU**	**Eyebane**
Euphorbia prostrata	**FACU**	**Prostrate Sandmat**
Euphorbia pulcherrima	**UPL**	**Poinsettia**
Euphorbia serpens	**FACU**	**Matted Sandmat**
Euphorbia spathulata	**FAC**	**Warty Spurge**
Euphorbia tirucalli	**FACU**	**False Caper**
Euphrosyne acerosa	**FACU**	**Copperweed**
Eurybia merita	**FACU**	**Behring Wood-Aster**
Eurybia sibirica	**FAC**	**Siberian Wood-Aster**
Eustoma exaltatum	**OBL**	**Catchfly Prairie-Gentian**
Euthamia graminifolia	**FAC**	**Flat-Top Goldentop**
Euthamia occidentalis	**FACW**	**Western Goldentop**
Eutrochium maculatum	**OBL**	**Spotted Trumpetweed**
Evolvulus sericeus	**UPL**	**Silver Dwarf-Morning-Glory**
Extriplex californica	**FAC**	**California Mock Saltbush**
Extriplex joaquiniana	**FACU**	**San Joaquin Mock Saltbush**
Fallopia convolvulus	**FACU**	**Black-Bindweed**
Fallopia dumetorum	**FACU**	**Corpse Black-Bindweed**
Fatoua villosa	**FAC**	**Hairy Crabweed**
Festuca californica	**FACU**	**California Fescue**
Festuca idahoensis	**FACU**	**Bluebunch Fescue**
Festuca ovina	**FACU**	**Sheep Fescue**
Festuca rubra	**FAC**	**Red Fescue**
Festuca subulata	**FACU**	**Bearded Fescue**
Festuca trachyphylla	**UPL**	**Hard Fescue**
Ficus carica	**FACU**	**Common Fig**
Fimbristylis annua	**FAC**	**Annual Fimbry**
Fimbristylis autumnalis	**OBL**	**Slender Fimbry**
Fimbristylis puberula	**FACW**	**Hairy Fimbry**
Fimbristylis thermalis	**OBL**	**Hot Springs Fimbry**
Fimbristylis vahlii	**FACW**	**Vahl's Fimbry**
Flaveria campestris	**FACW**	**Alkali Yellowtops**
Flaveria chlorifolia	**FACW**	**Clasping Yellowtops**
Flaveria trinervia	**FAC**	**Clustered Yellowtops**
Fleischmannia sonorae	**FAC**	**Sonoran Slender-Thoroughwort**
Floerkea proserpinacoides	**FACW**	**False Mermaidweed**

Forestiera pubescens	**FACU**	**Stretchberry**
Fragaria chiloensis	**FACU**	**Beach Strawberry**
Fragaria vesca	**UPL**	**Woodland Strawberry**
Fragaria virginiana	**FACU**	**Virginia Strawberry**
Frangula alnus	**FAC**	**Glossy False Buckthorn**
Frangula betulifolia	**FAC**	**Birch-Leaf False Buckthorn**
Frangula obovata	**FAC**	**_?_**
Frangula purshiana	**FACU**	**Cascara False Buckthorn**
Frankenia palmeri	**FACW**	**Palmer's Sea-Heath**
Frankenia salina	**FACW**	**Alkali Sea-Heath**
Fraxinus americana	**FACU**	**White Ash**
Fraxinus latifolia	**FACW**	**Oregon Ash**
Fraxinus pennsylvanica	**FACW**	**Green Ash**
Fraxinus velutina	**FAC**	**Velvet Ash**
Fritillaria agrestis	**FAC**	**Stinkbells**
Fuchsia magellanica	**FACU**	**Hardy Fuchsia**
Fuirena simplex	**OBL**	**Western Umbrella Sedge**
Fuirena squarrosa	**OBL**	**Hairy Umbrella Sedge**
Funastrum cynanchoides	**FACU**	**Fringed Twinevine**
Funkiella confusa	**FAC**	**Rimrock Ladies'-Braids**
Gaillardia flava	**FACU**	**Yellow Blanket-Flower**
Gaillardia pulchella	**FACU**	**Firewheel**
Galeopsis tetrahit	**FACU**	**Brittle-Stem Hemp-Nettle**
Galinsoga parviflora	**UPL**	**Gallant-Soldier**
Galinsoga quadriradiata	**UPL**	**Shaggy-Soldier**
Galium aparine	**FACU**	**Sticky-Willy**
Galium boreale	**FACU**	**Northern Bedstraw**
Galium circaezans	**FACU**	**Licorice Bedstraw**
Galium divaricatum	**FACU**	**Lamarck's Bedstraw**
Galium mexicanum	**FAC**	**Mexican Bedstraw**
Galium microphyllum	**FACU**	**Bracted Bedstraw**
Galium mollugo	**FACU**	**White Bedstraw**
Galium parisiense	**UPL**	**Wall Bedstraw**
Galium trifidum	**FACW**	**Three-Petal Bedstraw**
Galium triflorum	**FACU**	**Fragrant Bedstraw**
Galium uncinulatum	**FAC**	**Bristly Bedstraw**
Gamochaeta pensylvanica	**UPL**	**Pennsylvania Everlasting**
Gamochaeta purpurea	**FACU**	**Spoon-Leaf Purple Everlasting**
Gastridium phleoides	**FACU**	**Nit Grass**
Gaultheria humifusa	**FACW**	**Alpine Spicy-Wintergreen**
Gaultheria ovatifolia	**FAC**	**Western Teaberry**
Gaultheria shallon	**FACU**	**Salal**
Gayophytum humile	**FAC**	**Dwarf Groundsmoke**
Gayophytum racemosum	**FAC**	**Black-Foot Groundsmoke**
Gentiana affinis	**FACU**	**Pleated Gentian**
Gentiana algida	**FACW**	**Whitish Gentian**
Gentiana calycosa	**FACW**	**Rainier Pleated Gentian**

Gentiana douglasiana	**OBL**	**Swamp Gentian**
Gentiana fremontii	**FACW**	**Moss Gentian**
Gentiana glauca	**FAC**	**Pale Gentian**
Gentiana newberryi	**FACW**	**Alpine Gentian**
Gentiana parryi	**FAC**	**Parry's Gentian**
Gentiana prostrata	**FACW**	**Pygmy Gentian**
Gentiana sceptrum	**OBL**	**King's-Scepter Gentian**
Gentiana setigera	**OBL**	**Mendocino Gentian**
Gentianella amarella	**FACW**	**Autumn Dwarf-Gentian**
Gentianella propinqua	**FACW**	**Four-Part Dwarf-Gentian**
Gentianella wrightii	**OBL**	**Wright's Dwarf-Gentian**
Gentianopsis barbellata	**FACW**	**Perennial Fringed-Gentian**
Gentianopsis holopetala	**OBL**	**Sierran Fringed-Gentian**
Gentianopsis simplex	**FACW**	**One-Flower Fringed-Gentian**
Gentianopsis thermalis	**FACW**	**Rocky Mountain Fringed-Gentian**
Geocaulon lividum	**FAC**	**False Toadflax**
Geranium caespitosum	**FAC**	**Purple Cluster Crane's-Bill**
Geranium californicum	**FAC**	**California Crane's-Bill**
Geranium richardsonii	**FACU**	**White Crane's-Bill**
Geranium robertianum	**FACU**	**Lesser Herbrobert**
Geranium viscosissimum	**FAC**	**Sticky Purple Crane's-Bill**
Geum aleppicum	**FAC**	**Yellow Avens**
Geum macrophyllum	**FACW**	**Large-Leaf Avens**
Geum rivale	**FACW**	**Purple Avens**
Geum rossii	**FACU**	**Ross' Avens**
Geum triflorum	**FACU**	**Old-Man's-Whiskers**
Githopsis diffusa	**FAC**	**San Gabriel Bluecup**
Githopsis specularioides	**FACU**	**Common Bluecup**
Glechoma hederacea	**FACU**	**Groundivy**
Gleditsia triacanthos	**FAC**	**Honey-Locust**
Glehnia littoralis	**UPL**	**American Silvertop**
Glinus lotoides	**OBL**	**Lotus Sweetjuice**
Glinus radiatus	**FACW**	**Spreading Sweetjuice**
Glyceria X occidentalis	**OBL**	**_?_**
Glyceria borealis	**OBL**	**Small Floating Manna Grass**
Glyceria declinata	**FACW**	**Waxy Manna Grass**
Glyceria elata	**OBL**	**Tall Manna Grass**
Glyceria fluitans	**OBL**	**Water Manna Grass**
Glyceria grandis	**OBL**	**American Manna Grass**
Glyceria leptostachya	**OBL**	**Slender-Spike Manna Grass**
Glyceria striata	**OBL**	**Fowl Manna Grass**
Glycyrrhiza lepidota	**FAC**	**American Licorice**
Gnaphalium exilifolium	**FACW**	**Slender Cudweed**
Gnaphalium palustre	**FACW**	**Western Marsh Cudweed**
Gnaphalium uliginosum	**FAC**	**Marsh Cudweed**
Goodmania luteola	**FACW**	**Yellow Spinecape**
Goodyera oblongifolia	**FACU**	**Green-Leaf Rattlesnake-Plantain**

Goodyera repens	FACU	Dwarf Rattlesnake-Plantain
Gossypium hirsutum	UPL	Upland Cotton
Graphephorum wolfii	FACU	_?_
Gratiola ebracteata	OBL	Bractless Hedge-Hyssop
Gratiola heterosepala	OBL	Boggs Lake Hedge-Hyssop
Gratiola neglecta	OBL	Clammy Hedge-Hyssop
Grevillea robusta	UPL	Silk-Oak
Grindelia camporum	FACW	Great Valley Gumweed
Grindelia ciliata	FACU	Spanishgold
Grindelia fraxinipratensis	FACW	Ash Meadows Gumweed
Grindelia hirsutula	FACW	Hairy Gumweed
Grindelia integrifolia	FACW	Puget Sound Gumweed
Grindelia nana	FACW	Idaho Gumweed
Grindelia squarrosa	FACU	Curly-Cup Gumweed
Grindelia stricta	FACW	Oregon Gumweed
Gymnocarpium dryopteris	FAC	Northern Oak Fern
Gymnosteris parvula	FAC	Small-Flower Starlet
Habenaria quinqueseta	FACW	Long-Horn False Rein Orchid
Hackelia floribunda	FACU	Many-Flower Stickseed
Hackelia micrantha	FACU	Blue Stickseed
Hackelochloa granularis	UPL	Pit-Scale Grass
Hainardia cylindrica	FACW	Barb Grass
Halenia rothrockii	FAC	Mt. Graham Spurred-Gentian
Haloragis erecta	FAC	Erect Seaberry
Hamamelis virginiana	FACU	American Witch-Hazel
Harrimanella stelleriana	FACU	Alaska Bell-Heather
Hastingsia alba	OBL	White Rush-Lily
Hedera helix	FACU	English Ivy
Hedychium flavescens	FAC	Cream Ginger-Lily
Hedysarum alpinum	FACU	Alpine Sweet-Vetch
Heimia salicifolia	FACW	Shrubby-Yellowcrest
Helenium amarum	FACU	Yellowdicks
Helenium arizonicum	FACW	Arizona Sneezeweed
Helenium autumnale	FACW	Fall Sneezeweed
Helenium bigelovii	FACW	Bigelow's Sneezeweed
Helenium bolanderi	FACW	Coastal Sneezeweed
Helenium microcephalum	FACW	Small-Head Sneezeweed
Helenium puberulum	FACW	Rosilla
Helenium thurberi	OBL	Thurber's Sneezeweed
Helianthella quinquenervis	FACU	Nodding Dwarf-Sunflower
Helianthus annuus	FACU	Common Sunflower
Helianthus bolanderi	FAC	Bolander's Sunflower
Helianthus californicus	OBL	California Sunflower
Helianthus ciliaris	FAC	Texas-Blueweed
Helianthus exilis	FACU	Serpentine Sunflower
Helianthus grosseserratus	FAC	Saw-Tooth Sunflower
Helianthus heterophyllus	OBL	Variable-Leaf Sunflower

Helianthus maximiliani	**UPL**	**Maximilian Sunflower**
Helianthus nuttallii	**FACW**	**Nuttall's Sunflower**
Helianthus paradoxus	**FACW**	**Trans-Pecos Sunflower**
Helianthus tuberosus	**FACU**	**Jerusalem-Artichoke**
Heliopsis helianthoides	**FACU**	**Smooth Oxeye**
Heliotropium curassavicum	**FACU**	**Seaside Heliotrope**
Heliotropium glabriusculum	**FACW**	**Green-Eye Heliotrope**
Heliotropium greggii	**FAC**	**Fragrant Heliotrope**
Heliotropium molle	**FACW**	**Soft Heliotrope**
Heliotropium procumbens	**FACW**	**Four-Spike Heliotrope**
Helminthotheca echioides	**FAC**	**Akan Asante**
Helosciadium nodiflorum	**OBL**	**Fool's-Watercress**
Hemarthria altissima	**FACW**	**Limpo Grass**
Hemerocallis fulva	**FACU**	**Orange Day-Lily**
Hemieva ranunculifolia	**FAC**	**Buttercup Hemieva**
Heracleum maximum	**FACW**	**American Cow-Parsnip**
Hesperevax caulescens	**OBL**	**Dwarf Pygmy-Cudweed**
Hesperevax sparsiflora	**FACU**	**Erect Pygmy-Cudweed**
Hesperis matronalis	**FACU**	**Mother-of-the-Evening**
Hesperochiron californicus	**FACU**	**California Monkey-Fiddle**
Hesperochiron pumilus	**FAC**	**Dwarf Monkey-Fiddle**
Heteranthera dubia	**OBL**	**Grass-Leaf Mud-Plantain**
Heteranthera limosa	**OBL**	**Blue Mud-Plantain**
Heteranthera reniformis	**OBL**	**Kidney-Leaf Mud-Plantain**
Heterocodon rariflorum	**FACW**	**Western Pearlflower**
Heteropogon contortus	**FACU**	**Twisted Tanglehead**
Heterotheca oregona	**FACU**	**Oregon False Golden-Aster**
Heterotheca shevockii	**FACU**	**Shevock's False Golden-Aster**
Heuchera chlorantha	**FACU**	**Tall Alumroot**
Heuchera rubescens	**UPL**	**Pink Alumroot**
Hexalectris spicata	**UPL**	**Spiked Crested-Coralroot**
Hibiscus moscheutos	**OBL**	**Crimson-Eyed Rose-Mallow**
Hieracium triste	**FACU**	**Woolly Hawkweed**
Hippuris montana	**FACW**	**Mountain Mare's-Tail**
Hippuris vulgaris	**OBL**	**Common Mare's-Tail**
Hoffmannseggia glauca	**FACU**	**Waxy Rush-Pea**
Hoita macrostachya	**OBL**	**Large Leather-Root**
Hoita orbicularis	**OBL**	**Round-Leaf Leather-Root**
Holcus lanatus	**FAC**	**Common Velvet Grass**
Holcus mollis	**FAC**	**Creeping Velvet Grass**
Holodiscus discolor	**FACU**	**Creambush**
Holozonia filipes	**FACU**	**Whitecrown**
Hopia obtusa	**FACU**	**Vine-Mesquite**
Hordeum arizonicum	**FAC**	**Arizona Barley**
Hordeum brachyantherum	**FACW**	**Meadow Barley**
Hordeum depressum	**FACW**	**Dwarf Barley**
Hordeum intercedens	**FAC**	**Bob-Tail Barley**

Hordeum jubatum	**FAC**	**Fox-Tail Barley**
Hordeum marinum	**FAC**	**Seaside Barley**
Hordeum murinum	**FACU**	**Wall Barley**
Hordeum pusillum	**FACU**	**Little Barley**
Horkelia bolanderi	**FAC**	**Border Honeydew**
Horkelia congesta	**FACU**	**Sierran Honeydew**
Horkelia yadonii	**FACU**	**Santa Lucia Honeydew**
Hornungia procumbens	**FAC**	**Ovalpurse**
Hosackia alamosana	**OBL**	**Sonoran Deer-Vetch**
Hosackia gracilis	**FACW**	**Harlequin Deer-Vetch**
Hosackia oblongifolia	**OBL**	**Streambank Deer-Vetch**
Hosackia pinnata	**FACW**	**Meadow Deer-Vetch**
Hosackia rosea	**UPL**	**Rosy Deer-Vetch**
Houstonia pusilla	**UPL**	**Tiny Bluet**
Houstonia wrightii	**FACU**	**Pygmy Bluet**
Howellia aquatilis	**OBL**	**Water Howellwort**
Humulus lupulus	**FACU**	**Common Hop**
Huperzia haleakalae	**FACU**	**Pacific Fir-Moss**
Huperzia lucidula	**FACW**	**Shining Fir-Moss**
Hydrilla verticillata	**OBL**	**Water-Thyme**
Hydrocotyle prolifera	**OBL**	**Proliferous Marsh-Pennywort**
Hydrocotyle ranunculoides	**OBL**	**Floating Marsh-Pennywort**
Hydrocotyle sibthorpioides	**FACW**	**Lawn Marsh-Pennywort**
Hydrocotyle umbellata	**OBL**	**Many-Flower Marsh-Pennywort**
Hydrocotyle verticillata	**OBL**	**Whorled Marsh-Pennywort**
Hydrophyllum fendleri	**FAC**	**Fendler's Waterleaf**
Hydrophyllum occidentale	**FACW**	**Squaw-Lettuce**
Hydrophyllum tenuipes	**FACW**	**Pacific Waterleaf**
Hymenoxys hoopesii	**FAC**	**Owl's-Claws**
Hypericum anagalloides	**OBL**	**Tinker's-Penny**
Hypericum boreale	**OBL**	**Northern St. John's-Wort**
Hypericum calycinum	**FACU**	**Aaron's Beard**
Hypericum majus	**FACW**	**Greater Canadian St. John's-Wort**
Hypericum mutilum	**FACW**	**Dwarf St. John's-Wort**
Hypericum perforatum	**FACU**	**Common St. John's-Wort**
Hypericum scouleri	**FACW**	**Scouler's St. John's-Wort**
Hypochaeris radicata	**FACU**	**Hairy Cat's-Ear**
Hypoxis hirsuta	**FACW**	**Eastern Yellow Star-Grass**
Ilex aquifolium	**FACU**	**English Holly**
Iliamna grandiflora	**FACW**	**Large-Flower Wild Hollyhock**
Iliamna rivularis	**FACW**	**Streambank Wild Hollyhock**
Impatiens aurella	**FACW**	**Pale-Yellow Touch-Me-Not**
Impatiens capensis	**FACW**	**Spotted Touch-Me-Not**
Impatiens ecalcarata	**FACW**	**Spurless Touch-Me-Not**
Impatiens glandulifera	**FACW**	**Policeman's-Helmet**
Imperata brevifolia	**FAC**	**California Satintail**
Indigofera lindheimeriana	**FAC**	**Lindheimer's Indigo**

Inula helenium	**FAC**	**Elecampane**
Ipomoea aquatica	**OBL**	**Swamp-Cabbage**
Ipomoea cairica	**FACU**	**Mile-a-Minute-Vine**
Ipomoea cordatotriloba	**FAC**	**Tievine**
Ipomoea hederacea	**FACU**	**Ivy-Leaf Morning-Glory**
Ipomoea indica	**FAC**	**Ocean-Blue Morning-Glory**
Ipomoea lacunosa	**FACW**	**Whitestar**
Ipomoea lindheimeri	**UPL**	**Lindheimer's Morning-Glory**
Ipomoea purpurea	**UPL**	**Common Morning-Glory**
Ipomoea quamoclit	**FACU**	**Cypress-Vine**
Ipomoea triloba	**FACU**	**Littlebell**
Ipomoea violacea	**FAC**	**Heavenly-Blue Morning-Glory**
Iresine diffusa	**FAC**	**Juba's-Bush**
Iris giganticaerulea	**OBL**	**Giant Blue Iris**
Iris hartwegii	**FACU**	**Rainbow Iris**
Iris longipetala	**FACW**	**Coast Iris**
Iris missouriensis	**FACW**	**Rocky Mountain Iris**
Iris pseudacorus	**OBL**	**Pale-Yellow Iris**
Isocoma acradenia	**FACU**	**Alkali Jimmyweed**
Isocoma arguta	**FACU**	**Contra Costa Jimmyweed**
Isocoma menziesii	**FAC**	**Variable Jimmyweed**
Isoetes bolanderi	**OBL**	**Bolander's Quillwort**
Isoetes echinospora	**OBL**	**Spiny-Spore Quillwort**
Isoetes howellii	**OBL**	**Howell's Quillwort**
Isoetes melanopoda	**OBL**	**Black-Foot Quillwort**
Isoetes minima	**FACW**	**Midget Quillwort**
Isoetes nuttallii	**OBL**	**Nuttall's Quillwort**
Isoetes occidentalis	**OBL**	**Western Quillwort**
Isoetes orcuttii	**OBL**	**Orcutt's Quillwort**
Isolepis carinata	**OBL**	**Keeled Lateral-Bulrush**
Isolepis cernua	**OBL**	**Low Lateral-Bulrush**
Isolepis prolifera	**OBL**	**Proliferous Lateral-Bulrush**
Isolepis setacea	**FACW**	**Bristle-Leaf Lateral-Bulrush**
Iva annua	**FAC**	**Annual Marsh-Elder**
Iva axillaris	**FACU**	**Deer-Root**
Iva hayesiana	**FACW**	**San Diego Marsh-Elder**
Ivesia kingii	**FAC**	**King's Mousetail**
Ivesia lycopodioides	**FAC**	**Clubmoss Mousetail**
Ivesia pickeringii	**OBL**	**Silky Mousetail**
Ivesia pityocharis	**FACW**	**Pine Nut Mountain Mousetail**
Ivesia sericoleuca	**FAC**	**Plumas Mousetail**
Jacobaea vulgaris	**FACU**	**Stinking Willie**
Jaegeria hirta	**FACU**	**Botao-de-Ouro**
Jamesia americana	**FACU**	**Five-Petal Cliffbush**
Jaumea carnosa	**OBL**	**Marsh Jaumea**
Jensia yosemitana	**FACU**	**Yosemite Annual-Tarweed**
Juglans californica	**FACU**	**Southern California Walnut**

Juglans cinerea	**FACU**	**White Walnut**
Juglans hindsii	**FAC**	**Northern California Walnut**
Juglans major	**FAC**	**Arizona Walnut**
Juglans microcarpa	**FAC**	**Little Walnut**
Juglans nigra	**UPL**	**Black Walnut**
Juncus acuminatus	**OBL**	**Knotty-Leaf Rush**
Juncus acutus	**FACW**	**Spiny Rush**
Juncus albescens	**OBL**	**Northern White Rush**
Juncus alpinoarticulatus	**OBL**	**Northern Green Rush**
Juncus anthelatus	**FACW**	**Kentucky Rush**
Juncus articulatus	**OBL**	**Joint-Leaf Rush**
Juncus balticus	**FACW**	**Baltic Rush**
Juncus biglumis	**OBL**	**Two-Flower Rush**
Juncus bolanderi	**OBL**	**Bolander's Rush**
Juncus brachyphyllus	**FAC**	**Short-Leaf Rush**
Juncus brevicaudatus	**OBL**	**Narrow-Panicle Rush**
Juncus breweri	**FACW**	**Brewer's Rush**
Juncus bryoides	**OBL**	**Moss Dwarf Rush**
Juncus bufonius	**FACW**	**Toad Rush**
Juncus capillaris	**FACW**	**Hairy-Stem Dwarf Rush**
Juncus capitatus	**FACU**	**Leafy-Bract Dwarf Rush**
Juncus castaneus	**FACW**	**Chestnut Rush**
Juncus chlorocephalus	**FACW**	**Green-Head Rush**
Juncus compressus	**OBL**	**Round-Fruit Rush**
Juncus confusus	**FAC**	**Colorado Rush**
Juncus cooperi	**FACW**	**Cooper's Rush**
Juncus covillei	**FACW**	**Coville's Rush**
Juncus dichotomus	**FACW**	**Forked Rush**
Juncus diffusissimus	**FACW**	**Slim-Pod Rush**
Juncus digitatus	**OBL**	**Finger Rush**
Juncus drummondii	**FACW**	**Drummond's Rush**
Juncus dubius	**FACW**	**Mariposa Rush**
Juncus dudleyi	**FAC**	**Dudley's Rush**
Juncus duranii	**OBL**	**Duran's Rush**
Juncus effusus	**FACW**	**Lamp Rush**
Juncus elliottii	**FACW**	**Elliott's Rush**
Juncus ensifolius	**FACW**	**Dagger-Leaf Rush**
Juncus falcatus	**FACW**	**Sickle-Leaf Rush**
Juncus filiformis	**FACW**	**Thread Rush**
Juncus gerardii	**FACW**	**Saltmarsh Rush**
Juncus hallii	**FAC**	**Hall's Rush**
Juncus hemiendytus	**OBL**	**Herman's Dwarf Rush**
Juncus interior	**FAC**	**Inland Rush**
Juncus kelloggii	**FACW**	**Kellogg's Dwarf Rush**
Juncus leiospermus	**OBL**	**Red Bluff Dwarf Rush**
Juncus lescurii	**FACW**	**Salt Rush**
Juncus longistylis	**FACW**	**Long-Style Rush**

Juncus luciensis	**OBL**	**Santa Lucia Dwarf Rush**
Juncus macrandrus	**OBL**	**Long-Anther Rush**
Juncus macrophyllus	**FACW**	**Long-Leaf Rush**
Juncus marginatus	**FACW**	**Bog Rush**
Juncus mertensianus	**OBL**	**Mertens' Rush**
Juncus mexicanus	**FACW**	**Mexican Rush**
Juncus nevadensis	**FACW**	**Sierran Rush**
Juncus nodatus	**OBL**	**Stout Rush**
Juncus nodosus	**OBL**	**Knotted Rush**
Juncus occidentalis	**FACW**	**Western Rush**
Juncus orthophyllus	**FACW**	**Straight-Leaf Rush**
Juncus oxymeris	**FACW**	**Pointed Rush**
Juncus parryi	**FAC**	**Parry's Rush**
Juncus patens	**FACW**	**Spreading Rush**
Juncus phaeocephalus	**FACW**	**Brown-Head Rush**
Juncus regelii	**FACW**	**Regel's Rush**
Juncus rugulosus	**OBL**	**Wrinkled Rush**
Juncus saximontanus	**FACW**	**Rocky Mountain Rush**
Juncus scirpoides	**FACW**	**Needle-Pod Rush**
Juncus supiniformis	**OBL**	**Hairy-Leaf Rush**
Juncus tenuis	**FACW**	**Lesser Poverty Rush**
Juncus textilis	**FACW**	**Basket Rush**
Juncus tiehmii	**FACW**	**Nevada Rush**
Juncus torreyi	**FACW**	**Torrey's Rush**
Juncus triformis	**FACW**	**Yosemite Dwarf Rush**
Juncus triglumis	**FACW**	**Three-Flower Rush**
Juncus uncialis	**OBL**	**Inch-High Rush**
Juncus vaseyi	**FACW**	**Vasey's Rush**
Juncus xiphioides	**OBL**	**Iris-Leaf Rush**
Juniperus communis	**FACU**	**Common Juniper**
Juniperus deppeana	**FACU**	**Alligator Juniper**
Juniperus horizontalis	**FACU**	**Creeping Juniper**
Juniperus virginiana	**FACU**	**Eastern Red-Cedar**
Justicia americana	**OBL**	**American Water-Willow**
Kalmia microphylla	**OBL**	**Alpine-Laurel**
Kickxia elatine	**UPL**	**Sharp-Leaf Cancerwort**
Kobresia myosuroides	**FACU**	**Pacific Bog Sedge**
Kobresia sibirica	**FAC**	**Siberian Bog Sedge**
Kobresia simpliciuscula	**FACW**	**Simple Bog Sedge**
Koenigia islandica	**OBL**	**Island-Purslane**
Krigia biflora	**FACU**	**Two-Flower Dwarf-Dandelion**
Kumlienia hystricula	**OBL**	**Waterfall False Buttercup**
Kummerowia stipulacea	**FACU**	**Korean-Clover**
Kummerowia striata	**FACU**	**Japanese-Clover**
Kyllinga brevifolia	**FACW**	**Short-Leaf Spike Sedge**
Kyllinga odorata	**FACW**	**Fragrant Spike Sedge**
Lachnagrostis filiformis	**FACW**	**Common Blown Grass**

Lactuca biennis	**FAC**	**Wild Blue Lettuce**
Lactuca canadensis	**FACU**	**Canadian Blue Lettuce**
Lactuca graminifolia	**FAC**	**Grass-Leaf Lettuce**
Lactuca ludoviciana	**FAC**	**Louisiana Lettuce**
Lactuca saligna	**UPL**	**Willow-Leaf Lettuce**
Lactuca serriola	**FACU**	**Prickly Lettuce**
Lactuca tatarica	**FAC**	**Russian Blue Lettuce**
Laennecia coulteri	**FAC**	**Coulter's Woolwort**
Lamarckia aurea	**FACU**	**Golden-Top Grass**
Landoltia punctata	**OBL**	**Dotted Duckmeat**
Lantana camara	**FACU**	**Hedgeflower**
Lantana urticoides	**FACU**	**West Indian Shrub-Verbena**
Lapsana communis	**FAC**	**Common Nipplewort**
Larix occidentalis	**FACU**	**Western Larch**
Lasthenia burkei	**OBL**	**Burke's Goldfields**
Lasthenia californica	**FACU**	**California Goldfields**
Lasthenia chrysantha	**FAC**	**Alkali-Sink Goldfields**
Lasthenia conjugens	**FACW**	**Contra Costa Goldfields**
Lasthenia ferrisiae	**OBL**	**Ferris' Goldfields**
Lasthenia fremontii	**OBL**	**Fremont's Goldfields**
Lasthenia glaberrima	**OBL**	**Smooth Goldfields**
Lasthenia glabrata	**FACW**	**Yellow-Ray Goldfields**
Lasthenia minor	**FACW**	**Coastal Goldfields**
Lasthenia platycarpha	**FACW**	**Alkali Goldfields**
Lathyrus hirsutus	**FAC**	**Singletary Vetchling**
Lathyrus japonicus	**FACU**	**Sea Vetchling**
Lathyrus jepsonii	**OBL**	**Delta Vetchling**
Lathyrus lanszwertii	**UPL**	**Nevada Vetchling**
Lathyrus palustris	**OBL**	**Marsh Vetchling**
Lathyrus pusillus	**FAC**	**Tiny Vetchling**
Lathyrus sphaericus	**FACU**	**Grass Vetchling**
Lathyrus venosus	**FAC**	**Veiny Vetchling**
Layia chrysanthemoides	**FACW**	**Smooth Tidytips**
Layia heterotricha	**FAC**	**Pale-Yellow Tidytips**
Layia munzii	**FACW**	**Munz's Tidytips**
Leersia hexandra	**OBL**	**Southern Cut Grass**
Leersia oryzoides	**OBL**	**Rice Cut Grass**
Leersia virginica	**FACW**	**White Grass**
Legenere limosa	**OBL**	**False Venus'-Looking-Glass**
Lemna aequinoctialis	**OBL**	**Lesser Duckweed**
Lemna gibba	**OBL**	**Inflated Duckweed**
Lemna minor	**OBL**	**Common Duckweed**
Lemna minuta	**OBL**	**Least Duckweed**
Lemna obscura	**OBL**	**Little Duckweed**
Lemna trisulca	**OBL**	**Ivy-Leaf Duckweed**
Lemna turionifera	**OBL**	**Turion Duckweed**
Lemna valdiviana	**OBL**	**Pale Duckweed**

Leonotis nepetifolia	**FACU**	**Christmas-Candlestick**
Leontodon saxatilis	**FACU**	**Lesser Hawkbit**
Lepidium acutidens	**FAC**	**_?_**
Lepidium appelianum	**UPL**	**Globe-Pod Pepperwort**
Lepidium davisii	**FACW**	**Davis' Pepperwort**
Lepidium densiflorum	**UPL**	**Miner's Pepperwort**
Lepidium dictyotum	**FAC**	**Alkali Pepperwort**
Lepidium flavum	**UPL**	**Yellow Pepperwort**
Lepidium latifolium	**FAC**	**Broad-Leaf Pepperwort**
Lepidium latipes	**FACW**	**San Diego Pepperwort**
Lepidium nitidum	**FAC**	**Shining Pepperwort**
Lepidium oxycarpum	**OBL**	**Forked Pepperwort**
Lepidium perfoliatum	**FACU**	**Clasping Pepperwort**
Lepidium thurberi	**FACU**	**Thurber's Pepperwort**
Lepidium virginicum	**FACU**	**Poorman's-Pepperwort**
Lepidospartum squamatum	**FACU**	**California Scalebroom**
Leptarrhena pyrolifolia	**FACW**	**Pearleaf**
Leptochloa crinita	**FACU**	**False Rhodes Grass**
Leptosiphon bicolor	**UPL**	**True Babystars**
Leptosiphon nuttallii	**FACU**	**Nuttall's Perennial Gily-Flower**
Leucaena leucocephala	**FACU**	**White Leadtree**
Leucanthemum vulgare	**UPL**	**Ox-Eye Daisy**
Leucospora multifida	**FACW**	**Narrow-Leaf Paleseed**
Leucothoe davisiae	**FACW**	**Sierran Doghobble**
Lewisia brachycalyx	**FACU**	**Short-Sepal Bitter-Root**
Lewisia cantelovii	**OBL**	**Cantelow's Bitter-Root**
Lewisia pygmaea	**FACU**	**Alpine Bitter-Root**
Leymus cinereus	**FAC**	**Great Basin Lyme Grass**
Leymus condensatus	**FACU**	**Giant Lyme Grass**
Leymus mollis	**FACU**	**American Lyme Grass**
Leymus simplex	**FAC**	**Alkali Wildrye**
Leymus triticoides	**FAC**	**Beardless Lyme Grass**
Liatris lancifolia	**FAC**	**Lance-Leaf Gayfeather**
Liatris ligulistylis	**FAC**	**Strap-Style Gayfeather**
Ligusticum canbyi	**FAC**	**Canby's Wild Lovage**
Ligusticum grayi	**FAC**	**Sheep Wild Lovage**
Ligusticum porteri	**FACU**	**Porter's Wild Lovage**
Ligusticum tenuifolium	**FACW**	**Slender-Leaf Wild Lovage**
Ligusticum verticillatum	**FACW**	**Idaho Wild Lovage**
Ligustrum japonicum	**FACU**	**Japanese Privet**
Ligustrum vulgare	**UPL**	**European Privet**
Lilaeopsis masonii	**OBL**	**Mason's Grasswort**
Lilaeopsis occidentalis	**OBL**	**Western Grasswort**
Lilaeopsis schaffneriana	**OBL**	**Schaffner's Grasswort**
Lilium bolanderi	**FACW**	**Thimble Lily**
Lilium kelleyanum	**OBL**	**Kelley's Lily**
Lilium maritimum	**FACW**	**Coastal Lily**

Lilium pardalinum	**FACW**	**Leopard Lily**
Lilium parryi	**OBL**	**Lemon Lily**
Lilium parvum	**OBL**	**Sierran Tiger Lily**
Lilium philadelphicum	**FAC**	**Wood Lily**
Limnanthes alba	**FACW**	**White Meadowfoam**
Limnanthes bakeri	**OBL**	**Baker's Meadowfoam**
Limnanthes douglasii	**OBL**	**Douglas' Meadowfoam**
Limnanthes floccosa	**OBL**	**Woolly Meadowfoam**
Limnanthes montana	**OBL**	**Mountain Meadowfoam**
Limnanthes pumila	**OBL**	**_?_**
Limnanthes vinculans	**OBL**	**Cunningham Marsh Meadowfoam**
Limnobium spongia	**OBL**	**American Spongeplant**
Limnophila X ludoviciana	**OBL**	**_?_**
Limonium binervosum	**FAC**	**Rock Sea-Lavender**
Limonium brassicifolium	**FAC**	**Tree Sea-Lavender**
Limonium californicum	**FACW**	**Marsh-Rosemary**
Limonium limbatum	**FACW**	**Trans-Pecos Sea-Lavender**
Limonium ramosissimum	**FACW**	**Algerian Sea-Lavender**
Limonium sinuatum	**FACW**	**Wavy-Leaf Sea-Lavender**
Limosella acaulis	**OBL**	**Owyhee Mudwort**
Limosella aquatica	**OBL**	**Awl-Leaf Mudwort**
Limosella australis	**OBL**	**Welsh Mudwort**
Limosella pubiflora	**OBL**	**Chiricahua Mountain Mudwort**
Lindernia dubia	**OBL**	**Yellow-Seed False Pimpernel**
Linnaea borealis	**FACU**	**American Twinflower**
Liparis loeselii	**FACW**	**Yellow Wide-Lip Orchid**
Lipocarpha aristulata	**FACW**	**Awned Halfchaff Sedge**
Lipocarpha drummondii	**FACW**	**Drummond's Halfchaff Sedge**
Lipocarpha micrantha	**OBL**	**Small-Flower Halfchaff Sedge**
Lipocarpha occidentalis	**FACW**	**Western Halfchaff Sedge**
Liquidambar styraciflua	**FAC**	**Sweet-Gum**
Lloydia serotina	**FACU**	**Common Alp-Lily**
Lobelia anatina	**FACW**	**Apache Lobelia**
Lobelia berlandieri	**FAC**	**Berlandier's Lobelia**
Lobelia cardinalis	**OBL**	**Cardinal-Flower**
Lobelia dortmanna	**OBL**	**Water Lobelia**
Lobelia fenestralis	**FACU**	**Fringe-Leaf Lobelia**
Lobelia kalmii	**OBL**	**Brook Lobelia**
Loiseleuria procumbens	**FACW**	**Alpine-Azalea**
Lolium perenne	**FAC**	**Perennial Rye Grass**
Lomatium bicolor	**FACU**	**Wasatch Desert-Parsley**
Lomatium caruifolium	**FACW**	**Alkali Desert-Parsley**
Lomatium cookii	**OBL**	**Agate Desert-Parsley**
Lomatium nudicaule	**UPL**	**Indian-Consumption-Plant**
Lomatogonium rotatum	**OBL**	**Marsh-Felwort**
Lonicera X bella	**FACU**	**_?_**
Lonicera cauriana	**FAC**	**Sweet-Berry Honeysuckle**

Lonicera conjugialis	**FAC**	**Purple-Flower Honeysuckle**
Lonicera hispidula	**FACU**	**Pink Honeysuckle**
Lonicera involucrata	**FAC**	**Four-Line Honeysuckle**
Lonicera japonica	**FACU**	**Japanese Honeysuckle**
Lonicera morrowii	**UPL**	**Morrow's Honeysuckle**
Lonicera tatarica	**UPL**	**Twinsisters**
Lonicera utahensis	**FAC**	**Rocky Mountain Honeysuckle**
Lorandersonia linifolia	**FAC**	**Spear-Leaf False Geesewood**
Lotus corniculatus	**FAC**	**Garden Bird's-Foot-Trefoil**
Lotus tenuis	**FACU**	**Narrow-Leaf Bird's-Foot-Trefoil**
Lotus uliginosus	**FACU**	**Large Bird's-Foot-Trefoil**
Ludwigia grandiflora	**OBL**	**Large-Flower Primrose-Willow**
Ludwigia octovalvis	**OBL**	**Mexican Primrose-Willow**
Ludwigia palustris	**OBL**	**Marsh Primrose-Willow**
Ludwigia peploides	**OBL**	**Floating Primrose-Willow**
Ludwigia polycarpa	**OBL**	**Many-Fruit Primrose-Willow**
Ludwigia repens	**OBL**	**Creeping Primrose-Willow**
Luetkea pectinata	**FACU**	**Partridgefoot**
Lupinus arcticus	**FACU**	**Arctic Lupine**
Lupinus covillei	**FACU**	**Shaggy Lupine**
Lupinus kingii	**UPL**	**King's Lupine**
Lupinus latifolius	**FACW**	**Broad-Leaf Lupine**
Lupinus padre-crowleyi	**FACU**	**Father Crowley's Lupine**
Lupinus polyphyllus	**FAC**	**Blue-Pod Lupine**
Lupinus prunophilus	**FACU**	**Hairy Big-Leaf Lupine**
Lupinus rivularis	**FACU**	**River-Bank Lupine**
Luzula arcuata	**UPL**	**Curved Wood-Rush**
Luzula comosa	**FAC**	**Pacific Wood-Rush**
Luzula multiflora	**FACU**	**Common Wood-Rush**
Luzula parviflora	**FAC**	**Small-Flower Wood-Rush**
Luzula spicata	**FACU**	**Spiked Wood-Rush**
Luzula subcapitata	**OBL**	**Colorado Wood-Rush**
Luzula subcongesta	**FACW**	**Donner Wood-Rush**
Lycium torreyi	**FAC**	**Squawthorn**
Lycopodiella inundata	**OBL**	**Northern Bog Club-Moss**
Lycopodium clavatum	**FAC**	**Running Ground-Pine**
Lycopodium lagopus	**FACU**	**Single-Cone Ground-Pine**
Lycopus americanus	**OBL**	**Cut-Leaf Water-Horehound**
Lycopus asper	**OBL**	**Rough Water-Horehound**
Lycopus uniflorus	**OBL**	**Northern Water-Horehound**
Lysichiton americanus	**OBL**	**Yellow-Skunk-Cabbage**
Lysiloma watsonii	**FACU**	**Little-Leaf False Tamarind**
Lysimachia arvensis	**FAC**	**Scarlet Yellow-Loosestrife**
Lysimachia ciliata	**FACW**	**Fringed Yellow-Loosestrife**
Lysimachia hybrida	**OBL**	**Lowland Yellow-Loosestrife**
Lysimachia maritima	**FACW**	**Sea-Milkwort**
Lysimachia minima	**FACW**	**Chaffweed**

Lysimachia nummularia	FACW	Creeping-Jenny
Lysimachia punctata	OBL	Large Yellow-Loosestrife
Lysimachia terrestris	OBL	Swampcandles
Lysimachia thyrsiflora	OBL	Tufted Yellow-Loosestrife
Lysimachia vulgaris	FACW	Garden Yellow-Loosestrife
Lythrum alatum	OBL	Wing-Angle Loosestrife
Lythrum californicum	OBL	California Loosestrife
Lythrum hyssopifolium	OBL	Hyssop Loosestrife
Lythrum portula	OBL	Spatula-Leaf Loosestrife
Lythrum salicaria	OBL	Purple Loosestrife
Lythrum tribracteatum	OBL	Three-Bract Loosestrife
Maclura pomifera	UPL	Osage-Orange
Macroptilium atropurpureum	FACU	Purple Bush-Bean
Madia glomerata	FACU	Mountain Tarplant
Mahonia aquifolium	UPL	Holly-Leaf Oregon-Grape
Mahonia nervosa	FACU	Cascade Oregon-Grape
Maianthemum dilatatum	FAC	Two-Leaf False Solomon's-Seal
Maianthemum racemosum	FAC	Feathery False Solomon's-Seal
Maianthemum stellatum	FACU	Starry False Solomon's-Seal
Malacothamnus abbottii	FACW	Monterey Bush-Mallow
Malacothamnus davidsonii	FACU	Sand Bush-Mallow
Malaxis monophyllos	FACW	White Adder's-Mouth Orchid
Malephora crocea	FACU	Coppery-Mesemb
Malus fusca	FAC	Oregon Crabapple
Malvastrum coromandelianum	FAC	Three-Lobe False Mallow
Malvaviscus arboreus	FACU	Wax-Mallow
Malvella leprosa	FACU	Alkali-Mallow
Marrubium vulgare	FACU	White Horehound
Marsilea drummondii	OBL	Drummond's Water-Clover
Marsilea mollis	OBL	Chihuahuan Water-Clover
Marsilea oligospora	OBL	Pacific Water-Clover
Marsilea vestita	OBL	Hairy Water-Clover
Matricaria discoidea	FACU	Pineapple-Weed
Matricaria occidentalis	FACW	Valley Mayweed
Mazus pumilus	FACU	Japanese Mazus
Mecardonia procumbens	FACW	Baby-Jump-Up
Meconella oregana	FAC	White Fairy-Poppy
Medicago lupulina	FAC	Black Medick
Medicago polymorpha	FACU	Toothed Medick
Medicago sativa	UPL	Alfalfa
Medicago truncatula	FACU	Barrel Medick
Megathyrsus maximus	FAC	Guinea Grass
Melampodium perfoliatum	FAC	Perfoliate Blackfoot
Melampyrum lineare	FAC	American Cow-Wheat
Melia azedarach	UPL	China-Berry
Melica bulbosa	FACU	Onion Grass
Melica spectabilis	FAC	Showy Melic Grass

Melilotus indicus	**FACU**	**Indian Sweet-Clover**
Melilotus officinalis	**FACU**	**Yellow Sweet-Clover**
Melinis repens	**UPL**	**Creeping Molasses Grass**
Melissa officinalis	**UPL**	**Lemonbalm**
Melochia pyramidata	**FAC**	**Pyramid-Flower**
Melothria pendula	**FAC**	**Guadeloupe-Cucumber**
Mentha X gracilis	**FACW**	**_?_**
Mentha X piperita	**FACW**	**_?_**
Mentha X rotundifolia	**FAC**	**_?_**
Mentha X villosa	**FACW**	**_?_**
Mentha aquatica	**FACW**	**Water Mint**
Mentha arvensis	**FACW**	**American Wild Mint**
Mentha pulegium	**OBL**	**Pennyroyal**
Mentha spicata	**FACW**	**Spearmint**
Mentha suaveolens	**FACW**	**Apple Mint**
Mentzelia leucophylla	**FAC**	**Ash Meadows Blazingstar**
Menyanthes trifoliata	**OBL**	**Buck-Bean**
Menziesia ferruginea	**FACU**	**Fool's-Huckleberry**
Merremia dissecta	**FAC**	**Noyau-Vine**
Mertensia bella	**FACW**	**Oregon Bluebells**
Mertensia ciliata	**FACW**	**Tall Fringe Bluebells**
Mertensia franciscana	**OBL**	**Franciscan Bluebells**
Mertensia oblongifolia	**FAC**	**Languid-Lady**
Mertensia paniculata	**FACW**	**Tall Bluebells**
Mertensia viridis	**FACU**	**Green Bluebells**
Mesembryanthemum cordifolium	**FAC**	**Heart-Leaf Iceplant**
Mesembryanthemum crystallinum	**FACU**	**Crystalline Iceplant**
Mesembryanthemum nodiflorum	**FACU**	**Slender-Leaf Iceplant**
Micranthes aprica	**FACW**	**Sierran Pseudosaxifrage**
Micranthes californica	**FACW**	**California Pseudosaxifrage**
Micranthes ferruginea	**FAC**	**Russet-Hair Pseudosaxifrage**
Micranthes fragosa	**FACW**	**Cliff Pseudosaxifrage**
Micranthes howellii	**FAC**	**Howell's Pseudosaxifrage**
Micranthes integrifolia	**FACW**	**Columbian Pseudosaxifrage**
Micranthes lyallii	**FACW**	**Red-Stem Pseudosaxifrage**
Micranthes marshallii	**OBL**	**Hupa Valley Pseudosaxifrage**
Micranthes nelsoniana	**FAC**	**Heart-Leaf Pseudosaxifrage**
Micranthes nidifica	**FACW**	**Peak Pseudosaxifrage**
Micranthes occidentalis	**FAC**	**Mountain Pseudosaxifrage**
Micranthes odontoloma	**FACW**	**Streambank Pseudosaxifrage**
Micranthes oregana	**OBL**	**Bog Pseudosaxifrage**
Micranthes rhomboidea	**FACW**	**Diamond-Leaf Pseudosaxifrage**
Micranthes tolmiei	**FAC**	**Tolmie's Alpine Pseudosaxifrage**
Micropus californicus	**FACU**	**Slender Cottonseed**
Microseris borealis	**OBL**	**Northern Silverpuffs**
Microseris douglasii	**FACU**	**Douglas' Silverpuffs**
Microseris laciniata	**FACU**	**Cut-Leaf Silverpuffs**

Microsteris gracilis	**FACU**	**Annual-Phlox**
Mimetanthe pilosa	**FACW**	**False Monkey-Flower**
Mimulus alsinoides	**OBL**	**Wing-Stem Monkey-Flower**
Mimulus angustatus	**OBL**	**Purple-Lip Pansy Monkey-Flower**
Mimulus bicolor	**FACU**	**Yellow-and-White Monkey-Flower**
Mimulus breviflorus	**FACW**	**Short-Flower Monkey-Flower**
Mimulus breweri	**FACU**	**Brewer's Monkey-Flower**
Mimulus cardinalis	**FACW**	**Scarlet Monkey-Flower**
Mimulus congdonii	**FAC**	**Congdon's Monkey-Flower**
Mimulus dentatus	**OBL**	**Coastal Monkey-Flower**
Mimulus dentilobus	**OBL**	**Tooth-Petal Monkey-Flower**
Mimulus douglasii	**FACW**	**Brownies**
Mimulus eastwoodiae	**OBL**	**Eastwood's Monkey-Flower**
Mimulus exiguus	**FACU**	**San Bernardino Mountain Monkey-Flower**
Mimulus filicaulis	**FACW**	**Slender-Stem Monkey-Flower**
Mimulus floribundus	**OBL**	**Purple-Stem Monkey-Flower**
Mimulus glabratus	**OBL**	**Round-Leaf Monkey-Flower**
Mimulus glaucescens	**OBL**	**Shield-Bract Monkey-Flower**
Mimulus guttatus	**OBL**	**Seep Monkey-Flower**
Mimulus inconspicuus	**FACU**	**Small-Flower Monkey-Flower**
Mimulus laciniatus	**FAC**	**Cut-Leaf Monkey-Flower**
Mimulus latidens	**OBL**	**Broad-Tooth Monkey-Flower**
Mimulus lewisii	**FACW**	**Great Purple Monkey-Flower**
Mimulus moschatus	**FACW**	**Muskflower**
Mimulus nanus	**FACU**	**Dwarf Purple Monkey-Flower**
Mimulus nudatus	**OBL**	**Bare Monkey-Flower**
Mimulus parishii	**FACU**	**Parish's Monkey-Flower**
Mimulus primuloides	**FACW**	**Yellow Creeping Monkey-Flower**
Mimulus pulchellus	**FACW**	**Yellow-Lip Pansy Monkey-Flower**
Mimulus purpureus	**FACU**	**Little Purple Monkey-Flower**
Mimulus pygmaeus	**OBL**	**Egg Lake Monkey-Flower**
Mimulus ringens	**OBL**	**Allegheny Monkey-Flower**
Mimulus rubellus	**FAC**	**Little Red-Stem Monkey-Flower**
Mimulus suksdorfii	**FACU**	**Miniature Monkey-Flower**
Mimulus tilingii	**OBL**	**Subalpine Monkey-Flower**
Mimulus tricolor	**OBL**	**Tricolor Monkey-Flower**
Mimulus washingtonensis	**OBL**	**Washington Monkey-Flower**
Minuartia californica	**FACU**	**California Stitchwort**
Minuartia obtusiloba	**FACU**	**Alpine Stitchwort**
Minuartia rubella	**FACU**	**Boreal Stitchwort**
Minuartia stricta	**FAC**	**Bog Stitchwort**
Mirabilis jalapa	**UPL**	**Marvel-of-Peru**
Mirabilis nyctaginea	**FACU**	**Heart-Leaf Four-O'clock**
Miscanthus sinensis	**FACU**	**Chinese Silver Grass**
Mitella nuda	**FACW**	**Bare-Stem Bishop's-Cap**
Mitella stauropetala	**FAC**	**Side-Flower Bishop's-Cap**
Mitellastra caulescens	**FAC**	**Mock Millerwort**

Mitracarpus hirtus	**FACU**	**Tropical Girdlepod**
Modiola caroliniana	**FAC**	**Carolina Bristle-Mallow**
Moehringia lateriflora	**FACU**	**Blunt-Leaf Grove-Sandwort**
Moehringia macrophylla	**FAC**	**Large-Leaf Grove-Sandwort**
Mollugo cerviana	**FAC**	**Thread-Stem Carpetweed**
Mollugo verticillata	**FACU**	**Green Carpetweed**
Momordica charantia	**FACU**	**Balsam-Pear**
Monarda fistulosa	**FACU**	**Oswego-Tea**
Monarda punctata	**UPL**	**Spotted Beebalm**
Monardella australis	**FACU**	**Southern Mountainbalm**
Monardella linoides	**FACU**	**Flax-Leaf Mountainbalm**
Monardella odoratissima	**FACU**	**Alpine Mountainbalm**
Monardella viminea	**FACU**	**Willowy Mountainbalm**
Moneses uniflora	**FACU**	**Single-Delight**
Monochoria vaginalis	**OBL**	**Heart-Shape False Pickerelweed**
Monolepis nuttalliana	**FAC**	**Nuttall's Poverty-Weed**
Monolopia congdonii	**FACU**	**San Joaquin Woollythread**
Monotropa uniflora	**FACU**	**One-Flower Indian-Pipe**
Montia chamissoi	**OBL**	**Chamisso's Candy-Flower**
Montia dichotoma	**FAC**	**Dwarf Candy-Flower**
Montia fontana	**OBL**	**Fountain Candy-Flower**
Montia howellii	**FACW**	**Howell's Candy-Flower**
Montia linearis	**FAC**	**Linear-Leaf Candy-Flower**
Montia parvifolia	**FACW**	**Little-Leaf Candy-Flower**
Morella californica	**FACW**	**Pacific Bayberry**
Morus alba	**FACU**	**White Mulberry**
Morus microphylla	**FACU**	**Texas Mulberry**
Morus rubra	**FACU**	**Red Mulberry**
Muhlenbergia andina	**FAC**	**Fox-Tail Muhly**
Muhlenbergia asperifolia	**FACW**	**Alkali Muhly**
Muhlenbergia californica	**FACW**	**California Muhly**
Muhlenbergia eludens	**UPL**	**Gravel-Bar Muhly**
Muhlenbergia filiformis	**FACW**	**Pullup Muhly**
Muhlenbergia frondosa	**FACW**	**Wire-Stem Muhly**
Muhlenbergia glomerata	**FACW**	**Spiked Muhly**
Muhlenbergia mexicana	**FAC**	**Mexican Muhly**
Muhlenbergia minutissima	**FAC**	**Least Muhly**
Muhlenbergia montana	**UPL**	**Mountain Muhly**
Muhlenbergia pectinata	**OBL**	**Comb-Top Muhly**
Muhlenbergia racemosa	**FACW**	**Green Muhly**
Muhlenbergia ramulosa	**FACU**	**Ponderosa Muhly**
Muhlenbergia richardsonis	**FAC**	**Matted Muhly**
Muhlenbergia rigens	**FAC**	**Deer Grass**
Muhlenbergia schreberi	**FACU**	**Nimblewill**
Muhlenbergia sylvatica	**FACW**	**Woodland Muhly**
Muhlenbergia uniflora	**OBL**	**Bog Muhly**
Muhlenbergia utilis	**FACW**	**Aparejo Grass**

Muhlenbergia wrightii	**FACU**	**Wright's Muhly**
Muntingia calabura	**UPL**	**Strawberry-Tree**
Myoporum laetum	**FACU**	**Ngaio-Tree**
Myosotis arvensis	**FAC**	**Rough Forget-Me-Not**
Myosotis asiatica	**FAC**	**Asian Forget-Me-Not**
Myosotis discolor	**FAC**	**Yellow Scorpion-Grass**
Myosotis laxa	**OBL**	**Bay Forget-Me-Not**
Myosotis scorpioides	**FACW**	**True Forget-Me-Not**
Myosotis sylvatica	**FACU**	**Woodland Forget-Me-Not**
Myosotis verna	**FAC**	**Spring Forget-Me-Not**
Myosurus apetalus	**OBL**	**Bristly Mousetail**
Myosurus cupulatus	**FAC**	**Arizona Mousetail**
Myosurus minimus	**OBL**	**Tiny Mousetail**
Myosurus sessilis	**FACW**	**Vernal-Pool Mousetail**
Myrica hartwegii	**FAC**	**Sierran-Bayberry**
Myriophyllum aquaticum	**OBL**	**Parrot's-Feather**
Myriophyllum hippuroides	**OBL**	**Western Water-Milfoil**
Myriophyllum quitense	**OBL**	**Andean Water-Milfoil**
Myriophyllum sibiricum	**OBL**	**Siberian Water-Milfoil**
Myriophyllum spicatum	**OBL**	**Eurasian Water-Milfoil**
Myriophyllum verticillatum	**OBL**	**Whorled Water-Milfoil**
Nabalus racemosus	**FACU**	**Purple Rattlesnake-Root**
Najas flexilis	**OBL**	**Wavy Waternymph**
Najas gracillima	**OBL**	**Slender Waternymph**
Najas graminea	**OBL**	**Ricefield Waternymph**
Najas guadalupensis	**OBL**	**Guadalupe Waternymph**
Najas marina	**OBL**	**Holly-Leaf Waternymph**
Nama stenocarpum	**FACW**	**Mud Fiddleleaf**
Nama torynophyllum	**FACW**	**Matted Fiddleleaf**
Narthecium californicum	**OBL**	**California Bog Asphodel**
Nasturtium gambelii	**OBL**	**Gambel's Watercress**
Nasturtium microphyllum	**OBL**	**One-Row Watercress**
Nasturtium officinale	**OBL**	**Watercress**
Navarretia breweri	**FAC**	**Yellow Pincushion-Plant**
Navarretia capillaris	**FAC**	**Miniature Pincushion-Plant**
Navarretia cotulifolia	**OBL**	**Cotula-Leaf Pincushion-Plant**
Navarretia eriocephala	**FAC**	**Hoary Pincushion-Plant**
Navarretia fossalis	**OBL**	**Vernal-Pool Pincushion-Plant**
Navarretia heterandra	**OBL**	**Tehama Pincushion-Plant**
Navarretia intertexta	**FACW**	**Needle-Leaf Pincushion-Plant**
Navarretia jepsonii	**FACW**	**Jepson's Pincushion-Plant**
Navarretia leucocephala	**OBL**	**White-Flower Pincushion-Plant**
Navarretia mellita	**FAC**	**Honey-Scented Pincushion-Plant**
Navarretia myersii	**OBL**	**Myers' Pincushion-Plant**
Navarretia nigelliformis	**FACW**	**Adobe Pincushion-Plant**
Navarretia peninsularis	**FAC**	**Baja Pincushion-Plant**
Navarretia prostrata	**OBL**	**Prostrate Pincushion-Plant**

Navarretia saximontana	FACW	Rocky Mountain Pincushion-Plant
Navarretia squarrosa	FACU	Skunkweed
Navarretia subuligera	FACU	Awl-Leaf Pincushion-Plant
Navarretia tagetina	FACW	Marigold Pincushion-Plant
Nelumbo lutea	OBL	American Lotus
Nemophila pedunculata	FAC	Meadow Baby-Blue-Eyes
Neoholmgrenia andina	UPL	_?_
Neokochia americana	FAC	Green-Molly
Neokochia californica	FACW	California-Molly
Neostapfia colusana	OBL	Colusa Grass
Neottia banksiana	FACU	Northwestern Twayblade
Neottia borealis	FACW	Northern Twayblade
Neottia convallarioides	FAC	Broad-Lip Twayblade
Neottia cordata	FACW	Heart-Leaf Twayblade
Nepeta cataria	FACU	Catnip
Nephrolepis exaltata	FACU	Boston Sword Fern
Nesaea longipes	FACW	Stalkflower
Nicotiana attenuata	FACU	Coyote Tobacco
Nicotiana glauca	FAC	Tree Tobacco
Nicotiana obtusifolia	FACU	Desert Tobacco
Nicotiana quadrivalvis	FACU	Indian Tobacco
Nicotiana repanda	FAC	Fiddle-Leaf Tobacco
Nicotiana tabacum	UPL	Cultivated Tobacco
Nitrophila mohavensis	FACW	Amargosa Niterwort
Nitrophila occidentalis	FACW	Boraxweed
Nothoscordum bivalve	FACU	Crowpoison
Nuphar polysepala	OBL	_?_
Nymphaea X thiona	OBL	_?_
Nymphaea alba	OBL	European White Water-Lily
Nymphaea mexicana	OBL	Banana Water-Lily
Nymphaea odorata	OBL	American White Water-Lily
Nymphoides peltata	OBL	Yellow Floatingheart
Ocimum basilicum	UPL	Sweet Basil
Oemleria cerasiformis	FACU	Oso-Berry
Oenanthe sarmentosa	OBL	Pacific Water-Dropwort
Oenothera biennis	FACU	King's-Cureall
Oenothera canescens	FAC	Spotted Evening-Primrose
Oenothera coloradensis	FACW	_?_
Oenothera curtiflora	FACU	Velvetweed
Oenothera elata	FACW	Hooker's Evening-Primrose
Oenothera flava	FAC	Long-Tube Evening-Primrose
Oenothera jamesii	FACW	Trumpet Evening-Primrose
Oenothera kunthiana	FACU	Kunth's Evening-Primrose
Oenothera laciniata	FAC	Cut-Leaf Evening-Primrose
Oenothera longissima	OBL	Long-Stem Evening-Primrose
Oenothera organensis	OBL	Organ Mountain Evening-Primrose
Oenothera rhombipetala	FACU	Greater Four-Point Evening-Primrose

Oenothera rosea	FACW	Rose Evening-Primrose
Oenothera texensis	FACW	Texas Evening-Primrose
Oenothera villosa	FAC	Hairy Evening-Primrose
Olsynium douglasii	FACU	Grasswidow
Oncosiphon piluliferum	FACU	Stinknet
Ophioglossum californicum	FAC	California Adder's-Tongue
Ophioglossum engelmannii	FACW	Limestone Adder's-Tongue
Ophioglossum pusillum	FACW	Northern Adder's-Tongue
Ophioglossum vulgatum	FAC	Southern Adder's-Tongue
Oplopanax horridus	FAC	Devil's-Club
Orcuttia californica	OBL	California Orcutt Grass
Orcuttia inaequalis	OBL	San Joaquin Valley Orcutt Grass
Orcuttia pilosa	OBL	Hairy Orcutt Grass
Orcuttia tenuis	OBL	Slender Orcutt Grass
Orcuttia viscida	OBL	Sacramento Orcutt Grass
Oreostemma alpigenum	FAC	Tundra Mountaincrown
Oreostemma elatum	FACW	Plumas Mountaincrown
Ornithogalum umbellatum	FACU	Sleepydick
Orobanche riparia	FACW	River Broom-Rape
Orobanche uniflora	FACU	Naked Broom-Rape
Orogenia fusiformis	FACW	California Indian-Potato
Orthilia secunda	FACU	Sidebells
Orthocarpus bracteosus	FAC	Rosy Owl-Clover
Orthocarpus luteus	FACU	Golden-Tongue Owl-Clover
Oryza sativa	OBL	Cultivated Rice
Osmorhiza berteroi	FACU	Mountain Sweet-Cicely
Osmorhiza longistylis	FACU	Aniseroot
Osmorhiza purpurea	FAC	Purple Sweet-Cicely
Ostrya knowltonii	FAC	Knowlton's Hop-Hornbeam
Ottelia alismoides	OBL	Duck-Lettuce
Oxalis corniculata	FACU	Creeping Yellow Wood-Sorrel
Oxalis dillenii	FACU	Slender Yellow Wood-Sorrel
Oxalis oregana	FACU	Redwood-Sorrel
Oxalis stricta	FACU	Upright Yellow Wood-Sorrel
Oxalis trilliifolia	FAC	Trillium-Leaf Wood-Sorrel
Oxypolis fendleri	FACW	Fendler's Cowbane
Oxypolis occidentalis	OBL	Western Cowbane
Oxyria digyna	FACU	Mountain-Sorrel
Oxytropis deflexa	FACU	Pendant-Pod Locoweed
Oxytropis lambertii	UPL	Stemless Locoweed
Oxytropis oreophila	FACU	Mountain Locoweed
Oxytropis parryi	FACU	Parry's Locoweed
Oxytropis splendens	FAC	Whorled Locoweed
Ozomelis diversifolia	FAC	Angle-Leaf Mitrewort
Ozomelis trifida	FAC	Pacific Mitrewort
Packera bernardina	FACU	San Bernardino Groundsel
Packera bolanderi	FAC	Bolander's Groundsel

Packera clevelandii	**FACW**	**Cleveland's Groundsel**
Packera crocata	**FAC**	**Saffron Groundsel**
Packera debilis	**FACW**	**Weak-Stem Groundsel**
Packera dimorphophylla	**FACU**	**Two-Leaf Groundsel**
Packera hartiana	**FACW**	**Hart's Groundsel**
Packera heterophylla	**FACU**	**Dwarf Arctic Groundsel**
Packera indecora	**FACW**	**Rayless Mountain Groundsel**
Packera macounii	**FACU**	**Siskiyou Mountain Groundsel**
Packera obovata	**FACU**	**Round-Leaf Groundsel**
Packera pauciflora	**FAC**	**Rayless Alpine Groundsel**
Packera paupercula	**FACW**	**Balsam Groundsel**
Packera plattensis	**UPL**	**Prairie Groundsel**
Packera pseudaurea	**FACW**	**Streambank Groundsel**
Packera spellenbergii	**UPL**	**Carrizo Creek Groundsel**
Packera streptanthifolia	**FACU**	**Rocky Mountain Groundsel**
Packera subnuda	**FACW**	**Buek's Groundsel**
Packera tampicana	**FACW**	**Great Plains Groundsel**
Palmerella debilis	**FACW**	**Blue Lobelia**
Pancratium maritimum	**FACU**	**Sea-Daffodil**
Panicum amarum	**FACU**	**Bitter Panic Grass**
Panicum capillare	**FACU**	**Common Panic Grass**
Panicum coloratum	**FACW**	**Blue Panic Grass**
Panicum dichotomiflorum	**FACW**	**Fall Panic Grass**
Panicum flexile	**FAC**	**Wiry Panic Grass**
Panicum hallii	**UPL**	**Hall's Panic Grass**
Panicum hillmanii	**FACU**	**Hillman's Panic Grass**
Panicum repens	**FAC**	**Torpedo Grass**
Panicum virgatum	**FACW**	**Wand Panic Grass**
Parapholis incurva	**FACU**	**Curved Sickle Grass**
Parapholis strigosa	**OBL**	**European Sickle Grass**
Parathelypteris nevadensis	**FAC**	**_?_**
Parentucellia viscosa	**FAC**	**Yellow Glandweed**
Parietaria hespera	**FACU**	**Rillita Pellitory**
Parietaria pensylvanica	**FACU**	**Pennsylvania Pellitory**
Parkinsonia aculeata	**FAC**	**Mexican Palo-Verde**
Parnassia cirrata	**OBL**	**San Bernardino Grass-of-Parnassus**
Parnassia fimbriata	**OBL**	**Fringed Grass-of-Parnassus**
Parnassia kotzebuei	**OBL**	**Kotzebue's Grass-of-Parnassus**
Parnassia palustris	**OBL**	**Marsh Grass-of-Parnassus**
Parnassia parviflora	**OBL**	**Small-Flower Grass-of-Parnassus**
Paronychia ahartii	**FAC**	**Ahart's Nailwort**
Parthenium hysterophorus	**FAC**	**Santa Maria Feverfew**
Parthenocissus inserta	**FACU**	**Thicket-Creeper**
Parthenocissus quinquefolia	**FAC**	**Virginia-Creeper**
Pascopyrum smithii	**FAC**	**Western-Wheat Grass**
Paspalum dilatatum	**FAC**	**Golden Crown Grass**
Paspalum distichum	**FACW**	**Jointed Crown Grass**

Paspalum notatum	**FAC**	**Bahia Grass**
Paspalum plicatulum	**FAC**	**Brown-Seed Crown Grass**
Paspalum pubiflorum	**FACW**	**Hairy-Seed Crown Grass**
Paspalum setaceum	**UPL**	**Slender Crown Grass**
Paspalum urvillei	**FAC**	**Vasey's Grass**
Paspalum vaginatum	**FACW**	**Seashore Crown Grass**
Paspalum virgatum	**FACW**	**Talquezal**
Passiflora arizonica	**FAC**	**Arizona Passion-Flower**
Paulownia tomentosa	**UPL**	**Princesstree**
Paxistima myrsinites	**FACU**	**Oregon Boxleaf**
Pectiantia breweri	**FAC**	**_?_**
Pectiantia ovalis	**OBL**	**_?_**
Pectiantia pentandra	**FACW**	**_?_**
Pedicularis attollens	**OBL**	**Little Elephant's-Head**
Pedicularis contorta	**FACU**	**White Coil-Beak Lousewort**
Pedicularis crenulata	**FACW**	**Purple-Flower Lousewort**
Pedicularis fluviatilis	**FAC**	**Marsh Lousewort**
Pedicularis groenlandica	**OBL**	**Bull Elephant's-Head**
Pedicularis parryi	**FACU**	**Parry's Lousewort**
Pedicularis procera	**FACU**	**Giant Lousewort**
Pedicularis scopulorum	**FACW**	**Rocky Mountain Lousewort**
Pellaea ternifolia	**FACU**	**Trans-Pecos Cliffbrake**
Peltandra virginica	**OBL**	**Green Arrow-Arum**
Penstemon attenuatus	**FACU**	**Sulphur Beardtongue**
Penstemon baccharifolius	**FACU**	**Baccharis-Leaf Beardtongue**
Penstemon globosus	**FAC**	**Globe Beardtongue**
Penstemon gracilis	**UPL**	**Lilac Beardtongue**
Penstemon heterodoxus	**FACU**	**Sierran Beardtongue**
Penstemon lyallii	**FACU**	**Lyall's Beardtongue**
Penstemon procerus	**FAC**	**Pincushion Beardtongue**
Penstemon pseudoputus	**FACU**	**Kaibab Plateau Beardtongue**
Penstemon rydbergii	**FACU**	**Meadow Beardtongue**
Penstemon serrulatus	**FACU**	**Cascade Beardtongue**
Penstemon virgatus	**FACU**	**Upright Blue Beardtongue**
Penstemon whippleanus	**FACU**	**Dark Beardtongue**
Pentachaeta fragilis	**FAC**	**Fragile Pygmy Daisy**
Perideridia californica	**FACW**	**California Yampah**
Perideridia gairdneri	**FAC**	**Common Yampah**
Perideridia howellii	**FACW**	**Howell's Yampah**
Perideridia parishii	**FAC**	**Parish's Yampah**
Peritoma jonesii	**FACU**	**Jones' Beeplant**
Peritoma lutea	**FACU**	**Yellow Beeplant**
Peritoma multicaulis	**FACW**	**Playa Beeplant**
Peritoma serrulata	**FACU**	**Rocky Mountain Beeplant**
Persicaria amphibia	**OBL**	**Water Smartweed**
Persicaria arifolia	**OBL**	**Halberd-Leaf Tearthumb**
Persicaria bicornis	**FACW**	**Pink Knotweed**

Persicaria capitata	**FACU**	**Pink-Head Smartweed**
Persicaria glabra	**OBL**	**Smooth Smartweed**
Persicaria hydropiper	**OBL**	**Mild Water-Pepper**
Persicaria hydropiperoides	**OBL**	**Swamp Smartweed**
Persicaria lapathifolia	**FACW**	**Dock-Leaf Smartweed**
Persicaria maculosa	**FACW**	**Spotted Lady's-Thumb**
Persicaria orientalis	**FACW**	**Kiss-Me-Over-the-Garden-Gate**
Persicaria pensylvanica	**FACW**	**Pinkweed**
Persicaria punctata	**OBL**	**Dotted Smartweed**
Persicaria robustior	**OBL**	**Stout Smartweed**
Persicaria sagittata	**OBL**	**Arrow-Leaf Tearthumb**
Persicaria setacea	**OBL**	**Bog Smartweed**
Persicaria wallichii	**FAC**	**Garden Smartweed**
Petasites frigidus	**FACW**	**Arctic Sweet-Colt's-Foot**
Phacelia amabilis	**FACU**	**Saline Valley Scorpion-Weed**
Phacelia heterophylla	**FACU**	**Variable-Leaf Scorpion-Weed**
Phacelia inundata	**FACW**	**Playa Yellow Scorpion-Weed**
Phacelia inyoensis	**FAC**	**Inyo Yellow Scorpion-Weed**
Phacelia lemmonii	**FACU**	**Lemmon's Scorpion-Weed**
Phacelia orogenes	**FACU**	**Mountain Scorpion-Weed**
Phacelia parishii	**FACU**	**Parish's Scorpion-Weed**
Phacelia procera	**FAC**	**Tall Scorpion-Weed**
Phacelia ramosissima	**FACU**	**Branched Scorpion-Weed**
Phacelia tetramera	**FAC**	**Four-Part Yellow Scorpion-Weed**
Phalacroseris bolanderi	**OBL**	**Bolander's Mock Dandelion**
Phalaris angusta	**FACW**	**Timothy Canary Grass**
Phalaris aquatica	**FACU**	**Harding Grass**
Phalaris arundinacea	**FACW**	**Reed Canary Grass**
Phalaris brachystachys	**FACW**	**Short-Spike Canary Grass**
Phalaris californica	**FAC**	**California Canary Grass**
Phalaris canariensis	**FACU**	**Common Canary Grass**
Phalaris caroliniana	**FACW**	**May Grass**
Phalaris lemmonii	**FACW**	**Lemmon's Canary Grass**
Phalaris paradoxa	**FAC**	**Mediterranean Canary Grass**
Phegopteris connectilis	**FACU**	**Narrow Beech Fern**
Phippsia algida	**OBL**	**Ice Grass**
Phleum alpinum	**FAC**	**Mountain Timothy**
Phleum pratense	**FACU**	**Common Timothy**
Phlox idahonis	**FACW**	**Clearwater Phlox**
Phlox kelseyi	**FACW**	**Marsh Phlox**
Phlox paniculata	**FACU**	**Fall Phlox**
Phlox pilosa	**FAC**	**Downy Phlox**
Phragmites australis	**FACW**	**Common Reed**
Phragmites karka	**OBL**	**Tropical Reed**
Phryma leptostachya	**FACU**	**American Lopseed**
Phyla cuneifolia	**FAC**	**Wedgeleaf**
Phyla fruticosa	**FAC**	**Diamond-Leaf Frogfruit**

Phyla lanceolata	**OBL**	**Northern Frogfruit**
Phyla nodiflora	**FACW**	**Turkey-Tangle**
Phyllanthus caroliniensis	**FAC**	**Carolina Leaf-Flower**
Phyllodoce breweri	**FAC**	**Red Mountain-Heath**
Phyllodoce empetriformis	**FACU**	**Pink Mountain-Heath**
Phyllodoce glanduliflora	**FACU**	**Yellow Mountain-Heath**
Phyllospadix scouleri	**OBL**	**Scouler's Surf-Grass**
Phyllospadix torreyi	**OBL**	**Torrey's Surf-Grass**
Physalis angulata	**UPL**	**Cut-Leaf Ground-Cherry**
Physalis peruviana	**UPL**	**Peruvian Ground-Cherry**
Physalis philadelphica	**UPL**	**Mexican Ground-Cherry**
Physalis pubescens	**FACU**	**Husk-Tomato**
Physocarpus capitatus	**FACW**	**Pacific Ninebark**
Physocarpus monogynus	**UPL**	**Mountain Ninebark**
Physocarpus opulifolius	**FACU**	**Atlantic Ninebark**
Physostegia parviflora	**FACW**	**Western False Dragonhead**
Physostegia virginiana	**FACW**	**Obedient-Plant**
Phytolacca americana	**FAC**	**American Pokeweed**
Phytolacca icosandra	**FACU**	**Tropical Pokeweed**
Picea engelmannii	**FACU**	**Engelmann's Spruce**
Picea glauca	**FAC**	**White Spruce**
Picea pungens	**FAC**	**Blue Spruce**
Picea sitchensis	**FAC**	**Sitka Spruce**
Pilularia americana	**OBL**	**American Pillwort**
Pinguicula macroceras	**OBL**	**California Butterwort**
Pinus contorta	**FAC**	**Lodgepole Pine**
Pinus monticola	**FACU**	**Western White Pine**
Pinus ponderosa	**FACU**	**Ponderosa Pine**
Piperia dilatata	**FACW**	**Scentbottle**
Piperia unalascensis	**FACU**	**Alaska Rein Orchid**
Pistia stratiotes	**OBL**	**Water-Lettuce**
Plagiobothrys acanthocarpus	**OBL**	**Adobe Popcorn-Flower**
Plagiobothrys austiniae	**OBL**	**Austin's Popcorn-Flower**
Plagiobothrys bracteatus	**FACW**	**Bracted Popcorn-Flower**
Plagiobothrys chorisianus	**OBL**	**Artist's Popcorn-Flower**
Plagiobothrys distantiflorus	**OBL**	**California Popcorn-Flower**
Plagiobothrys figuratus	**FACW**	**Fragrant Popcorn-Flower**
Plagiobothrys glaber	**OBL**	**Hairless Popcorn-Flower**
Plagiobothrys glyptocarpus	**FACW**	**Sculptured Popcorn-Flower**
Plagiobothrys greenei	**FACW**	**Greene's Popcorn-Flower**
Plagiobothrys hispidulus	**FACW**	**Harsh Popcorn-Flower**
Plagiobothrys humistratus	**OBL**	**Dwarf Popcorn-Flower**
Plagiobothrys hystriculus	**FACW**	**Bearded Popcorn-Flower**
Plagiobothrys leptocladus	**OBL**	**Alkali Popcorn-Flower**
Plagiobothrys lithocaryus	**FACW**	**Mayacamas Popcorn-Flower**
Plagiobothrys mollis	**FACW**	**Soft Popcorn-Flower**
Plagiobothrys nitens	**OBL**	**Shiny-Nutlet Popcorn-Flower**

Plagiobothrys nothofulvus	**FAC**	**Rusty Popcorn-Flower**
Plagiobothrys parishii	**OBL**	**Parish's Popcorn-Flower**
Plagiobothrys reticulatus	**FACW**	**Netted Popcorn-Flower**
Plagiobothrys salsus	**FACW**	**Salty Popcorn-Flower**
Plagiobothrys scouleri	**FACW**	**Meadow Popcorn-Flower**
Plagiobothrys stipitatus	**FACW**	**Stalked Popcorn-Flower**
Plagiobothrys strictus	**OBL**	**Calistoga Popcorn-Flower**
Plagiobothrys tenellus	**FACU**	**Pacific Popcorn-Flower**
Plagiobothrys tener	**OBL**	**Slender Popcorn-Flower**
Plagiobothrys trachycarpus	**FACW**	**Rough-Fruit Popcorn-Flower**
Plagiobothrys undulatus	**OBL**	**Wavy-Stem Popcorn-Flower**
Planodes virginicum	**FAC**	**Virginia Winged Rockcress**
Plantago arenaria	**UPL**	**Sand Plantain**
Plantago australis	**FACW**	**Mexican Plantain**
Plantago bigelovii	**OBL**	**Annual Coastal Plantain**
Plantago coronopus	**FAC**	**Buck-Horn Plantain**
Plantago elongata	**FACW**	**Prairie Plantain**
Plantago eriopoda	**FACW**	**Red-Woolly Plantain**
Plantago firma	**FACW**	**Chilean Plantain**
Plantago lanceolata	**FAC**	**English Plantain**
Plantago major	**FAC**	**Great Plantain**
Plantago maritima	**FACW**	**Goosetongue**
Plantago ovata	**FACU**	**Blond Plantain**
Plantago pusilla	**FAC**	**Dwarf Plantain**
Plantago rhodosperma	**FAC**	**Red-Seed Plantain**
Plantago rugelii	**FAC**	**Black-Seed Plantain**
Plantago subnuda	**FACW**	**Tall Coastal Plantain**
Plantago virginica	**FACU**	**Pale-Seed Plantain**
Platanthera X estesii	**FACW**	**_?_**
Platanthera X folsomii	**FACW**	**_?_**
Platanthera X kelleyi	**FACW**	**_?_**
Platanthera X lassenii	**FACW**	**_?_**
Platanthera aquilonis	**OBL**	**Bog Orchid**
Platanthera brevifolia	**FAC**	**Short-Leaf Fringed Orchid**
Platanthera huronensis	**OBL**	**Lake Huron Green Orchid**
Platanthera limosa	**OBL**	**Thurber's Bog Orchid**
Platanthera obtusata	**FACW**	**Blunt-Leaf Orchid**
Platanthera orbiculata	**FAC**	**Lesser Round-Leaf Orchid**
Platanthera rotundifolia	**OBL**	**Round-Leaf Orchid**
Platanthera sparsiflora	**FACW**	**Canyon Bog Orchid**
Platanthera stricta	**FACW**	**Slender Bog Orchid**
Platanthera tescamnis	**OBL**	**Intermountain Bog Orchid**
Platanthera yosemitensis	**FACW**	**Yosemite Bog Orchid**
Platanus occidentalis	**FAC**	**American Sycamore**
Platanus racemosa	**FAC**	**California Sycamore**
Platanus wrightii	**FACW**	**Arizona Sycamore**
Plecostachys serpyllifolia	**FACU**	**Petite-Licorice**

Plectritis ciliosa	**FACU**	**Long-Spur Seablush**
Plectritis congesta	**FACU**	**Short-Spur Seablush**
Plectritis macrocera	**FACU**	**White Seablush**
Pleuropogon californicus	**OBL**	**California False Semaphore Grass**
Pleuropogon hooverianus	**FACW**	**North Coast False Semaphore Grass**
Pleuropogon oregonus	**OBL**	**Oregon False Semaphore Grass**
Pleuropogon refractus	**OBL**	**Nodding False Semaphore Grass**
Pluchea odorata	**FACW**	**Sweetscent**
Pluchea sericea	**FACW**	**Arrow-Weed**
Plumbago auriculata	**UPL**	**Cape Leadwort**
Plumbago zeylanica	**FAC**	**Wild Leadwort**
Poa abbreviata	**FACU**	**Northern Blue Grass**
Poa alpina	**FAC**	**Alpine Blue Grass**
Poa annua	**FAC**	**Annual Blue Grass**
Poa arctica	**FACU**	**Arctic Blue Grass**
Poa arida	**FAC**	**Prairie Blue Grass**
Poa arnowiae	**FACU**	**Arnow's Blue Grass**
Poa atropurpurea	**FACW**	**San Bernardino Blue Grass**
Poa bulbosa	**FACU**	**Bulbous Blue Grass**
Poa compressa	**FACU**	**Flat-Stem Blue Grass**
Poa douglasii	**FACU**	**Seashore Blue Grass**
Poa interior	**FAC**	**Inland Blue Grass**
Poa leibergii	**FACU**	**Leiberg's Blue Grass**
Poa leptocoma	**FACW**	**Marsh Blue Grass**
Poa macrantha	**UPL**	**Sand-Dune Blue Grass**
Poa napensis	**OBL**	**Napa Blue Grass**
Poa nemoralis	**FAC**	**Forest Blue Grass**
Poa palustris	**FAC**	**Fowl Blue Grass**
Poa pratensis	**FAC**	**Kentucky Blue Grass**
Poa reflexa	**FAC**	**Nodding Blue Grass**
Poa secunda	**FACU**	**Curly Blue Grass**
Poa stebbinsii	**FACU**	**Subalpine Blue Grass**
Poa stenantha	**FACU**	**Narrow-Flower Blue Grass**
Poa trivialis	**FACW**	**Rough-Stalk Blue Grass**
Poa unilateralis	**FACU**	**San Francisco Blue Grass**
Podagrostis humilis	**FACW**	**Alpine False Bent**
Pogogyne abramsii	**OBL**	**San Diego Mesa-Mint**
Pogogyne clareana	**FACW**	**Santa Lucia Mesa-Mint**
Pogogyne douglasii	**OBL**	**Douglas' Mesa-Mint**
Pogogyne floribunda	**OBL**	**Profuse-Flower Mesa-Mint**
Pogogyne nudiuscula	**OBL**	**Otay Mesa-Mint**
Pogogyne serpylloides	**FACW**	**Thyme-Leaf Mesa-Mint**
Pogogyne ziziphoroides	**OBL**	**Sacramento Mesa-Mint**
Polanisia dodecandra	**FACU**	**Red-Whisker Clammyweed**
Polemonium foliosissimum	**FAC**	**Towering Jacob's-Ladder**
Polemonium micranthum	**FACU**	**Annual Jacob's-Ladder**
Polemonium occidentale	**FACW**	**Western Jacob's-Ladder**

Polemonium pauciflorum	**FACW**	**Few-Flower Jacob's-Ladder**
Polyctenium fremontii	**FAC**	**Desert Combleaf**
Polygala ambigua	**FACU**	**Alternate Milkwort**
Polygala sanguinea	**FACU**	**Purple Milkwort**
Polygala verticillata	**FACU**	**Whorled Milkwort**
Polygonatum biflorum	**FACU**	**King Solomon's-Seal**
Polygonum achoreum	**FACU**	**Leathery Knotweed**
Polygonum argyrocoleon	**FAC**	**Silver-Sheath Knotweed**
Polygonum austiniae	**FACU**	**Mrs. Austin's Knotweed**
Polygonum aviculare	**FAC**	**Yard Knotweed**
Polygonum douglasii	**FACU**	**Douglas' Knotweed**
Polygonum engelmannii	**FACU**	**Engelmann's Knotweed**
Polygonum erectum	**FACU**	**Erect Knotweed**
Polygonum fowleri	**FACW**	**Fowler's Knotweed**
Polygonum kelloggii	**FACW**	**Kellogg's Knotweed**
Polygonum majus	**FACU**	**Wiry Knotweed**
Polygonum marinense	**OBL**	**Marin Knotweed**
Polygonum minimum	**FACU**	**Zigzag Knotweed**
Polygonum parryi	**FAC**	**Parry's Knotweed**
Polygonum patulum	**FACW**	**Bellard's Knotweed**
Polygonum polygaloides	**FACW**	**White-Margin Knotweed**
Polygonum ramosissimum	**FAC**	**Yellow-Flower Knotweed**
Polygonum sawatchense	**FACU**	**Sawatch Knotweed**
Polygonum spergulariiforme	**FACU**	**Fall Knotweed**
Polygonum striatulum	**FACW**	**Striped Knotweed**
Polypogon australis	**FACW**	**Chilean Rabbit's-Foot Grass**
Polypogon elongatus	**OBL**	**Streambank Rabbit's-Foot Grass**
Polypogon fugax	**FACU**	**Hill Rabbit's-Foot Grass**
Polypogon interruptus	**FACW**	**Ditch Rabbit's-Foot Grass**
Polypogon maritimus	**OBL**	**Maritime Rabbit's-Foot Grass**
Polypogon monspeliensis	**FACW**	**Annual Rabbit's-Foot Grass**
Polypogon viridis	**FACW**	**Beardless Rabbit's-Foot Grass**
Polypremum procumbens	**FACU**	**Juniper-Leaf**
Polystichum lonchitis	**FACU**	**Northern Holly Fern**
Polystichum munitum	**FACU**	**Pineland Sword Fern**
Pontederia cordata	**OBL**	**Pickerelweed**
Populus X acuminata	**FAC**	**_?_**
Populus X hinckleyana	**FAC**	**_?_**
Populus angustifolia	**FACW**	**Narrow-Leaf Cottonwood**
Populus balsamifera	**FAC**	**Balsam Poplar**
Populus deltoides	**FAC**	**Eastern Cottonwood**
Populus tremuloides	**FACU**	**Quaking Aspen**
Porterella carnosula	**OBL**	**Porterplant**
Portulaca grandiflora	**UPL**	**Rose-Moss**
Portulaca halimoides	**FAC**	**Silk-Cotton Purslane**
Portulaca oleracea	**FAC**	**Little-Hogweed**
Portulaca pilosa	**FACU**	**Kiss-Me-Quick**

Portulaca umbraticola	**FACU**	**Wing-Pod Purslane**
Potamogeton X faxonii	**OBL**	**_?_**
Potamogeton X nericus	**OBL**	**_?_**
Potamogeton X spathuliformis	**OBL**	**_?_**
Potamogeton alpinus	**OBL**	**Reddish Pondweed**
Potamogeton amplifolius	**OBL**	**Large-Leaf Pondweed**
Potamogeton berchtoldii	**OBL**	**Little Aguja Pondweed**
Potamogeton clystocarpus	**OBL**	**Little Aguja Pondweed**
Potamogeton crispus	**OBL**	**Curly Pondweed**
Potamogeton diversifolius	**OBL**	**Waterthread**
Potamogeton epihydrus	**OBL**	**Ribbon-Leaf Pondweed**
Potamogeton foliosus	**OBL**	**Leafy Pondweed**
Potamogeton friesii	**OBL**	**Flat-Stalk Pondweed**
Potamogeton gramineus	**OBL**	**Grassy Pondweed**
Potamogeton illinoensis	**OBL**	**Illinois Pondweed**
Potamogeton natans	**OBL**	**Broad-Leaf Pondweed**
Potamogeton nodosus	**OBL**	**Long-Leaf Pondweed**
Potamogeton obtusifolius	**OBL**	**Blunt-Leaf Pondweed**
Potamogeton praelongus	**OBL**	**White-Stem Pondweed**
Potamogeton pusillus	**OBL**	**Small Pondweed**
Potamogeton richardsonii	**OBL**	**Red-Head Pondweed**
Potamogeton robbinsii	**OBL**	**Fern Pondweed**
Potamogeton strictifolius	**OBL**	**Straight-Leaf Pondweed**
Potamogeton zosteriformis	**OBL**	**Flat-Stem Pondweed**
Potentilla X nana	**FAC**	**_?_**
Potentilla anserina	**OBL**	**Silverweed**
Potentilla argentea	**FACU**	**Silver-Leaf Cinquefoil**
Potentilla basaltica	**FACW**	**Soldier Meadows Cinquefoil**
Potentilla biennis	**FACW**	**Biennial Cinquefoil**
Potentilla breweri	**FAC**	**Brewer's Cinquefoil**
Potentilla bruceae	**FAC**	**Bruce's Cinquefoil**
Potentilla drummondii	**FAC**	**Drummond's Cinquefoil**
Potentilla flabellifolia	**FACW**	**Fringe-Leaf Cinquefoil**
Potentilla glaucophylla	**FACU**	**Mountain-Meadow Cinquefoil**
Potentilla gracilis	**FAC**	**Graceful Cinquefoil**
Potentilla hickmanii	**FACW**	**Hickman's Cinquefoil**
Potentilla indica	**UPL**	**Indian-Strawberry**
Potentilla millefolia	**FACW**	**Cut-Leaf Cinquefoil**
Potentilla multijuga	**OBL**	**Ballona Cinquefoil**
Potentilla newberryi	**OBL**	**Newberry's Cinquefoil**
Potentilla norvegica	**FAC**	**Norwegian Cinquefoil**
Potentilla pensylvanica	**FACU**	**Pennsylvania Cinquefoil**
Potentilla plattensis	**FACW**	**Platte River Cinquefoil**
Potentilla pulcherrima	**FAC**	**Soft Cinquefoil**
Potentilla rivalis	**FACW**	**Brook Cinquefoil**
Potentilla rubricaulis	**FACU**	**Rocky Mountain Cinquefoil**
Potentilla supina	**FACW**	**Bushy Cinquefoil**

Potentilla thurberi	**FACW**	**Scarlet Cinquefoil**
Potentilla uliginosa	**OBL**	**Cunningham Marsh Cinquefoil**
Poterium sanguisorba	**FACU**	**_?_**
Primula alcalina	**OBL**	**Blue-Dome Primrose**
Primula angustifolia	**FACU**	**Alpine Primrose**
Primula capillaris	**FACW**	**Ruby Mountain Primrose**
Primula cusickiana	**FAC**	**Wallowa Primrose**
Primula egaliksensis	**OBL**	**Greenland Primrose**
Primula incana	**OBL**	**Silvery Primrose**
Primula parryi	**FAC**	**Brook Primrose**
Primula rusbyi	**FAC**	**Rusby's Primrose**
Primula suffrutescens	**FAC**	**Sierran Primrose**
Proboscidea louisiana	**FACU**	**Ram's-Horn**
Prosartes trachycarpa	**FACU**	**Rough-Fruit Fairybells**
Prosopis glandulosa	**FACU**	**Honey Mesquite**
Prosopis pubescens	**FAC**	**American Screw-Bean**
Prosopis velutina	**FACU**	**Velvet Mesquite**
Prunella vulgaris	**FACU**	**Common Selfheal**
Prunus americana	**FACU**	**American Plum**
Prunus avium	**FACU**	**Sweet Cherry**
Prunus caroliniana	**FACU**	**Carolina Laurel Cherry**
Prunus emarginata	**FACU**	**Bitter Cherry**
Prunus pensylvanica	**FACU**	**Fire Cherry**
Prunus serotina	**FACU**	**Black Cherry**
Prunus virginiana	**FAC**	**Choke Cherry**
Psathyrostachys juncea	**UPL**	**Russian-Wild Rye**
Psathyrotes annua	**FACU**	**Mealy Turtleback**
Pseudognaphalium canescens	**FACU**	**Wright's Rabbit-Tobacco**
Pseudognaphalium luteoalbum	**FAC**	**Jersey Rabbit-Tobacco**
Pseudognaphalium stramineum	**FAC**	**Cotton-Batting-Plant**
Pseudotsuga menziesii	**FACU**	**Douglas-Fir**
Psidium cattleianum	**FACU**	**Purple Strawberry Guava**
Psidium guajava	**UPL**	**Guava**
Psilactis asteroides	**FACW**	**New Mexico Bare-Ray-Aster**
Psilocarphus brevissimus	**FACW**	**Dwarf Woollyheads**
Psilocarphus chilensis	**FACW**	**Chilean Woollyheads**
Psilocarphus elatior	**FACW**	**Tall Woollyheads**
Psilocarphus oregonus	**OBL**	**Oregon Woollyheads**
Psilocarphus tenellus	**OBL**	**Slender Woollyheads**
Psilotum nudum	**FACW**	**Whisk Fern**
Psorothamnus arborescens	**FACU**	**Mojave Smokebush**
Ptelea trifoliata	**UPL**	**Common Hoptree**
Pteridium aquilinum	**FACU**	**Northern Bracken Fern**
Pteris vittata	**FAC**	**Ladder Brake**
Ptilagrostis kingii	**FACU**	**Sierran False Needle Grass**
Puccinellia distans	**FACW**	**Spreading Alkali Grass**
Puccinellia fasciculata	**OBL**	**Saltmarsh Alkali Grass**

Puccinellia howellii	**OBL**	**Howell's Alkali Grass**
Puccinellia lemmonii	**FACW**	**Lemmon's Alkali Grass**
Puccinellia lucida	**OBL**	**Shining Alkali Grass**
Puccinellia nutkaensis	**OBL**	**Nootka Alkali Grass**
Puccinellia nuttalliana	**FACW**	**Nuttall's Alkali Grass**
Puccinellia parishii	**OBL**	**Parish's Alkali Grass**
Puccinellia pumila	**FACW**	**Dwarf Alkali Grass**
Puccinellia simplex	**FACW**	**California Alkali Grass**
Pueraria montana	**UPL**	**Kudzu**
Pulicaria paludosa	**FAC**	**Spanish False Fleabane**
Pyrola asarifolia	**FAC**	**Pink Wintergreen**
Pyrola chlorantha	**FAC**	**Green-Flower Wintergreen**
Pyrola elliptica	**UPL**	**Shinleaf**
Pyrola minor	**FACU**	**Snowline Wintergreen**
Pyrrocoma hirta	**FAC**	**Tacky Goldenweed**
Pyrrocoma lanceolata	**FAC**	**Lance-Leaf Goldenweed**
Pyrrocoma racemosa	**FAC**	**Clustered Goldenweed**
Pyrrocoma uniflora	**FACW**	**Plantain Goldenweed**
Quercus garryana	**UPL**	**Oregon White Oak**
Quercus hemisphaerica	**FACU**	**Darlington's Oak**
Quercus lobata	**FACU**	**Valley Oak**
Quercus macrocarpa	**FAC**	**Burr Oak**
Quercus muehlenbergii	**FAC**	**Chinkapin Oak**
Quercus rubra	**FACU**	**Northern Red Oak**
Quercus virginiana	**FACU**	**Live Oak**
Quincula lobata	**FACU**	**Chinese-Lantern**
Raillardella pringlei	**OBL**	**Showy Raillardella**
Raillardella scaposa	**FACU**	**Green-Leaf Raillardella**
Ranunculus abortivus	**FACW**	**Kidney-Leaf Buttercup**
Ranunculus acriformis	**FACW**	**Sharp-Leaf Buttercup**
Ranunculus acris	**FACW**	**Tall Buttercup**
Ranunculus adoneus	**FACW**	**Alpine Buttercup**
Ranunculus aestivalis	**FACW**	**Fall Buttercup**
Ranunculus alismifolius	**FACW**	**Water-Plantain Buttercup**
Ranunculus aquatilis	**OBL**	**White Water-Crowfoot**
Ranunculus arcticus	**FAC**	**Northern Buttercup**
Ranunculus arvensis	**FACU**	**Hungerweed**
Ranunculus bonariensis	**OBL**	**Carter's Buttercup**
Ranunculus bulbosus	**FAC**	**St. Anthony's-Turnip**
Ranunculus californicus	**FACU**	**California Buttercup**
Ranunculus canus	**FAC**	**Sacramento Valley Buttercup**
Ranunculus cardiophyllus	**FACW**	**Heart-Leaf Buttercup**
Ranunculus eschscholtzii	**FAC**	**Spruce-Fir Buttercup**
Ranunculus flabellaris	**OBL**	**Greater Yellow Water Buttercup**
Ranunculus flammula	**OBL**	**Greater Creeping Spearwort**
Ranunculus glaberrimus	**FAC**	**Sagebrush Buttercup**
Ranunculus gmelinii	**FACW**	**Lesser Yellow Water Buttercup**

Ranunculus gormanii	**FACW**	**Gorman's Buttercup**
Ranunculus grayi	**FAC**	**Arctic Buttercup**
Ranunculus hydrocharoides	**OBL**	**Frog-Bit Buttercup**
Ranunculus hyperboreus	**OBL**	**Far-Northern Buttercup**
Ranunculus inamoenus	**FACW**	**Graceful Buttercup**
Ranunculus jovis	**FAC**	**Hillside Buttercup**
Ranunculus lobbii	**OBL**	**Lobb's Water-Crowfoot**
Ranunculus longirostris	**OBL**	**Long-Beak Water-Crowfoot**
Ranunculus macauleyi	**FACW**	**Rocky Mountain Buttercup**
Ranunculus macounii	**OBL**	**Macoun's Buttercup**
Ranunculus muricatus	**FACW**	**Spiny-Fruit Buttercup**
Ranunculus occidentalis	**FAC**	**Western Buttercup**
Ranunculus oreogenes	**FACU**	**Oregon Buttercup**
Ranunculus orthorhynchus	**FACW**	**Straight-Beak Buttercup**
Ranunculus parviflorus	**FAC**	**Small-Flower Buttercup**
Ranunculus pensylvanicus	**FACW**	**Pennsylvania Buttercup**
Ranunculus populago	**OBL**	**Mountain Buttercup**
Ranunculus pusillus	**OBL**	**Low Spearwort**
Ranunculus pygmaeus	**FACW**	**Dwarf Buttercup**
Ranunculus repens	**FAC**	**Creeping Buttercup**
Ranunculus sardous	**FACW**	**Hairy Buttercup**
Ranunculus sceleratus	**OBL**	**Cursed Buttercup**
Ranunculus subrigidus	**OBL**	**Short-Beak Water-Crowfoot**
Ranunculus sulphureus	**FACW**	**Sulphur Buttercup**
Ranunculus trichophyllus	**OBL**	**Thread-Leaf Water-Crowfoot**
Ranunculus trilobus	**FACU**	**Three-Lobe Buttercup**
Ranunculus uncinatus	**FAC**	**Woodland Buttercup**
Reynoutria X bohemica	**FACU**	**_?_**
Reynoutria japonica	**FACU**	**Japanese-Knotweed**
Reynoutria sachalinensis	**FACU**	**Giant-Knotweed**
Rhamnus alaternus	**FACU**	**Evergreen Buckthorn**
Rhamnus alnifolia	**OBL**	**Alder-Leaf Buckthorn**
Rhamnus cathartica	**FAC**	**European Buckthorn**
Rhinanthus minor	**FACU**	**Little Yellow-Rattle**
Rhinotropis cornuta	**FACW**	**Sierran Desert-Milkwort**
Rhodiola integrifolia	**FACU**	**Entire-Leaf Rosewort**
Rhodiola rhodantha	**FACW**	**Queen's-Crown**
Rhododendron albiflorum	**FACU**	**Cascade Azalea**
Rhododendron columbianum	**FACW**	**Western Labrador-Tea**
Rhododendron macrophyllum	**FACU**	**California Rhododendron**
Rhododendron occidentale	**FAC**	**Western Azalea**
Rhododendron prinophyllum	**FAC**	**Early Azalea**
Rhus aromatica	**FACU**	**Fragrant Sumac**
Rhus copallinum	**FACU**	**Winged Sumac**
Rhynchospora alba	**OBL**	**White Beak Sedge**
Rhynchospora brachychaeta	**FACW**	**West Indian Beak Sedge**
Rhynchospora californica	**OBL**	**California Beak Sedge**

Rhynchospora capitellata	**OBL**	**Brownish Beak Sedge**
Rhynchospora globularis	**OBL**	**Globe Beak Sedge**
Rhynchospora recognita	**FACW**	**Coarse Globe Beak Sedge**
Ribes acerifolium	**FACU**	**Maple-Leaf Currant**
Ribes americanum	**FACW**	**Wild Black Currant**
Ribes aureum	**FAC**	**Golden Currant**
Ribes bracteosum	**FAC**	**California Black Currant**
Ribes divaricatum	**FAC**	**Coastal Black Gooseberry**
Ribes hudsonianum	**FACW**	**Northern Black Currant**
Ribes inerme	**FAC**	**White-Stem Gooseberry**
Ribes lacustre	**FACW**	**Bristly Black Gooseberry**
Ribes laxiflorum	**FACU**	**Trailing Black Currant**
Ribes lobbii	**FACU**	**Oregon Gooseberry**
Ribes nevadense	**FAC**	**Sierran Currant**
Ribes oxyacanthoides	**FACU**	**Canadian Gooseberry**
Ribes sanguineum	**UPL**	**Blood Currant**
Ribes thacherianum	**FACU**	**Santa Cruz Gooseberry**
Ribes triste	**OBL**	**Swamp Red Currant**
Ribes viscosissimum	**FAC**	**Sticky Currant**
Ribes wolfii	**FAC**	**Winaha Currant**
Ricinus communis	**FACU**	**Castor-Bean**
Rivina humilis	**FAC**	**Rougeplant**
Robinia pseudoacacia	**FACU**	**Black Locust**
Romanzoffia californica	**FAC**	**California Mistmaiden**
Romanzoffia sitchensis	**FACW**	**Sitka Mistmaiden**
Rorippa austriaca	**FACW**	**Austrian Yellowcress**
Rorippa calycina	**FACW**	**Persistent-Sepal Yellowcress**
Rorippa columbiae	**OBL**	**Columbian Yellowcress**
Rorippa curvipes	**FACW**	**Blunt-Leaf Yellowcress**
Rorippa curvisiliqua	**OBL**	**Curve-Pod Yellowcress**
Rorippa dubia	**FAC**	**_?_**
Rorippa microtitis	**FACW**	**Chihuahuan Yellowcress**
Rorippa palustris	**OBL**	**Bog Yellowcress**
Rorippa ramosa	**FACW**	**Durango Yellowcress**
Rorippa sinuata	**FACW**	**Spreading Yellowcress**
Rorippa sphaerocarpa	**FACW**	**Round-Fruit Yellowcress**
Rorippa subumbellata	**OBL**	**Lake Tahoe Yellowcress**
Rorippa sylvestris	**OBL**	**Creeping Yellowcress**
Rorippa tenerrima	**FAC**	**Modoc Yellowcress**
Rorippa teres	**FACW**	**Southern Marsh Yellowcress**
Rosa acicularis	**FACU**	**Prickly Rose**
Rosa arkansana	**FACU**	**Prairie Rose**
Rosa californica	**FAC**	**California Rose**
Rosa gymnocarpa	**FACU**	**Bald-Hip Rose**
Rosa micrantha	**FACU**	**Small-Flower Sweetbrier**
Rosa multiflora	**FACU**	**Rambler Rose**
Rosa nutkana	**FACU**	**Nootka Rose**

Rosa pisocarpa	**FAC**	**Clustered Rose**
Rosa rubiginosa	**UPL**	**Sweetbrier**
Rosa woodsii	**FACU**	**Woods' Rose**
Rotala indica	**OBL**	**Indian Toothcup**
Rotala ramosior	**OBL**	**Lowland Toothcup**
Rottboellia cochinchinensis	**FAC**	**Itch Grass**
Rubus allegheniensis	**FACU**	**Allegheny Blackberry**
Rubus arcticus	**FAC**	**Northern Blackberry**
Rubus arizonensis	**FACU**	**Arizona Dewberry**
Rubus armeniacus	**FAC**	**Himalayan Blackberry**
Rubus bartonianus	**FACW**	**Barton's Raspberry**
Rubus flagellaris	**FACU**	**Whiplash Dewberry**
Rubus idaeus	**FACU**	**Common Red Raspberry**
Rubus laciniatus	**FACU**	**Cut-Leaf Blackberry**
Rubus lasiococcus	**FACU**	**Hairy-Fruit Smooth Dewberry**
Rubus leucodermis	**FACU**	**White-Stem Raspberry**
Rubus parviflorus	**FAC**	**Western Thimble-Berry**
Rubus pedatus	**FACU**	**Strawberry-Leaf Raspberry**
Rubus pensilvanicus	**FAC**	**Pennsylvania Blackberry**
Rubus phoenicolasius	**FACU**	**Wine Raspberry**
Rubus pubescens	**FAC**	**Dwarf Red Raspberry**
Rubus spectabilis	**FAC**	**Salmon Raspberry**
Rubus ursinus	**FAC**	**California Dewberry**
Rudbeckia alpicola	**FACW**	**Showy Coneflower**
Rudbeckia californica	**FACW**	**California Coneflower**
Rudbeckia glaucescens	**FACW**	**Waxy Coneflower**
Rudbeckia hirta	**FACU**	**Black-Eyed-Susan**
Rudbeckia klamathensis	**FACW**	**Klamath Coneflower**
Rudbeckia laciniata	**FAC**	**Green-Head Coneflower**
Rudbeckia montana	**FACW**	**Montane Coneflower**
Rudbeckia occidentalis	**FAC**	**Western Coneflower**
Rudbeckia triloba	**FACU**	**Brown-Eyed-Susan**
Rumex acetosa	**FAC**	**Garden Sorrel**
Rumex acetosella	**FACU**	**Common Sheep Sorrel**
Rumex altissimus	**FACW**	**Pale Dock**
Rumex britannica	**OBL**	**Greater Water Dock**
Rumex californicus	**FACW**	**California Willow Dock**
Rumex conglomeratus	**FACW**	**Sharp Dock**
Rumex crassus	**FACW**	**Fleshy Willow Dock**
Rumex crispus	**FAC**	**Curly Dock**
Rumex densiflorus	**FACW**	**Dense-Flower Dock**
Rumex dentatus	**FACW**	**Toothed Dock**
Rumex fueginus	**FACW**	**Tierra del Fuego Dock**
Rumex hastatulus	**FAC**	**Heart-Wing Sorrel**
Rumex hesperius	**FACW**	**Western Willow dock**
Rumex kerneri	**FACW**	**Kerner's Dock**
Rumex lacustris	**OBL**	**Lake Willow Dock**

Rumex lapponicus	**FAC**	**Lapland Sorrel**
Rumex mexicanus	**FAC**	**Mexican Dock**
Rumex obtusifolius	**FAC**	**Bitter Dock**
Rumex occidentalis	**FACW**	**Western Dock**
Rumex palustris	**FACW**	**Marsh Dock**
Rumex paucifolius	**FAC**	**Alpine Sheep Sorrel**
Rumex persicarioides	**FACW**	**Coastal Dock**
Rumex pulcher	**FAC**	**Fiddle Dock**
Rumex salicifolius	**FACW**	**Willow Dock**
Rumex spiralis	**FAC**	**Winged Dock**
Rumex stenophyllus	**FACW**	**Narrow-Leaf Dock**
Rumex transitorius	**FACW**	**Pacific Willow Dock**
Rumex triangulivalvis	**FACW**	**Triangular-Valved Dock**
Rumex venosus	**UPL**	**Veiny Dock**
Rumex verticillatus	**FACW**	**Swamp Dock**
Rumex violascens	**FACW**	**Violet Dock**
Ruppia cirrhosa	**OBL**	**Spiral Ditch-Grass**
Ruppia maritima	**OBL**	**Beaked Ditch-Grass**
Sabatia angularis	**FAC**	**Rose-Pink**
Saccharum ravennae	**FAC**	**Ranenna Grass**
Sagina apetala	**FAC**	**Annual Pearlwort**
Sagina decumbens	**FACU**	**Trailing Pearlwort**
Sagina maxima	**FAC**	**Sticky-Stem Pearlwort**
Sagina procumbens	**FAC**	**Bird-Eye Pearlwort**
Sagina saginoides	**FACW**	**Alpine Pearlwort**
Sagittaria brevirostra	**OBL**	**Short-Beak Arrowhead**
Sagittaria calycina	**OBL**	**Hooded Arrowhead**
Sagittaria cuneata	**OBL**	**Arum-Leaf Arrowhead**
Sagittaria latifolia	**OBL**	**Duck-Potato**
Sagittaria longiloba	**OBL**	**Long-Barb Arrowhead**
Sagittaria rigida	**OBL**	**Sessile-Fruit Arrowhead**
Sagittaria sanfordii	**OBL**	**Valley Arrowhead**
Salicornia bigelovii	**OBL**	**Dwarf Saltwort**
Salicornia depressa	**OBL**	**Woody Saltwort**
Salicornia rubra	**OBL**	**Red Saltwort**
Salix X fragilis	**FAC**	**_?_**
Salix X pendulina	**FACW**	**_?_**
Salix X sepulcralis	**FACW**	**_?_**
Salix alba	**FACW**	**White Willow**
Salix amygdaloides	**FACW**	**Peach-Leaf Willow**
Salix arctica	**FAC**	**Arctic Willow**
Salix arizonica	**OBL**	**Arizona Willow**
Salix babylonica	**FAC**	**Chinese Willow**
Salix barclayi	**FACW**	**Barclay's Willow**
Salix barrattiana	**FACW**	**Barratt's Willow**
Salix bebbiana	**FACW**	**Gray Willow**
Salix bonplandiana	**FACW**	**Red Willow**

Salix boothii	**FACW**	**Booth's Willow**
Salix brachycarpa	**FACW**	**Short-Fruit Willow**
Salix breweri	**FAC**	**Brewer's Willow**
Salix candida	**OBL**	**Sage Willow**
Salix caprea	**FACW**	**Goat Willow**
Salix cascadensis	**FACU**	**Cascade Willow**
Salix columbiana	**FACW**	**_?_**
Salix commutata	**OBL**	**Under-Green Willow**
Salix delnortensis	**FAC**	**Del Norte Willow**
Salix discolor	**FACW**	**Pussy Willow**
Salix drummondiana	**FACW**	**Drummond's Willow**
Salix eastwoodiae	**FACW**	**Sierran Willow**
Salix exigua	**FACW**	**Narrow-Leaf Willow**
Salix exilifolia	**FACW**	**Yew-Leaf Willow**
Salix famelica	**FACW**	**_?_**
Salix farriae	**OBL**	**Farr's Willow**
Salix geyeriana	**OBL**	**Geyer's Willow**
Salix glauca	**FACW**	**Gray-Leaf Willow**
Salix gooddingii	**FACW**	**Goodding's Black Willow**
Salix hookeriana	**FACW**	**Coastal Willow**
Salix interior	**FACW**	**Sandbar Willow**
Salix irrorata	**FACW**	**Dewy-Stem Willow**
Salix jepsonii	**OBL**	**Jepson's Willow**
Salix laevigata	**FACW**	**Polished Willow**
Salix lasiandra	**FACW**	**Pacific Willow**
Salix lasiolepis	**FACW**	**Arroyo Willow**
Salix lemmonii	**FACW**	**Lemmon's Willow**
Salix ligulifolia	**FACW**	**Strap-Leaf Willow**
Salix lutea	**OBL**	**Yellow Willow**
Salix maccalliana	**FACW**	**Mccalla's Willow**
Salix melanopsis	**OBL**	**Dusky Willow**
Salix monochroma	**FACW**	**One-Color Willow**
Salix monticola	**OBL**	**Park Willow**
Salix myrtillifolia	**FACW**	**Blueberry Willow**
Salix nigra	**OBL**	**Black Willow**
Salix nivalis	**FACW**	**Snow Willow**
Salix orestera	**FACW**	**Gray-Leaf Sierran Willow**
Salix pedicellaris	**OBL**	**Bog Willow**
Salix planifolia	**OBL**	**Tea-Leaf Willow**
Salix prolixa	**OBL**	**Mackenzie's Willow**
Salix pseudomonticola	**FACW**	**False Mountain Willow**
Salix purpurea	**FACW**	**Purple Willow**
Salix reticulata	**FAC**	**Net-Vein Willow**
Salix rotundifolia	**FACW**	**Round-Leaf Willow**
Salix scouleriana	**FAC**	**Scouler's Willow**
Salix serissima	**OBL**	**Autumn Willow**
Salix sitchensis	**FACW**	**Sitka Willow**

Salix thurberi	**FAC**	**_?_**
Salix tweedyi	**FACW**	**Tweedy's Willow**
Salix vestita	**FAC**	**Rock Willow**
Salix viminalis	**FACW**	**Basket Willow**
Salix wolfii	**OBL**	**Idaho Willow**
Salsola soda	**FACW**	**Opposite-Leaf Russian-Thistle**
Salsola tragus	**FACU**	**Prickly Russian-Thistle**
Salvia lycioides	**FACU**	**Canyon Sage**
Salvinia minima	**OBL**	**Water-Spangles**
Salvinia molesta	**OBL**	**Kariba-Weed**
Salvinia oblongifolia	**OBL**	**Oblong-Leaf Water-Moss**
Sambucus nigra	**FACU**	**Black Elder**
Sambucus racemosa	**FACU**	**Red Elder**
Samolus ebracteatus	**FACW**	**Limewater Brookweed**
Samolus parviflorus	**OBL**	**_?_**
Samolus vagans	**OBL**	**Chiricahua Mountain Brookweed**
Sanguisorba canadensis	**FACW**	**Canadian Burnet**
Sanguisorba officinalis	**FACW**	**Great Burnet**
Sanicula marilandica	**FAC**	**Maryland Black-Snakeroot**
Sanicula maritima	**FACW**	**Adobe Black-Snakeroot**
Sapindus saponaria	**FACU**	**Wing-Leaf Soapberry**
Saponaria officinalis	**FACU**	**Bouncing-Bett**
Sarcobatus vermiculatus	**FACU**	**Greasewood**
Sarcocornia pacifica	**OBL**	**Pacific Swampfire**
Sarcocornia utahensis	**OBL**	**Utah Swampfire**
Sarracenia purpurea	**OBL**	**Purple Pitcherplant**
Sarracenia rubra	**OBL**	**Sweet Pitcherplant**
Saussurea americana	**FACW**	**American Saw-Wort**
Saxifraga adscendens	**FACW**	**Wedge-Leaf Saxifrage**
Saxifraga austromontana	**FACU**	**Matted Saxifrage**
Saxifraga caespitosa	**FAC**	**Tufted Alpine Saxifrage**
Saxifraga cernua	**FACW**	**Nodding Saxifrage**
Saxifraga chrysantha	**FACU**	**Golden Saxifrage**
Saxifraga hirculus	**OBL**	**Yellow Marsh Saxifrage**
Saxifraga mertensiana	**FACW**	**Woodland Saxifrage**
Saxifraga oppositifolia	**FACU**	**Purple Mountain Saxifrage**
Saxifraga rivularis	**FACW**	**Alpine-Brook Saxifrage**
Saxifraga vespertina	**FACU**	**Yellow-Dot Saxifrage**
Sceptridium multifidum	**FAC**	**Leathery Grape Fern**
Schedonorus arundinaceus	**FACU**	**Tall False Rye Grass**
Schedonorus pratensis	**FACU**	**Meadow False Rye Grass**
Scheuchzeria palustris	**OBL**	**Rannoch-Rush**
Schinus molle	**FACU**	**Peruvian Peppertree**
Schinus terebinthifolia	**FAC**	**Brazilian Peppertree**
Schizachne purpurascens	**FACU**	**False Melic Grass**
Schizachyrium littorale	**FACU**	**Dune False Bluestem**
Schizachyrium scoparium	**FACU**	**Little False Bluestem**

Schoenoplectus acutus	**OBL**	**Hard-Stem Club-Rush**
Schoenoplectus americanus	**OBL**	**Chairmaker's Club-Rush**
Schoenoplectus californicus	**OBL**	**California Club-Rush**
Schoenoplectus fluviatilis	**OBL**	**River Club-Rush**
Schoenoplectus glaucus	**OBL**	**Tuberous Club-Rush**
Schoenoplectus heterochaetus	**OBL**	**Pale Great Club-Rush**
Schoenoplectus maritimus	**OBL**	**Saltmarsh Club-Rush**
Schoenoplectus mucronatus	**OBL**	**Bog Club-Rush**
Schoenoplectus pungens	**OBL**	**Three-Square**
Schoenoplectus robustus	**OBL**	**Seaside Club-Rush**
Schoenoplectus saximontanus	**OBL**	**Rocky Mountain Club-Rush**
Schoenoplectus subterminalis	**OBL**	**Swaying Club-Rush**
Schoenoplectus tabernaemontani	**OBL**	**Soft-Stem Club-Rush**
Schoenus nigricans	**OBL**	**Black Bog-Rush**
Scilla luciliae	**FACU**	**Boissier's Glory-of-the-Snow**
Scirpus atrocinctus	**OBL**	**Black-Girdle Bulrush**
Scirpus atrovirens	**OBL**	**Dark-Green Bulrush**
Scirpus congdonii	**FACW**	**Congdon's Bulrush**
Scirpus cyperinus	**OBL**	**Cottongrass Bulrush**
Scirpus diffusus	**FACW**	**Umbrella Bulrush**
Scirpus microcarpus	**OBL**	**Red-Tinge Bulrush**
Scirpus nevadensis	**OBL**	**Nevada Bulrush**
Scirpus pallidus	**OBL**	**Pale Bulrush**
Scirpus pendulus	**OBL**	**Rufous Bulrush**
Scleranthus annuus	**FACU**	**Annual Knawel**
Sclerolinon digynum	**FACW**	**Northwestern Yellow-Flax**
Scolochloa festucacea	**OBL**	**Common River Grass**
Scorzoneroides autumnalis	**FAC**	**August-Flower**
Scrophularia atrata	**FACU**	**Black-Flower Figwort**
Scrophularia californica	**FAC**	**California Figwort**
Scrophularia lanceolata	**FAC**	**Lance-Leaf Figwort**
Scutellaria bolanderi	**FACW**	**Sierran Skullcap**
Scutellaria galericulata	**OBL**	**Hooded Skullcap**
Scutellaria lateriflora	**FACW**	**Mad Dog Skullcap**
Scutellaria siphocampyloides	**FACU**	**Gray-Leaf Skullcap**
Sedella leiocarpa	**FAC**	**Lake County Mock Stonecrop**
Sedella pumila	**FAC**	**Sierran Mock Stonecrop**
Selaginella kraussiana	**FACW**	**Krauss' Spike-Moss**
Selaginella selaginoides	**FACW**	**Northern Spike-Moss**
Selenia dissecta	**FACW**	**Texas Selenia**
Selenia jonesii	**FACW**	**Jones' Selenia**
Senecio amplectens	**FACW**	**Showy Alpine Ragwort**
Senecio clarkianus	**FACW**	**Clark's Ragwort**
Senecio cliffordii	**UPL**	**Clifford's Ragwort**
Senecio crassulus	**FACU**	**Thick-Leaf Ragwort**
Senecio eremophilus	**FACU**	**Desert Ragwort**
Senecio hieraciifolius	**FACU**	**American Burnweed**

Senecio hydrophiloides	**FACW**	**Stout Meadow Ragwort**
Senecio hydrophilus	**OBL**	**Alkali-Marsh Ragwort**
Senecio integerrimus	**FACU**	**Lamb-Tongue Ragwort**
Senecio lugens	**FAC**	**Small Black-Tip Ragwort**
Senecio minimus	**FACU**	**Coastal Burnweed**
Senecio scorzonella	**FAC**	**Sierran Ragwort**
Senecio serra	**FACU**	**Tall Ragwort**
Senecio sphaerocephalus	**FACW**	**Mountain-Marsh Ragwort**
Senecio sylvaticus	**UPL**	**Woodland Ragwort**
Senecio triangularis	**FACW**	**Arrow-Leaf Ragwort**
Senecio vulgaris	**FACU**	**Old-Man-in-the-Spring**
Senegalia greggii	**FACU**	**Long-Flower Catclaw**
Senna hirsuta	**FACU**	**Woolly Wild Sensitive-Plant**
Senna obtusifolia	**UPL**	**Coffeeweed**
Senna pendula	**FAC**	**Valamuerto**
Sesbania emerus	**FAC**	**Danglepod**
Sesbania herbacea	**FACW**	**Peatree**
Sesbania punicea	**FACW**	**Purple River-Hemp**
Sesuvium maritimum	**FACW**	**Slender Sea-Purslane**
Sesuvium portulacastrum	**FACW**	**Shoreline Sea-Purslane**
Sesuvium verrucosum	**FACW**	**Verrucose Sea-Purslane**
Setaria adhaerens	**FACU**	**Adherent Bristle Grass**
Setaria faberi	**UPL**	**Japanese Bristle Grass**
Setaria italica	**FACU**	**Italian Bristle Grass**
Setaria magna	**FACW**	**Giant Bristle Grass**
Setaria parviflora	**FAC**	**Marsh Bristle Grass**
Setaria pumila	**FAC**	**Yellow Bristle Grass**
Setaria sphacelata	**OBL**	**African Bristle Grass**
Setaria verticillata	**FACU**	**Rough Bristle Grass**
Setaria verticilliformis	**FAC**	**Foreward-Barb Bristle Grass**
Seymeria cassioides	**FAC**	**Yaupon Black-Senna**
Shepherdia argentea	**FACU**	**Silver Buffalo-Berry**
Shepherdia canadensis	**UPL**	**Russet Buffalo-Berry**
Sibbaldia procumbens	**FACU**	**Creeping-Glow-Wort**
Sida acuta	**UPL**	**Common-Wireweed**
Sida rhombifolia	**FACU**	**Cuban-Jute**
Sida spinosa	**UPL**	**Prickly Fanpetals**
Sidalcea calycosa	**OBL**	**Annual Checkerbloom**
Sidalcea campestris	**FACU**	**Meadow Checkerbloom**
Sidalcea candida	**FACW**	**White Checkerbloom**
Sidalcea covillei	**FACU**	**Owens Valley Checkerbloom**
Sidalcea cusickii	**FACW**	**Cusick's Checkerbloom**
Sidalcea hirsuta	**OBL**	**Hairy Checkerbloom**
Sidalcea malviflora	**FACW**	**Dwarf Checkerbloom**
Sidalcea neomexicana	**FACW**	**Rocky Mountain Checkerbloom**
Sidalcea oregana	**FACW**	**Oregon Checkerbloom**
Sidalcea pedata	**OBL**	**Mountain Checkerbloom**

Sidalcea ranunculacea	**OBL**	**Marsh Checkerbloom**
Sidalcea reptans	**OBL**	**Sierran Checkerbloom**
Sidalcea stipularis	**OBL**	**Scadden Flat Checkerbloom**
Sideroxylon lanuginosum	**FACU**	**Gum Bully**
Silene acaulis	**UPL**	**Cushion-Pink**
Silene menziesii	**FAC**	**White Catchfly**
Silene spaldingii	**FACU**	**Spalding's Silene**
Silene uralensis	**FACW**	**Apetalous Catchfly**
Silphium perfoliatum	**FACW**	**Cup-Plant**
Sinapis alba	**FAC**	**White-Mustard**
Sisymbrium altissimum	**FACU**	**Tall Hedge-Mustard**
Sisyrinchium bellum	**FACW**	**California Blue-Eyed-Grass**
Sisyrinchium californicum	**FACW**	**Golden Blue-Eyed-Grass**
Sisyrinchium cernuum	**FAC**	**Nodding Blue-Eyed-Grass**
Sisyrinchium demissum	**OBL**	**Stiff Blue-Eyed-Grass**
Sisyrinchium elmeri	**OBL**	**Elmer's Blue-Eyed-Grass**
Sisyrinchium funereum	**FACW**	**Funeral Mountain Blue-Eyed-Grass**
Sisyrinchium halophilum	**FACW**	**Nevada Blue-Eyed-Grass**
Sisyrinchium idahoense	**FACW**	**Idaho Blue-Eyed-Grass**
Sisyrinchium longipes	**FACW**	**Timberland Blue-Eyed-Grass**
Sisyrinchium minus	**FACU**	**Dwarf Blue-Eyed-Grass**
Sisyrinchium montanum	**FACW**	**Strict Blue-Eyed-Grass**
Sisyrinchium sarmentosum	**OBL**	**Mountain Blue-Eyed-Grass**
Sisyrinchium septentrionale	**FACW**	**Northern Blue-Eyed-Grass**
Sium suave	**OBL**	**Hemlock Water-Parsnip**
Smilax jamesii	**FACW**	**English Peak Greenbrier**
Solanum americanum	**FACU**	**American Black Nightshade**
Solanum carolinense	**FACU**	**Carolina Horse-Nettle**
Solanum douglasii	**FAC**	**Green-Spot Nightshade**
Solanum dulcamara	**FAC**	**Climbing Nightshade**
Solanum nigrum	**FACU**	**European Black Nightshade**
Solanum ptychanthum	**FACU**	**Eastern Black Nightshade**
Solidago altissima	**FACU**	**Tall Goldenrod**
Solidago confinis	**OBL**	**Southern Goldenrod**
Solidago elongata	**FACU**	**Cascade Canada Goldenrod**
Solidago gigantea	**FACW**	**Late Goldenrod**
Solidago lepida	**FAC**	**Western Canada Goldenrod**
Solidago multiradiata	**FACU**	**Rocky Mountain Goldenrod**
Solidago rigida	**FACU**	**Hard-Leaf Flat-Top-Goldenrod**
Solidago simplex	**FACU**	**Mt. Albert Goldenrod**
Solidago spathulata	**FACU**	**Coast Goldenrod**
Solidago spectabilis	**FACW**	**Nevada Goldenrod**
Soliva sessilis	**FACU**	**Lawn Burrweed**
Sonchus arvensis	**FACU**	**Field Sow-Thistle**
Sonchus asper	**FAC**	**Spiny-Leaf Sow-Thistle**
Sonchus oleraceus	**UPL**	**Common Sow-Thistle**
Sorbus scopulina	**FACU**	**Cascade Mountain-Ash**

Sorbus sitchensis	**FAC**	**Sitka Mountain-Ash**
Sorghastrum nutans	**FACU**	**Yellow Indian Grass**
Sorghum bicolor	**FACU**	**Broom-Corn**
Sorghum halepense	**FACU**	**Johnson Grass**
Sparganium angustifolium	**OBL**	**Narrow-Leaf Burr-Reed**
Sparganium emersum	**OBL**	**European Burr-Reed**
Sparganium eurycarpum	**OBL**	**Broad-Fruit Burr-Reed**
Sparganium natans	**OBL**	**Arctic Burr-Reed**
Spartina alterniflora	**OBL**	**Saltwater Cord Grass**
Spartina densiflora	**OBL**	**Dense-Flower Cord Grass**
Spartina foliosa	**OBL**	**California Cord Grass**
Spartina gracilis	**FACW**	**Alkali Cord Grass**
Spartina patens	**OBL**	**Salt-Meadow Cord Grass**
Spartina pectinata	**OBL**	**Freshwater Cord Grass**
Spergularia atrosperma	**FACW**	**Black-Seed Sandspurry**
Spergularia bocconi	**FACW**	**Boccone's Sandspurry**
Spergularia canadensis	**FACW**	**Canadian Sandspurry**
Spergularia diandra	**FACW**	**Alkali Sandspurry**
Spergularia echinosperma	**OBL**	**Bristle-Seed Sandspurry**
Spergularia macrotheca	**FAC**	**Sticky Sandspurry**
Spergularia marina	**OBL**	**Saltmarsh Sandspurry**
Spergularia media	**FACW**	**Satin-Flower**
Spergularia platensis	**OBL**	**La Plata Sandspurry**
Spergularia rubra	**FAC**	**Ruby Sandspurry**
Spermolepis divaricata	**FACW**	**Rough-Fruit Scaleseed**
Spermolepis echinata	**FACU**	**Bristly-Fruit Scaleseed**
Sphaerophysa salsula	**FACU**	**Red Bladder-Vetch**
Sphenopholis intermedia	**FAC**	**Slender Wedgescale**
Sphenopholis obtusata	**FAC**	**Prairie Wedgescale**
Sphenosciadium capitellatum	**FACW**	**Swamp Whiteheads**
Spinulum annotinum	**FAC**	**Interrupted Club-Moss**
Spiraea X hitchcockii	**FAC**	**_?_**
Spiraea betulifolia	**FACU**	**Shiny-Leaf Meadowsweet**
Spiraea douglasii	**FACW**	**Douglas' Meadowsweet**
Spiranthes delitescens	**OBL**	**Madrean Ladies'-Tresses**
Spiranthes diluvialis	**FACW**	**Diluvim Ladies'-Tresses**
Spiranthes infernalis	**FACW**	**Ash Meadows Ladies'-Tresses**
Spiranthes magnicamporum	**FAC**	**Great Plains Ladies'-Tresses**
Spiranthes porrifolia	**FACW**	**Western Ladies'-Tresses**
Spiranthes romanzoffiana	**FACW**	**Hooded Ladies'-Tresses**
Spirodela polyrhiza	**OBL**	**Common Duckmeat**
Sporobolus airoides	**FAC**	**Alkali-Sacaton**
Sporobolus cryptandrus	**FACU**	**Sand Dropseed**
Sporobolus diandrus	**UPL**	**Tussock Dropseed**
Sporobolus flexuosus	**FACU**	**Mesa Dropseed**
Sporobolus giganteus	**FACU**	**Giant Dropseed**
Sporobolus indicus	**FACU**	**Smut Grass**

Sporobolus neglectus	**UPL**	**Small Dropseed**
Sporobolus pyramidatus	**FACU**	**Target Dropseed**
Sporobolus texanus	**FACW**	**Texas Dropseed**
Sporobolus wrightii	**FAC**	**Wright's Dropseed**
Stachys ajugoides	**OBL**	**Bugle Hedge-Nettle**
Stachys albens	**OBL**	**White-Stem Hedge-Nettle**
Stachys chamissonis	**OBL**	**Coastal Hedge-Nettle**
Stachys coccinea	**FAC**	**Scarlet Hedge-Nettle**
Stachys crenata	**FAC**	**Mouse's-Ear**
Stachys floridana	**FAC**	**Florida Hedge-Nettle**
Stachys mexicana	**FACW**	**Mexican Hedge-Nettle**
Stachys pilosa	**FACW**	**Hairy Hedge-Nettle**
Stachys pycnantha	**FACW**	**Short-Spike Hedge-Nettle**
Stachys rigida	**FACW**	**Rough Hedge-Nettle**
Stachys stricta	**OBL**	**Sonoma Hedge-Nettle**
Steinchisma hians	**FACW**	**Gaping Grass**
Stellaria alsine	**OBL**	**Bog Chickweed**
Stellaria borealis	**FACW**	**Boreal Starwort**
Stellaria calycantha	**FACW**	**Northern Bog Starwort**
Stellaria crassifolia	**FACW**	**Fleshy Starwort**
Stellaria crispa	**FAC**	**Ruffled Starwort**
Stellaria cuspidata	**FAC**	**Mexican Starwort**
Stellaria graminea	**FAC**	**Grass-Leaf Starwort**
Stellaria humifusa	**OBL**	**Saltmarsh Starwort**
Stellaria littoralis	**OBL**	**Beach Starwort**
Stellaria longifolia	**FACW**	**Long-Leaf Starwort**
Stellaria longipes	**FACW**	**Long-Stalk Starwort**
Stellaria media	**FACU**	**Common Chickweed**
Stellaria obtusa	**FACW**	**Rocky Mountain Starwort**
Stellaria umbellata	**FACW**	**Umbrella Starwort**
Stemodia durantifolia	**OBL**	**White-Woolly Twintip**
Stenotaphrum secundatum	**FAC**	**St. Augustine Grass**
Streptopus amplexifolius	**FAC**	**Clasping Twistedstalk**
Streptopus lanceolatus	**FAC**	**Lance-Leaf Twistedstalk**
Strophostyles helvola	**FACU**	**Trailing Fuzzy-Bean**
Stuckenia filiformis	**OBL**	**Slender-Leaf False Pondweed**
Stuckenia pectinata	**OBL**	**Sago False Pondweed**
Stuckenia striata	**OBL**	**Striped False Pondweed**
Stuckenia vaginata	**OBL**	**Sheathed False Pondweed**
Styrax platanifolius	**FAC**	**Sycamore-Leaf Snowbell**
Suaeda calceoliformis	**FACW**	**Paiuteweed**
Suaeda californica	**FACW**	**Broom Seepweed**
Suaeda esteroa	**FACW**	**Seablite**
Suaeda mexicana	**FACW**	**Mexican Seepweed**
Suaeda nigra	**OBL**	**Shrubby Seepweed**
Suaeda occidentalis	**FACW**	**Western Seepweed**
Suaeda taxifolia	**FACW**	**Needle-Leaf Seepweed**

Subularia aquatica	**OBL**	**American Water-Awlwort**
Suckleya suckleyana	**FACW**	**Poison Suckleya**
Suksdorfia violacea	**FAC**	**Violet Mock Brookfoam**
Sullivantia hapemanii	**FACW**	**Hapeman's Coolwort**
Swertia perennis	**FACW**	**Felwort**
Symphoricarpos albus	**FACU**	**Common Snowberry**
Symphoricarpos mollis	**FACU**	**Creeping Snowberry**
Symphoricarpos occidentalis	**FAC**	**Western Snowberry**
Symphoricarpos orbiculatus	**UPL**	**Coral-Berry**
Symphyotrichum ascendens	**FAC**	**Western American-Aster**
Symphyotrichum bahamense	**OBL**	**Island American-Aster**
Symphyotrichum boreale	**OBL**	**Boreal American-Aster**
Symphyotrichum bracteolatum	**FAC**	**Bracted American-Aster**
Symphyotrichum chilense	**FAC**	**Pacific American-Aster**
Symphyotrichum ciliatum	**FACW**	**Alkali American-Aster**
Symphyotrichum defoliatum	**OBL**	**San Bernardino American-Aster**
Symphyotrichum divaricatum	**OBL**	**Lawn American-Aster**
Symphyotrichum ericoides	**FAC**	**White Heath American-Aster**
Symphyotrichum expansum	**OBL**	**Desert American-Aster**
Symphyotrichum falcatum	**FACU**	**Rough White Prairie American-Aster**
Symphyotrichum foliaceum	**UPL**	**Alpine Leafy-Head American-Aster**
Symphyotrichum frondosum	**FACW**	**Leafy American-Aster**
Symphyotrichum laeve	**FACU**	**Smooth Blue American-Aster**
Symphyotrichum lanceolatum	**OBL**	**White Panicled American-Aster**
Symphyotrichum lentum	**OBL**	**Suisun Marsh American-Aster**
Symphyotrichum novae-angliae	**FACW**	**New England American-Aster**
Symphyotrichum ontarionis	**FAC**	**Ontario American-Aster**
Symphyotrichum pilosum	**FACU**	**White Oldfield American-Aster**
Symphyotrichum porteri	**FACU**	**Smooth White American-Aster**
Symphyotrichum praealtum	**OBL**	**Willow-Leaf American-Aster**
Symphyotrichum spathulatum	**FAC**	**Mountain American-Aster**
Symphyotrichum squamatum	**OBL**	**_?_**
Symphyotrichum subspicatum	**FACW**	**Leafy-Bract American-Aster**
Symphyotrichum subulatum	**OBL**	**Seaside American-Aster**
Symphytum asperum	**FAC**	**Prickly Comfrey**
Synthyris ranunculina	**OBL**	**Charleston Mountain Kitten's-Tail**
Tamarix aphylla	**FAC**	**Athel Tamarisk**
Tamarix chinensis	**FAC**	**Five-Stamen Tamarisk**
Tamarix gallica	**FAC**	**French Tamarisk**
Tamarix parviflora	**FAC**	**Small-Flower Tamarisk**
Tanacetum vulgare	**FACU**	**Common Tansy**
Taraxacum californicum	**FACW**	**California Dandelion**
Taraxacum ceratophorum	**UPL**	**Horned Dandelion**
Taraxacum officinale	**FACU**	**Common Dandelion**
Taraxia breviflora	**FAC**	**Nested Goldeneggs**
Taraxia subacaulis	**FACW**	**Spreading Goldeneggs**
Taraxia tanacetifolia	**FACU**	**Tansy-Leaf Goldeneggs**

Tarenaya hassleriana	FACU	Pinkqueen
Tauschia tenuissima	FACW	Leiberg's Umbrella-Wort
Taxodium distichum	OBL	Southern Bald-Cypress
Taxus brevifolia	FACU	Pacific Yew
Tecoma stans	UPL	Yellow Trumpetbush
Tellima grandiflora	FACU	Fragrant Fringecup
Teucrium canadense	FACW	American Germander
Teucrium chamaedrys	FACU	Wall Germander
Teucrium cubense	FACW	Small Coastal Germander
Thalictrum alpinum	FACW	Alpine Meadow-Rue
Thalictrum dasycarpum	FACW	Purple Meadow-Rue
Thalictrum fendleri	FAC	Fendler's Meadow-Rue
Thalictrum occidentale	FACU	Western Meadow-Rue
Thalictrum revolutum	FACU	Waxy-Leaf Meadow-Rue
Thalictrum sparsiflorum	FAC	Few-Flower Meadow-Rue
Thalictrum venulosum	FACU	Veiny-Leaf Meadow-Rue
Thelypodium brachycarpum	UPL	Short-Pod Thelypody
Thelypodium crispum	FACU	Crisped Thelypody
Thelypodium integrifolium	FACW	Entire-Leaf Thelypody
Thelypodium sagittatum	FACW	Arrowhead Thelypody
Thelypodium stenopetalum	FAC	Slender-Petal Thelypody
Thelypteris ovata	FACW	Ovate Marsh Fern
Thelypteris puberula	FACW	Showy Maiden Fern
Thermopsis divaricarpa	FAC	Spread-Fruit Golden-Banner
Thermopsis montana	FAC	Montane Golden-Banner
Thermopsis rhombifolia	FACU	Prairie Golden-Banner
Thevetia peruviana	UPL	Luckynut
Thlaspi arvense	UPL	Field Pennycress
Thuja plicata	FAC	Western Arborvitae
Tiarella trifoliata	FAC	Three-Leaf Foamflower
Tilia americana	FACU	American Basswood
Tiquilia nuttallii	UPL	Rosette Crinklemat
Tithonia diversifolia	FACU	Tree-Marigold
Tithonia thurberi	FACW	Arizona Sunflower-Weed
Tolmiea diplomenziesii	FAC	_?_
Tolmiea menziesii	FACW	Piggyback-Plant
Torreyochloa erecta	OBL	Spiked False Manna Grass
Torreyochloa pallida	OBL	Pale False Manna Grass
Toxicodendron diversilobum	FACU	Pacific Poison-Oak
Toxicodendron radicans	FAC	Eastern Poison Ivy
Toxicodendron rydbergii	FACU	Western Poison Ivy
Toxicoscordion fontanum	OBL	_?_
Toxicoscordion micranthum	OBL	Small-Flower Poison Camas
Toxicoscordion venenosum	FACU	Meadow Poison Camas
Tradescantia fluminensis	FAC	Small-Leaf Wandering-Jew
Tradescantia occidentalis	FACU	Prairie Spiderwort
Tradescantia ohiensis	FACW	Bluejacket

Tradescantia wrightii	**FACW**	**Wright's Spiderwort**
Transberingia bursifolia	**UPL**	**False Fissurewort**
Trautvetteria caroliniensis	**FACW**	**Carolina Tassel-Rue**
Triadica sebifera	**FAC**	**Chinese Tallowtree**
Triantha occidentalis	**FACW**	**Western False Asphodel**
Trianthema portulacastrum	**FAC**	**Desert Horse-Purslane**
Trichocoronis wrightii	**FACW**	**Limestone Bugheal**
Trichophorum caespitosum	**OBL**	**Tufted Leafless-Bulrush**
Trichophorum clementis	**FAC**	**Yosemite Leafless-Bulrush**
Trichophorum pumilum	**FACW**	**Rolland's Leafless-Bulrush**
Trichostema austromontanum	**OBL**	**San Jacinto Bluecurls**
Trichostema lanceolatum	**FACU**	**Vinegar-Weed**
Trichostema micranthum	**FAC**	**Small-Flower Bluecurls**
Tridens albescens	**FACU**	**White Fluff Grass**
Tridens flavus	**UPL**	**Tall Redtop**
Tridens muticus	**FAC**	**Awnless Fluff Grass**
Trientalis europaea	**FAC**	**Arctic Starflower**
Trientalis latifolia	**FAC**	**Western Starflower**
Trifolium albopurpureum	**FACU**	**Rancheria Clover**
Trifolium amabile	**OBL**	**Aztec Clover**
Trifolium amoenum	**FACW**	**Showy Indian Clover**
Trifolium barbigerum	**FACW**	**Bearded Clover**
Trifolium beckwithii	**FAC**	**Plumas Clover**
Trifolium bolanderi	**OBL**	**Parasol Clover**
Trifolium cyathiferum	**FAC**	**Bowl Clover**
Trifolium dasyphyllum	**UPL**	**Uinta Clover**
Trifolium depauperatum	**FAC**	**Balloon Sack Clover**
Trifolium douglasii	**FACW**	**Douglas' Clover**
Trifolium dubium	**UPL**	**Suckling Clover**
Trifolium eriocephalum	**FAC**	**Woolly-Head Clover**
Trifolium fragiferum	**FAC**	**Strawberry-Head Clover**
Trifolium fucatum	**FACU**	**Sour Clover**
Trifolium grayi	**FACW**	**Gray's Clover**
Trifolium haydenii	**FACU**	**Hayden's Clover**
Trifolium howellii	**FACW**	**Canyon Clover**
Trifolium hybridum	**FAC**	**Alsike Clover**
Trifolium hydrophilum	**FAC**	**Saline Clover**
Trifolium kingii	**FAC**	**King's Clover**
Trifolium longipes	**FACW**	**Long-Stalk Clover**
Trifolium macrocephalum	**FACU**	**Large-Head Clover**
Trifolium microcephalum	**FAC**	**Small-Head Clover**
Trifolium monanthum	**FAC**	**Mountain Carpet Clover**
Trifolium mucronatum	**FACW**	**Cusp Clover**
Trifolium neurophyllum	**FACW**	**White Mountain Clover**
Trifolium obtusiflorum	**FAC**	**Clammy Clover**
Trifolium parryi	**FAC**	**Parry's Clover**
Trifolium pinetorum	**FACW**	**Pinewoods Clover**

Trifolium polyodon	**FACW**	**Pacific Grove Clover**
Trifolium pratense	**FACU**	**Red Clover**
Trifolium productum	**FAC**	**Shasta Clover**
Trifolium repens	**FACU**	**White Clover**
Trifolium resupinatum	**UPL**	**Reversed Clover**
Trifolium variegatum	**FAC**	**White-Tip Clover**
Trifolium willdenowii	**FACW**	**Springbank Clover**
Trifolium wormskioldii	**FACW**	**Cow Clover**
Triglochin concinna	**OBL**	**Slender Arrow-Grass**
Triglochin maritima	**OBL**	**Seaside Arrow-Grass**
Triglochin palustris	**OBL**	**Marsh Arrow-Grass**
Triglochin scilloides	**OBL**	**Flowering-Quillwort**
Triglochin striata	**OBL**	**Three-Rib Arrow-Grass**
Trillium albidum	**FACU**	**Giant White Trillium**
Trillium ovatum	**FACU**	**Western Trillium**
Triodanis perfoliata	**FACU**	**Clasping-Leaf Venus'-Looking-Glass**
Triphasia trifolia	**FACU**	**Limeberry**
Tripleurospermum maritimum	**FACU**	**False Mayweed**
Tripsacum dactyloides	**FAC**	**Eastern Mock Grama**
Trisetum cernuum	**FACU**	**Tall False Oat**
Trisetum orthochaetum	**FACW**	**Bitterroot False Oat**
Trisetum spicatum	**FACU**	**Narrow False Oat**
Triteleia hyacinthina	**FAC**	**Fool's-Onion**
Triteleia ixioides	**FAC**	**Prettyface**
Triteleia peduncularis	**FACW**	**Long-Ray Triplet-Lily**
Trollius laxus	**OBL**	**American Globeflower**
Tropaeolum majus	**UPL**	**Garden-Nasturtium**
Tsuga heterophylla	**FACU**	**Western Hemlock**
Tsuga mertensiana	**FACU**	**Mountain Hemlock**
Tuctoria greenei	**OBL**	**Awnless Spiral Grass**
Tuctoria mucronata	**OBL**	**Prickly Spiral Grass**
Tussilago farfara	**FACU**	**Colt's-Foot**
Typha X glauca	**OBL**	**_?_**
Typha X provincialis	**OBL**	**_?_**
Typha angustifolia	**OBL**	**Narrow-Leaf Cat-Tail**
Typha domingensis	**OBL**	**Southern Cat-Tail**
Typha latifolia	**OBL**	**Broad-Leaf Cat-Tail**
Ulex europaeus	**UPL**	**Common Gorse**
Ulmus americana	**FAC**	**American Elm**
Ulmus glabra	**FACU**	**Wych Elm**
Ulmus parvifolia	**UPL**	**Chinese Elm**
Ulmus pumila	**UPL**	**Siberian Elm**
Ulmus rubra	**FAC**	**Slippery Elm**
Umbellularia californica	**FAC**	**California-Laurel**
Urochloa fusca	**UPL**	**Brown-Top Liverseed Grass**
Urochloa panicoides	**FACU**	**Panic Liverseed Grass**
Urochloa platyphylla	**FAC**	**Broad-Leaf Liverseed Grass**

Urtica dioica	**FAC**	**Stinging Nettle**
Utricularia cornuta	**OBL**	**Horned Bladderwort**
Utricularia gibba	**OBL**	**Humped Bladderwort**
Utricularia inflata	**OBL**	**Swollen Bladderwort**
Utricularia intermedia	**OBL**	**Flat-Leaf Bladderwort**
Utricularia macrorhiza	**OBL**	**Greater Bladderwort**
Utricularia minor	**OBL**	**Lesser Bladderwort**
Utricularia ochroleuca	**OBL**	**Dwarf Bladderwort**
Utricularia striata	**OBL**	**Striped Bladderwort**
Utricularia subulata	**OBL**	**Zigzag Bladderwort**
Vaccaria hispanica	**FACU**	**Cowcockle**
Vaccinium alaskaense	**FAC**	**Alaska Blueberry**
Vaccinium caespitosum	**FAC**	**Dwarf Blueberry**
Vaccinium macrocarpon	**OBL**	**Large Cranberry**
Vaccinium membranaceum	**FACU**	**Square-Twig Blueberry**
Vaccinium myrtilloides	**FACU**	**Velvet-Leaf Blueberry**
Vaccinium myrtillus	**FACU**	**Whortle-Berry**
Vaccinium ovalifolium	**UPL**	**Oval-Leaf Blueberry**
Vaccinium ovatum	**UPL**	**Evergreen Blueberry**
Vaccinium oxycoccos	**OBL**	**Small Cranberry**
Vaccinium parvifolium	**FAC**	**Red Blueberry**
Vaccinium scoparium	**FACU**	**Grouseberry**
Vaccinium uliginosum	**FACW**	**Alpine Blueberry**
Vachellia farnesiana	**FACU**	**Mealy False Acacia**
Vahlodea atropurpurea	**FACW**	**Arctic-Hair Grass**
Valeriana acutiloba	**FACU**	**Cordilleran Valerian**
Valeriana dioica	**FACW**	**Marsh Valerian**
Valeriana edulis	**FAC**	**Tobacco-Root**
Valeriana occidentalis	**FAC**	**Small-Flower Valerian**
Valeriana scouleri	**FAC**	**Scouler's Valerian**
Valeriana sitchensis	**FAC**	**Sitka Valerian**
Valeriana texana	**OBL**	**Guadalupe Valerian**
Valerianella amarella	**FACU**	**Hairy Cornsalad**
Vallisneria americana	**OBL**	**American Eel-Grass**
Veratrum californicum	**FACW**	**California False Hellebore**
Veratrum fimbriatum	**FACW**	**Fringed False Hellebore**
Veratrum viride	**FACW**	**American False Hellebore**
Verbascum blattaria	**UPL**	**White Moth Mullein**
Verbascum thapsus	**FACU**	**Great Mullein**
Verbena bonariensis	**FACW**	**Purple-Top Vervain**
Verbena bracteata	**FAC**	**Carpet Vervain**
Verbena californica	**FACW**	**Red Hills Vervain**
Verbena hastata	**FAC**	**Simpler's-Joy**
Verbena incompta	**FACU**	**Brazilian Vervain**
Verbena lasiostachys	**FAC**	**Western Vervain**
Verbena macdougalii	**FACU**	**New Mexico Vervain**
Verbena officinalis	**FACU**	**Herb-of-the-Cross**

Verbena scabra	**OBL**	**Sandpaper Vervain**
Verbena urticifolia	**FAC**	**White Vervain**
Verbesina encelioides	**FACU**	**Golden Crownbeard**
Vernonia marginata	**FACU**	**Plains Ironweed**
Vernonia missurica	**FACW**	**Missouri Ironweed**
Vernonia noveboracensis	**FAC**	**New York Ironweed**
Veronica americana	**OBL**	**American-Brooklime**
Veronica anagallis-aquatica	**OBL**	**Blue Water Speedwell**
Veronica arvensis	**FACU**	**Corn Speedwell**
Veronica beccabunga	**OBL**	**European Speedwell**
Veronica chamaedrys	**FACU**	**Germander Speedwell**
Veronica cusickii	**FAC**	**Cusick's Speedwell**
Veronica officinalis	**UPL**	**Common Gypsyweed**
Veronica peregrina	**FAC**	**Neckweed**
Veronica scutellata	**OBL**	**Grass-Leaf Speedwell**
Veronica serpyllifolia	**FAC**	**Thyme-Leaf Speedwell**
Veronica wormskjoldii	**FACW**	**American Alpine Speedwell**
Viburnum edule	**FACW**	**Squashberry**
Viburnum lentago	**FAC**	**Nanny-Berry**
Viburnum opulus	**FACW**	**Highbush-Cranberry**
Viburnum rufidulum	**FACU**	**Rusty Blackhaw**
Vicia americana	**FAC**	**American Purple Vetch**
Vicia ludoviciana	**UPL**	**Louisiana Vetch**
Vicia nigricans	**FACU**	**Black Vetch**
Vicia sativa	**FACU**	**Garden Vetch**
Vinca major	**FACU**	**Bigleaf Periwinkle**
Viola X viarum	**FACU**	**_?_**
Viola adunca	**FAC**	**Hook-Spur Violet**
Viola bicolor	**FAC**	**Field Pansy**
Viola canadensis	**FACU**	**Canadian White Violet**
Viola glabella	**FAC**	**Pioneer Violet**
Viola hallii	**FAC**	**Oregon Violet**
Viola labradorica	**FAC**	**Alpine Violet**
Viola langsdorfii	**FACW**	**Aleutian Violet**
Viola macloskeyi	**OBL**	**Smooth White Violet**
Viola missouriensis	**FACW**	**Missouri Violet**
Viola nephrophylla	**FACW**	**Northern Bog Violet**
Viola palustris	**FACW**	**Alpine-Marsh Violet**
Viola pedatifida	**FACU**	**Crow-Foot Violet**
Viola renifolia	**FACW**	**Kidney-Leaf White Violet**
Viola septentrionalis	**FACU**	**Northern Woodland Violet**
Viola sororia	**FAC**	**Hooded Blue Violet**
Vitex trifolia	**UPL**	**Three-Leaf Chastetree**
Vitis aestivalis	**FACU**	**Summer Grape**
Vitis arizonica	**FACU**	**Canyon Grape**
Vitis californica	**FACU**	**California Grape**
Vitis girdiana	**FAC**	**Valley Grape**

Vitis labrusca	**FACU**	**Fox Grape**
Vitis riparia	**FAC**	**River-Bank Grape**
Vitis rupestris	**FACU**	**Rock Grape**
Vulpia bromoides	**FACU**	**Brome Six-Weeks Grass**
Vulpia myuros	**FACU**	**Rat-Tail Six-Weeks Grass**
Vulpia octoflora	**UPL**	**Eight-Flower Six-Weeks Grass**
Waltheria indica	**UPL**	**Basora-Prieta**
Washingtonia filifera	**FAC**	**California Fan Palm**
Washingtonia robusta	**FACW**	**Washington Fan Palm**
Wislizenia refracta	**FACU**	**Spectacle-Fruit**
Wolffia arrhiza	**OBL**	**Spotless Watermeal**
Wolffia borealis	**OBL**	**Northern Watermeal**
Wolffia brasiliensis	**OBL**	**Brazilian Watermeal**
Wolffia columbiana	**OBL**	**Columbian Watermeal**
Wolffia globosa	**OBL**	**Asian Watermeal**
Wolffiella lingulata	**OBL**	**Tongue-Shape Bogmat**
Wolffiella oblonga	**OBL**	**Saber Bogmat**
Woodwardia fimbriata	**FACW**	**Giant Chain Fern**
Woodwardia radicans	**OBL**	**Rooting Chain Fern**
Wyethia amplexicaulis	**FAC**	**Northern Mule's-Ears**
Wyethia angustifolia	**FACU**	**California-Compassplant**
Wyethia helianthoides	**FACW**	**White-Ray Mule's-Ears**
X Elyhordeum macounii	**FACU**	**_?_**
X Leydeum piperi	**FAC**	**_?_**
Xanthisma spinulosum	**UPL**	**Lacy Sleepy Daisy**
Xanthium spinosum	**FACU**	**Spiny Cockleburr**
Xanthium strumarium	**FAC**	**Rough Cockleburr**
Xanthocephalum gymnospermoides	**FAC**	**San Pedro Matchweed**
Xerophyllum tenax	**FACU**	**Western Turkeybeard**
Yabea microcarpa	**FACU**	**False Hedge-Parsley**
Youngia japonica	**FACU**	**Oriental False Hawk's-Beard**
Yucca gloriosa	**UPL**	**Moundlily Yucca**
Zannichellia palustris	**OBL**	**Horned-Pondweed**
Zantedeschia aethiopica	**OBL**	**Calla-Lily**
Zeltnera X nevadensis	**FACW**	**_?_**
Zeltnera beyrichii	**FACU**	**Quinineweed**
Zeltnera calycosa	**FACW**	**Buckley's Mountain-Pink**
Zeltnera exaltata	**FACW**	**Desert Mountain-Pink**
Zeltnera glandulifera	**FACU**	**Sticky Mountain-Pink**
Zeltnera muehlenbergii	**FAC**	**Monterey Mountain-Pink**
Zeltnera namophila	**FACW**	**Spring-Loving Mountain-Pink**
Zeltnera nudicaulis	**FACW**	**Santa Catalina Mountain-Pink**
Zeltnera trichantha	**FAC**	**Alkali Mountain-Pink**
Zizania palustris	**OBL**	**Northern Wild Rice**
Zizia aptera	**FAC**	**Heart-Leaf Alexanders**
Ziziphus mauritiana	**UPL**	**Indian Jujube**
Zostera marina	**OBL**	**Seawrack**

Zoysia matrella	**FACU**	**Manila Temple Grass**
Zoysia pacifica	**UPL**	**Pacific Temple Grass**

GUIDELINES FOR SUMBITTALS FOR COMPLIANCE WITH SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

October 28, 2020

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), requires Federal agencies to take into account the effects of their undertakings on Historic Properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Therefore, prior to the issuance or authorization of any permit under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, the U.S. Army Corps of Engineers (Corps) must consider the effect the authorization may have on Historic Properties. Historic Properties may include, but are not limited to, archaeological districts, historic districts, sites, buildings, structures, objects, sacred sites, traditional cultural places, and traditional cultural landscapes that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

In order to comply with the NHPA, the South Pacific Division has prepared these guidelines to assist applicants, their consultants, and the Corps in minimizing time and effort preparing submittals to the State Historic Preservation Officer and expediting the review process. Reports not meeting the minimum guidelines will be returned to the applicant or consultant for revision.

In addition to standard professional reporting requirements, consultants should address the following elements in the preparation of cultural resources reports submitted to the Corps for compliance with Section 106 of the NHPA. It is important that the cultural resources consultant establish a working relationship with the Regulatory Project Manager, and/or District Archaeologist, prior to preparing a cultural resources report. The cultural resources report must be a stand-alone document and not dependent on other reports associated with a project.

Project Description. Include a complete and specific project description identifying purpose, acreage, location (including construction, staging, and access areas), construction methods, construction phasing (if any), and the elements of project construction, such as utilities, roads, buildings, etc., that have potential to affect historic properties. Such elements may include the portions of the project that will be altered, the parts that will remain unchanged, the visual impact of the project's various components, and the location and depth of ground disturbance that will occur as a result of the project's implementation.

Define Undertaking. The work, structure, or discharge that requires Corps authorization is the undertaking. Include a statement, as appropriate, that "The project would affect waters of the United States, therefore, the project proponent must meet requirements of Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899 and/or Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, and is therefore, seeking authorization from the U.S. Army Corps of Engineers." Include a statement regarding what federal agency has been designated the lead federal agency for compliance with Section 106 of the NHPA if more than one federal agency is involved.

Area of Potential Effect (APE)/Permit Area. The Corps shall define the permit area and APE for the project. Describe the horizontal and vertical (depth of ground disturbance) area of direct and indirect effects. Include a discussion on viewshed for the built environment, when appropriate. A viewshed APE may be different than a geographic APE and may require photographs looking toward and looking from the affected structure(s) as well as an analysis of how the viewshed was determined.

 Maps. Include a vicinity map, a page-size U.S.G.S map showing the anticipated permit area and APE, and a high quality large-scale map (1 inch = 200 feet) showing the proposed project development, and the approved or preliminary waters of the United States delineation.

 Literature Review. Include a records check that is not over one year old from the appropriate records repository, as well as review of other pertinent material including, but not limited to gray literature, Sanborn maps, historic topographical maps, historic aerial photographs, or other sources outside the records check. Additional information from local sources such as historical societies and public libraries, when available, should be provided. Include records of previous surveys and previously identified historic properties, when appropriate. Include sources for identification of submerged resources, when appropriate. Describe past and current land uses in a site-specific historical context statement.

 Field Methodology.

 Provide a detailed narrative on the field methodology, including field dates, the number and/or the names of the people on the survey, as well as the qualifications of the crew chief, and the field conditions. Also include the rationale for how the field methodology is appropriate relative to both the project's potential effects on historic properties and the field conditions at the time of the inventory.

 Identify whether the entire permit area was subject to a uniform field methodology, and, if not, describe where and how variations to the primary field methodology occurred. Include a map of variations to the primary field methodology, as appropriate.

 Specifically address both surface and subsurface identification efforts. Reference any applicable state and/or Federal standards under which the survey was conducted.

 Resources identified in field inventories completed more than 2 years old must be re-examined, and if necessary re-recorded, to determine site integrity and project effect.

 Describe potential for subsurface archeological remains. Include statement on how that determination was made, i.e., soils maps, field observation, geoarchaeological explorations, etc.

 Native American Coordination. Must be current, as tribal contacts are subject to change. Letters to tribes, both those with and without Federal recognition, and/or interested Native American individuals must be followed by telephone/email or other reasonable attempts to engage responses. Documentation of contacts and responses must be included. Lack of response must also be documented. Note, communication between consultants and tribes or Native American individuals is considered coordination. Federally-recognized tribes are sovereign nations and may require more formal government-to-government consultation if they so wish. The Corps will direct such consultation.

 Other Interested Party Coordination. Interested parties are individuals or entities which have expressed and demonstrated a viable interest in a proposed project. Letters to interested parties must be followed by telephone/email or other reasonable attempts to engage responses. Coordination must be current and documentation of contacts and responses must be included. Lack of response must also be documented. Note, communication between consultants and interested parties is considered coordination. Interested parties may request to become consulting parties and must submit their request in writing to the Corps.

 Findings.

 Provide a detailed description of all cultural resources identified within the APE of the permit area. Provide a detailed description of all previously identified historic properties located within close proximity of the permit area, as appropriate. Include all applicable data forms and/or site records as an appendix to the report.

 Maps. Include a high quality large-scale map (1 inch = 200 feet) showing the proposed project development overlaying the approved or preliminary waters of the United States delineation and the cultural resource locations, including isolates. Cultural resource locations and boundaries on the map are to be drawn to scale and not represented as symbols.

 Photographs. Must include high quality color photographs of each cultural resource identified and also include photographs showing the environmental setting, where appropriate.

 Recommendation of Eligibility of a property for listing on the National Register of Historic Places (NRHP). Unless otherwise determined, consultation with the State Historic Preservation Officer (SHPO), or Tribal Historic Preservation Officer (THPO) when on tribal lands, and the Advisory Council on Historic Preservation (ACHP) is the sole responsibility of the Corps. Consultation with the SHPO/THPO towards compliance with Section 106 should begin early in the process. Normally, the Corps makes the final decision on eligibility with concurrence from the SHPO/THPO, thus the consultant must be clear whether this has occurred in the past (provide date of SHPO/THPO concurrence letter) or whether the eligibility recommendation is the consultant's recommendation.

Eligibility recommendation:

 Must be completed for each cultural resource identified within the permit area; and

 Must include an historic context statement in accordance with National Park Service, National Register Bulletin 15, and other appropriate National Register bulletins; and

 Must evaluate whether a cultural resource is or is not eligible for inclusion in the NRHP under each of four of the criteria, and must consider the issue of integrity of each resource. A concise, rational argument for or against eligibility must accompany each recommendation.

 Eligibility Testing Plan. If the eligibility of a cultural resource is in question, the consultant can submit a draft eligibility testing plan with the survey report to the Corps. It may be appropriate to include tribes or Native American individuals, or other interested parties, in development and execution of the eligibility testing plan. The SHPO/THPO and the Corps will review and comment on or approve the eligibility testing plan for the specific sites and will advise the consultant when the testing plan may be implemented. After testing is complete, a testing report shall be submitted to the Corps so that the Corps may consult with the SHPO/THPO regarding the eligibility of the cultural resource.

 Recommendation of Effect of the undertaking on cultural resources identified as historic properties.

 For each cultural resource identified as an historic property, the consultant must discuss the specific proposed project impacts and define the effect within the ACHP framework at 36 CFR § 800.4(d), and, where, appropriate, 36 CFR § 800.5. Describe how much of the historic property would be affected. After the effect on each historic property is defined, the consultant must make an effect recommendation for the overall undertaking.

 Adversely Affected Historic Properties. A Historic Properties Treatment Plan (HPTP) and Memorandum of Agreement (MOA) will be required for adversely affected historic properties. These are sometimes combined as a second step in the Section 106 process, subject to advance SHPO/THPO approval. Typically, the MOA is developed by the Corps, though the applicant or consultant may develop the MOA with prior approval, and in consultation with the Corps. The HPTP will be developed by the applicant or consultant and is submitted through the Corps to the SHPO/THPO and ACHP with the MOA. Such documents can be provided electronically and should be capable of being edited and not overly formatted.

 Monitoring Plan. In the instance where a cultural resource determined eligible for listing on the National Register of Historic Places is located within the Corps' permit area, but will be avoided by the project, the consultant should submit a proposed avoidance and monitoring plan for review and comment on or approval by SHPO/THPO and the Corps. The approved monitoring plan shall be implemented at the instruction of the Corps.

 Professional Qualifications. Principal Investigators must meet the Secretary of the Interior's Standards for Professional Qualifications (48 FR 44738-44739) in the discipline germane to a particular resource type. For example, prehistoric archeologists should not identify and evaluate built environment resources without the oversight of an historian or architectural historian, nor should the reverse occur. Provide the identification and qualifications for those participating in the survey and evaluation of resources.

 Report Format. Include an Abstract which summarizes the project and findings. Include a table of contents and section headings that identify project purpose, project description, literature review, field methodology, and the remaining categories identified in the paragraphs above, in addition to background statements and any other information the consultant believes will aid in the identification, evaluation, and effect determination of the project on historic properties. Section headings are very important as they assist the reader in locating the appropriate subjects. Reports must be submitted following individual Corps District submittal requirements.

U S Army Corps of Engineers
Sacramento District

2021 Nationwide Permit Summary

33 CFR Part 330; Issuance of Nationwide Permits – February 25, 2022

14. Linear Transportation Projects. Activities required for crossings of waters of the United States associated with the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, driveways, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge of dredged or fill material cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge of dredged or fill material cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) The loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge of dredged or fill material in a special aquatic site, including wetlands. (See general condition 32.) (Authorities: Sections 10 and 404).

Note 1: For linear transportation projects crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Linear transportation projects must comply with 33 CFR 330.6(d).

Note 2: Some discharges of dredged or fill material for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Note 3: For NWP 14 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require pre-construction notification (see paragraph (b)(4) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, ''District Engineer's Decision.'' The district engineer may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

A. Regional Conditions

1. Regional Conditions for California
2. Regional Conditions for Nevada and Utah

B. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

☐ 1. **Navigation**.

☐ (a) No activity may cause more than a minimal adverse effect on navigation.

☐ (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on

authorized facilities in navigable waters of the United States.

☐ (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his or her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

☐ 2. **Aquatic Life Movements**. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

☐ 3. **Spawning Areas**. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

☐ 4. **Migratory Bird Breeding Areas**. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

☐ 5. **Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

☐ 6. **Suitable Material**. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

☐ 7. **Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

☐ 8. **Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

☐ 9. **Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

☐ 10. **Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

☐ 11. **Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

☐ 12. **Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

☐ 13. **Removal of Temporary Fills**. Temporary structures must be removed, to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

☐ 14. **Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

☐ 15. **Single and Complete Project**. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

☐ 16. **Wild and Scenic Rivers**.

☐ (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

☐ (b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The

district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

☐ (c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: https://www.rivers.gov/.

☐ 17. **Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

☐ 18. **Endangered Species**.

☐ (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."

☐ (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), the pre-construction notification must include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-Federal applicant has identified listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species (or species proposed for listing or designated critical habitat (or critical habitat proposed for such designation), or until ESA section 7 consultation or conference has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

☐ (d) As a result of formal or informal consultation or conference with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

☐ (e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

☐ (f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA

section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

☐ (g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at https://www.fws.gov/ or https://www.fws.gov/ipac/ and https://www.fisheries.noaa.gov/topic/endangered-species-conservation respectively.

☐ 19. **Migratory Birds and Bald and Golden Eagles**. The permittee is responsible for ensuring that an action authorized by an NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

☐ 20. **Historic Properties**.

☐ (a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

☐ (b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect.

☐ (d) Where the non-Federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and has so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

☐ (e) Prospective permittees should be aware that section 110(k) of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps,

after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

☐ 21. **Discovery of Previously Unknown Remains and Artifacts**. Permittees that discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by an NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

☐ 22. **Designated Critical Resource Waters**. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

☐ (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57 and 58 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

☐ (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

☐ 23. **Mitigation**. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

☐ (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

☐ (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

☐ (c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

☐ (d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

☐ (e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas involves planting vegetation, only native species should be planted. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss

concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

☐ (f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

☐ (1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

☐ (2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f).)

☐ (3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

☐ (4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another federal agency holds an easement, the district engineer will coordinate with that federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

☐ (5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

☐ (6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

☐ (g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

☐ (h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

☐ (i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

☐ 24. **Safety of Impoundment Structures**. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state or federal, dam safety

criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

☐ 25. **Water Quality**.

☐ (a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed discharge must be obtained or waived (see 33 CFR 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed discharge in order for the activity to be authorized by an NWP.

☐ (b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed discharge is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge, the permittee must submit a copy of the certification to the district engineer. The discharge is not authorized by an NWP until the district engineer has notified the permittee that the water quality certification requirement has been satisfied by the issuance of a water quality certification or a waiver.

☐ (c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

☐ 26. **Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all of the conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence or presumption of concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

☐ 27. **Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

☐ 28. **Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:

☐ (a) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States cannot exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

☐ (b) If one or more of the NWPs used to authorize the single and complete project has specified acreage limits, the acreage loss of waters of the United States authorized by those NWPs cannot exceed their respective specified acreage limits. For example, if a commercial development is constructed under NWP 39, and the single and complete project includes the filling of an upland ditch authorized by NWP 46, the maximum acreage loss of waters of the United States for the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States due to the NWP 39 and 46 activities cannot exceed 1 acre.

☐ 29. **Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

☐ 30. **Compliance Certification**. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

☐ (a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

☐ (b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

☐ (c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

☐ 31. **Activities Affecting Structures or Works Built by the United States**. If an NWP activity also requires review by, or permission from, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

☐ 32. **Pre-Construction Notification**.

☐ (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

☐ (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

☐ (2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

☐ (b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

☐ (1) Name, address and telephone numbers of the prospective permittee;

☐ (2) Location of the proposed activity;

☐ (3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

☐ (4)

☐ (i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

☐ (ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an

NWP but do not require PCNs). This information will be used by the district engineer to evaluate the cumulative adverse environmental effects of the proposed linear project, and does not change those non-PCN NWP activities into NWP PCNs.

☐ (iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

☐ (5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial and intermittent streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

☐ (6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

☐ (7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

☐ (8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

☐ (9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

☐ (10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

☐ (c) Form of Pre-Construction Notification: The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

☐ (d) Agency Coordination:

☐ (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

☐ (2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

☐ (3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete

PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

☐ (4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

☐ (5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

C. District Engineer's Decision

☐ 1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the single and complete crossings of waters of the United States that require PCNs to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings of waters of the United States authorized by an NWP. If an applicant requests a waiver of an applicable limit, as provided for in NWPs 13, 36, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects.

☐ 2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by an NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

☐ 3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters. The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed

compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure that the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

☐ 4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

D. Further Information

1. District engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

E. Nationwide Permit Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance but are still reasonably foreseeable.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high-water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has surface water flowing continuously year-round during a typical year.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required, and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23).

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high-water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high-water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized jurisdictional stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channel ward of the high tide line.

Tribal lands: Any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a "water of the United States." If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

NATIONWIDE PERMIT PROCESS

Prospective permittee submits a Pre-construction Notification (PCN)

PCN is received by the District, assigned to a project manager, given a number and entered into the database. PCN is then evaluated for completeness.

PCN Complete?

Yes

No

30 days

Prospective permittee is notified in writing that the activity does not qualify for a NWP and is provide instructions on how to seek authorization under another permit type.

No

Corps preliminarily determines the proposed activity would result in only minimal adverse impacts to the aquatic ecosystem, would not be contrary to the public interest, and meets terms/conditions of the NWP.

Yes

Prospective permittee is notified that PCN is incomplete and Corps requests additional information.

30 days

Yes

Prospective permittee submits additional information.

No

PCN is withdrawn

Are any of the following required?

1. Agency Coordination (per General Condition 32, paragraph d)
2. Tribal coordination/consultation
3. Consultation for compliance with Section 7 of the Endangered Species Act
4. Consultation for adverse effects to essential fish habitat (EFH)
5. Consultation for compliance with Section 106 of the National Historic Preservation Act

No

Yes

Has sufficient information been submitted to conduct the coordination/consultation?

Yes

No

Prospective permittee is notified that additional information is needed.

Prospective permittee submits additional information.

No

Yes

Corps initiates required tribal/agency coordination./consultation.

Tribal/agency coordination/ consultation is completed

Section 401 Certification and/or waiver has been received for the project

No

Permittee is sent NWP provisional notification letter. However, no work may proceed until a Section 401 Water Quality Certification, or waiver thereof, is granted and submitted to the District office.

Yes

Permittee is sent NWP verification letter with applicable special conditions. Work may proceed subject to the terms and conditions of the NWP, including any special conditions. If (1) NWP verification is not received within 45 days of receipt of a complete PCN, and (2) the permittee has not received notification, in writing, from the Corps that an individual permit is required, and (3) the activity does not require a written waiver to exceed specified limits of a NWP; then work may proceed under authority of the NWP.

LEGEND

- **Permittee Action**
- **District Review**
- **NWP Timeline Stopped**
- **District Determination**
- **Consultation/Coordination with other agencies**
- **Other Agency Action**
- **Final District NWP Determination**

Final 2021 Nationwide Permit (NWP) Regional Conditions for the States of Nevada and Utah

(NWPs 12, 21, 29, 39, 40, 42-44, 48, 50-52, and 55-58,
Effective March 15, 2021 until March 15, 2026)

A. Regional Conditions for the States of Nevada and Utah:

1. The permittee shall submit a pre-construction notification (PCN) for all 2021 NWPs, in accordance with General Condition 32, in the following circumstances:

a. Activities involving new bank stabilization that do not incorporate bioengineering techniques. Bioengineering techniques include using live plants alone or in combination with dead or inorganic materials, including rock, sand, or gravel;

b. Activities resulting in a discharge of dredged or fill material in waters of the U.S. (WOTUS) on Tribal Lands; and,

c. Activities involving the permanent channelization, realignment, or relocation of streams.

2. The use of any 2021 NWP is prohibited for the following:

a. Activities in peatlands[1] containing histosols, including bogs and fens; and,

b. Discharges of dredged and/or fill material below the ordinary high water mark of the Great Salt Lake containing bioherms (microbialites).

B. 401 Water Quality Certification (401 WQC) Regional Conditions for Nevada:

1. The following conditions from the attached December 11, 2020, 401 WQC granted by the U.S. Environmental Protection Agency (EPA), shall apply to NWP 43 on tribal lands within U.S. EPA Region 9[2] boundaries in the State of Nevada:

a. All applicants must provide notice to EPA Region 9 prior to commencing construction to provide EPA Region 9 with the opportunity to inspect the activity for the purposes of determining whether any discharge from the proposed project will violate this water quality

[1]A peatland is defined as a wetland with saturated organic soil (greater than or equal to 16 inches in thickness) that is classified as a histosol in the Natural Resources Conservation Service (NRCS) Field Indicators of Hydric Soils in the United States (Version 8.0, 2016). A copy of the document can be obtained from the NRCS at: http://www.nrcs.usda.gov/Internet/_DOCUMENTS/nrcs142p2_053171.pdf

[2]The EPA 401 WQC does not apply to activities proceeding in the territories of the 23 tribes in Region 9 that have been approved as Section 401 certifying authorities —the Navajo Nation, Hualapai Tribe, Paiute-Shoshone of the Bishop Community, Big Pine Paiute-Shoshone Tribe, Twenty-Nine Palms Band of Mission Indians, Hoopa Valley Tribe, Hopi Tribe, Pyramid Lake Paiute Tribe, Dry Creek Rancheria of Pomo Indians, Pala Band of Mission Indians, Cortina Band of Wintun Indians, Walker River Paiute Tribe, Yerington Paiute, Duck Valley, Confederated Tribes of the Goshute Reservation, Gila River Indian Community, San Carlos Apache, Morongo Band of Mission Indians, Big Pine Paiute Tribe of the Owen Valley, Rincon Band of Luiseno Indians, Cabazon, Quartz Valley, Karuk and White Mountain Apache Tribe. In limited circumstances some lands within tribal boundaries fall outside a tribe's Section 401 certifying authority and are subject to this certification.

certification. Where the Corps requires a PCN for the applicable NWP, the applicant should also provide the PCN to Region 9. Within 30 days, EPA Region 9 will provide written verification to the applicant that the proposed project will not violate the water quality certification of the NWP.

b. Projects or activities are not authorized under the NWP if the project will involve point source discharge into an active channel of a WOTUS identified as a section 303(d) or Total Maximum Daily Load (TMDL) listed impaired waterbody and the discharge may result in further exceedance of a specific parameter (e.g. total suspended solids, dissolved oxygen, temperature) for which the waterbody is listed. The current lists of 303(d) and TMDL listed waterbodies are available on EPA Region 9's web site at: https://www.epa.gov/tmdl/impaired-waters-and-tmdls-pacific-southwest-region-9.

C. 401 Water Quality Certification (401 WQC) Regional Conditions for Utah:

1. The following conditions from the attached December 8, 2020, 401 WQC granted by the State of Utah, Department of Environmental Quality, shall apply to all 2021 NWPs on non-tribal land in the State of Utah:

a. The Project Proponent shall provide Director Notification and Review for the following projects in order to protect designated beneficial uses and assure that Utah Water Quality Standards (WQS) are not violated:

i. Any project proposed under Nationwide Permits 3 (Maintenance) and 37 (Emergency Watershed Protection and Rehabilitation) and any project proposed under NWP 27 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities) where PCN is required;

ii. Any proposed project that will be within 500 feet of the existing waters' edge of the Great Salt Lake, Utah Lake, and Bear Lake;

iii. Any project with a potential discharge into an impaired waterbody with an approved TMDL, where the project has the potential to discharge a pollutant identified/ addressed by the TMDL;

iv. Any project with a potential discharge to Category 1 or Category 2 waters; and,

v. Any project with a potential discharge where federal agencies are exempted from PCN normally required under the general permit in question.

b. All activities with a potential discharge to WOTUS must implement and maintain best management practices (BMPs) to fully protect the waterbodies assigned beneficial use(s).

c. All activities shall not cause further degradation of impaired waterbodies- as defined in the State of Utah, Division of Water Quality's most recent 303(d) list, regardless of

whether a TMDL has been completed. The project proponent must review impairments on the waterbodies where the projects have potential to discharge and is responsible for ensuring that WQS are not exceeded and designated beneficial uses are not impaired.

d. Hazardous and otherwise deleterious materials (e.g. oil, gasoline, chemicals, trash, sawdust, etc.) shall not be stored, disposed of, or accumulated or conveyed through adjacent to, or in immediate vicinity of, WOTUS unless adequate measures and controls are provided to ensure those materials will not enter WOTUS in the State of Utah. Any spill or discharge of oil or other substance which may cause pollution to WOTUS in the State of Utah, including wetlands, must be immediately reported to the Utah DEQ Hotline at (801) 536-4123, a 24-hour phone number.

e. All project proponents conducting activities in, or immediately adjacent to, WOTUS in the State of Utah with assigned class 1C (domestic drinking water) that are upstream 2 miles or less from any intake supply must notify the water supply operator and the local health department prior to commencement of work. If the water supply operator or the local health department recommends additional BMPs or monitoring, the project proponent must consider those recommendations in their project design.

f. All activities conducted in, or immediately adjacent to, WOTUS in the State of Utah with assigned beneficial use class 3A (cold water fishery) or has blue ribbon fishery designation must avoid removal of native riparian vegetation that provides stream shading to the maximum extent practicable. Any projects that approve removal of riparian vegetation that provides shade must require reestablishment of native vegetation that provides equal or greater shade. The project proponent shall provide successful reestablishment of native vegetation.

g. All activities conducted in WOTUS in the State of Utah shall be conducted in the "dry" to the maximum extent practicable, by diverting flow utilizing cofferdams, berms constructed of sandbags, clean rock (containing no fine sediment) or other non-erodible, non-toxic material. All diversion materials shall be removed at the completion of the work. Project proponent shall consider conducting instream work during low flow conditions and work shall not be conducted during spawning season. Additionally, construction machinery shall not be operated within WOTUS in the State of Utah unless it is unavoidable, in which case it shall be conducted in the "dry" as stated above. The work shall be conducted in a manner to minimize the duration of the disturbance, turbidity increases, substrate disturbance, and minimize the removal of riparian vegetation. Construction machinery shall be clean to prevent the transfer of aquatic invasive species.

2. The following conditions from the attached December 11, 2020, 401 WQC granted by Ute Mountain Ute Tribe (UMUT) shall apply to NWPs 43, 57, and 58, on the Ute Mountain Ute Reservation in the State of Utah:

a. All applicants, including federal agencies, must notify UMUT's Tribal Environmental Department of the use of all NWPs for which certification has been granted prior to commencing work on the project. Notification must include:

i. project location (lat. and long., exact point on map);

ii. NWP that will be used and the specific activity that will be authorized under the NWP;

iii. amount of permanent and temporary fills;

iv. a short summary of the proposed activity, and all other federal, state, tribal or local permits or licenses required for the project;

v. complete contact information of both the applicant and contractor (name, name of the company or property if applicable, telephone, mobile, and email);

vi. summary of best management practices that will be use; and,

vii. notify UMUT at least 7 days before the completion of construction and operations begin.

b. Point source discharges may not occur: (1) in fens, bogs or other peatlands; (2) within 100 feet of the point of discharge of a known natural spring source; (3) hanging gardens; or (4) culturally sensitive waters.

c. Except as specified in the application, no debris, silt, sand, cement, concrete, oil or petroleum, organic material, or other construction related materials or wastes shall be allowed to enter into or be stored where it may enter into WOTUS.

d. Silt fences, straw wattles, and other techniques shall be employed as appropriate to protect WOTUS from sedimentation and other pollutants.

e. Water used in dust suppression shall not contain contaminants that could violate water quality standards.

f. Erosion control matting that is either biodegradable blankets or loose-weave mesh must be used to the maximum extent practicable.

g. All equipment used in WOTUS must be inspected for fluid leaks and invasive species prior to use on a project. All fluid leaks shall be repaired and cleaned prior to use or when discovered, or if the fluid leak can't be repaired, the equipment shall not be used on site. Equipment used in waters with the possibility of aquatic nuisance species infestation must be thoroughly cleaned before they are used on the project.

h. Vegetation should be protected except where its removal is necessary for completion of the work. Locations disturbed by construction activities should be revegetated with appropriate native vegetation in a manner that optimizes plant establishment for the specific site. Revegetation may include topsoil replacement, planting, seeding fertilization, liming, and weed-free mulching, as necessary. Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas. All revegetation materials, including plants and plant seed shall be on site or scheduled for delivery prior to or upon completion of the earth moving activities.

i. Activities may not result in any unconfined discharge of liquid cement into WOTUS. Grouting riprap must occur under dry conditions with no exposure of wet concrete to the waterbody.

j. Activities that may result in a point source discharge shall occur during seasonal low flow or no flow periods to the extent practicable.

k. The placement of material (discharge) for the construction of new dams is not certified, except for stream restoration projects.

l. For NWP 43, *Stormwater Management Facilities*, certification is granted with conditions only for replacement and repair activities that impact (e.g., fill, relocate, realign or straighten) no more than 300 linear feet (lf) of stream or 1/10 acre of WOTUS.

m. For NWP 57, *Electric Utility Line and Telecommunications Activities*, construction activities shall not impact (e.g., fill, relocate, realign, or straighten) more than 300 lf of stream for a single and complete project.

n. For NWP 58, *Utility Line Activities for Water and Other Substances*, activities shall not impact (e.g., fill, relocate, realign, or straighten) more than 300 lf of stream channel for a single and complete project.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Brigadier General Paul E. Owen
Division Engineer, South Pacific Division
U.S. Army Corps of Engineers
1455 Market Street
San Francisco, CA 94103-1398

Subject: Programmatic Clean Water Act, Section 401 Certification of the Draft 2020 Nationwide Permits for Tribal Lands within the Region 9 coverage area of the U.S. Environmental Protection Agency

Dear General Owen,

The U.S. Environmental Protection Agency Region 9 (EPA) has responsibility under section 401 of the Clean Water Act (CWA) to evaluate and certify water quality protections for federal permits or licenses issued for work on tribal lands (40 CFR 121.13(a)). We have reviewed the U.S. Army Corps of Engineers (Corps) Federal Register notice dated September 15, 2020, announcing the proposed issuance of the Corps' CWA Section 404 Nationwide Permits (NWPs). We have also reviewed the regional conditions proposed for each District within the South Pacific Division and hereby transmit our programmatic water quality certification of these general permits. The enclosed conditions of the NWPs become binding requirements of NWPs issued for work on tribal lands within EPA Region 9.[1,2] Please instruct your regulatory staff to provide this certification to anyone contacting the Corps with applicable projects.

Based on a thorough review of the materials provided by the Corps, EPA made a determination as to whether potential discharges authorized by the proposed NWPs will comply with applicable provisions of Sections 301, 302, 303, 306 and 307 of the CWA. In summary, of the 57 proposed active permits, EPA is conditionally certifying 19 NWPs, denying 12 NWPs , and waiving certification for 15 NWPs. The Corps is not requesting certification for 11 NWPs.[3] The 401 certification conditions are necessary to assure that potential discharges authorized by the NWPs will comply with applicable water quality requirements. A table summarizing the certification status for each NWP, is included in the attached certification. The attached programmatic 401 certification will remain in effect for the authorization

[1] This water quality certification does not apply to activities proceeding in the territories of the 23 tribes in Region 9 that have been approved as Section 401 certifying authorities —the Navajo Nation, Hualapai Tribe, Paiute-Shoshone of the Bishop Community, Big Pine Paiute-Shoshone Tribe, Twenty-Nine Palms Band of Mission Indians, Hoopa Valley Tribe, Hopi Tribe, Pyramid Lake Paiute Tribe, Dry Creek Rancheria of Pomo Indians, Pala Band of Mission Indians, Cortina Band of Wintun Indians, Walker River Paiute Tribe, Yerington Paiute, Duck Valley, Confederated Tribes of the Goshute Reservation, Gila River Indian Community, San Carlos Apache, Morongo Band of Mission Indians, Big Pine Paiute Tribe of the Owen Valley, Rincon Band of Luiseno Indians, Cabazon, Quartz Valley, Karuk and White Mountain Apache Tribe. In limited circumstances some lands within tribal boundaries fall outside a tribe's Section 401 certifying authority and are subject to this certification.

[2] Consistent with the *EPA Policy on Consultation and Coordination with Indian Tribes*, EPA sent a letter dated September 29, 2020, offering to consult with tribes in Region 9 on this certification. EPA did not receive any formal requests for consultation or any written comments on the draft certification.

[3] The 11 NWPs are as follows: 1, 2, 8, 9, 10 11, 24, 28, 35, A, B.

period of the 2020 NWPs and will be re-evaluated when the NWPs are next proposed for reissuance and revisions in 2025.

If a project fails to meet the enclosed conditions, the applicant must contact EPA Region 9 for individual project certification. Please advise project proponents who seek authorization under the NWPs for individual project certification on tribal lands within EPA Region 9 to submit their questions, pre-filing meeting requests, and subsequent 401 certification requests when required to: R9-401-Certs@epa.gov.

Thank you for your ongoing partnership in implementing the regulatory programs of the CWA. Please contact me at (415) 972-3337 with any questions regarding this conditional certification, or have your staff contact Elizabeth Goldmann at (415) 972-3398 or goldmann.elizabeth@epa.gov.

Sincerely,

Tomás Torres
Director
Water Division

Enclosure:
U.S. Environmental Protection Agency Region 9's Programmatic Clean Water Act Section 401 Certification of the 2020 Nationwide Permits for Projects on Applicable Tribal Lands in California, Nevada, Arizona and Navajo Allottee Lands

cc:
All federally recognized Indian Tribes within EPA Region 9
James Mazza, Regulatory Branch Chief, San Francisco District
Michael Jewel, Regulatory Branch Chief, Sacramento District
David Castanon, Regulatory Branch Chief, Los Angeles District
Kelly Allen, Regulatory Branch Chief, Albuquerque District
Wade Eakle, Corps, South Pacific Division
Trevor Baggiore, Arizona Department of Environmental Quality
Paul Hann, California State Water Resources Control Board
Birgit Widegren, Nevada Division of Environmental Protection

Enclosure
U.S. Environmental Protection Agency Region 9's Programmatic Clean Water Act Section 401 Certification of the 2020 Nationwide Permits for Projects on applicable Tribal Lands in California, Nevada, Arizona and Navajo Allottee Lands

This Certification applies to any potential point source discharges from potential projects authorized under the proposed re-issuance of the following U.S. Army Corps of Engineers (Corps) CWA 404 Nationwide Permits (NWPs) into waters of the United States that occur within applicable tribal lands in California, Nevada, Arizona and Navajo Allottee land in the corresponding Sacramento, San Francisco, Los Angeles and Albuquerque Corps Districts: NWP 3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, C, and D, and E. The Corps is not requesting certification for 11 NWPs: 1, 2, 8, 9, 10, 11, 24, 28, 35, A, and B.

Section 401(a)(1) of the CWA requires applicants for Federal permits and licenses that may result in discharges into waters of the United States, to obtain certification that any such discharges will comply with applicable provisions of the CWA, including Sections 301, 302, 303, 306 and 307. Where no state agency or tribe has authority to give such certification, U.S. Environmental Protection Agency (EPA) Region 9 is the certifying authority. In this case, the EPA is making the certification decision for potential discharges that may result from the projects authorized under the proposed Corps CWA 404 NWPs listed above.[1]

Project Description

The Corps is proposing to re-issue its existing NWPs and associated general conditions and definitions, with some modifications. The Corps states that it is "proposing these modifications to simplify and clarify the NWPs, reduce burdens on the regulated public, and continue to comply with the statutory requirement that these NWPs authorize only activities with no more than minimal individual and cumulative adverse environmental effects." 85 FR 57298. For more

[1] This water quality certification does not apply to activities proceeding in the territories of the 23 tribes in Region 9 that have been approved as Section 401 certifying authorities —the Navajo Nation, Hualapai Tribe, Paiute-Shoshone of the Bishop Community, Big Pine Paiute-Shoshone Tribe, Twenty-Nine Palms Band of Mission Indians, Hoopa Valley Tribe, Hopi Tribe, Pyramid Lake Paiute Tribe, Dry Creek Rancheria of Pomo Indians, Pala Band of Mission Indians, Cortina Band of Wintun Indians, Walker River Paiute Tribe, Yerington Paiute, Duck Valley, Confederated Tribes of the Goshute Reservation, Gila River Indian Community, San Carlos Apache, Morongo Band of Mission Indians, Big Pine Paiute Tribe of the Owen Valley, Rincon Band of Luiseno Indians, Cabazon, Quartz Valley, Karuk and White Mountain Apache Tribe. In limited circumstances some lands within tribal boundaries fall outside a tribe's Section 401 certifying authority and are subject to this certification.

details: https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Nationwide-Permits/.

General Information

The general information provided in this section does not constitute a certification condition(s).

The project proponents for potential projects authorized under the NWPs are responsible for obtaining all other permits, licenses, and certifications that may be required by federal, state, or tribal authorities.

Copies of this certification shall be kept on the job site and readily available for reference.

The project proponent for potential projects authorized under the NWP are encouraged to contact EPA Region 9 during the project planning phase if there are any questions about relevant best management practices (e.g., bioengineering techniques, biodegradable erosion control measures, revegetation using native plant species, suitable fill materials, and disposal of debris/construction materials preventing runoff) and resources that can assist with compliance.

Prior to work commencing, project proponents should notify the appropriate Tribal Environmental Office.

Project proponents for potential projects should also notify the appropriate Tribal Office and EPA Region 9 if spills or unauthorized discharges occur during the project.

Pursuant to CWA section 308(a), EPA Region 9 representatives are authorized to inspect the authorized activity and any mitigation areas to determine compliance with the terms and conditions of the NWP.

If you have questions regarding this certification, please contact EPA Region 9 at: R9-401-Certs@epa.gov.

Granted with Conditions (121.7(d)(2)):

On behalf the 125 federally recognized tribes with tribal lands within Region 9, CWA Section 401 certification, for the following proposed NWPs, is granted with conditions. EPA Region 9 has determined that any discharge authorized under the following proposed NWPs will comply with water quality requirements, as defined at 40 CFR 121.1(n), subject to the following conditions pursuant to Section 401(d).

NWPs 5, 6, 7, 18, 19, 20, 23, 25, 27, 32, 33, 36, 37, 38, 41, 43, 45, 53, and E.

Condition 1 – Notification to EPA

All applicants must provide notice to EPA Region 9 prior to commencing construction to provide EPA Region 9 with the opportunity to inspect the activity for the purposes of determining whether any discharge from the proposed project will violate this water quality certification. Where the Corps requires a PCN for the applicable NWP, the applicant should also provide the PCN to

Region 9. Within 30 days, EPA Region 9 will provide written verification to the applicant that the proposed project will not violate the water quality certification of the NWP.

Why the condition is necessary to assure that any discharge authorized under the general license or permit will comply with water quality requirements:
This condition is necessary to provide EPA Region 9 with notice and information to allow for an efficient and effective pre-operation inspection to determine if the certified discharge will violate the certification. If the project scope changes during the Corps review prior to initiation of the activity, it is also critical for EPA Region 9 to be provided any changes in the project design, scope, amount and location of discharges to inform the pre-operation inspection opportunity as provided by 40 CFR 121.11(a).

Citation(s) that authorizes this condition: 40 CFR 121.11(a)

Condition 2 – Projects or Activities Discharging to Impaired Waters
Projects or activities are not authorized under the NWPs if the project will involve point source discharge into an active channel of a water of the U.S. identified as a section 303(d) or TMDL listed impaired waterbody and the discharge may result in further exceedance of a specific parameter (e.g. total suspended solids, dissolved oxygen, temperature) for which the waterbody is listed. The current lists of 303(d) and TMDL listed waterbodies are available on EPA Region 9's web site at: https://www.epa.gov/tmdl/impaired-waters-and-tmdls-pacific-southwest-region-9.

Why the condition is necessary to assure that any discharge authorized under the general license or permit will comply with water quality requirements:
A 303(d) listed waterbody is impaired due to the cumulative effects of discharges of pollutants. The NWPs do not provide necessary activity specific information to determine compliance with specific water quality requirements, such as limits on total suspended solids, temperature, dissolved oxygen, nutrients, or pH for which a specific waterbody could be listed as impaired. Site specific analysis is required to determine whether water quality requirements are met in the active channel of a water of the U.S. identified as a section 303(d) or TMDL listed impaired waterbody.[2]

Citation(s) that authorizes this condition: CWA section 303(d)

Denied (121.7(e)(2))

On behalf of the 125 federally recognized tribes with tribal lands within EPA Region 9, EPA Region 9 cannot certify that the range of discharges from potential projects authorized under the following proposed NWPs will comply with water quality requirements, as defined in 40 CFR 121.1(n). Therefore, CWA Section 401 water quality certification is denied for NWPs 3, 12, 13, 14, 29, 39, 40, 42, 44, 51, C and D, and applicants must request an individual water quality certification, consistent with 40 CFR 121.5.

Certification denial is due to insufficient information. 40 CFR 121.7(e)(2)(iii). In EPA's unique role certifying on behalf of a tribe, in a tribal jurisdiction where EPA is not the regulator, EPA lacks important information about tribal water resources. In the case of the 125 federally

[2]For example, Granite Creek in Arizona, a 303(d) listed as impaired for *e. coli*, runs through Yavapai Prescott Indian Reservation.

recognized tribes with tribal lands within EPA Region 9, EPA Region 9 lacks sufficient information on sensitive resources that may exist on these tribal lands, potential impaired waters on these tribal lands, and potential cultural importance of the water resources on these tribal lands. Additional information on these specific subjects would be needed for EPA Region 9 to assure that the range of discharges from potential projects authorized under NWPs 3, 12, 13, 14, 29, 39, 40, 42, 44, 51, C, and D will comply with water quality requirements, as defined in 40 CFR 121.1(n).

This information would also be necessary for EPA Region 9 to identify specific water quality requirements and evaluate whether the range of discharges from potential projects will comply with such requirements, in accordance with CWA section 401(a)(1) and 40 CFR 121.7(b). Lacking this information, EPA Region 9 is therefore denying certification.

Waived (121.9(a)(1)):

On behalf of the 125 federally recognized tribes with tribal lands within U.S. Environmental Protection Agency (EPA) Region 9, EPA Region 9 is expressly waiving its authority to act on the CWA Section 401 certification request for the following proposed NWPs:

NWPs 4, 15, 16, 17, 21, 22, 30, 31, 34, 46, 48, 49, 50, 52, 54

Summary Table – EPA Region 9 CWA § 401 Certification of NWPs

NWP	Certification Status				Specific Conditions
	Certified with Conditions	Denial	Waived	NWPs the Corps is not Requesting Certification	
1				X	
2				X	
3		X			
4			X		
5	X				Notice to EPA, NWP not applicable to 303(d) listed waters
6	X				Notice to EPA, NWP not applicable to 303(d) listed waters
7	X				Notice to EPA, NWP not applicable to 303(d) listed waters
8				X	
9				X	
10				X	
11				X	
12		X			
13		X			
14		X			

15			X		
16			X		
17			X		
18	X				Notice to EPA, NWP not applicable to 303(d) listed waters
19	X				Notice to EPA, NWP not applicable to 303(d) listed waters
20	X				Notice to EPA, NWP not applicable to 303(d) listed waters
21			X		
22			X		
23	X				Notice to EPA, NWP not applicable to 303(d) listed waters
24				X	
25	X				Notice to EPA, NWP not applicable to 303(d) listed waters
26				Reserved. This NWP is no longer in use.	
27	X				Notice to EPA, NWP not applicable to 303(d) listed waters
28				X	
29		X			
30			X		
31			X		
32	X				Notice to EPA, NWP not applicable to 303(d) listed waters
33	X				Notice to EPA, NWP not applicable to 303(d) listed waters
34			X		
35				X	
36	X				Notice to EPA, NWP not applicable to 303(d) listed waters
37	X				Notice to EPA, NWP not applicable to 303(d) listed waters
38	X				Notice to EPA, NWP not applicable to 303(d) listed waters
39	X				Notice to EPA, NWP not applicable to 303(d) listed waters
40		X			
41	X				Notice to EPA, NWP not applicable to 303(d) listed waters
42		X			
43		X			
44		X			

45	X				Notice to EPA, NWP not applicable to 303(d) listed waters
46			X		
47				Reserved. This NWP is no longer in use.	
48			X		
49			X		
50			X		
51		X			
52			X		
53	X				Notice to EPA, NWP not applicable to 303(d) listed waters
54			X		
A				X	
B				X	
C		X			
D		X			
E	X				Notice to EPA, NWP not applicable to 303(d) listed waters

STATE OF UTAH
DIVISION OF WATER QUALITY
DEPARTMENT OF ENVIRONMENTAL QUALITY
SALT LAKE CITY, UTAH

§401 Water Quality Certification No. DWQ-2020-10001

Applicant: US Army Corps of Engineers
Michael Jewell, Chief Regulatory Division
Sacramento District
1325 J Street
Sacramento, CA 95814

Project: **On September 15, 2020,** the U.S. Army Corps of Engineers issued **85 FR 57298 Proposal to Reissue and Modify Nationwide Permits** proposing to reissue 52 existing nationwide permits (NWPs) and issue five new NWPs. NWPs are general permits issued by the U.S. Army Corps of Engineers on a nationwide basis to streamline the authorization of certain activities under Section 404 of the Clean Water Act that result in no more than minimal individual and cumulative adverse environmental effects. Many of the proposed NWPs require notification to the district engineer before commencing activities to ensure that the activities authorized by those NWPs cause no more than minimal individual and cumulative adverse environmental effects.

Location: State of Utah

Watercourse(s): Waters of the United States (WOTUS)

Request Date: October 13, 2020

Effective Date: December 8, 2020

DWQ-2020-024910

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Attachment 1: Applicant/Project Proponent Resources

I. Definitions

1.) **Blue Ribbon Fishery:** status administered by the Utah Division of Wildlife Resources and the Blue Ribbon Advisory Council that indicates the waterbody has high quality in the following attributes: fishing, outdoor experience, fish habitat, and economic benefits.

2.) **Category 1 Waters** are *"Waters which have been determined by the Board to be of exceptional recreational or ecological significance or have been determined to be a State or National resource requiring protection, shall be maintained at existing high quality through designation, by the Board after public hearing, as Category 1 Waters."* UAC R317-2-3.2

3.) **Category 2 Waters** *"are designated surface water segments which are treated as Category 1 Waters except that a point source discharge may be permitted provided that the discharge does not degrade existing water quality."* UAC R317-2-3.3

4.) **Designated Beneficial Uses**: means a water's present most reasonable uses, grouped by use classes to protect the uses against controllable pollution. Beneficial uses designated within each class are described in Utah Administrative Code (UAC) R317-2-6 and waterbodies beneficial uses can be found in UAC R317-2-13. For the purposes of this document, the term "designated beneficial uses" will be used to describe all uses required to be protected by Utah Water Quality Standards and Antidegradation Policy.

5.) **Director Notification and Review** means submittal of the U.S. Army Corps of Engineers (USACE) application and any supplemental attachments to the Utah Department of Environmental Quality (DEQ), Director of the Utah Division of Water Quality (DWQ) for review.

6.) **Existing Uses** *"means those uses actually attained in a water body on or after November 28, 1975, whether or not they are included in the water quality standards."* UAC R317-1-1." *If a situation is found where there is an existing use which is a higher use (i.e., more stringent protection requirements) than that current designated use, the Director will apply the water quality standards and anti-degradation policy to protect the existing use."* UAC R317-2-3.

7.) **Project Proponent** *"means the applicant for license or permit or entity seeking certification."* 40 CFR §121.1

8.) **Total Maximum Daily Load (TMDL)-** *"means the maximum amount of a particular pollutant that a waterbody can receive and still meet state water quality standards, and an allocation of that amount to the pollutant's sources."* UAC R317-1-1

9.) **Waters of the United States (WOTUS)** means waterbodies subject to the provisions of the Clean Water Act.

10.) **303(d) list** is a state's list of impaired and threatened waters, including but not limited to; streams, lakes, and reservoirs adopted to implement the Clean Water Act Section 303(d).

II. Acronyms

BMPs- Best Management Practices
CWA- Clean Water Act
DEQ- Utah Department of Environmental Quality
DWQ – Utah Division of Water Quality
NWP(s)- Nationwide Permit(s)
PCN- Preconstruction Notification
UAC- Utah Administrative Code
USACE - U.S. Army Corps of Engineers
TMDL – Total Maximum Daily Load
WQS- Utah Water Quality Standards
WOTUS- Waters of the United States

III. Executive Summary

Pursuant to Section 401 of the Clean Water Act (CWA) 33 U.S.C. Section 1251 et seq., DWQ grants water quality certification to all USACE nationwide permits (NWPs) proposed by 85 FR 57298 except those that involve dam maintenance/rehabilitation or reservoir dewatering. Certification is subject to the conditions outlined in this document, adherence to the Sacramento Districts Regional Conditions, and adherence to any conditions outlined in the proposed NWPs. The conditions outlined in this certification are necessary to assure compliance with effluent limitations, monitoring requirements, and other applicable laws and regulations adopted for state primacy of the CWA. Condition justification and appropriate citations of Federal and State laws that authorize the condition, as required by 30 CFR Part 121.7, can be found in the section immediately following the conditions. In order to further assure compliance, DWQ reserves the right to request an individual certification for any project that is determined to have potential for significant adverse effects on water quality, potential to cause a violation of Utah Water Quality Standards (WQS) under UAC R317-2 or potential to degrade Waters of the United States (WOTUS), causing a violation of Utah Antidegradation Policy in UAC 317-2-3 in the State of Utah.

DWQ's conditions are based on and are necessary to comply with applicable state rules. Specifically, the following Utah Rules represent overarching considerations that require the conditions outlined by this document to apply to the USACE NWPs: Utah's rules promulgating standards of quality for waters of the State affirm "it shall be unlawful and a violation of these rules for any person to discharge or place any wastes or other substances in such manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated" UAC R317-2-7.1.a. Additionally, "All actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses." UAC R317-2-8. As stated in UAC R317-15-6.1 the Director will

ordinarily consider whether the proposed discharge "impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3

The Utah DWQ participated in a pre-filing meeting with the USACE on September 16, 2020, and received a formal 401 Certification request on October 13, 2020 from the USACE for the reissuance of the USACE NWPs. Utah DWQ was informed that the reasonable period of time to make a certification decision was 60 days, which requires the DWQ to act by December 12, 2020.

The Utah DWQ requested a 19 day extension of the 60 day deadline to make a certification decision on October 15, 2020. The extension was requested because on September 11, 2020, the EPA finalized the "Clean Water Act Section 401 Certification Rule", which had significant impact on Utah DWQ's certification program. The DWQ requested the additional time to ensure that the certification decision met the new requirements outlined in 40 CFR Part 121.

The USACE denied Utah's request for extension on October 23, 2020 and the DWQ was advised to act on the request by December 12, 2020.

IV. Background

NWPs authorize certain activities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The USACE is proposing to reissue its existing NWPs and associated general conditions and definitions, with some modifications. The USACE are also proposing to issue five new NWPs. The USACE is proposing to divide the current NWP that authorizes utility line activities (NWP 12) into three separate NWPs that address the differences in how different linear projects are constructed, the substances they convey, and the different standards and best management practices that help ensure those NWPs authorize only those activities that have no more than minimal adverse environmental effects. Specifically, we are proposing to modify the current utility line NWP 12 to authorize only oil and natural gas pipeline activities. Two proposed new NWPs would authorize activities associated with the construction, maintenance, repair, and removal of electric utility lines/telecommunication lines and utility lines that convey water, sewage, and other substances with the potential to pollute. The fifth proposed new NWP would authorize discharges of dredged or fill material into jurisdictional waters for the construction, expansion, and maintenance of water reuse and reclamation facilities. NWPs authorize only activities with no more than minimal individual and cumulative adverse environmental effects.

V. Certification Conditions

1.) The Project Proponent shall provide Director Notification and Review for the following projects in order to protect designated beneficial uses and assure that WQS are not violated:

(a) Any project proposed under Nationwide Permits 3 (Maintenance) and 37 (Emergency Watershed Protection and Rehabilitation) and any project proposed under NWP 27 (Aquatic Habitat Restoration, Enhancement, and Establishment Activities) where PCN is required;

(b) Any proposed project that will be within 500 feet of the existing waters' edge of the Great Salt Lake, Utah Lake, and Bear Lake;

(c) Any project with a potential discharge is to an impaired waterbody with an approved Total Maximum Daily Load (TMDL), where the project has the potential to discharge a pollutant identified/ addressed by the TMDL;

(d) Any project with a potential discharge to *Category 1* or *Category 2* waters;

(e) Any project with a potential discharge where federal agencies are exempted from PCN normally required under the general permit in question.

2.) All activities with a potential discharge to WOTUS must implement and maintain best management practices (BMPs) to fully protect the waterbodies assigned beneficial use(s).

3.) All activities shall not cause further degradation of impaired waterbodies- as defined in DWQ's most recent 303(d) list, regardless of whether a TMDL has been completed. The project proponent must review impairments on the waterbodies where the projects have potential to discharge and is responsible for ensuring that WQS are not exceeded and designated beneficial uses are not impaired.

4.) Hazardous and otherwise deleterious materials (e.g. oil, gasoline, chemicals, trash, sawdust, etc.) shall not be stored, disposed of, or accumulated or conveyed through adjacent to or in immediate vicinity WOTUS unless adequate measures and controls are provided to ensure those materials will not enter WOTUS in the State of Utah. **Any spill or discharge of oil or other substance which may cause pollution to WOTUS in the State of Utah, including wetlands, must be immediately reported to the Utah DEQ Hotline at (801) 536-4123, a 24-hour phone number.**

5.) All project proponents conducting activities in or immediately adjacent to WOTUS in the State of Utah with assigned class 1C (domestic drinking water) that are upstream 2 miles or less from any intake supply must notify the water supply operator and the local health department prior to commencement of work. If the water supply operator or the local health department recommends additional BMPs or monitoring, the project proponent must consider those recommendations in their project design.

6.) All activities conducted in or immediately adjacent to WOTUS in the State of Utah with assigned beneficial use class 3A (cold water fishery) or has blue ribbon fishery designation must avoid removal of native riparian vegetation that provides stream shading to the maximum extent practicable. Any projects that approve removal of riparian vegetation that provides shade must require reestablishment of native vegetation that provides equal or greater shade. The project proponent shall provide successful reestablishment of native vegetation.

7.) All activities conducted in WOTUS in the State of Utah shall be conducted in the "dry" to the maximum extent practicable, by diverting flow utilizing cofferdams, berms constructed of sandbags, clean rock (containing no fine sediment) or other non-erodible, non-toxic material. All diversion materials shall be removed at the completion of the work. Project proponent shall consider conducting instream work during low flow conditions and work shall not be conducted during spawning season. Additionally, construction machinery shall not be operated within WOTUS in the State of Utah unless it is unavoidable, in which case it shall be conducted in the "dry" as stated above. The work shall be conducted in a manner to minimize the duration of the disturbance, turbidity increases, substrate disturbance, and minimize the removal of riparian vegetation. Construction machinery shall be clean to prevent the transfer of aquatic invasive species.

VI. Condition Justification and Citations

1.) **Director Notification and Review** is a condition for projects identified in Part V(1) above which present an increased likelihood of jeopardizing designated beneficial uses or otherwise causing a violation of WQS, promulgated pursuant to Utah Code Sections 19-5-104, 19-5-110 and Section 303 of the Clean Water Act. Director Notification will allow the DWQ to consider water-body specific factors that are not otherwise considered by NWPs. In support of cooperative federalism, the DWQ conditions approval of NWPs identified in Part V(1) above on Director notification, rather than denying all NWPs with potential adverse water quality impacts, to avoid unnecessary burden to applicants that would be associated with a blanket requirement for individual certification requests for all identified projects.

The opportunity to review specifically identified projects will allow the DWQ to assure that WQS will be met without automatically requiring a certification request to the Director directly from the project proponent. Director Notification would take substantially less time than requiring an individual certification request and associated pre-filing meeting. The Director will provide one of the following responses within two weeks;

(i) The DWQ has determined the project will likely have minimal impact to water quality, pending the project proponent's consideration of any written comments,

or in infrequent cases

(ii) The DWQ has determined that the project requires individual certification to adequately protect designated beneficial uses, prevent violation of WQS, or prevent antidegradation. The DWQ reserves the right to require an individual 401 certification in rare circumstances where the DWQ determines there is a potential for adverse water quality impacts.

(a) ***Projects Proposed Under Nationwide Permits 3, 27, and 37*** are conditioned on Director Notification and Review because they often involve removing built up debris and sediment or the release of sediment and as a result have the potential to result in discharges which threaten designated beneficial uses or may cause violation(s) of WQS for turbidity.

Projects issued under NWP 3 approve maintenance projects that often involve removal of sediment and debris which could then be released to WOTUS. Projects issued under NWP 27 approve projects that allow releasing sediment for Aquatic Habitat Restoration, Enhancement, and Establishment Activities.

Projects issued under NWP 37 approve projects for Emergency Watershed Protection and Rehabilitation and have potential for significant water quality impacts. In the past the DWQ reviewed these projects which often deal with rehabilitation of a waterbody after impacts from fire. These projects can often address increased sediment loads and debris in water channels because the riparian buffer is lost and there is increased runoff from the surrounding area. Projects issued under NWP 37 pose similar risks to those permitted under NWP 3 and 27.

Without proper precautions, projects under NWPs 3, 27 and 37 could result in significant increases in turbidity in the waterbody proposed for discharge. Numeric water quality criteria for turbidity in certain use designations could be violated if the project proponent does not take proper steps to minimize the increases. WQS for turbidity will be violated if there is an increase of 10 Nephelometric Turbidity Units (NTU) in waterbodies with designated beneficial uses related to recreation and if there is an increase of 10 NTUs (3A & 3B) or 15 NTUs (3C & 3D) in waterbodies with aquatic wildlife designated beneficial uses. UAC R317-2-14.1 and UAC R317-2-14.2.

In addition to violating numeric WQS, significant turbidity spikes or sediment deposits could cause a waterbody fail to meet all its designated beneficial uses or if large quantities of sediment are transported downstream, it could impact the downstream designated beneficial uses. The DWQ acknowledges that PCN is not always required under NWP 27, and only requests the requirement of Director Notification, when a PCN is required. As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge *"impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6"* UAC R317-15-6.1.A.1., *"exceeds water quality criteria, either narrative or numeric, in Section R317-2-7"* UAC R317-15-6.1A.2. or *"fails to meet the antidegradation (ADR) requirements of Section R317-2-7"* UAC R317-15-6.1.A.3

Citations: UAC R317-2-14.1, UAC R317-2-14.2., UAC R317-2-7.1.a., UAC R317-2-8. , UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

(b) ***Projects within 500 feet of the Great Salt Lake, Utah Lake, and Bear Lake*** are conditioned on Director Notification and Review. The DWQ has determined that the Great Salt Lake, Utah Lake, and Bear Lake are unique waterbodies that require special attention and are at greater risk for potential adverse impacts when projects are within 500 feet of their existing water's edge. Utah Lake is the largest freshwater lake in Utah, the Great Salt Lake is the largest saline lake in the U.S. and provides habitat to migrating birds, and Bear Lake is well known for its recreation opportunities. When projects are being completed in close vicinity to these waterbodies, it poses increased risk of impacts to the designated uses for these waterbodies. Both Utah Lake and Bear lake have recreation designated use 2A (frequent primary contact recreation) and aquatic wildlife designated uses associated with either 3A cold water species of game fish (Bear Lake) or 3B warm water species of game fish. Both types of designated uses could be impacted by turbidity increases. Water quality criteria for turbidity will be violated if there is an increase of 10 NTUs in waterbodies with designated uses related to recreation and if there is an increase of 10 NTUs in aquatic wildlife designated use classes 3A and 3B. UAC R317-2-14.1 and UAC R317-2-14.2. Significant turbidity spikes or sediment deposits could cause a waterbody not to meet all its designated beneficial uses or if large quantities of sediment are transported downstream, it could impact the downstream beneficial uses. Utah's rules promulgating standards of quality for waters of the State affirm "it shall be unlawful and a violation of these rules for any person to discharge or place any wastes or other substances in such manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated" UAC R317-2-7.1.a. As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge "impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3. when making a certification decision.

Citation(s): UAC R317-2-14.1, UAC R317-2-14.2., UAC R317-2-7.1.a., UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

(c) ***Projects with potential discharge to an impaired waterbody with an approved Total Maximum Daily Load (TMDL), where the project has the potential to discharge a pollutant identified/ addressed by the TMDL*** are conditioned on Director Notification and Review. A total maximum daily load or *TMDL* "means the maximum amount of a particular pollutant that a waterbody can receive and still meet WQS, and an allocation of that amount to the pollutant's sources." UAC R317-1-1. When a waterbody is impaired and listed on the 303(d) list, states are required to create and implement TMDLs for the specific waterbody to restore water quality. Waters on Utah's most up to date 303(d) list are not currently meeting their designated beneficial uses. According to Utah's Final 2016 Integrated Report[1] the waters identified as impaired are not meeting their designated beneficial uses because "the concentration of the pollutant- or several pollutants- exceeds numeric water quality criteria, or quantitative biological assessments indicate that the biological designated uses are not

[1] https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2017-004941.pdf

supported (Narrative water quality standards are violated)." TMDLs are created to limit discharges to the waterbody with the goal of meeting designated beneficial uses. If project proponents do not adhere to the BMPs and pollutant reduction requirements identified in approved TMDLs (as applicable) then there may be a violation of WQS and designated beneficial uses could be further impacted. If the potential discharge contains pollutants/ parameters that are included in an approved TMDL, the project proponent must take extra precautions, as identified in the TMDL, to minimize and prevent discharges that could further degrade the waterbodies, and prevent the waterbodies from meeting its designated beneficial and existing uses. Director notification and review of projects with the potential to discharge to impaired water bodies with approved TMDLs will ensure consistency with TMDL requirements and goals.

Citation(s): UAC R317-1, UAC R317-2-7.1.a., UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

(d) ***Projects with potential discharges to Category 1 and Category 2 waters*** are conditioned on Director Notification and Review in order to ensure that the Utah DWQ's Antidegradation Policies are being implemented effectively. Category 1 waters are "waters which have been determined by the Board to be of exceptional recreational or ecological significance or have been determined to be a State or National resource requiring protection, shall be maintained at existing high quality through designation, by the Board after public hearing, as Category 1 Waters." UAC R317-2-3.2. Category 2 waters "are designated surface water segments which are treated as Category 1 Waters except that a point source discharge may be permitted provided that the discharge does not degrade existing water quality." UAC R317-2-3.3. Discharges may be allowed in Category 1 and Category 2 waters "where pollution will be temporary and limited after consideration of the factors in UAC R317-2-.3.5.b.4., and where best management practices will be employed to minimize pollution effects." UAC R317-2-3.2 and UAC R317-2-3.3.

Although NWPs are typically issued for projects with minimal impacts to water quality, the NWPs do not take into consideration the quality of the water affected. In order to comply with the Antidegradation Policy outlined by UAC R317-2-3.5.b.4, requiring that pollution to Category 1 and Category 2 waters be temporary and limited, the DWQ must review all projects with the potential to discharge to those waters. Without the ability to review the individual projects proposing to discharge to Category 1 and Category 2 waters, the DWQ cannot assure that they will meet the antidegradation policy or other applicable water quality requirements. As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge "impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3 when making a certification decision.

Citation(s): UAC R317-2-3.2., UAC R317-2-3.3. , UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

(e) ***Projects that exempt federal agencies from providing PCN where PCN is required for other entities*** are conditioned on Director Notice and Review. Federal agencies that are seeking NWPs, should be held to the same standards as other project proponents. Not all federal agencies have staffs that are environmental experts when it comes to water quality. The DWQ is concerned that failure for federal agencies to submit PCNs and receive oversight from the USACE or DWQ, could result in greater than minimal impacts to water quality, exceedance of WQS, and/or violation of antidegradation requirements. Federal agencies are not exempt for meeting WQS and may not always be able to ensure that WQS are met without any oversight from an entity that can provide water quality expertise.

Citation(s): UAC R317-2-14.1, UAC R317-2-14.2., UAC R317-2-7.1.a., UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

2.) **Implementation of Best Management Practices.** Project approval is conditioned on implementation of BMPs, which are required to be implemented by the Antidegradation Policy in UAC R317-2-3, WQS may be violated unless appropriate best management practices (BMPs) are incorporated to minimize the erosion-sediment and nutrient load. Violations of WQS could cause a waterbody to fail to meet its designated beneficial uses. As required by Utah's Antidegradation policy UAC R317-2-3.1 "Existing instream water uses shall be maintained and protected. No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses." As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge "impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3 when making a certification decision. If appropriate BMPs are incorporated, there is assurance that the project will not violate WQS or impair a waterbody's beneficial use. See Attachment 1 for resources on identifying beneficial uses for WOTUS in the State of Utah and Construction Site BMPs.

Citation(s): UAC R317-2-3.1, UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

3.) **Protection of Impaired Waterbodies.** Waters that are impaired and conjunctively on Utah's most up to date 303(d) list are not currently meeting their designated beneficial uses. According to Utah's Final 2016 Integrated Report[1] the waters identified as impaired are not meeting their designated beneficial uses because "the concentration of the pollutant- or several pollutants- exceeds numeric water quality criteria, or quantitative biological assessments indicate that the biological designated uses are not supported (Narrative water quality standards are violated)." Utah's antidegradation policy states "existing instream water uses shall be maintained and protected. No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses." UAC R317-2-3.1. In order to ensure that proposed activities meet Utah's antidegradation and that discharges do not further degrade water quality the project proponent needs to be aware of the waterbodies assessment, more specifically if the

[1] https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2017-004941.pdf

waterbody is impaired and listed on Utah's most current 303(d) list. If the potential discharge contains pollutants/ parameters that the waterbody is listed as impaired for, the project proponent needs to take extra precautions to minimize and prevent discharges that could further degrade the waterbodies and prevent the waterbodies from meeting its beneficial and existing uses. Typical pollutants associated with USACE Section 404 permits (e.g. sediment), especially when a waterbodies proposed for discharge is impaired could cause applicable WQS to be violated, if appropriate measures are taken." As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge "impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3. when making a certification decision.

Citation(s): UAC R317-2-3.1, UAC R317-2.1.a., UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

4.) **Proper Storage of Hazardous and Otherwise Deleterious Materials.** Project approval is conditioned on proper storage of hazardous and otherwise deleterious materials, and notification of any discharge of those materials, to assure that water quality and narrative standards are not violated. When projects are occurring in or around waterbodies, there is a chance for pollutants to inadvertently be spilled/discharged into waterbodies due to increased risk from project related activities (e.g. presence of machinery, onsite chemical and gas storage, improper waste storage, and failure to use proper BMPs). To prevent or reduce the possibility that hazardous and otherwise deleterious materials are inadvertently discharged into a waterbody, project proponents must not store, dispose of, or accumulated such materials adjacent to or in immediate vicinity of WOTUS unless adequate measures and controls are provided to ensure those materials will not enter waters of the state. If there is a discharge to WOTUS in the State of Utah, it must be immediately reported to the DEQ, as stated in Utah Code §19-5-114. An inadvertent discharge of pollutants can cause violations with Utah's Narrative Standards, which states "It shall be unlawful, and a violation of these rules, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures; or determined by biological assessments in Subsection R317-2-7.3."UAC R317-3-7.2. Utah's rules promulgating standards of quality for waters of the State affirm "it shall be unlawful and a violation of these rules for any person to discharge or place any wastes or other substances in such manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated." UAC R317-2-7.1.a. Discharges of pollutants, even inadvertently, could cause both a violation of applicable water quality standards and possibly interfere with a waterbodies designated uses.

Citation(s): Utah Code § 19-5-114, UAC R317-3-7.2, UAC R317-2-7.1.a, UAC R317-15-6.1., UAC R317-15-6.1.A.1., UAC R317-15-6.1A.2.

5.) **Notification to water supply operators and local health departments** is a condition of project approval for all projects in or immediately adjacent to WOTUS with assigned class 1C for domestic drinking water upstream two miles or less from any intake supply. NWP general permit condition 7 as described in 80 FR 57298, 57386 states " no activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization." The DWQ has determined that this condition is not specific enough to protect of beneficial use class 1C (Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water) because it fails to provide an exact distance. As stated in Utah's Antidegradation Policy UAC R317-2-3.5.d "depending upon the locations of the discharge and its proximity to downstream drinking water diversions, additional treatment or more stringent effluent limits or additional monitoring, beyond that which may otherwise be required to meet minimum technology standards or in stream WQS, may be required by the Director in order to adequately protect public health and the environment." "The additional treatment/effluent limits/monitoring which may be required will be determined by the Director after consultation with the Division of Drinking Water and the downstream drinking water users." UAC R317-2-3.5.d. These additional requirements are necessary to ensure that beneficial use class 1C is maintained in the waterbody proposed for discharge or in some cases, protection of the downstream waterbodies designated beneficial use, when classified as 1C. Should the project proponent refuse to work with the local health department and water supply operators, the Director may request an individual certification request and issue additional requirements in consultation with the operator, the public health departments, and the Division of Drinking water in order to maintain the designated beneficial use.

Citation(s): UAC R317-2-3.5.d, UAC R317-2-7.1.a, UAC R317-2-8., UAC R317-15-6.1, UAC R317-15-6.1.A.1, UAC R317-15-6.1A.2., UAC R317-15-6.1.A.3

6.) **Vegetation Preservation and Reestablishment in fisheries.** Project approval is conditioned on avoiding vegetation removal to the maximum extent practicable in or immediately adjacent to WOTUS used as fisheries in order to maintain existing beneficial use. Waterbodies with beneficial use class 3A (cold water fishery) or waterbodies with a blue ribbon fishery designation rely heavily on the available stream cover/shade to maintain designated beneficial uses. Riparian vegetation supplies necessary shade to stabilize water temperatures in streams. Removal of riparian vegetation, without reestablishment could cause a waterbody not to maintain beneficial use 3A or its blue river fishery designation. Utah's antidegradation policy states "existing instream water uses shall be maintained and protected. No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses." UAC R317-2-3.1. Failure to minimize riparian vegetation removal and failure to reestablish riparian vegetation which results in the failure to maintain beneficial use class 3A would be considered a violation of Utah's rules promulgating standards of quality for waters of the State, more specifically Utah's antidegradation policy found at UAC R317-2-3. Additionally, the loss of riparian vegetation

could cause a violation of the instream numeric criteria for temperature, which is listed as 20°C with a max temperature change of 2°C for beneficial use class 3A. UAC R317-2-14.2. If the temperature of the waterbody increases, there is a potential for instream water quality criteria for dissolved oxygen (DO) to be violated. Temperature and DO have an inverse relationship, where temperature increases then DO decreases, so in increase in temperature could cause a decrease in DO, and possibly a violation of the instream criteria for DO which for beneficial use class 3A is a minimum of 8.0 mg/L when early life stages are present and 4.0 mg/L when all other life stages are present. UAC R317-2-14.2. As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge "impairs the designated beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3 when making a certification decision.

Citation(s): UAC R317-2-3.1., UAC R317-2-3., UACR317-2-14.2., UAC R317-2-14.2., UAC R317-15-6.1, UAC R317-15-6.1.A.1, UAC R317-15-6.1A.2., UAC R317-15-6.1.A.3.

7.) **Dry Conditions to the Maximum Extent Practicable.** Project approval is conditioned on conducting activities under dry conditions to the maximum extent practicable to assure that WQS are not exceeded. DWQ acknowledges that some of the NWP general permit conditions encourage activities to be conducted under dry conditions, but the conditions do not go far enough to provide reasonable assurance of compliance with applicable WQS, particularly in Utah where dry conditions can be reasonably achieved. NWP general permit conditions 3, 11, and 12 partially address concerns the DWQ has, but are ultimately insufficient. NWP general condition 3 as described in 80 FR 57298, 57385 states *"activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized"*, condition 11 as described in 80 FR 57298, 57386 states *"heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance"* and condition 12 as described in 80 FR 57298, 57386 states *"appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides."*

General condition 3 as written does not adequately protect fish spawning, as required by Utah WQS and Antidegradation Policy. Certain activities/discharges (e.g. sediment discharges, streambed alteration, streambank alteration (fish habitat)) permitted through a USACE Section 404 permit to waterbodies during spawning season (in a waterbody where spawning may occur), will likely impact fish spawning. Activities/ discharges approved through a USACE Section 404 permit could have significant impacts to turbidity, DO, temperature, available substrate, and available habitat, which subsequently can have significant impacts to spawning. The impairment

of fish spawning is not considered a temporary and limited impact and therefore does not meet Utah's antidegradation policy found in UAC R317-2-3.5. An impairment of fish spawning may also impact whether the waterbody can maintain is designated beneficial uses, as it relates to aquatic wildlife use classes. Utah's rules promulgating standards of quality for waters of the State affirm "it shall be unlawful and a violation of these rules for any person to discharge or place any wastes or other substances in such manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated" UAC R317-2-7.1.a.

General conditions 11 and 12, as stated above, do begin to address the use of machinery and timing of projects in WOTUS in the State of Utah, but additional conditions are necessary to meet Utah WQS. Condition 11 addresses work being conducted in wetlands that are considered WOTUS in the State of Utah, but does not address machinery use in open waterbodies or streams. Construction machinery used within a waterbody can cause significant impacts to water quality if adequate precautions are not taken. When it is unavoidable to operate construction machinery within the waterbody the project proponent should focus on minimizing the duration of the disturbance, turbidity increase, substrate disturbance, removal of riparian vegetation, and work shall be conducted in the "dry" to the maximum extent practicable. Minimizing the duration of impact reduces the chance that the impacts will accumulate and cause significant impacts to water quality. Minimizing turbidly increases is important because the State of Utah has numeric water quality criteria for turbidity in certain use designations, which could be violated if the project proponent does not take proper steps to minimize the increases. Water quality criteria for turbidity will be violated if there is an increase of 10 NTUs in waterbodies with designated uses related to recreation and if there is an increase of 10 NTUs (3A & 3B) or 15 NTUs (3C & 3D) in waterbodies with aquatic wildlife designated uses. UAC R317-2-14.1 and UAC R317-2-14.2. Conducting work in the "dry" to the maximum extent practicable will help reduce the risk of the numeric criteria for turbidity to be exceeded, as well as reduce the risk of a significant sediment load being transported downstream. Discharges of sediment can not only violate numeric criteria, but also, risk violating Utah's narrative standard "It shall be unlawful, and a violation of these rules, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures; or determined by biological assessments in Subsection R317-2-7.3." UAC R317-2-7.2. Violations of numeric and narrative criteria could cause a waterbody not to meet its designated beneficial use and a transport of sediment downstream could prevent a downstream waterbody from meeting its designated beneficial uses. As required by Utah's Antidegradation policy UAC R317-2-3.1 "Existing instream water uses shall be maintained and protected. No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses.". Additionally, "All actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses." UAC R317-2-8. As stated in UAC R317-15-6.1 the Director will ordinarily consider whether the proposed discharge "impairs the designated

beneficial use classifications (e.g., aquatic life, drinking water, recreation) in Section R317-2-6" UAC R317-15-6.1.A.1., "exceeds water quality criteria, either narrative or numeric, in Section R317-2-7" UAC R317-15-6.1A.2. or "fails to meet the antidegradation (ADR) requirements of Section R317-2-7" UAC R317-15-6.1.A.3 when making a certification decision.

Citation(s): UAC R317-2-3.5. , UAC R317-2-7.1.a., UAC R317-2-14.1, UAC R317-2-14.2., UAC R317-2-7.1.a., UAC R317-2-7.2. , UAC R317-2-3.1, UAC R317-2-8. , UAC R317-15-6.1, UAC R317-15-6.1.A.1, UAC R317-15-6.1A.2., UAC R317-15-6.1.A.3.

VII. Denials

NWPs for Projects that involve dam maintenance/rehabilitation or reservoir dewatering are denied and must apply for individual certification from the Director because they have the potential to discharge massive amounts of sediment if not properly regulated and administered. As stated in justification1a, the DWQ has concerns with projects that have potential to discharge large quantities of sediment into waterbodies. Projects such as dam maintenance/rehabilitation or reservoir dewatering that involve potential release of large quantities of sediment, either as part of project activities or inadvertently, have potential for catastrophic impacts to water quality. For example, in August 2016, the Tibble Fork Dam had an unplanned release of approximately 8,700 cubic yards of sediment from the Tibble Fork Reservoir into the North Fork of the American Fork River, causing a fish kill of about 5,250 fish. Samples taken revealed sediment concentrations of heavy metals (arsenic, cadmium, lead, and Zinc) in excess of EPA Region 3 Freshwater Sediment Screening Values for aquatic life and human health-based concentration for lead. The project had been permitted under a USACE Section 404 NWP, but the DWQ was unaware of the project. If the DWQ had the opportunity to review the project prior to USACE NWP issuance, impacts may have been prevented or at least minimized by adding project-specific conditions or additional oversight to the project. To avoid future violations and catastrophic releases, the DWQ is requiring individual permits for these types of projects.

Citation(s): UAC R317-2-14.1, UAC R317-2-14.2., UAC R317-2-7.1.a., UAC R317-2-8. , UAC R317-15-6.1, UAC R317-15-6.1.A.1., UAC R317-15-6.1.A.2., UAC R317-15-6.1.A.3.

VIII. Disclaimers

1.) This Section 401 Certification does not preclude the applicant's responsibility to comply with all applicable Federal, State or local laws, regulations or ordinances, including WQS. Permit coverage does not release the applicant from any liability or penalty, should violations to the permit terms and conditions or Federal or State Laws occur.

2.) Applicants must acquire all necessary easements, access authorizations and permits to ensure they are able to implement the project. This Section 401 Certification does not convey any property rights or exclusive privileges, nor does it authorize access or injury to private property.

IX. Public Notice and Comments

1.) **Public Notice Dates:** November 5, 2020 – December 7, 2020

2.) **Public Notice Comments, Response, and Actions:** The NWP 401 Certification received one comment.

(a) Comment 1

- Comment 1: The USACE requested that "USACE" be replaced with "prospective permittee" or "project proponent" when referring to condition requirements.

- Comment 1 Response: The USACE was advised that the request was reasonable and would be considered during finalization of the Certification.

- Comment 1 Action: The DWQ replaced "USACE" with "project proponent" in two locations at the request of the USACE. The changes were not significant and overall did not impact the conditions. Since this change was not considered major, the Certification will not be Public Noticed again.

3.) During finalization of the Certification certain dates, spelling edits, and minor language or formatting corrections may have been completed. Due to the nature of these changes they were not considered major and the Certification will not be Public Noticed again.

X. Water Quality Certification

The Utah Division of Water Quality Certifies that if projects issued under the USACE Nationwide Permits adhere to the conditions outlined in this certification, adhere to Sacramento Districts Regional Conditions, and adhere to any conditions outlined in the proposed NWPs then the projects will comply with water quality requirements and applicable provisions of the Clean Water Act sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303(Water Quality Standards and Implementation Plans), 306(National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards).

Erica Brown Gaddis PhD, Director

12/08/2020
Date

XI. References

Division of Water Quality. 2016. Utah's Final 2016 Integrated Report. Salt lake City, Utah. Utah Department of Environmental Quality.

Available at: https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2017-004941.pdf

Proposal To Reissue and Modify Nationwide Permits, 85 FR 57298 (September 15, 2020).

Available at: https://www.federalregister.gov/documents/2020/09/15/2020-17116/proposal-to-reissue-and-modify-nationwide-permits

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Attachment 1: Project Proponent Resources

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Project Proponent Resources

Best Management Practices for Construction Sites: https://deq.utah.gov/sbeap/best-management-practices-for-construction-sites

Utah DEQ Interactive Map: https://enviro.deq.utah.gov/

EPA's Final "Clean Water Act Section 401 Certification Rule" : https://www.epa.gov/sites/production/files/2020-07/documents/clean_water_act_section_401_certification_rule.pdf

Approved TMDLs in the State of Utah: https://deq.utah.gov/water-quality/watershed-monitoring-program/approved-tmdls-watershed-management-program

Ute Mountain Ute Tribe

Environmental Programs Department
P.O. Box 448
Towaoc, Colorado 81334-0448

(970) 564-5430
December 14, 2020

Kelly Allen
Albuquerque District
Regulatory Division
505-342-3216
Kelly.e.allen@usace.army.mil

DATE: 12/11/2020

SENT VIA EMAIL
DIGITAL READ RECEIPT REQUESTED

Re: Certification of the proposed U.S. Army Corps of Engineers 2020 Nationwide Permits pursuant to Section 401 of the Clean Water Act for lands of the Ute Mountain Ute Tribe in Colorado, New Mexico and Utah in the Albuquerque, Sacramento and Omaha Districts.

The Ute Mountain Ute Tribe (UMUT) has responsibility under Section 401 of the Clean Water Act (CWA) to evaluate and certify water quality protection for federal permits or licenses issued for work on lands within the boundary of the Ute Mountain Ute Reservation.

This certification is in response to the US Army Corps of Engineers Notice of Issuance of Proposed Nationwide Permits (NWPs) listed in the September 15, 2020 Federal Register for Clean Water Act (CWA) Section 401 water quality certification and the CWA 401 certification request from the U.S. Army Corps of Engineers Albuquerque District on October 15, 2020.

This certification applies to any potential point source discharges from potential projects authorized under the proposed U.S. Corps of Engineers Nationwide Permit Reissuance (Federal Register September 15, 2020) into waters of the United States that occur within the Ute Mountain Ute Reservation. It is the responsibility of the applicant to determine the proper CWA Section 401 authority through coordination and recommendations of status through the UMUT or certification of land status by the Bureau of Indian Affairs (BIA).

Section 401(a)(1) of the Clean Water Act requires applicants for Federal permits and licenses that may result in discharges into waters of the United States to obtain certification that potential discharges will comply with applicable provisions of the CWA including Sections 301, 302, 303, 306 and 307.

These requirements will protect water quality and help ensure that the NWP program minimizes adverse impacts on the aquatic environment on tribal lands, both individually and cumulatively, as required by CWA Section 404(e).

Project applicants will need to request an individual certification from UMUT for NWP that are denied. If a project is unable to meet the enclosed conditions, or if certification is denied for an applicable NWP, the applicant may request an individual certification from UMUT. An individual certification request must follow the requirements outlined in §121.5 of EPA's CWA § 401 Certification Rule, effective September 11, 2020.

Projects failing to meet the enclosed conditions, despite qualifying for use of a NWP are not eligible for coverage under this programmatic certification and must contact UMUT for individual project certification. Projects qualifying for use of a NWP and meeting the enclosed conditions must notify UMUT pursuant to General Condition #1, but may proceed after verifying that notification has been received and without further written verification from UMUT.

General Information

The general information provided in this cover letter section does not constitute a certification condition(s). The Applicant is responsible for obtaining all other permits, licenses, and certifications that may be required by federal, state or tribal authorities where applicable, including an EPA general construction CWA Section 402 stormwater permit notice of intent. This certification must be retained in your files with the applicable NWPs as documentation of UMUT certification for the above-referenced proposed NWPs. This certification is specifically associated with the proposed NWPs and expires when these NWPs expire.

UMUT has not received the final nationwide permits, national or regional conditions from the Corps. Therefore, if nationwide permits, national conditions and/or regional conditions are modified significantly, UMUT expects notifications of these modifications and that the Corps of Engineers will follow the spirit of 40 CFR Part 121 and request new or revised 401 certifications to reflect the significant changes in the permits.

The Corps and applicants should consider contacting UMUT Environmental Programs Department as early as possible for potential permits and actions that may be complicated and when early discussions may be beneficial to all parties. UMUT requests notification when the Corps District Engineer intends to exert discretionary authority or waive the acreage, linear feet or cubic yard limits of any of the 2020 proposed Nationwide Permits. We would like the opportunity to discuss the rationale and finding of DeMinnimus impact in these instances. The Corps should be aware of UMUT lands outside of commonly known reservation boundaries including but not limited to tribal trust lands that are outside of reservation boundaries. A state certification is not valid on these waters, and without a valid 401 certification, a permit is not valid.

For NWPs or projects that do require an individual 401 certification, a request for certification must follow the requirements outlined in Section 121.5 of EPA's final 401 regulation, effective September 11, 2020. Inquiries, prefiling meeting requests and certification requests should be sent to clarrick@utemountain.org. Suggested minimum information needed by UMUT is available by request. If minimum information is not included, the information will be requested after receipt of the certification request. UMUT may decide to Public Notice certification requests and offer the public an opportunity to request a public hearing on all individually requested certifications. This additional time should be considered in setting the reasonable time period for certifications.

If there are any questions or if any clarification is necessary please contact Colin Larrick, Water Quality Program Manager, at 970-564-5430 or clarrick@utemountain.org

Sincerely,

Scott Clow
Environmental Programs Director
Ute Mountain Ute Tribe

Ute Mountain Ute Tribe Clean Water Act Section 401
Water Quality Certification for the U.S. Corps of Engineers CWA Section 404
2020 Nationwide Permits Reissuance

This Certification applies to any potential point source discharges from potential projects authorized under the proposed re-issuance of the following U.S. Army Corps of Engineers CWA 404 Nationwide Permit (NWPs) into waters of the United States that occur within the Ute Mountain Ute Reservation within the Albuquerque, Omaha and Sacramento Corps Districts: NWP 3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, C, and D.

Section 401(a)(1) of the Clean Water Act requires applicants for Federal permits and licenses that may result in discharges into waters of the United States to obtain certification that potential discharges will comply with applicable provisions of the CWA, including Sections 301, 302, 303, 306 and 307.

This Certification does not apply to the following NWPs: 1, 2, 8, 9, 10, 11, 24, 28, 35, A, and B. If any activity authorized by these listed NWPs may result in a discharge into a water of the United States, the Corps must seek CWA section 401 certification from the Ute Mountain Ute Tribe for discharges that occur in the boundaries of the Ute Mountain Ute Tribe within the Albuquerque, Omaha and Sacramento Corps Districts. In addition, this certification does not apply to NWPs applied "after-the-fact" (i.e., after the discharge has occurred) or to NWPs where a waiver on limits has been granted by the District or Division Engineer.

General Information

The general information provided in this section is intended to provide context for UMUT's certification decision and does not itself constitute a certification condition(s). The information in this section is being provided to help ensure applicants comply with the terms and conditions of the CWA § 401 certifications of the NWPs on applicable UMUT lands.

- The Applicant and applicants for projects authorized under the NWPs should obtain all other permits, licenses, and certifications that may be required by federal, state, or tribal authority.
- If a project is unable to meet the enclosed conditions, or if certification is denied for an applicable NWP, the Applicant may request an individual certification from UMUT. An individual certification request must follow the requirements outlined in 40 CFR 121.5 of EPA's CWA § 401 Certification Rule, effective September 11, 2020.
- Copies of this certification should be kept on the job site and readily available for reference.
- If the project is constructed and/or operated in a manner not consistent with the applicable NWP, general conditions, or regional conditions, the permittee may be in violation of this certification.
- UMUT representatives may inspect the authorized activity and any mitigation areas to determine compliance with the terms and conditions of the NWP. CWA Section 308(a).

UMUT is expressly waiving its authority to act on the CWA § 401 certification request for the following proposed NWPs: **NWPs Waived (121.9(a)(1))**

4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
22. Removal of Vessels
48. Commercial Shellfish Mariculture
54. Living Shorelines

NWPs Granted with Conditions (121.7(d)(2))

CWA Section 401 certification is granted with the following conditions for NWPs 3, 5, 6, 7, 13, 14, 15, 18, 19, 20, 23, 25, 27, 30, 31, 32, 33, 36, 38, 41, 43, 45, 46, C, and E. UMUT has determined that any discharge authorized under these proposed NWPs will comply with water quality requirements, including applicable provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, and tribal regulatory requirements for point source discharges into waters of the United States, subject to the following conditions pursuant to Section 401(d).

All conditionally certified NWPs, including those with additional permit-specific conditions, must comply with the following conditions:

Conditions Applicable to all NWPs	**Why the condition is necessary to assure the proposed project will comply with water quality requirements**	**Citation that authorizes the condition**
All applicants, including federal agencies, must notify UMUT's Tribal Environmental Department of the use of all NWPs for which certification has been granted prior to commencing work on the project. Notifications must include: • project location (lat. Long., exact point on map); • NWP that will be used and the specific activity that will be authorized under the NWP; • amount of permanent and temporary fills; • a short summary of the proposed activity, and all other federal, state, tribal or local permits or licenses required for the project; • complete contact information of both the applicant and contractor (name, name of the company or property if applicable, telephone, mobile, and email); and, • summary of best management practices that will be used.	Notification will ensure that UMUT is aware of all Corps-authorized activities potentially affecting Indian country lands. It also will ensure the Corps and UMUT can demonstrate that the NWP program has no more than minimal impacts to the aquatic environment, individually and cumulatively, and that the activities will not adversely impact cultural and historic uses of tribal waters. In order to ensure that UMUT has the opportunity to inspect the project prior to the onset of operations, the applicant must notify the tribal government in a timely manner of the status of the project construction.	CWA sections 301, 302, 303, 306, and 307[i] CWA 308(a) 40 CFR 121.11(a) Endnotes (ii-iv)

• Notify UMUT at least 7 days before the completion of construction and operations begin.		
Point source discharges may not occur: (1) in fens, bogs or other peatlands; (2) within 100 feet of the point of discharge of a known natural spring source; or (3) hanging gardens or (4) culturally sensitive waters.	This condition is necessary to ensure activities that may result in point source discharges into waters of the United States do not degrade these unique and difficult to replace wetland types, which play an importation role in maintaining water quality and hydrologic function in mountain and prairie ecoregions.	40 CFR 230 Subpart E; Ute Mountain (iv) Endnotes (i-iv)
Except as specified in the application, no debris, silt, sand, cement, concrete, oil or petroleum, organic material, or other construction related materials or wastes shall be allowed to enter into or be stored where it may enter into waters of the U.S.	This condition is necessary to ensure water quality is not degraded by toxic pollutants in toxic amounts, raw materials, oil, grease, gasoline, or other types of fluids used to operate and maintain equipment used to complete the project.	40 CFR 230.10(d); 40 CFR 230.71; Ute Mountain (iv) Endnotes (i-iv)
Silt fences, straw wattles, and other techniques shall be employed as appropriate to protect waters of the U.S. from sedimentation and other pollutants.	This condition minimizes turbidity and sediment caused by construction activities, minimizes equipment contact with water (and potential for oil, gas, invasive species, etc. contamination), and allows for clean-up of potential spills before entering waters. It is necessary to ensure that water quality is not degraded, and biology of the waters are not negatively impacted by the project.	40 CFR 230.10(d) and 230.72 Ute Mountain (iv)
Water used in dust suppression shall not contain contaminants that could violate water quality standards.	This condition is necessary to ensure water quality is not degraded by toxic material in toxic amounts, raw materials, oil, grease, gasoline, or other types of fluids used to operate and maintain equipment used to complete the project.	40 CFR 230.10(d); 40 CFR 230.71; Endnotes (i-iv Ute Mountain (iv)
Erosion control matting that is either biodegradable blankets or loose-weave mesh must be used to the maximum extent practicable.	Condition is necessary to provide clarity on how to meet "appropriate soil erosion and sediment controls," as required by NWPs General Condition 12. Use of other "appropriate" measures is not prohibited, but the inclusion of this condition ensures that water quality impacts of dredged or fill material are minimized.	40 CFR 230.10(d); 40 CFR 230.72 Ute Mountain (iv)
All equipment used in waters of the U.S. must be inspected for fluid leaks and invasive species prior to use on a project. All fluid leaks shall be repaired and cleaned prior to use or when discovered, or if the fluid leak can't be	This condition is necessary to ensure water quality is not degraded by oil, grease, gasoline, or other types of fluids used to operate and maintain equipment used to complete the project. This condition helps protect the native	40 CFR 230.10(d); 40 CFR 230.74 Ute Mountain (iv)

repaired, the equipment shall not be used on site. Equipment used in waters with the possibility of aquatic nuisance species infestation must be thoroughly cleaned before they are used on the project.	biology of the impacted waters by preventing the spread of invasive or nuisance species.	
Vegetation should be protected except where its removal is necessary for completion of the work. Locations disturbed by construction activities should be revegetated with appropriate native vegetation in a manner that optimizes plant establishment for the specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary. Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas. All revegetation materials, including plants and plant seed shall be on site or scheduled for delivery prior to or upon completion of the earth moving activities.	Condition is necessary to provide the project proponent with clarity on what meets the requirement for appropriate revegetation as required by NWPs General Condition 13. Revegetation maintains and improves water quality because riparian vegetation acts as buffer to reduce the amount of sediment and pollutants that enter waterways. Native vegetation, because it is adapted to local conditions (e.g., soil types and temperature) provided this function most efficiently. Native vegetation also protects the biology of waters by providing habitat for semi-aquatic organisms and other organisms that are a food source to aquatic life.	40 CFR 230.10(d); 40 CFR 230.75; Ute Mountain (iv)
Activities may not result in any unconfined discharge of liquid cement into waters of the U.S. Grouting riprap must occur under dry conditions with no exposure of wet concrete to the waterbody.	This condition is necessary to ensure water quality is not degraded and the biology of the waters are not negatively impacted by toxic compounds.	40 CFR 230.10(d); 40 CFR 230.71; CWA 307 ("No toxics in toxic amounts") Ute Mountain (iv)
Activities that may result in a point source discharge shall occur during seasonal low flow or no flow periods to the extent practicable.	This condition minimizes turbidity and sediment caused by construction activities, minimizes equipment contact with water (and potential for oil, gas, invasive species, etc. contamination), and allows for clean-up of potential spills before entering waters. It is necessary to ensure that water quality is not degraded, and biology of the waters are not negatively impacted by the project.	40 CFR 230.10(d); 40 CFR 230.72(d); 40 CFR 230.23; 40 CFR 230.24; Ute Mountain (iv)
The placement of material (discharge) for the construction of new dams is not certified, except for stream restoration projects.	This condition is necessary to ensure impacts to water quality as a result of flow alterations are minimized to the maximum extent practicable, as required by NWPs General Condition 8.	40 CFR 230.23; 40 CFR 230.24; Ute Mountain (iv)

*****SEE NEXT PAGE FOR LIST OF NWPS GRANTED WITH CONDITIONS*****

NWPs Granted with Permit-Specific Conditions in addition to the Conditions listed above. (121.7(d)(2)):

NWP #	Permit-Specific Conditions	Why the condition is necessary to assure the proposed project will comply with water quality requirements	Citation that authorizes the condition
3. Maintenance	1) No more than 25 cubic yards of new or additional riprap may be placed to protect the structure or fill; 2) Bridge replacements must span the bankfull width and/or the ordinary highwater mark of the affected waters of the U.S. 3) Fill or dredged material shall not result in an increase in land contour height beyond the original dimensions for the repair of low water crossings, or loss of stream cross section dimensions. 4) Silt and sediment removal associated with low water crossings shall not exceed 50 linear feet. 5) Silt and sediment removal associated with bridge crossings shall not exceed 100 linear feet.	1) The placement of new or additional riprap without limiting the amount of impacts authorized could result in more than minimal adverse effects on water quality. Limiting the placement of additional riprap to no more than 25 cubic yards will help ensure that the placement provides localized erosion control without causing undesirable consequences to water quality and degradation of physical habitat. 2) The placement of a bridge/structure within bankfull width and/or the ordinary high water mark of a water of the U.S. would alter the hydrologic characteristics of the waterbody which could lead to an increased erosional force, scour around the bridge/structure during bankfull flows, high sediment loads to the waterbody, abandonment of the primary channel, and undermining of the structure itself. 3) The discharge of dredged or fill material which alters the contours of a waterbody and/or its riparian zone can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. Without a linear foot limit associated with silt and sediment removal in waters of the U.S., excess removal can result in varying degrees of change in the complex	40 CFR 230.10(d); 40 CFR 230.73; 40 CFR 230.75 Ute Mountain (iv)

		physical, chemical, and biological characteristics. Excess silt and sediment removal may alter the direction or velocity of water flow or otherwise change the dimensions of a water body which can result in adverse changes to structure and dynamics of aquatic communities, erosion rates, and increases in suspended particulates. This justification applies to conditions 4 and 5.	
7. Outfall Structures	1) Construction of the outfall structure shall be placed at the streambed elevation and, at a minimum, the pipe should be sized to prevent high pressure discharge of stormwater. 2) Outfall structures shall not be constructed in wetlands. 3) Controls shall be put in place to stabilize all areas of the bed and bank around and adjacent to the outfall structure and associated intake structures that may be affected by outfall or stream flows, respectively. 4) Structures shall not result in a loss of waters of the U.S. (e.g. tile systems).	This justification covers condition 1 and 2. By specifying conditions on outfalls sizing, placement, and stabilization, these measures will help ensure that outfall structures are constructed such that they provide localized erosion control at the point(s) of discharge while minimizing habitat degradation and undesirable downstream impacts. 3) Erosion from outfall structures can be caused by several factors, such as uncontrolled stormwater runoff, inadequate energy dissipation structures, nick point migration, poor slope stabilization, or extreme storm events that exceed design capacities. Without stabilization controls in place, construction of outfall structures can lead to changes in erosion and deposition rates, increases in suspended particulates in the waterbody, and undermining of the outfall structure itself. 4) Structures that result in a loss of waters of the U.S. can degrade and/or eliminate aquatic habitat and adversely affect bottom-dwelling organisms at the site by smothering immobile forms or forcing mobile forms to migrate. These conditions are necessary to ensure that physical habitat and hydrologic characteristics of waters are not	Ute Mountain (iv) 303(a); 40 CFR 230.7; 40 CFR 230.10; 40 CFR 230.10(d); 40 CFR 230.73; 40 CFR 230.70

		degraded; maintain the habitat and biology of the waters and ensure the hydrogeomorphology is not negatively impacted by the project.	
13. Bank Stabilization	1) Activities shall use of native vegetation or other bioengineered design techniques (e.g. willow plantings, root wads, large woody debris, etc.) or a combination of hard-armoring (e.g. rock) and native vegetation or bioengineered design techniques. Artificial soil stabilizing material (e.g. mulch, matting, netting, etc.) shall be used to reduce soil erosion. These materials, to include all plants and plant seed, shall be on site or scheduled for delivery prior to or upon completion of the earth moving activities. Sediment control measures shall be maintained in good working order at all times. 2) The slopes of disturbed banks should be configured to mimic a stable reach of the same stream within ½ mile in either direction of the project and not reduce the bottom width of the stream. 3) If flow conditions dictate the use of hardened structures, only appropriately sized angular rock may be used. Soil cement, concrete, grouted riprap, etc. may not be used.	This justification applies to conditions 1-3. While effective at preventing localized erosion, hard armoring used as streambank stabilization can have a number of negative downstream effects such as increasing flow velocities, impeding hydrologic interaction with the floodplain, and degrading physical habitat. Specifying the methods and techniques which can be used under NWP 13 will help prevent habitat degradation and minimize negative downstream impacts while also achieving localized streambank stabilization and erosion control.	Ute Mountain (iv) 303(a) 40 CFR 230.7;40 CFR 230.10(d); 40 CFR 230.72
14. Linear Transportation Projects	1) Stormwater from the construction and operation of these projects must be routed into constructed runoff water quality control systems (e.g. sediment basins, wet ponds, etc.)	<u>This justification applies to conditions 1 - 3.</u> Constructed water quality control systems sequester sediments and other pollutants from runoff, as well as reduce velocity of those flows, prior to entry into waters of the United States. Maintaining natural stream bottom widths and elevations limits increases in streamflow velocity and	Ute Mountain (iv) 303(a) 40 CFR 230.7 and 230.10

	2) Affected streambanks must be sloped such that the steam bottom width is not reduced, and bottom elevations are restored to original elevations. In general, stream bank slopes should not be steeper than 3:1 unless there is a compelling reason. 3) Crossings must be placed as close to perpendicular to the water course as possible.	reduces the potential for streambed scouring and bank incising. Limiting bank slope reduces the potential for erosion, undercutting and slumping, which add sediment to streams. Perpendicular stream crossings minimize the length of stream bed and bank impacts for a project. Collectively, these controls will ensure that physical habitat and hydrologic characteristics of waters are not degraded, will maintain the habitat and biology of the waters and will ensure the hydrogeomorphology is not negatively impacted by the project.	
15. Bridges	1) Stormwater from the construction and operation of these projects (including runoff from bridge decks) must be routed into constructed runoff water quality control systems (e.g. sediment basins, wet ponds, etc.) 2) Affected streambanks must be sloped such that the steam bottom width is not reduced, and bottom elevations are restored to original elevations. 3) Crossings must be placed as close to perpendicular to the watercourse as possible. 4) Bridge decks must be designed such that they do not drain directly into the waterbody. 5) Bridges must span the bankfull width and/or ordinary high water mark of the affected waters of the U.S. Bridges may not impair flow under normal circumstances, should not produce eddies or unintended scour holes and should be designed to prevent accumulation of sediment that may block flows.	This justification applies to conditions 1 - 3. Constructed water quality control systems sequester sediments and other pollutants from runoff, as well as reduce velocity of those flows, prior to entry into waters of the United States. Maintaining natural stream bottom widths and elevations limits increases in streamflow velocity and reduces the potential for streambed scouring and bank incising. Limiting bank slope reduces the potential for erosion, undercutting and slumping, which add sediment to streams. Perpendicular stream crossings minimize the length of stream bed and bank impacts for a project. Collectively, these controls will ensure that physical habitat and hydrologic characteristics of waters are not degraded, will maintain the habitat and biology of the waters and will ensure the hydrogeomorphology is not negatively impacted by the project. 4) Drainage directly from the bridge decks may cause erosion, and introduce additional pollutants, such as oil, gas, sediment, and toxics. Directing bridge deck drainage into constructed runoff water quality control systems will help prevent erosion and keep pollutants from directly entering the waterway.	Ute Mountain (iv) 303(a) 40 CFR 230.7; 40 CFR230.10(d); 40 CFR 230.72

		5) The placement of a bridge/structure within bankfull width and/or the ordinary high water mark of a Water of the U.S. would alter the hydrologic characteristics of the waterbody which could lead to an increased erosional forces, scour around the bridge/structure during bankfull flows, high sediment loads to the waterbody, abandonment of the primary channel, and undermining of the structure itself.	
19. Minor Dredging	Dredged or fill materials must be placed in uplands and controlled such that it cannot return to waters of the U.S. Dredged or fill material may not be placed on temporary islet, islands, sandbars, landmass or other area of sediment accumulation within the banks of a stream, shore of lake, edge of wetland or other type of waterbody, unless the vegetation and geomorphology signify a long term stable configuration (e.g. areas of accumulation are not formed from temporary situations such as drought conditions or temporary upstream reservoir release conditions).	Placement of dredged or fill material in these locations may be susceptible to being washed away by high flows, which would contribute to sedimentation and potential conveyance of pollutants downstream. This condition is necessary to ensure that physical habitat and hydrologic characteristics of waters are not degraded; maintain the habitat and biology of the waters and ensure the hydrogeomorphology is not negatively impacted by the project.	Ute Mountain (iv) 40 CFR 230.10(d); 40 CFR 230.70
27. Aquatic Habitat Restoration	Activities that may result in a discharge into waters of the United States shall not result in conversion of one habitat type to another (e.g. wetlands to open water).	Aquatic habitat restorations that convert from one habitat type to another can alter the functions and services provided by the existing resources resulting in a functional loss. This condition is necessary to ensure that physical habitat and hydrologic characteristics of waters are not degraded; maintain the habitat and biology of the waters and ensure the hydrogeomorphology is not negatively impacted by the project.	Ute Mountain (iv) 40 CFR 230.10(d); 40 CFR 230.75

43. Stormwater Management Facilities	Certification is granted with conditions only for replacement and repair activities that impact (e.g., fill, relocate, realign or straighten) no more than 300 LF of stream or 1/10 acre of waters of the U.S.	Activities with more than 300 LF or 1/10 acre of waters of the U.S. of stream impact could result in more than minimal adverse environmental effects to water quality. This condition is necessary to ensure that water quality is not degraded, the biology of the waters are not negatively impacted by the project, and that no toxic compounds in toxic amounts will be used.	40 CFR 230.10(d); 40 CFR 230.73; 40 CFR 230.75; Ute Mountain (iv)
C. Electric Utility Line and Telecom Activities	Construction activities shall not impact (e.g., fill, relocate, realign or straighten) more than 300 LF of stream for a single and complete project.	Activities with more than 300 LF of stream impact could result in more than minimal adverse environmental effects to water quality. This condition is necessary to ensure that physical habitat and hydrologic characteristics of waters are not degraded; maintain the habitat and biology of the waters and ensure the hydrogeomorphology is not negatively impacted by the project.	CWA sections 301, 302, 303, 306, and 307 (see endnote i); Ute Mountain (iv)
E. Water Reclamation and Reuse	Activities shall not impact (e.g., fill, relocate, realign or straighten) more than 300 LF of stream channel for a single and complete project.	Activities with more than 300 LF of stream impact could result in more than minimal adverse environmental effects to water quality. This condition is necessary to ensure that physical habitat and hydrologic characteristics of waters are not degraded; maintain the habitat and biology of the waters and ensure the hydrogeomorphology is not negatively impacted by the project.	CWA sections 301, 302, 303, 306, and 307 (see endnote i); Ute Mountain (iv)

NWPs Denied (121.7(e)(2))

UMUT has determined that the discharges from the following NWPs will not comply with water quality requirements. Therefore, CWA Section 401 certification is denied, and applicants must apply for an individual water quality certification. Denials apply to all UMUT lands.

** Reviewer NOTE: For readability of the table we have removed the column with the heading, "The following water quality data or information would be needed to assure that the range of discharges from potential projects will comply with water quality requirements." This information follows the table and is the same for all NWPs where certification is denied. **

NWP #	Water quality requirement with which discharges that could be authorized by the general license or permit will not comply	Brief statement explaining why discharges that could be authorized by the general license or permit will not comply with this water quality requirement
12. O&G Pipeline Activities	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C Section 311 and implementing regulations Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse effects to water quality individually and cumulatively. In addition, the removal of the PCN requirement for activities that involve mechanized land clearing in forested wetlands does not allow the evaluation of the functional loss from conversion of wetland type from a forested wetland, which may modify habitat and alter water levels beyond normal water fluctuations, inhibiting the existing uses of the waterbody.
16. Return Water from Upland Contained Disposal Areas	40 CFR § 230.23 307 toxics Ute Mountain (iv)	Return water from upland contained disposal areas can contain debris, sediment, and other pollutants which would be discharged into aquatic resources under this NWP. The return water itself can modify current patterns and dimensions of a waterbody while any debris or sediment in the return water can result in adverse impacts through sedimentation and oxygen depletion from nutrient adsorption of suspended material.
17. Hydropower Projects	40 CFR 230.23 40 CFR 230.24 Ute Mountain (iv)	Discharges of dredged or fill material associated with hydropower projects having less than 10,000 kW of total generating capacity can alter the normal water-level fluctuation pattern of an area, resulting in prolonged periods of inundation, exaggerated extremes of high and low water, or a static, nonfluctuating water level. These alterations can change salinity patterns, alter erosion or sedimentation rates, alter water temperatures.
21. Surface Coal Mining Activities	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively.

		Discharges associated with surface coal mining activities can result in varying degrees of change in the complex physical, chemical, and biological characteristics of the substrate. These changes can adversely affect the level of water quality such that existing instream water uses will no longer be maintained and protected.
24. Indian Tribe or State Administered Section 404 Programs	CWA 404(g) implementing regulations	
29. Residential Developments	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Discharges associated with residential developments under NWP 29 can result in significant losses to ecosystem services provided by existing aquatic resources. Adverse impacts may result from changes in water levels, flow, chemical content, substrate characteristics, or salinity and can result in losses to important breeding and nesting areas, food sources, and travel corridors for aquatic wildlife.
34. Cranberry Production	40 CFR 230.23 40 CFR 230.24 Ute Mountain (iv)	Discharges of dredged or fill material associated with cranberry production can alter the normal water-level fluctuation pattern of an area, resulting in prolonged periods of inundation, exaggerated extremes of high and low water, or a static, nonfluctuating water level. These alterations can change salinity patterns, alter erosion or sedimentation rates, and alter water temperatures which can alter or destroy communities and populations of aquatic animals and vegetation, induce populations of nuisance organisms, modify habitat, reduce food supplies, restrict movement of aquatic fauna, destroy spawning areas, and change surrounding areas.
37. Emergency Watershed	Ute Mountain (iv)	

Protection and Rehabilitation		
39. Commercial Development	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Discharges of dredged or fill material associated with commercial development activities permitted under NWP 39 can result in degradation of water quality such that existing instream water uses are no longer maintained. These activities can result in changes to the physical, chemical, and biological characteristics of the aquatic ecosystem that may result in water quality which does not support the propagation of fish, shellfish, and wildlife and recreation in and on the water.
40. Agricultural Activities	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Agricultural activities under NWP 40 which may result in the discharge of dredged or fill material can change the material chemistry and physical characteristics of a waterbody through the introduction of chemical constituents in suspended or dissolved form. These changes may reduce or eliminate the suitability of waterbodies for aquatic organisms, human consumption, or recreation.
42. Recreational Facilities	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Discharges of dredged or fill material associated with recreational facilities permitted under NWP 42 can result in degradation of water quality such that existing instream water uses are no longer maintained. These activities can result

		in changes to the physical, chemical, and biological characteristics of the aquatic ecosystem that may result in water quality which does not support the propagation of fish, shellfish, and wildlife and recreation in and on the water.
44. Mining Activities	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Discharges associated with mining activities may result in an increase in turbidity to the extent which reduces the water quality necessary to support the propagation of fish, shellfish, wildlife, and recreation in and on the water. The biological and chemical context of the suspended material may also react with the dissolved oxygen in the water which can result in oxygen depletion. Toxic compounds absorbed or adsorbed to fine-grained particulates in suspended material may become biologically available to organisms either in the water column or on the substrate. Discharges from these activities may increase the availability of contaminants in the aquatic ecosystem which may lead to the bioaccumulation of such contaminants in wildlife.
49. Coal Remining	40 CFR 230.23 40 CFR 230.24 Ute Mountain (iv)	Discharges associated with the remining and reclamation of lands that were previously mined for coal may result in an increase in turbidity to the extent which reduces the water quality necessary to support the propagation of fish, shellfish, wildlife, and recreation in and on the water. The biological and chemical context of the suspended material may also react with the dissolved oxygen in the water which can result in oxygen depletion. Toxic compounds absorbed or adsorbed to fine-grained particulates in suspended material may become biologically available to organisms either in the water column or on the substrate.
50. Underground Coal Mining	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively.

		Discharges associated with underground coal mining activities may result in an increase in turbidity to the extent which reduces the water quality necessary to support the propagation of fish, shellfish, wildlife, and recreation in and on the water. The biological and chemical context of the suspended material may also react with the dissolved oxygen in the water which can result in oxygen depletion. Toxic compounds absorbed or adsorbed to fine-grained particulates in suspended material may become biologically available to organisms either in the water column or on the substrate. Discharges from these activities may increase the availability of contaminants in the aquatic ecosystem which may lead to the bioaccumulation of such contaminants in wildlife.
51. Land-based Renewable Energy	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Land-based renewable energy activities may result in an increase in suspended particulates entering waterbodies as a result of land runoff and direct dredging or filling. Suspended particulates may remain in the water column for varying amounts of time, reducing light penetration and lowering photosynthesis rates for aquatic vegetation.
52. Water-based Renewable Energy	CWA sections 301, 302, 303, 306, and 307 (see endnote i); 40 CFR 230 Subpart C, Subpart D Ute Mountain (iv)	The activities permitted under this NWP will not comply with this water quality requirement because there are no limits on the linear foot impacts to streams. Without the 300 linear foot limit in place, discharges permitted under this NWP would allow many thousands of linear feet of impacts resulting in more than minimal adverse water quality effects individually and cumulatively. Discharges associated with water-based renewable resources can have adverse impacts on water-related recreation including both consumptive and non-consumptive uses. Impacts from these activities may impair or water use by

		changing turbidity, increasing suspended particulates, altering water temperature, changing habitat, and other changes to the aquatic ecosystem.
53. Removal of Low Head Dams	40 CFR 230.23 40 CFR 230.24 Ute Mountain (iv)	The removal of low head dams in the arid and semi-arid west, where natural recovery can be slow, many times requires active restoration to achieve a net increase in ecological functions and services. Otherwise, the removal of the dam can lead to adverse impacts including significant increases in suspended particulate levels and sedimentation downstream which may cause oxygen depletion and destruction of habitat.
D. Utility Line Activities for Water and other Substances	40 CFR 230.20 40 CFR 230.23 40 CFR 230.24 Ute Mountain (iv)	Discharges resulting from the numerous activities permitted under this NWP may directly impact bottom-dwelling organisms by limiting aquatic organism movement, by smothering immobile forms, or by forcing mobile forms to migrate to potentially unsuitable habitat. Erosion, slumping, or lateral displacement of surrounding bottom can adversely affect areas of the substrate outside of discharge location by changing or destroying habitat. These changes may degrade water quality such that the waters no longer support the propagation of fish, shellfish, wildlife, and recreation in and on the waterbody.

[i] CWA sections 301, 302, 303, 306, and 307 are listed in CWA section 401(a)(1) and, therefore, those sections and federal regulations implementing those sections can be considered water quality requirements and provide a legal basis for certification grants, denials or conditions. Section 303 and EPA's implementing regulations at Part 131 establish "existing uses" as "the absolute floor of water quality in all waters of the United States." 48 Fed. Reg. 51,400, 51,403 (Nov. 8, 1983). Existing uses are "those uses actually attained in the water body on or after November 28, 1975, *whether or not they are included in the water quality standards*." 40 C.F.R. § 131.3(e) (emphasis added). As a result, States are prohibited from removing designated uses from a waterbody segment if they are existing uses unless establishing a use with even more stringent criteria, 40 C.F.R. § 131.10(h), and existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected even if degradation is allowed under a State antidegradation policy, 40 C.F.R. § 131.12(a)(1). As a result, regardless of what water quality standards may be applicable to a water of the US, no discharge may be authorized under the CWA that would be so extensive as to change or destroy an existing use of that waterbody. Additionally, Section 404 is incorporated by reference into section 401(a)(1) and 401(d) by virtue of section 301(a), which prohibits the discharge of any pollutant by any person"[e]xcept as in compliance with this section and section[] . . . 404 of this title..." Section 404(a) authorizes the permitting of discharges of dredge or fill material "into the navigable waters at specified disposal sites." Under Section 404(b), those sites must be specified "through the application of guidelines developed by the Administrator, in conjunction with the Secretary." These guidelines, the CWA 404(b)(1) Guidelines, are contained at 40 CFR Part 230, establish

requirements for all permitted Section 404 discharges, including a requirement that such discharges must comply with all State water quality standards. 40 C.F.R. § 230.10(b)(1) & (2).

[ii] CWA - 40 CFR § 230 Subpart C - Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem

[iii] CWA - 40 CFR § 230 Subpart D - Potential Impacts on Biological Characteristics of the Aquatic Ecosystem

[iv] Water Quality Standards For Surface Waters of the Ute Mountain Ute Indian Reservation – Section 4 Anti-degradation Policy, Section 5. Narrative Water Quality Criteria, Section 6. Narrative Biological Criterion, Section 12 Designated Uses and Criteria

ERDC/EL TR-08-28

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of Engineers®
Engineer Research and
Development Center

Wetlands Regulatory Assistance Program

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)

U.S. Army Corps of Engineers

September 2008



Environmental Laboratory

Approved for public release; distribution is unlimited.

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U.S. Army Corps of Engineers

U.S. Army Engineer Research and Development Center
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Final report

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Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000

Abstract: This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual, which provides technical guidance and procedures for identifying and delineating wetlands that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. The development of Regional Supplements is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. This supplement is applicable to the Arid West Region, which consists of all or portions of 12 states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming.

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Preface

This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual. It was developed by the U.S. Army Engineer Research and Development Center (ERDC) at the request of Headquarters, U.S. Army Corps of Engineers (USACE), with funding provided through the Wetlands Regulatory Assistance Program (WRAP). This is Version 2.0 of the Arid West Regional Supplement; it replaces the "interim" version, which was published in December 2006.

This document was developed in cooperation with the Arid West Regional Working Group, whose members contributed their time and expertise to the project over a period of many months. Working Group meetings were held in Sacramento, CA, on 9–10 December 2003; Salt Lake City, UT, on 26–27 October 2004; Phoenix, AZ, on 15–16 February 2005; and Denver, CO, on 27–28 June 2006. Members of the Regional Working Group and contributors to this document were:

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Independent peer reviews were performed in accordance with Office of Management and Budget guidelines. The peer-review team consisted of Terri Skadeland, Chair, NRCS, Lakewood, CO; David Blauch, Ecological Resource Consultants, Inc., Boulder, CO; Nancy Keate, Utah Department of Natural Resources, Salt Lake City, UT; Stephanie MacDonald, EcoPlan Associates, Inc., Mesa, AZ; Richard McEldowney, PBS&J, Inc., Bozeman, MT; Maryann McGraw, New Mexico Environment Department, Surface

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Technical editors for this Regional Supplement were Dr. James S. Wakeley, Robert W. Lichvar, and Chris V. Noble, ERDC. Katherine Trott was the project proponent and coordinator at Headquarters, USACE. During the conduct of this work, Dr. Morris Mauney was Chief of the Wetlands and Coastal Ecology Branch; Dr. David Tazik was Chief, Ecosystem Evaluation and Engineering Division; and Dr. Elizabeth Fleming was Director, EL.

COL Gary E. Johnston was Commander and Executive Director of ERDC. Dr. James R. Houston was Director.

The correct citation for this document is:

U.S. Army Corps of Engineers. 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0),* ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

1 Introduction

Purpose and use of this regional supplement

This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual (hereafter called the Corps Manual). The Corps Manual provides technical guidance and procedures, from a national perspective, for identifying and delineating wetlands that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act (33 U.S.C. 1344) or Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). According to the Corps Manual, identification of wetlands is based on a three-factor approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. This Regional Supplement presents wetland indicators, delineation guidance, and other information that is specific to the Arid West Region.

This Regional Supplement is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. Regional differences in climate, geology, soils, hydrology, plant and animal communities, and other factors are important to the identification and functioning of wetlands. These differences cannot be considered adequately in a single national manual. The development of this supplement follows National Academy of Sciences recommendations to increase the regional sensitivity of wetland-delineation methods (National Research Council 1995). The intent of this supplement is to bring the Corps Manual up to date with current knowledge and practice in the region and not to change the way wetlands are defined or identified. The procedures given in the Corps Manual, in combination with wetland indicators and guidance provided in this supplement, can be used to identify wetlands for a number of purposes, including resource inventories, management plans, and regulatory programs. The determination that a wetland is subject to regulatory jurisdiction under Section 404 or Section 10 must be made independently of procedures described in this supplement.

This Regional Supplement is designed for use with the current version of the Corps Manual (Environmental Laboratory 1987) and all subsequent versions. Where differences in the two documents occur, this Regional Supplement takes precedence over the Corps Manual for applications in

the Arid West Region. Table 1 identifies specific sections of the Corps Manual that are replaced by this supplement. Other guidance and procedures given in this supplement and not listed in Table 1 are intended to augment the Corps Manual but not necessarily to replace it. The Corps of Engineers has final authority over the use and interpretation of the Corps Manual and this supplement in the Arid West Region.

Table 1. Sections of the Corps Manual replaced by this Regional Supplement for applications in the Arid West.

Item	Replaced Portions of the Corps Manual (Environmental Laboratory 1987)	Replacement Guidance (this Supplement)
Hydrophytic Vegetation Indicators	Paragraph 35, all subparts, and all references to specific indicators in Part IV.	Chapter 2
Hydric Soil Indicators	Paragraphs 44 and 45, all subparts, and all references to specific indicators in Part IV.	Chapter 3
Wetland Hydrology Indicators	Paragraph 49(b), all subparts, and all references to specific indicators in Part IV.	Chapter 4
Growing Season Definition	Glossary	Chapter 4, Growing Season; Glossary
Hydrology Standard for Highly Disturbed or Problematic Wetland Situations	Paragraph 48, including Table 5 and the accompanying User Note in the online version of the Manual	Chapter 5, Wetlands that Periodically Lack Indicators of Wetland Hydrology, Procedure item 3(g)

Indicators and procedures given in this supplement are designed to identify wetlands as defined jointly by the Corps of Engineers (33 CFR 328.3) and Environmental Protection Agency (40 CFR 230.3). Wetlands are a subset of the "waters of the United States" that may be subject to regulation under Section 404. One key feature of the definition of wetlands is that, under normal circumstances, they support "a prevalence of vegetation typically adapted for life in saturated soil conditions." Many waters of the United States are unvegetated and thus are excluded from the Corps/EPA definition of wetlands, although they may still be subject to Clean Water Act regulation. Other potential waters of the United States in the Arid West include but are not limited to tidal areas, desert playas, mud and salt flats, and intermittent and ephemeral stream channels. Delineation of these waters is based on the high tide line, the "ordinary high

water mark" (33 CFR 328.3), or other criteria and is beyond the scope of this Regional Supplement.

Amendments to this document will be issued periodically in response to new scientific information and user comments. Between published versions, Headquarters, U.S. Army Corps of Engineers, may provide updates to this document and any other supplemental information used to make wetland determinations under Section 404 or Section 10. Wetland delineators should use the most recent approved versions of this document and supplemental information. See the Corps of Engineers Headquarters regulatory web site for information and updates (http://www.usace.army.mil/inet/functions/cw/cecwo/reg/). The Corps of Engineers has established an interagency National Advisory Team for Wetland Delineation whose role is to review new data and make recommendations for needed changes in wetland-delineation procedures to Headquarters, U.S. Army Corps of Engineers. Items for consideration by the team, including full documentation and supporting data, should be submitted to:

National Advisory Team for Wetland Delineation
Regulatory Branch (Attn: CECW-CO)
U.S. Army Corps of Engineers
441 G Street, N.W.
Washington, DC 20314-1000

Applicable region and subregions

This supplement is applicable to the Arid West Region, which consists of all or portions of 12 states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming (Figure 1). The region encompasses a wide variety of landforms and ecosystems, but is differentiated from surrounding areas by its predominantly dry climate and long summer dry season. Annual evapotranspiration exceeds precipitation across most of the region (Bailey 1995).

The approximate spatial extent of the Arid West Region is shown in Figure 1 and is based mainly on a combination of Land Resource Regions (LRR) B, C, and D recognized by the U.S. Department of Agriculture (USDA Natural Resources Conservation Service 2006a). The region also corresponds generally to the combined Level I Ecoregions 10, 11, 12, and 13 of the Commission for Environmental Cooperation (CEC 1997). The region includes the associated coastal zone of southern California. The

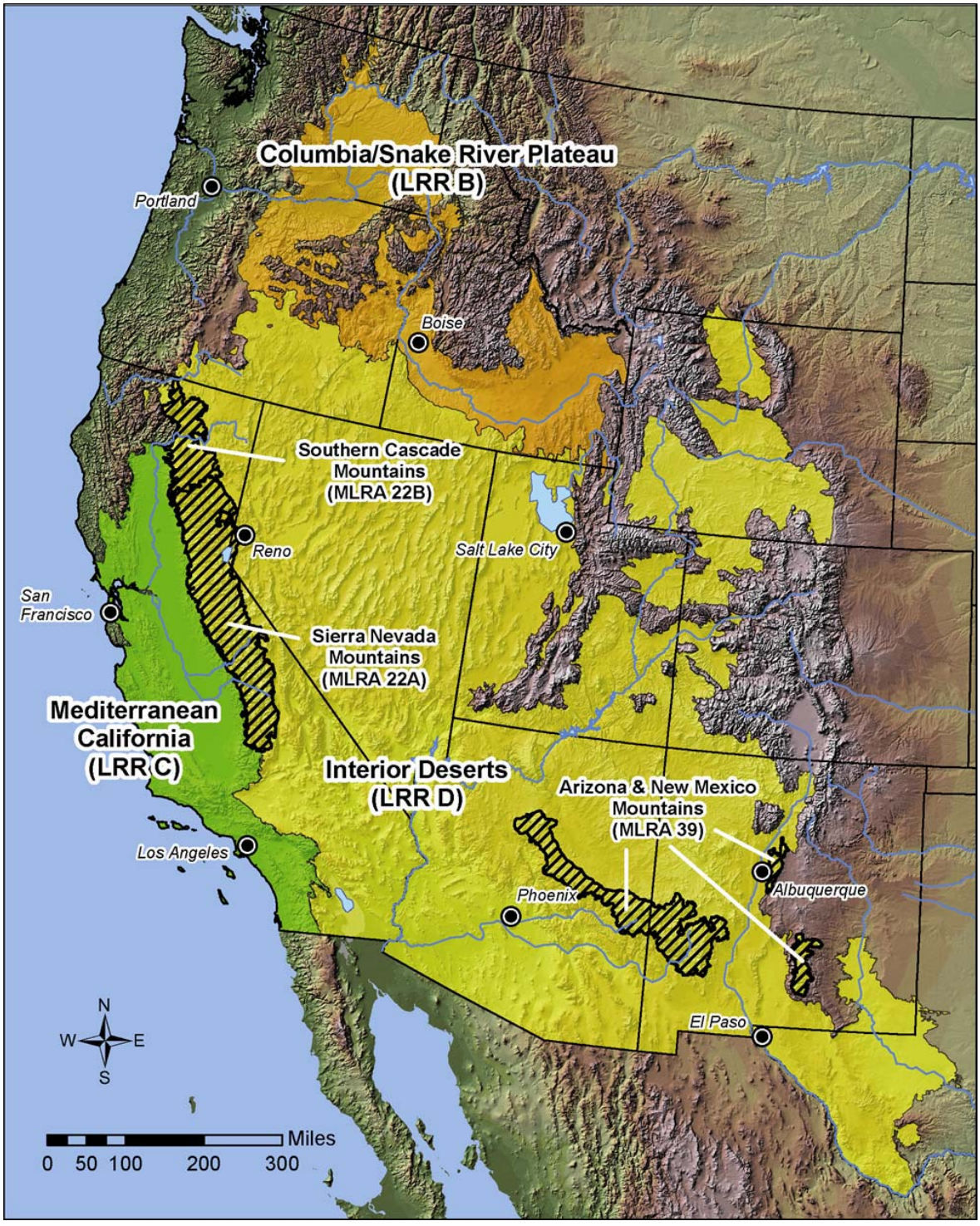


Figure 1. Approximate boundaries of the Arid West Region and subregions (LRR B, C, and D). This regional supplement is applicable throughout the highlighted areas, including coastal areas, with the following exceptions: (1) the cross-hatched portions of LRR D comprising the Sierra Nevada Mountains (MLRA 22A), the Southern Cascade Mountains (MLRA 22B), and the Arizona and New Mexico Mountains (MLRA 39) and (2) other embedded mountain ranges not indicated on the map that support predominantly coniferous forests with interspersed meadows, shrublands, and riparian woodlands above and including the ponderosa pine zone. See text and Table 2 for details.

Table 2. Comparison of general landscape characteristics between the Arid West Region and the Western Mountains, Valleys, and Coast Region

Landscape Characteristics	Arid West Regional Supplement	Western Mountains, Valleys, and Coast Regional Supplement
Climate	Generally hot and dry with a long summer dry season. Average annual precipitation mostly <15 in. (380 mm) except along the coast. Most precipitation falls as rain.	Cooler and more humid, with a shorter dry season. Average annual precipitation mostly >20 in. (500 mm). Except near the coast, much of the annual precipitation falls as snow, particularly at higher elevations.
Vegetation	Little or no forest cover at the same elevation as the site and, if present, usually dominated by pinyon pine (e.g., *P. monophylla* or *P. edulis*), junipers (*Juniperus*), cottonwoods (e.g., *Populus fremontii*), willows (*Salix*), or hardwoods (e.g., *Quercus, Platanus*). Landscape mostly dominated by grasses and shrubs (e.g., sagebrush (*Artemisia*), rabbitbrush (*Chrysothamnus*), bitterbrush (*Purshia*), and creosote bush (*Larrea*)). Halophytes (e.g., *Allenrolfea, Salicornia, Distichlis*) present in saline areas.	Forests at comparable elevations in the local area dominated by conifers (e.g., spruce (*Picea),* fir *(Abies),* hemlock *(Tsuga),* Douglas-fir *(Pseudotsuga),* coast redwood (*Sequoia*), or pine *(Pinus)* except pinyon) or aspen (*Populus tremuloides*). In the Willamette Valley, Oregon ash (*Fraxinus latifolia*) and bigleaf maple (*Acer macrophyllum*) often dominate. Open areas generally dominated by grasses, sedges, shrubs (e.g., willows or alders (*Alnus*)), or alpine tundra.
Soils	Mostly dry, poorly developed, low in organic matter content, and high in carbonates. Soils sometimes highly alkaline. Surface salt crusts and efflorescences common in low areas.	Generally better developed, higher in organic matter content, and low in carbonates. Surface salt features are less common except in geothermal areas.
Hydrology	Drainage basins often lacking outlets. Temporary ponds (often saline), salt lakes, and ephemeral streams predominate. Water tables often perched. Major streams and rivers flow through but have headwaters outside the Arid West.	Streams and rivers often perennial. Open drainages with many natural, freshwater lakes. Water tables often continuous with deeper groundwater. Region serves as the headwaters of the major streams and rivers of the western United States.

Arid West Region is dominated mainly by grasslands, shrublands, hardwood savannas, deciduous woodlands, and pinyon/juniper (e.g., *Pinus monophylla* or *P. edulis / Juniperus* spp.) woodlands.

The Arid West Region is surrounded by and interspersed with portions of the Western Mountains, Valleys, and Coast Region. The following areas are excluded from the Arid West Region because environmental conditions are more appropriate for application of the Western Mountains, Valleys, and Coast Regional Supplement (U.S. Army Corps of Engineers 2008, or current version):

- Sierra Nevada Mountains (Major Land Resource Area (MLRA) 22A)
- Southern Cascade Mountains (MLRA 22B)

- Arizona and New Mexico Mountains (MLRA 39)
- Other mountain ranges scattered throughout the West that support mainly coniferous forests on the lower slopes, alpine tundra at the highest elevations (if present), and open coniferous woodlands, shrublands, meadows, and hardwood riparian woodlands in the valleys, down to the lower elevational limit of the ponderosa pine (*Pinus ponderosa*) zone or its local equivalent.

The decision to use the Arid West Regional Supplement or the Western Mountains, Valleys, and Coast Regional Supplement on a particular field site should be based on landscape and site conditions, and not solely on map location. Figure 1 is highly generalized and does not indicate many of the smaller mountain ranges where the Western Mountains, Valleys, and Coast supplement would be applicable. Furthermore, there are arid environments beyond the highlighted areas in Figure 1 where the Arid West Regional Supplement would be appropriate. Both regions are highly diverse and transitions between them can be gradual. Table 2 summarizes general patterns in climate, vegetation, soils, and hydrology that help to differentiate the two regions. In many areas of the West, the transition between the two regions is indicated by the upper limit of pinyon/juniper and associated shrub-dominated communities, and the lower limit of ponderosa pine or other coniferous forests.

Region and subregion boundaries are depicted in Figure 1 as sharp lines. However, climatic conditions and the physical and biological characteristics of landscapes do not change abruptly at the boundaries. In reality, regions and subregions often grade into one another in broad transition zones that may be tens or hundreds of miles wide. The lists of wetland indicators presented in these Regional Supplements may differ between adjoining regions or subregions. In transitional areas, the investigator must use experience and good judgment to select the supplement and indicators that are appropriate to the site based on its physical and biological characteristics. Wetland boundaries are not likely to differ between two supplements in transitional areas, but one supplement may provide more detailed treatment of certain problem situations encountered on the site. If in doubt about which supplement to use in a transitional area, apply both supplements and compare the results. For additional guidance, contact the appropriate Corps of Engineers District Regulatory Office for guidance. Contact information for District regulatory offices is available at

the Corps Headquarters web site (http://www.usace.army.mil/inet/functions/cw/cecwo/reg/district.htm).

Physical and biological characteristics of the region

The Arid West Region consists of desert and shrub-steppe ecosystems in the rain shadow of the Cascade and Sierra Nevada Mountain ranges, plus portions of central and southern California that have a Mediterranean climate with mild winters and dry summers. In general, the region is characterized by relatively high average temperatures, low humidity, and often extreme temporal and spatial variability in precipitation amounts. The Arid West is a vast and topographically diverse region containing enclosed basins, broad valleys, plateaus, canyons, arroyos, mesas, buttes, and numerous mountain ranges. Soils are generally dry, poorly developed, low in percentage of organic matter, and high in carbonates (CEC 1997). Native vegetation across much of the region is dominated mainly by grasses and shrubs with relatively few large trees except in the embedded mountain ranges and riparian zones along perennial streams (Bailey 1995, CEC 1997, USDA Natural Resources Conservation Service 2006a).

Within the Arid West Region, this supplement recognizes three subregions that differ sufficiently from each other in climate, landforms, biogeography, and/or wetland characteristics to warrant separate consideration of wetland indicators and delineation guidance. These subregions are the Interior Deserts (corresponds to LRR D), the Columbia/Snake River Plateau (LRR B), and Mediterranean California (LRR C) (Figure 1). Important characteristics of each subregion are described briefly below. However, most of the indicators presented in this Regional Supplement are applicable across all subregions of the Arid West.

Interior deserts (LRR D)

The Interior Deserts subregion consists of two distinct parts: the "hot desert" and the "cold desert." Each part also contains extensive areas of mountains dominated by chaparral and coniferous forests. The hot desert consists of the combined Mojave, Sonoran, and Chihuahuan Deserts in southeastern California, southern Nevada, Arizona, New Mexico, and west Texas. Average annual temperature ranges from 50 to 75 °F (10 to 24 °C). Summers are long and very hot. The record high temperature for the United States of 134 °F (57 °C) was recorded in Death Valley, California, in 1913. Average annual precipitation ranges from approximately 2 to 10 in.

(50 to 250 mm) in the valleys with higher amounts in the mountains (Bailey 1995). Significant rainfall occurs in both winter and summer, and there is little snow (Barbour and Billings 1989). Winter frontal storms from the Pacific Ocean generally produce widespread rainfall of low intensity. Summer convective thunderstorms are common and may produce very high-intensity and short-duration rainfall in limited areas, leaving nearby areas dry. In addition, tropical cyclones that move northeastward across the Pacific Ocean toward Baja California and mainland Mexico can bring intense rain and occasional flooding to the area (Field 2004). The vegetation of the hot desert is derived mainly from the subtropical flora to the south. Several species are characteristic of the hot desert, but their abundance and distribution vary across the area. Creosote bush (*Larrea divaricata*) is commonly associated with the hot desert, along with other xeric shrubs, succulents, cacti, and short grasses. In various portions of the hot desert area, characteristic plants include Joshua tree (*Yucca brevifolia*), palo verde (*Cercidium* spp.), ocotillo (*Fouquieria splendens*), mesquite (*Prosopis* spp.), saguaro cactus (*Carnegiea gigantea*), and cholla and prickly pear cacti (*Opuntia* spp.).

The cold desert lies generally north of the hot desert and east of the Sierra Nevada Mountain range, and includes the basin-and-range province of eastern California, Nevada, southeastern Oregon, and Utah, and the Colorado Plateau in Arizona, Utah, Colorado, and New Mexico. Average annual temperature ranges from 40 to 55 °F (4 to 13 °C) and winters are cold. The area receives 5 to 20 in. (130 to 500 mm) of precipitation each year; winter precipitation falls mainly as snow (Bailey 1995). Winter Pacific frontal storms associated with low-pressure systems are an increasingly important source of moisture as one moves from south to north. These storms produce rain and snowfall of relatively low intensity and long duration over wide areas. Little rain falls during summer, except in the mountains (Field 2004). The basin-and-range province is dominated by fault-block mountain ranges and broad valleys, whereas the Colorado Plateau consists mainly of uplifted and highly eroded sedimentary rocks. Sagebrush (*Artemisia tridentata*) and rabbit brush (*Chrysothamnus nauseosus*) dominate much of the cold desert area, with saltbush (*Atriplex* spp.), iodine bush (*Allenrolfea occidentalis*), and greasewood (*Sarcobatus vermiculatus*) on the more alkaline soils. Pinyon/juniper and ponderosa pine woodlands occupy large areas of the Colorado Plateau, interspersed with native grasslands and shrub-steppes (Bailey 1995).

Columbia/Snake River Plateau (LRR B)

The Columbia/Snake River Plateau lies east of the Cascade Mountains in Washington, Oregon, and southern Idaho. Much of the subregion is covered by deposits of loess, volcanic ash, and basalt. The climate is semi-arid with average annual temperatures of 40 to 49 °F (5 to 10 °C) in much of the area and average annual precipitation in lowland areas ranging from 6 to 20 in. (150 to 510 mm) (Bailey 1995, USDA Natural Resources Conservation Service 2006a). Summers are dry. Natural vegetation across much of the area is dominated by sagebrush, saltbush, and short grasses, with greasewood on alkali flats. Willows and sedges are common along streams and in wet areas at the bases of the mountains (Bailey 1995). The Palouse area of southeastern Washington and west-central Idaho once supported extensive prairie ecosystems dominated by perennial bunch-grasses such as bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*). However, this area has largely been converted to agriculture.

Mediterranean California (LRR C)

Mediterranean California is characterized by relatively warm, wet winters and dry summers. Average annual temperature ranges from approximately 41 to 67 °F (5 to 20 °C). Average annual precipitation ranges from 6 in. (150 mm) in the upper San Joaquin Valley to more than 30 in. (760 mm) along the central California coast (USDA Natural Resources Conservation Service 2006a). The area is influenced mainly by winter frontal storms from the Pacific Ocean. Most precipitation falls from November to April; summers in the lowlands can be very dry (Bailey 1995, CEC 1997). Mediterranean California contains a variety of landscapes including broad valleys, foothills, mountains, and coastal areas. The subregion supports a highly diverse mix of plant communities including chaparral, coastal strand, coastal sage scrub, valley grassland, oak woodland, and foothill woodland (Hickman 1993).

Types and distribution of wetlands

Wetland types

While the Arid West is characterized by limited amounts of water, the varied landscapes included in this broad region support many different wetland types. Overall, however, wetlands and other shallow aquatic

habitats occupy only about 1-5 percent of the land surface in the region (Dahl 1990).

Detailed information on the extent of wetlands is available for selected parts of the Arid West Region. Nevada, for example, considered one of the drier states in the country, contains approximately 1.7 million acres of wetlands (Peters 2005), or about 2 percent of the land surface. It is estimated that just under 1 percent of Arizona's and New Mexico's land surfaces are wetland (Dahl 1990). Wetlands currently occupy approximately 4.6 percent of California's Central Valley, although this is much less than the 30 percent wetland coverage that is estimated to have been present in the 1850s (Frayer et al. 1989). Most of the reduction was due to wetland conversion for agricultural purposes in the early 1900s. For the Arid West Region as a whole, between 30 and 90 percent of wetland acreage that existed in the late 1700s has been converted to other uses (Dahl 1990).

In many parts of the Arid West, ribbons of wetland are concentrated along rivers and streams that flow through parched landscapes. Non-wetland woody riparian habitats are often interspersed with temporarily or seasonally flooded wetlands. Emergent marsh complexes are found in large basins, often remnants of ancient lakes. Examples include the Malheur and Klamath marshes in Oregon, the Lahontan Valley wetlands in northern Nevada, and the Salton Sea wetlands in southern California. The Arid West Region includes approximately 450 miles of coastline in central and southern California, where scattered salt marshes have developed along the shores of protected estuarine bays, river mouths, and lagoons. Fresh tidal marshes are very limited in this coastal stretch due to the relatively steep gradient of most rivers entering the Pacific Ocean.

Many types of wetlands and shallow aquatic habitats are unique to the Arid West Region. In desert areas, springs and seeps often support small marshes (cienegas), oases, and other wetland types (U.S. Geological Survey 1996). Desert playas are intermittent shallow lakes that develop in the flat, lower portions of arid basins during the wet season (Lichvar et al. 2006). They are mostly unvegetated and may not contain water every year. Salt lakes (e.g., Great Salt Lake) and their associated salt flats, as well as inland salt marshes, are also characteristic of the Great Basin.

The channeled scablands of eastern Washington contain a mosaic of depressional marshes, old flood channels, and ephemeral ponds. The

pock-marked surface was formed when the volcanic rock in the area was deeply scoured by massive flooding thought to have occurred 12,000 to 20,000 years ago during and following the last Pleistocene glaciation (Houston and Vial 1995). Small, temporarily and seasonally ponded depressions called vernal pools occur in scattered areas from San Diego County, California, to the Modoc Plateau in southern Oregon. These wetlands are found in a variety of landscapes where they are usually underlain by an impermeable layer such as a hardpan, claypan, or basalt. Vernal pools often fill and empty several times during the rainy season. Other wetland types in the Arid West include seeps near the bases of slopes; wet meadows; wetlands associated with the fringes of reservoirs; wetlands associated with ephemeral, intermittent, and perennial streams and rivers; and man-made depressional wetlands in mined areas, agricultural lands, suburban areas (e.g., golf courses), and wetland restoration sites.

Irrigated wetlands

Irrigation has been practiced in some portions of the Arid West for more than 125 years and has changed the natural hydrologic regime over large areas. When practiced over many years, the application of irrigation water can alter soil characteristics (e.g., color, redox features, and salt content) and vegetation of affected areas. Long-term irrigation has created new wetlands and altered existing wetlands throughout the region.

Common types of irrigation include flood, sprinkler, and drip. Flood irrigation is the most common form in the Arid West and is often practiced on a very large scale. Streams are diverted by means of dams, weirs, or other structures into man-made delivery channels that convey the water by gravity to where it is needed. Excess water flows off the irrigated area and collects in a series of drainage or wastewater ditches to be used by downstream irrigators or returned to a tributary. Sprinkler and drip systems produce considerably less runoff than flood irrigation systems.

Irrigation augments the natural hydrology of the affected areas in both intended and unintended ways, through leakage of water from delivery channels and ditches, direct application of irrigation water to pastures and fields, and overflow of unused or excess irrigation water into other areas down gradient. The added water, over time, may create new wetlands or augment and enlarge previously existing wetlands. For example, seep wetlands may develop in former uplands due to leakage from irrigation canals and ditches; prolonged flooding and soil saturation may induce the

formation of redoximorphic features and establishment of hydrophytic vegetation in irrigated pastures; and the accumulation of excess irrigation water in basins and swales may augment previously existing wetlands, raising their water tables and expanding their margins. On the other hand, groundwater withdrawal for irrigation purposes may also depress water tables in the vicinity of a well. Indicators given in this Regional Supplement can be used to identify all wetlands, whether natural or created artificially by human activity. The appropriate Corps of Engineers District Regulatory Office should be consulted when it is necessary to distinguish between naturally occurring and irrigation-induced wetlands for Clean Water Act regulatory purposes.

2 Hydrophytic Vegetation Indicators

Introduction

The Corps Manual defines hydrophytic vegetation as the community of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to exert a controlling influence on the plant species present. The manual uses a plant-community approach to evaluate vegetation. Hydrophytic vegetation decisions are based on the assemblage of plant species growing on a site, rather than the presence or absence of particular indicator species. Hydrophytic vegetation is present when the plant community is dominated by species that can tolerate prolonged inundation or soil saturation during the growing season. Hydrophytic vegetation in the Arid West is identified by using the indicators described in this chapter.

Many factors besides site wetness affect the composition of the plant community in an area, including regional climate, local weather patterns, topography, soils, and plant distributional patterns at various spatial scales. The Arid West Region is best described as having extreme variability in many of these influencing characteristics. Community composition reflects the adaptive capabilities of the plant species present, superimposed on a complex spatial pattern of hydrologic, edaphic, and other environmental conditions. Disturbances and climatic fluctuations, such as floods, wildfires, drought, grazing, tilling, and recent site modifications, are also important. They can set back or alter the course of plant-community development and may even change the hydrophytic status of the community. See Chapter 5 for discussions of specific problematic vegetation situations in the region.

Arid western landscapes provide habitat for a variety of plant species that have special adaptations for survival in areas with saline conditions and ephemeral water sources. Halophytes and phreatophytes, for example, are associated with many wetland settings in the Arid West. The morphological and physiological adaptations of halophytes allow these species to exist in highly saline soil and water conditions. The long roots of phreatophytes are adapted to reach deep subsurface water tables, allowing these species to survive in locations that receive only intermittent surface-water inputs. Although often found in wetlands, halophytes and phreatophytes can

sometimes be misleading indicators of wetland conditions when they dominate areas that are highly saline but lack wetland hydrology or hydric soils, or they occur in areas where groundwater is below the depth required for wetland delineation purposes.

Arid-land vegetation is highly responsive to precipitation patterns, and the Arid West is known for a high degree of spatial and temporal variability in rainfall amounts (Reid and Frostick 1997). Wetlands subject to seasonal hydrology in the region often show substantial changes in species presence and abundance through the year. In addition to seasonal and annual variability, decadal-scale shifts in the frequency and amount of precipitation influence many wetland types in the region. Long-term drought conditions may stress woody shrubs and trees, but they typically survive and persist at drought-influenced wetland sites. Shifts in the presence and species composition of herbaceous vegetation, however, can be rapid and dramatic. Examples of wetland types that are influenced by seasonal and longer term climatic fluctuations in the Arid West include, but are not limited to, vernal pools, grassy playas, seeps, springs, and riparian wetlands associated with ephemeral, intermittent, and perennial streams and rivers. Problematic wetland situations in the Arid West are discussed further in Chapter 5.

Hydrophytic vegetation decisions are based primarily on the wetland indicator status (Reed 1988, or current approved list) of species that make up the plant community. Species in the facultative categories (FACW, FAC, and FACU) are recognized as occurring in both wetlands and non-wetlands to varying degrees. Although most wetlands are dominated by species rated OBL, FACW, and FAC, some wetland communities may be dominated by FACU species and cannot be identified by dominant species alone. In those cases, other indicators of hydrophytic vegetation must also be considered. This situation is not necessarily due to inaccurate wetland indicator ratings; rather, it is due to the broad tolerances of certain plant species that allow them to be widely distributed across the moisture gradient. Therefore, for some species, it is difficult to assign a single indicator status rating that encompasses all of the various landscape and ecological settings it can occupy.

Hydrophytic vegetation indicators and procedures presented in this chapter are designed to identify the majority of wetland plant communities in the Arid West. However, some wetland communities may lack any of these

indicators, at least at certain times. These situations are considered in Chapter 5 (Difficult Wetland Situations in the Arid West).

Guidance on vegetation sampling and analysis

General guidance on sampling of vegetation for wetland-delineation purposes is given in the Corps Manual for both the Routine and Comprehensive methods. Those procedures are intended to be flexible and may need to be modified for application in a given region or on a particular site. Vegetation sampling done as part of a wetland delineation is designed to characterize the site in question rapidly without the need for detailed scientific study or statistical methods. A balance must be established between the need to accomplish the work quickly and the need to characterize the site's heterogeneity accurately and at an appropriate scale. The following guidance on vegetation sampling is intended to supplement the Corps Manual for applications in the Arid West.

The first step is to stratify the site so that the major landscape or vegetation units can be evaluated separately. This may be done in advance using an aerial photograph or topographic map, or by walking over the site. In general, routine wetland determinations are based on visual estimates of percent cover of plant species that can be made either (1) within the vegetation unit as a whole, or (2) within one or more sampling plots established in representative locations within each unit. Percent cover estimates are more accurate and repeatable if taken within a defined plot. This also facilitates field verification of another delineator's work. The sizes and shapes of sampling plots, if used, may be modified as appropriate to adapt to site conditions and should be recorded on the field data form if they deviate from those recommended in the Corps Manual. Near the wetland boundary, it may be necessary to adjust plot size or shape to avoid overlapping the boundary and extending into an adjacent community having different vegetation, soils, or hydrologic conditions. For wetland delineation purposes, an area is considered to be vegetated if it has 5 percent or more total plant cover at the peak of the growing season. See "Sparse and Patchy Vegetation" in Chapter 5 for guidance on dealing with unvegetated wet areas.

If it is not possible to locate one or a few plots in a way that adequately represents the vegetation unit being sampled, then percent cover estimates can be made by walking the unit and visually estimating the coverage of each species over a broader area. If additional quantification of cover

estimates is needed, then an optional procedure for point-intercept sampling along transects (see Appendix B) may be used to characterize the vegetation unit. To use either of these sampling methods, soil and hydrologic conditions must be uniform across the sampled area.

Vegetation sampling guidance presented here and in the Corps Manual should be appropriate for most situations. However, many variations in vegetation structure, diversity, and spatial arrangement exist on the landscape and cannot be addressed adequately in this supplement. A list of references is given in Table 3 for more complex sampling situations. If alternative sampling techniques are used, they should be described in field notes or in the delineation report. The basic data must include abundance values for each species present. Typical abundance measures include basal area (for trees), percent areal cover, stem density, or frequency based on point-intercept sampling. In any case, the data must be in a format that can be used in the dominance test or prevalence index for determining hydrophytic vegetation (see Hydrophytic Vegetation Indicators).

Table 3. Selected references to additional vegetation sampling approaches that could be used in wetland delineation.

Reference	Comment
Elzinga, C. L., Salzer, D. W., and Willoughby, J. W. 1998. *Measuring and Monitoring Plant Populations*. Bureau of Land Management Technical Reference 1730-1. U.S. Dept. of the Interior, Washington, DC.	Clearly presented and easy-to-read information on determining sample size and adequacy.
Kent, M., and Coker, P. 1992. *Vegetation Description and Analysis: A Practical Approach.* Wiley, New York.	Simple and clear methods for setting up a study, and collecting and analyzing the data. Initial chapters are helpful for data collection and sampling approaches in wetland delineation.
Mueller-Dombois, D., and Ellenberg, H. 1974. *Aims and Methods of Vegetation Ecology*. Wiley, New York.	A standard text in vegetation ecology, sampling, and analysis. This reference provides many sampling and analytical methods that are helpful in complex delineations.

In this supplement, absolute percent cover is the preferred abundance measure for all species. For percent cover estimates, it is not necessary for all plants to be rooted in the plot as long as they are growing under the same soil and hydrologic conditions. It may be necessary to exclude plants that overhang the plot if they are rooted in areas having different soil and

hydrologic conditions, particularly when sampling near the wetland boundary.

Definitions of strata

Vegetation strata within a plot are sampled separately when evaluating indicators of hydrophytic vegetation. The structure of vegetation varies greatly in wetland communities across the region. Throughout much of the Arid West, short-statured woody plants (i.e., less than 3.2 ft (1 m) high or "sub-shrubs") are a common growth form. The Corps Manual combines short woody plants and herbaceous plants into a single "herb" stratum for sampling purposes. However, in the Arid West, more information about the plant community is gained when short shrubs and herbaceous plants are sampled separately. Therefore, the following vegetation strata are recommended for use across the Arid West. This system places short woody shrubs in the sapling/shrub stratum and limits the herb stratum to only herbaceous plant species. Unless otherwise noted, a stratum for sampling purposes is defined as having 5 percent or more total plant cover. If either the tree or woody vine strata have less than 5 percent cover during the peak of the growing season, then any trees or vines present may be combined with the sapling/shrub stratum.

1. *Tree stratum* – Consists of woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
2. *Sapling/shrub stratum* – Consists of woody plants less than 3 in. DBH, regardless of height.
3. *Herb stratum* – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size.
4. *Woody vines* – Consists of all woody vines, regardless of height.

Seasonal considerations and cautions

To the extent possible, the hydrophytic vegetation decision should be based on the plant community that is normally present during the wet portion of the growing season in a normal rainfall year. However, wetland determinations must often be performed at other times of year, or in years with unusual or atypical weather conditions. The Arid West has a highly seasonal climate, with hot dry summers, cool wet springs, and winters that can be cold and snowy in interior and northern areas. Vegetation sampling for a wetland determination can be challenging when some plants die back in response to seasonal or long-term drought, freezing temperatures, or

other factors. At these times, experience and professional judgment may be required to adapt the vegetation sampling scheme or use other sources of information to determine the plant community that is normally present.

For example, winter sampling in some areas may be hampered by snow and ice that cover the ground and make it impractical to identify plant species and estimate plant cover. When an on-site evaluation of the vegetation is impractical due to excessive snow and ice, one option is to use existing off-site data sources, such as National Wetlands Inventory (NWI) maps, soil surveys, and aerial photographs, to make a preliminary hydrophytic-vegetation determination. These sources may be supplemented with limited on-site data, including those plant species that can be identified. Later, when conditions are favorable, an on-site investigation must be made to verify the preliminary determination and complete the wetland delineation.

Other factors can alter the plant community on a site and affect a hydrophytic vegetation determination, including seasonal changes in species composition, intense grazing, wildfires and other natural disturbances, and human land-use practices. These factors are considered in Chapter 5.

Hydrophytic vegetation indicators

The following indicators should be applied in the sequence presented. The stepwise procedure is designed to reduce field effort by requiring that only one indicator, the dominance test, be evaluated in the majority of wetland determinations. Hydrophytic vegetation is present if any of the indicators is satisfied. All of these indicators are applicable throughout the entire Arid West Region.

Indicators of hydrophytic vegetation involve looking up the wetland indicator status of plant species on the wetland plant list (Reed 1988 or current list). For the purposes of this supplement, only the five basic levels of wetland indicator status (i.e., OBL, FACW, FAC, FACU, and UPL) (Reed 1988) are used in hydrophytic vegetation indicators. Plus (+) and minus (–) modifiers are not used (e.g., FAC–, FAC, and FAC+ plants are all considered to be FAC). For species listed as NI (reviewed but given no regional indicator) or NO (no known occurrence in the region at the time the list was compiled), apply the indicator status assigned to the species in the nearest adjacent region. If the species is listed as NI or NO but no

adjacent regional indicator is assigned, do not use the species to calculate hydrophytic vegetation indicators. In general, species that are not listed on the wetland plant list are assumed to be upland (UPL) species. However, recent changes in plant nomenclature have resulted in a number of species that are not listed by Reed (1988) but are not necessarily UPL plants. Procedures described in Chapter 5, section on Problematic Hydrophytic Vegetation, can be used if it is believed that individual FACU, NI, NO, or unlisted plant species are functioning as hydrophytes on a particular site. For Clean Water Act purposes, wetland delineators should use the latest plant lists approved by Headquarters, U.S. Army Corps of Engineers (Figure 2) (http://www.usace.army.mil/inet/functions/cw/cecwo/reg/reg_supp.htm).

The dominance test (Indicator 1) is the basic hydrophytic vegetation indicator and should be applied in every wetland determination. Most wetlands in the Arid West have plant communities that will pass the dominance test, and this is the only indicator that needs to be used in most situations. However, some wetland plant communities may fail a test based only on dominant species. Therefore, in those cases where indicators of hydric soil and wetland hydrology are present, the vegetation should be re-evaluated with the prevalence index (Indicator 2), which takes into consideration all plant species in the community, not just a few dominants. In addition, plant morphological adaptations (Indicator 3) can be used to distinguish certain wetland plant communities in the Arid West, when indicators of hydric soil and wetland hydrology are present. Finally, certain problematic wetland situations may lack any of these indicators and are described in Chapter 5.



Figure 2. Plant list regional boundaries (red lines) currently used by the U.S. Fish and Wildlife Service, National Wetlands Inventory, in the Arid West.

Procedure

The procedure for using hydrophytic vegetation indicators is as follows:

1. Apply Indicator 1 (Dominance Test).
   a. If the plant community passes the dominance test, then the vegetation is hydrophytic and no further vegetation analysis is required.
   b. If the plant community fails the dominance test, and indicators of hydric soil and/or wetland hydrology are absent, then hydrophytic vegetation is absent unless the site meets requirements for a problematic wetland situation (see Chapter 5).
   c. If the plant community fails the dominance test, but indicators of hydric soil and wetland hydrology are both present, proceed to step 2.
2. Apply Indicator 2 (Prevalence Index). This and the following step assume that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present.
   a. If the plant community satisfies the prevalence index, then the vegetation is hydrophytic. No further vegetation analysis is required.
   b. If the plant community fails the prevalence index, proceed to step 3.
3. Apply Indicator 3 (Morphological Adaptations).
   a. If the indicator is satisfied, then the vegetation is hydrophytic.
   b. If none of the indicators is satisfied, then hydrophytic vegetation is absent unless indicators of hydric soil and wetland hydrology are present and the site meets the requirements for a problematic wetland situation (Chapter 5).

Indicator 1: Dominance test

Description: More than 50 percent of the dominant plant species across all strata are rated OBL, FACW, or FAC.

User Notes: Use the "50/20 rule" described below to select dominant species from each stratum of the community. Combine dominant species across strata and apply the dominance test to the combined list. Once a species is selected as a dominant, its cover value is not used in the dominance test; each dominant species is treated equally. Thus, a plant community with seven dominant species across all strata would need at least four dominant species that are OBL, FACW, or FAC to be considered hydrophytic by this indicator. Species that are dominant in two or more strata should be counted two or more times in the dominance test.

Procedure for Selecting Dominant Species by the 50/20 Rule: Dominant plant species are the most abundant species in the community; they contribute more to the character of the community than do the other non-dominant species present. The 50/20 rule is a repeatable and objective procedure for selecting dominant plant species and is recommended when data are available for all species in the community.

Dominant species are chosen independently from each stratum of the community. In general, dominants are the most abundant species that individually or collectively account for more than 50 percent of the total coverage of vegetation in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total. For the purposes of this regional supplement, absolute percent cover is the recommended abundance measure for plants in all vegetation strata. See Table 4 for an example application of the 50/20 rule in evaluating a plant community. Steps in selecting dominant species by the 50/20 rule are as follows:

1. Estimate the absolute percent cover of each species in the first stratum. Since the same data may be used later to calculate the prevalence index, the data should be recorded as absolute cover and not converted to relative cover.
2. Rank all species in the stratum from most to least abundant.
3. Calculate the total coverage of all species in the stratum (i.e., sum their individual percent cover values). Absolute cover estimates do not necessarily sum to 100 percent.
4. Select plant species from the ranked list, in decreasing order of coverage, until the cumulative coverage of selected species *exceeds* 50 percent of the total coverage for the stratum. If two or more species are equal in coverage (i.e., they are tied in rank), they should all be selected. The selected plant species are all considered to be dominants. All dominants must be identified to species.
5. In addition, select any other species that, by itself, is at least 20 percent of the total percent cover in the stratum. Any such species is also considered to be a dominant and must be accurately identified.
6. Repeat steps 1-5 for any other stratum present. Combine the lists of dominant species across all strata. Note that a species may be dominant in more than one stratum (e.g., a woody species may be dominant in both the tree and sapling/shrub strata).

Table 4. Example of the selection of dominant species by the 50/20 rule and determination of hydrophytic vegetation by the dominance test.

Stratum	Species Name	Wetland Indicator Status	Absolute Percent Cover	Dominant?
Herb	*Ambrosia psilostachya*	FAC	3	Yes
	Distichlis spicata	FACW	3	Yes
	Agrostis exarata	FACW	2	No
	Polypogon monspeliensis	FACW	2	No
	Oenothera californica	UPL	1	No
		Total cover	11	
		50/20 Thresholds: 50% of total cover = 5.5% 20% of total cover = 2.2%		
Sapling/shrub	*Baccharis salicifolia*	FACW	10	Yes
	Salix lasiolepis	FACW	5	Yes
	Chrysothamnus nauseosus spp. *albicaulis*	UPL	2	No
		Total cover	17	
		50/20 Thresholds: 50% of total cover = 8.5% 20% of total cover = 3.4%		
Tree	*Salix lasiolepis*	FACW	20	Yes
Hydrophytic Vegetation Determination	Total number of dominant species across all strata = 5. Percent of dominant species that are OBL, FACW, or FAC = 5/5 = 100%. Therefore, this community is hydrophytic by Indicator 1 (Dominance Test).			

Indicator 2: Prevalence index

Description: The prevalence index is 3.0 or less

User Notes: The prevalence index ranges from 1 to 5. A prevalence index of 3.0 or less indicates that hydrophytic vegetation is present. To calculate the prevalence index, at least 80 percent of the total vegetation cover on the plot (summed across all strata) must be of species that have been correctly identified and have an assigned wetland indicator status (Reed 1988 or current list) or are upland (UPL) species.

Procedure for Calculating a Plot-Based Prevalence Index: The prevalence index is a weighted-average wetland indicator status of all plant species in the sampling plot, where each indicator status category is given a numeric code (OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5) and weighting is by abundance (absolute percent cover). It is a more

comprehensive analysis of the hydrophytic status of the community than one based on just a few dominant species. It is particularly useful (1) in communities with only one or two dominants, (2) in highly diverse communities where many species may be present at roughly equal coverage, and (3) when strata differ greatly in total plant cover (e.g., total herb cover is 80 percent but sapling/shrub cover is only 10 percent). The prevalence index is used in this supplement to determine whether hydrophytic vegetation is present on sites where indicators of hydric soil and wetland hydrology are present but the vegetation initially fails the dominance test.

The following procedure is used to calculate a plot-based prevalence index. The method was described by Wentworth et al. (1988) and modified by Wakeley and Lichvar (1997). It uses the same field data (i.e., percent cover estimates for each plant species) that were used to select dominant species by the 50/20 rule, with the added constraint that at least 80 percent of the total vegetation cover on the plot must be of species that have been correctly identified and have an assigned indicator status (including UPL for those species not on the wetland plant list). For any species that occurs in more than one stratum, cover estimates are summed across strata. Steps for determining the prevalence index are as follows:

1. Identify and estimate the absolute percent cover of each species in each stratum of the community. Sum the cover estimates for any species that is present in more than one stratum.
2. Organize all species (across all strata) into groups according to their wetland indicator status (i.e., OBL, FACW, FAC, FACU, or UPL) and sum their cover values within groups. Do not include species that were not identified.
3. Calculate the prevalence index using the following formula:

$$PI = \frac{A_{OBL} + 2A_{FACW} + 3A_{FAC} + 4A_{FACU} + 5A_{UPL}}{A_{OBL} + A_{FACW} + A_{FAC} + A_{FACU} + A_{UPL}}$$

where:

PI = Prevalence index
A_{OBL} = Summed percent cover values of obligate (OBL) plant species
A_{FACW} = Summed percent cover values of facultative wetland (FACW) plant species

A_{FAC} = Summed percent cover values of facultative (FAC) plant species

A_{FACU} = Summed percent cover values of facultative upland (FACU) plant species

A_{UPL} = Summed percent cover values of upland (UPL) plant species

See Table 5 for an example calculation of the prevalence index using the same data set as in Table 4. The following web link provides free public-domain software for simultaneous calculation of the 50/20 rule, dominance test, and prevalence index:
http://www.crrel.usace.army.mil/rsgisc/wetshed/wetdatashed.htm.

Table 5. Example of the Prevalence Index using the same data as in Table 4.

Indicator Status Group	Species Name	Absolute Percent Cover by Species	Total Cover by Group	Multiply by:[1]	Product
OBL species	None	0	0	1	0
FACW species	*Distichlis spicata* *Agrostis exarata* *Baccharis salicifolia* *Salix lasiolepis*[2] *Polypogon monspeliensis*	3 2 10 25 2	42	2	84
FAC species	*Ambrosia psilostachya*	3	3	3	9
FACU species	None	0	0	4	0
UPL species	*Oenothera californica* *Chrysothamnus nauseosus* ssp. *albicaulis*	1 2	3	5	15
Sum			48 (A)		108 (B)
Hydrophytic Vegetation Determination		Prevalence Index = B/A = 108/48 = 2.25; therefore, this community is hydrophytic by Indicator 2 (Prevalence Index).			

[1] Where OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5.

[2] *Salix lasiolepis* was recorded in two strata (see Table 4) so the cover estimates for this species were summed across strata.

Indicator 3: Morphological adaptations

Description: The plant community passes either the dominance test (Indicator 1) or the prevalence index (Indicator 2) after reconsideration of the indicator status of certain plant species that exhibit morphological adaptations for life in wetlands.

User Notes: Some hydrophytes in the Arid West develop easily recognized physical characteristics, or morphological adaptations, when they occur in wetland areas. Some of these adaptations may help them to survive prolonged inundation or saturation in the root zone; others may simply be a consequence of living under such wet conditions. Common morphological adaptations in the Arid West include, but are not necessarily limited to, adventitious roots and shallow root systems developed on or near the soil surface. These adaptations may also develop on FACU species when they occur in wetlands, indicating that those individuals are functioning as hydrophytes in that setting.

To apply this indicator, these morphological features must be observed on more than 50 percent of the individuals of a FACU species living in an area where indicators of hydric soil and wetland hydrology are present. Follow this procedure:

1. Confirm that the morphological feature is present mainly in the potential wetland area and is not also common on the same species in the surrounding non-wetlands.
2. For each FACU species that exhibits morphological adaptations, estimate the percentage of individuals that have the features. Record this percentage on the data form.
3. If more than 50 percent of the individuals of a FACU species have morphological adaptations for life in wetlands, that species is considered to be a hydrophyte and its indicator status on that plot should be reassigned as FAC. All other species retain their published indicator statuses. Record any supporting information on the data sheet, including a description of the morphological adaptation(s) present and any other observations of the growth habit of the species in adjacent wetland and non-wetland locations (photo documentation is recommended).
4. Recalculate the dominance test (Indicator 1) and/or the prevalence index (Indicator 2) using a FAC indicator status for this species. The vegetation is hydrophytic if either test is satisfied.

3 Hydric Soil Indicators

Introduction

The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1994). Most hydric soils exhibit characteristic morphologies that result from repeated periods of saturation or inundation for more than a few days. Saturation or inundation, when combined with microbial activity in the soil, causes the depletion of oxygen. This anaerobiosis promotes certain biogeochemical processes, such as the accumulation of organic matter and the reduction, translocation, or accumulation of iron and other reducible elements. These processes result in distinctive characteristics that persist in the soil during both wet and dry periods, making them particularly useful for identifying hydric soils in the field (USDA Natural Resources Conservation Service 2006b).

This chapter presents indicators that are designed to help identify hydric soils in the Arid West Region. Indicators are not intended to replace or relieve the requirements contained in the definition of a hydric soil. Therefore, a soil that meets the definition of a hydric soil is hydric whether or not it exhibits indicators. Guidance for identifying hydric soils that lack indicators can be found later in this chapter (see the sections on documenting the site and its soils) and in Chapter 5 (Difficult Wetland Situations in the Arid West).

This list of indicators is dynamic; changes and additions to the list are anticipated with new research and field testing. The indicators presented in this supplement are a subset of the NTCHS *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006b or current version) that are commonly found in the Arid West. Any change to the NTCHS *Field Indicators of Hydric Soils in the United States* represents a change to this subset of indicators for the Arid West. Check the NRCS hydric soils web site (http://soils.usda.gov/use/hydric/) for updates to these indicators. To use the indicators properly, a basic knowledge of soil/landscape relationships is necessary.

Most of the hydric soil indicators presented in this supplement are applicable throughout the Arid West Region; however, some are specific to certain subregions. As used in this supplement, subregions are equivalent to the Land Resource Regions (LRR) or Major Land Resource Areas (MLRA) recognized by the USDA Natural Resources Conservation Service (2006a) (see Chapter 1, Figure 1). It is important to understand that boundaries between subregions are actually broad transition zones. Although an indicator may be noted as most relevant in a specific subregion, it may also be applicable in the transition to an adjacent subregion.

Concepts

Hydric soil indicators are formed predominantly by the accumulation or loss of iron, manganese, sulfur, or carbon compounds in a saturated and anaerobic environment. These processes and the features that develop are described in the following paragraphs.

Iron and manganese reduction, translocation, and accumulation

Saturated or inundated soils. In an anaerobic environment, soil microbes reduce iron from the ferric (Fe^{3+}) to the ferrous (Fe^{2+}) form, and manganese from the manganic (Mn^{4+}) to the manganous (Mn^{2+}) form. Of the two, evidence of iron reduction is more commonly observed in soils. Areas in the soil where iron is reduced often develop characteristic bluish-gray or greenish-gray colors known as *gley*. Ferric iron is insoluble but ferrous iron easily enters the soil solution and may be moved or translocated to other areas of the soil. Areas that have lost iron typically develop characteristic gray or reddish-gray colors and are known as *redox depletions*. If a soil reverts to an aerobic state, iron that is in solution will oxidize and become concentrated in patches and along root channels and other pores. These areas of oxidized iron are called *redox concentrations*. Since water movement in these saturated or inundated soils can be multidirectional, redox depletions and concentrations can occur anywhere in the soil and have irregular shapes and sizes. Soils that are saturated and contain ferrous iron at the time of sampling may change color upon exposure to the air, as ferrous iron is rapidly converted to ferric iron in the presence of oxygen. Such soils are said to have a *reduced matrix* (Vepraskas 1992).

While indicators related to iron or manganese depletion or concentration are the most common in hydric soils, they cannot form in soils whose

parent materials are low in Fe or Mn. Soils formed in such materials may have low-chroma colors that are not related to saturation and reduction. For such soils, features formed through accumulation of organic carbon may be present.

Sulfate reduction

Sulfur is one of the last elements to be reduced by microbes in an anaerobic environment. The microbes convert SO_4^{2-} to H_2S, or hydrogen sulfide. This results in a very pronounced "rotten egg" odor in some soils that are inundated or saturated for very long periods. In non-saturated or non-inundated soils, sulfate is not reduced and there is no rotten egg odor. The presence of hydrogen sulfide is a strong indicator of a hydric soil, but this indicator is found only in the wettest sites in soils that contain sulfur-bearing compounds.

Organic matter accumulation

Since the efficiency of soil microbes is considerably lower in a saturated and anaerobic environment, less organic matter and organic carbon is consumed. Therefore, in saturated or inundated soils, partially decomposed organic matter and carbon may begin to accumulate. The result in wetlands is often the development of thick organic surfaces on the soil or dark organic-rich surface mineral layers.

Determining the texture of soil materials high in organic carbon. Material high in organic carbon could fall into three categories: organic, mucky mineral, or mineral. In lieu of laboratory data, the following estimation method can be used for soil material that is wet or nearly saturated with water. This method may be inconclusive with loamy or clayey textured mineral soils. Gently rub the wet soil material between forefinger and thumb. If upon the first or second rub the material feels gritty, it is mineral soil material. If after the second rub the material feels greasy, it is either mucky mineral or organic soil material. Gently rub the material two or three more times. If after these additional rubs it feels gritty or plastic, it is mucky mineral soil material; if it still feels greasy, it is organic soil material. If the material is organic soil material a further division should be made, as follows.

Organic soil materials are classified as sapric, hemic, or fibric. Differentiating criteria are based on the percentage of visible fibers observable with

a hand lens in an undisturbed state and after rubbing between thumb and fingers 10 times (Table 6). Sapric, hemic, and fibric correspond to the textures muck, mucky peat, and peat. If there is a conflict between unrubbed and rubbed fiber content, rubbed content is used. Live roots are not considered.

Table 6. Proportion of fibers visible with a hand lens.

Soil Texture	Unrubbed	Rubbed	Horizon Descriptor
Muck	<33%	<17%	Sapric
Mucky peat	33-67%	17-40%	Hemic
Peat	>67%	>40%	Fibric

Adapted from USDA Natural Resources Conservation Service (1999).

Another field method for determining the degree of decomposition for organic materials is a system modified from a method originally developed by L. von Post and described in detail in ASTM standard D 5715-00. This method is based on a visual examination of the color of the water that is expelled and the soil material remaining in the hand after a saturated sample is squeezed (Table 7). If a conflict occurs between results for sapric, hemic, or fibric material using percent visible fiber (Table 6) and degree of humification (Table 7), then percent visible fiber should be used.

Cautions

A soil that is artificially drained or protected (for instance, by dikes or levees) is still hydric if the soil in its undisturbed state would meet the definition of a hydric soil. To be identified as hydric, these soils should generally have one or more of the indicators. However, not all areas that have hydric soils will qualify as wetlands, if they no longer have wetland hydrology or support hydrophytic vegetation.

Morphological features that do not reflect contemporary or recent conditions of saturation and anaerobiosis are called relict features. Typically, contemporary and recent hydric soil features have diffuse boundaries; relict hydric soil features have sharp boundaries (Vepraskas 1992). Additional guidance for some of the most common problem hydric soils can be found in Chapter 5. When soil morphology seems inconsistent with the landscape, vegetation, or observable hydrology, it may be necessary to

obtain the assistance of an experienced soil or wetland scientist to determine whether the soil is hydric.

Table 7. Determining degree of decomposition of organic materials.

Degree of Humification	Nature of Material Extruded on Squeezing	Nature of Plant Structure in Residue	Horizon Descriptor
H1	Clear, colorless water; no organic solids squeezed out	Unaltered, fibrous, undecomposed	Fibric
H2	Yellowish water; no organic solids squeezed out	Almost unaltered, fibrous	
H3	Brown, turbid water; no organic solids squeezed out	Easily identifiable	
H4	Dark brown, turbid water; no organic solids squeezed out	Visibly altered but identifiable	Hemic
H5	Turbid water and some organic solids squeezed out	Recognizable but vague, difficult to identify	
H6	Turbid water; 1/3 of sample squeezed out	Indistinct, pasty	
H7	Very turbid water; 1/2 of sample squeezed out	Faintly recognizable; few remains identifiable, mostly amorphous	Sapric
H8	Thick and pasty; 2/3 of sample squeezed out	Very indistinct	
H9	No free water; nearly all of sample squeezed out	No identifiable remains	
H10	No free water; all of sample squeezed out	Completely amorphous	

Procedures for sampling soils

Observe and document the site

Before making any decision about the presence or absence of hydric soils, the overall site and how it interacts with the soil should be considered. The questions below, while not required to identify a hydric soil, can help to explain why one is or is not present. Always look at the landscape features of the immediate site and compare them to the surrounding areas. Try to contrast the features of wet and dry sites that are in close proximity. When observing slope features, look first at the area immediately around the sampling point. For example, a nearly level bench or depression at the sampling point may be more important to site wetness than the overall landform on which it occurs. By understanding how water moves across

the site, the reasons for the presence or absence of hydric soil indicators should be clear.

If one or more of the hydric soil indicators given later in this chapter is present, then the soil is hydric. If no hydric soil indicators are present, the additional site information below may be useful in documenting whether the soil is indeed non-hydric or if it might represent a "problem" hydric soil.

- *Hydrology*–Is standing water observed on the site or is water observed in the soil pit? What is the depth of the water table in the area? Is there indirect evidence of ponding or flooding?
- *Slope*–Is the site level or nearly level so that surface water does not run off readily, or is it steeper where surface water would run off from the soil?
- *Slope shape*–Is the surface concave, where water would tend to collect and possibly pond on the soil surface? On hillsides, are there convergent slopes, where surface or groundwater may be directed toward a central stream or swale? Or is the surface or slope shape convex, causing water to run off or disperse?
- *Landform*–Is the soil on a low terrace or floodplain that may be subject to seasonal high water tables or flooding? Is it at the toe of a slope where runoff may tend to collect or groundwater emerge at or near the surface? Has the microtopography been altered by cultivation?
- *Soil materials*–Is there a restrictive layer in the soil that would slow or prevent the infiltration of water? This could include consolidated bedrock, cemented layers such as duripans and petrocalcic horizons, layers of silt or substantial clay content, or strongly contrasting soil textures (e.g., silt over sand). Or is there relatively loose soil material (sand, gravel, or rocks) or fractured bedrock that would allow the water to flow laterally down slope?
- *Vegetation*–Does the vegetation at the site indicate wetter conditions than at other nearby sites, or is it similar to what is found at nearby upland sites?

Observe and document the soil

To observe and document a hydric soil, first remove any loose leaves, needles, or bark from the soil surface. Do not remove the organic surface layers of the soil, which usually consist of plant remains in varying stages of decomposition. Dig a hole and describe the soil profile. In general, the

hole should be dug to the depth needed to document an indicator or to confirm the absence of indicators. For most soils, the recommended excavation depth is approximately 20 in. (50 cm) from the soil surface, although a shallower soil pit may suffice for some indicators (e.g., A2 – Histic Epipedon). Digging may be difficult in some areas due to rocks and hardpans. Use the completed profile description to determine which hydric soil indicators have been met (USDA Natural Resources Conservation Service 2006b).

For soils with deep, dark surface layers, deeper examination may be required when field indicators are not easily seen within 20 in. (50 cm) of the surface. The accumulation of organic matter in these soils may mask redoximorphic features in the surface layers. Examination to 40 in. (1 m) or more may be needed to determine whether they meet the requirements of indicator A12 – Thick Dark Surface. A soil auger or probe may be useful for sampling soil materials below 20 in.

Whenever possible, excavate the soil deep enough to determine if there are layers or materials present that might restrict soil drainage. This will help to understand why the soil may or may not be hydric. Consider taking photographs of both the soil and the overall site, including a clearly marked measurement scale in soil pictures.

Depths used in the indicators are measured from the muck surface, or from the mineral soil surface if a muck surface is absent. For indicators A1 (Histosols), A2 (Histic Epipedon), and A3 (Black Histic), depths are measured from the top of the organic material (peat, mucky peat, or muck).

All colors noted in this supplement refer to moist Munsell® colors (Gretag/Macbeth 2000). Dry soils should be moistened until the color no longer changes and wet soils should be allowed to dry until they no longer glisten. Care should be taken to avoid over-moistening dry soil. Soil colors specified in the indicators do not have decimal points; however, intermediate colors do occur between Munsell chips. Soil chroma should not be rounded to qualify as meeting an indicator. For example, a soil matrix with a chroma between 2 and 3 should be listed as having a chroma of 2+. This soil material does not have a chroma of 2 and would not meet any indicator that requires a chroma of 2 or less. Always examine soil matrix colors in the field immediately after sampling. Ferrous iron, if

present, can oxidize rapidly and create colors of higher chroma or redder hue.

Soils that are saturated at the time of sampling may contain reduced iron and/or manganese that are not detectable by eye. Under saturated conditions, redox concentrations may be absent or difficult to see, particularly in dark-colored soils. It may be necessary to let the soil dry to a moist state (5 to 30 minutes or more) for the iron or manganese to oxidize and redox features to become visible.

Particular attention should be paid to changes in microtopography over short distances. Small changes in elevation may result in repetitive sequences of hydric/non-hydric soils, making the delineation of individual areas of hydric and non-hydric soils difficult. Often the dominant condition (hydric or non-hydric) is the only reliable interpretation. The shape of the local landform can greatly affect the movement of water through the landscape. Significant changes in parent material or lithologic discontinuities in the soil can affect the hydrologic properties of the soil. After a sufficient number of exploratory excavations have been made to understand the soil-hydrologic relationships at the site, subsequent excavations can be limited to the depth needed to identify hydric soil indicators.

Use of existing soil data

Soil surveys

Soil surveys are available for many areas of the Arid West and can provide useful information regarding soil properties and soil moisture conditions for an area. Soil surveys in the Arid West, however, vary considerably in the mapping scale and the amount of ground-truthing used to document the survey. A list of available soil surveys is located at http://soils.usda.gov/survey/online_surveys/ and soil maps and data are available online at http://websoilsurvey.nrcs.usda.gov/. Most detailed soil surveys in the region are mapped at a scale of 1:24,000 (2.64 in./mile). At this scale, the smallest soil areas delineated, called map units, are about 5 acres (2 ha) in size. Map units usually contain more than one soil type or component. They often contain several minor components or inclusions of soils with properties that may be similar to or quite different from the major component. Those soils that are hydric are noted in the *Hydric Soils List* published separately from the soil survey report. Soil survey information can be

valuable for planning purposes, but it is not site-specific and does not preclude the need for an onsite investigation.

Hydric soils lists

Hydric Soils Lists are developed for each detailed soil survey. Using criteria approved by the NTCHS, these lists rate each soil component as either hydric or non-hydric based on soil property data. If the soil is rated as hydric, information is provided regarding which hydric criteria are met and on what landform the soil typically occurs. Hydric Soils Lists are useful as general background information for an onsite delineation. The hydric soils list should be used as a tool, indicating that hydric soil will likely be found within a given area. However, not all areas within a polygon identified as having hydric soils may be hydric.

Hydric Soils Lists developed for individual detailed soil surveys are known as Local Hydric Soils Lists. They are available from state or county NRCS offices and over the internet from the Soil Data Mart (http://soildatamart.nrcs.usda.gov/). Local Hydric Soils Lists have been compiled into a National Hydric Soils List available at http://soils.usda.gov/use/hydric/. However, use of Local Hydric Soils Lists is preferred since they are more current and reflect local variations in soil properties.

Hydric soil indicators

Many of the hydric soil indicators were developed specifically for wetland-delineation purposes. During the development of these indicators, soils in the interior of wetlands were not always examined; therefore, there are wetlands that lack any of the approved hydric soil indicators in the wettest interior portions. Wetland delineators and other users of the hydric soil indicators should concentrate their sampling efforts near the wetland edge and, if these soils are hydric, assume that soils in the wetter, interior portions of the wetland are also hydric even if they lack an indicator.

Hydric soil indicators are presented in three groups. Indicators for “All Soils” are used in any soil regardless of texture. Indicators for “Sandy Soils” are used in soil layers with USDA textures of loamy fine sand or coarser. Indicators for “Loamy and Clayey Soils” are used with soil layers of loamy very fine sand and finer. Both sandy and loamy/clayey layers may be present in the same soil profile. Therefore, a soil that contains a loamy surface layer over sand is hydric if it meets all of the requirements of

matrix color, amount and contrast of redox concentrations, depth, and thickness for a specific A (All Soils), F (Loamy and Clayey Soils), or S (Sandy Soils) indicator.

It is permissible to combine certain hydric soil indicators if all requirements of the indicators are met except thickness (see Hydric Soil Technical Note 4, http://soils.usda.gov/use/hydric/ntchs/tech_notes/index.html). The most restrictive requirements for thickness of layers in any indicators used must be met. Not all indicators are possible candidates for combination. For example, indicator F2 (Loamy Gleyed Matrix) has no thickness requirement, so a site would either meet the requirements of this indicator or it would not. Table 8 lists the indicators that are the most likely candidates for combining in the region.

Table 8. Minimum thickness requirements for commonly combined indicators in the Arid West Region.

Indicator	Thickness Requirement
S5 – Sandy Redox	4 in. (10 cm) thick starting within 6 in. (15 cm) of the soil surface
F1 – Loamy Mucky Mineral	4 in. (10 cm) thick starting within 6 in. (15 cm) of the soil surface
F3 – Depleted Matrix	6 in. (15 cm) thick starting within 10 in. (25 cm) of the soil surface
F6 – Redox Dark Surface	4 in. (10 cm) thick entirely within the upper 12 in. (30 cm)
F7 – Depleted Dark Surface	4 in. (10 cm) thick entirely within the upper 12 in. (30 cm)

Table 9 presents an example of a soil in which a combination of layers meets the requirements for indicators F6 (Redox Dark Surface) and F3 (Depleted Matrix). The second layer meets the morphological characteristics of F6 and the third layer meets the morphological characteristics of F3, but neither meets the thickness requirements for the indicators. However, the combined thickness of the second and third layers meets the more restrictive conditions of thickness for F3 (i.e., 6 in. (15 cm) starting within 10 in. (25 cm) of the soil surface). Therefore, the soil is considered to be hydric based on the combination of indicators.

Table 9. Example of a soil that is hydric based on a combination of indicators F6 and F3.

Depth (inches)	Matrix Color	Redox Concentrations			Texture
		Color	Abundance	Contrast	
0 – 3	10YR 2/1	--	--	--	Loamy
3 – 6	10YR 3/1	7.5YR 5/6	3 percent	Prominent	Loamy
6 – 10	10YR 5/2	7.5YR 5/6	5 percent	Prominent	Loamy
10 – 14	2.5Y 4/2	--	--	--	Loamy

Another common situation in which it is appropriate to combine the characteristics of hydric soil indicators is when stratified textures of sandy (i.e., loamy fine sand and coarser) and loamy (i.e., loamy very fine sand and finer) material occur in the upper 12 in. of the soil. For example, the soil shown in Table 10 is hydric based on a combination of indicators F6 (Redox Dark Surface) and S5 (Sandy Redox). This soil meets the morphological characteristics of F6 in the first layer and S5 in the second layer, but neither layer by itself meets the thickness requirements for the indicators. However, the combined thickness of the two layers (6 in.) meets the more restrictive thickness requirement of either indicator (4 in.).

Table 10. Example of a soil that is hydric based on a combination of indicators F6 and S5.

Depth (inches)	Matrix Color	Redox Concentrations			Texture
		Color	Abundance	Contrast	
0 – 3	10YR 3/1	10YR 5/6	3 percent	Prominent	Loamy
3 – 6	10YR 4/1	10YR 5/6	3 percent	Prominent	Sandy
6 – 16	10YR 4/1	--	--	--	Loamy

All soils

"All soils" refers to soils with any USDA soil texture. Use the following indicators regardless of soil texture.

Unless otherwise indicated, all mineral layers above any of the indicators must have a dominant chroma of 2 or less, or the layer(s) with dominant chroma of more than 2 must be less than 6 in. (15 cm) thick to meet any hydric soil indicator. Nodules and concretions are not considered to be redox concentrations unless otherwise noted.

Indicator A1: Histosol

Technical Description: Classifies as a Histosol (except Folists)

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).



Figure 3. Example of a Histosol, in which muck (sapric soil material) is greater than 3 ft (0.9 m) thick.

User Notes: In a Histosol, 16 in. (40 cm) or more of the upper 32 in. (80 cm) is organic soil material (Figure 3). Histosols also include soils that have organic soil material of any thickness over rock or fragmental soil material that has interstices filled with organic soil material. Organic soil material has an organic carbon content (by weight) of 12 to 18 percent or more, depending on the clay content of the soil. The material includes muck (sapric soil material), mucky peat (hemic soil material), or peat (fibric soil material). See the glossary of *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006b) for definitions of muck, mucky peat, peat, and organic soil material. See the Concepts section of this chapter for field methods to identify organic soil materials.

Indicator A2: Histic Epipedon

Technical Description: A histic epipedon underlain by mineral soil material with chroma of 2 or less.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: Most histic epipedons are surface horizons 8 in. (20 cm) or more thick of organic soil material (Figure 4). Aquic conditions or artificial drainage are required (see *Soil Taxonomy*, USDA Natural Resources Conservation Service 1999); however, aquic conditions can be assumed if indicators of hydrophytic vegetation and wetland hydrology are present. See the glossary of *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006b) for definitions. See the Concepts section of this chapter for field methods to identify organic soil materials. See indicator A1 for organic carbon requirements. Slightly lower organic carbon contents are allowed in plowed soils.



Figure 4. Organic surface layer less than 16 in. (40.6 cm) thick.

Indicator A3: Black Histic

Technical Description: A layer of peat, mucky peat, or muck 8 in. (20 cm) or more thick that starts within 6 in. (15 cm) of the soil surface; has hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less (Figure 5).

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).



Figure 5. Black organic surface layer greater than 11 in. (28 cm) thick.

User Notes: This indicator does not require proof of aquic conditions or artificial drainage. See the glossary of *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006b) for definitions of peat, mucky peat, and muck. See the Concepts section of this chapter for field methods to identify organic soil materials. See indicator A1 for organic carbon requirements.

Indicator A4: Hydrogen Sulfide

Technical Description: A hydrogen sulfide (rotten egg) odor within 12 in. (30 cm) of the soil surface.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: Any time the soil smells of hydrogen sulfide (rotten egg odor), sulfur is currently being reduced and the soil is definitely in an anaerobic state. In some soils, the odor is well pronounced; in others it is very fleeting as the gas dissipates rapidly. If in doubt, quickly open several small holes in the area of concern to determine if a hydrogen sulfide odor is really present. This indicator is most commonly found in areas that are permanently saturated or inundated.

Indicator A5: Stratified Layers

Technical Description: Several stratified layers starting within 6 in. (15 cm) of the soil surface. One or more of the layers has a value of 3 or less with chroma of 1 or less and/or it is muck, mucky peat, or peat, or has a mucky modified mineral texture. The remaining layers have chroma of 2 or less (Figures 6 and 7).



Figure 6. Stratified layers in loamy material.



Figure 7. Stratified layers in sandy material. Scale in inches.

Applicable Subregions: Applicable to the Mediterranean California Subregion (LRR C).

User Notes: Use of this indicator may require assistance from a soil scientist with local experience. An undisturbed sample must be observed. Individual strata are dominantly less than 1 in. (2.5 cm) thick. A hand lens is an excellent tool to aid in the identification of this indicator. Many alluvial soils have stratified layers at greater depths; these are not hydric soils. Many alluvial soils have stratified layers at the required depths, but lack chroma of 2 or less; these do not fit this indicator. Stratified layers occur in any type of soil material, generally in floodplains and other areas where wet soils are subject to rapid and repeated burial with thin deposits of sediment.

Indicator A9: 1 cm Muck

Technical Description: A layer of muck 0.5 in. (1 cm) or more thick with a value of 3 or less and chroma of 1 or less, starting within 6 in. (15 cm) of the soil surface.

Applicable Subregions: Applicable to the Interior Deserts Subregion (LRR D).

User Notes: Normally the muck layer is at the soil surface; however, it may occur at any depth within 6 in. (15 cm) of the surface. Muck is sapric soil material with at least 12 to 18 percent organic carbon. Organic soil material is called muck (sapric soil material) if virtually all of the material has undergone sufficient decomposition to limit recognition of the plant parts. Hemic (mucky peat) and fibric (peat) soil materials do not qualify. To determine if muck is present, first remove loose leaves, needles, bark, and other easily identified plant remains. This is sometimes called leaf litter, a duff layer, or a leaf or root mat. Then examine for decomposed organic soil material. Generally, muck is black and has a greasy feel; sand grains should not be evident (see the Concepts section of this chapter for field methods to identify organic soil materials). Determination of this indicator is made below the leaf or root mat; however, root mats that meet the definition of hemic or fibric soil material are included in the decision-making process for indicators A1 (Histosols) and A2 (Histic Epipedon).

Indicator A11: Depleted Below Dark Surface

Technical Description: A layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, starting within 12 in. (30 cm) of the soil surface, and having a minimum thickness of either:

- 6 in. (15 cm), or
- 2 in. (5 cm) if the 2 in. (5 cm) consists of fragmental soil material.

Loamy/clayey layer(s) above the depleted or gleyed matrix must have a value of 3 or less and chroma of 2 or less. Any sandy material above the depleted or gleyed matrix must have a value of 3 or less and chroma of 1 or less, and at least 70 percent of the visible soil particles must be covered, coated, or similarly masked with organic material.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: This indicator often occurs in grassland soils (Mollisols), but also applies to other soils that have dark-colored surface layers, such as umbric epipedons and dark-colored ochric epipedons (Figure 8). For soils that have dark surface layers greater than 12 in. (30 cm) thick, use indicator A12. Two percent or more distinct or prominent redox concentrations, including iron/manganese soft masses, pore linings, or both, are required in soils that have matrix values/chromas of 4/1, 4/2, and 5/2 (Figure A1). If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible. See the Glossary (Appendix A) for definitions of depleted matrix, gleyed matrix, distinct and prominent features, and fragmental soil material.



Figure 8. Depleted matrix starts immediately below the black surface layer (approximately 10 in. (25 cm)).

In some places, the gleyed matrix may change color upon exposure to air (reduced matrix). This phenomenon is included in the concept of a gleyed matrix (USDA Natural Resources Conservation Service 2002).

Indicator A12: Thick Dark Surface

Technical Description: A layer at least 6 in. (15 cm) thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less starting below 12 in. (30 cm) of the surface. The layer(s) above the depleted or gleyed matrix must have a value of 2.5 or less and chroma of 1 or less to a depth of at least 12 in. (30 cm) and value of 3 or less and chroma of 1 or less in any remaining layers above the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have at least 70 percent of the visible soil particles covered, coated, or similarly masked with organic material.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: The soil has a depleted matrix or gleyed matrix below a black or very dark gray surface layer 12 in. (30 cm) or more thick (Figure 9). This indicator is most often associated with overthickened soils in concave landscape positions. Two percent or more distinct or prominent redox concentrations (Table A1), including iron/manganese soft masses, pore linings, or both, are required in soils that have matrix values/chromas of 4/1, 4/2, and 5/2 (Figure A1). If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible. See the Glossary (Appendix A) for the definitions of depleted and gleyed matrix.



Figure 9. Deep observations may be necessary to identify the depleted or gleyed matrix below the dark surface layer.

In some places, the gleyed matrix may change color upon exposure to air (reduced matrix). This phenomenon is included in the concept of a gleyed matrix (USDA Natural Resources Conservation Service 2002).

Sandy soils

"Sandy soils" refers to soil materials with a USDA soil texture of loamy fine sand and coarser. Use the following indicators in soil layers consisting of sandy soil materials.

Unless otherwise indicated (e.g., see indicator S6 – Stripped Matrix), all mineral layers above any of the indicators must have a dominant chroma of 2 or less, or the layer(s) with dominant chroma of more than 2 must be less than 6 in. (15 cm) thick to meet any hydric soil indicator. Nodules and concretions are not considered to be redox concentrations unless otherwise noted.

Indicator S1: Sandy Mucky Mineral

Technical Description: A layer of mucky modified sandy soil material 2 in. (5 cm) or more thick starting within 6 in. (15 cm) of the soil surface (Figure 10).

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: *Mucky* is a USDA texture modifier for mineral soils. The organic carbon content is at least 5 percent and ranges to as high as 14 percent for sandy soils. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content, the higher the organic carbon requirement. See the glossary of *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006b) for the definition of mucky modified mineral texture. A field procedure for identifying mucky mineral soil material is presented in the Concepts section of this chapter.



Figure 10. The mucky modified sandy layer is approximately 3 in. (7.5 cm) thick. Scale in inches on the right side of ruler.

Indicator S4: Sandy Gleyed Matrix

Technical Description: A gleyed matrix that occupies 60 percent or more of a layer starting within 6 in. (15 cm) of the soil surface (Figure 11).



Figure 11. In this example, the gleyed matrix begins at the soil surface.

Applicable Subregions:
Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: The gleyed matrix only has to be present within 6 in. (15 cm) of the surface. Soils with gleyed matrices are saturated for significant periods; therefore, *no minimum thickness of gleyed layer is required*. See the Glossary (Appendix A) for the definition of a gleyed matrix.

Indicator S5: Sandy Redox

Technical Description: A layer starting within 6 in. (15 cm) of the soil surface that is at least 4 in. (10 cm) thick and has a matrix with 60 percent or more chroma of 2 or less with 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings (Figure 12).



Figure 12. Redox features in this soil begin at about 2 in.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: Distinct and prominent are defined in the Glossary (Appendix A). Redox concentrations include iron and manganese masses (reddish mottles) and pore linings (Vepraskas 1992). Included within the concept of redox concentrations are iron/manganese bodies as soft masses with diffuse boundaries. Common (2 to less than 20 percent) to many (20 percent or more) redox concentrations (USDA Natural Resources Conservation Service 2002) are required. If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible.

Indicator S6: Stripped Matrix

Technical Description: A layer starting within 6 in. (15 cm) of the soil surface in which iron/manganese oxides and/or organic matter have been stripped from the matrix and the primary base color of the soil material has been exposed. The stripped areas and translocated oxides and/or organic matter form a faint, diffuse splotchy pattern of two or more colors. The stripped zones are 10 percent or more of the volume; they are rounded and approximately 0.5 to 1 in. (1 to 3 cm) in diameter (Figure 13).



Figure 13. The layer stripped of organic matter begins beneath the dark surface layer (approximately 2 in. (5 cm)).

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: This indicator includes the indicator previously named streaking (Environmental Laboratory 1987). Common to many (USDA Natural Resources Conservation Service 2002) areas of stripped (uncoated) soil materials 0.5 to 1 in. (1 to 3 cm) in size are required, but they may be smaller. Commonly, the splotches of color have a value of 5 or more and chroma 1 and/or 2 (stripped) and chroma 3 and/or 4 (unstripped). However, there are no specific color requirements for this indicator. The mobilization and translocation of the oxides and/or organic matter are the important processes involved in this indicator and should result in splotchy coated and uncoated soil areas. A 10-power hand lens can be helpful in seeing stripped and unstripped areas.

Loamy and clayey soils

"Loamy and clayey soils" refers to soil materials with USDA textures of loamy very fine sand and finer. Use the following indicators in soil layers consisting of loamy or clayey soil materials.

Unless otherwise indicated (e.g., see Indicator F8 – Redox Depressions), all mineral layers above any of the indicators must have a dominant chroma of 2 or less, or the layer(s) with dominant chroma of more than 2 must be less than 6 in. (15 cm) thick to meet any hydric soil indicator. Nodules and concretions are not considered to be redox concentrations unless otherwise noted.

Indicator F1: Loamy Mucky Mineral

Technical Description: A layer of mucky modified loamy or clayey soil material 4 in. (10 cm) or more thick starting within 6 in. (15 cm) of the soil surface.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: *Mucky* is a USDA texture modifier for mineral soils. The organic carbon is at least 8 percent, but can range up to 18 percent. The percentage requirement is dependent upon the clay content of the soil; the higher the clay content, the higher the organic carbon requirement. See the Concepts section of this chapter for guidance on identifying mucky mineral soil materials in the field; however, loamy mucky soil material is difficult to distinguish without laboratory testing.

Indicator F2: Loamy Gleyed Matrix

Technical Description: A gleyed matrix that occupies 60 percent or more of a layer starting within 12 in. (30 cm) of the soil surface (Figure 14).



Figure 14. This gleyed matrix begins at the soil surface.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: Gley colors are not synonymous with gray colors. Gley colors are those colors that are on the gley pages (Gretag/Macbeth 2000). They have hue N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB, with a value of 4 or more. The gleyed matrix only has to be present within 12 in. (30 cm) of the surface. Soils with gleyed matrices are saturated for significant periods; therefore, *no minimum thickness of gleyed layer is required*. See the Glossary (Appendix A) for the definition of a gleyed matrix.

Indicator F3: Depleted Matrix

Technical Description: A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

- 2 in. (5 cm) if 2 in. (5 cm) is entirely within the upper 6 in. (15 cm) of the soil, or
- 6 in. (15 cm) starting within 10 in. (25 cm) of the soil surface.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: This is one of the most commonly observed hydric soil indicators at wetland boundaries. Redox concentrations including iron/manganese soft masses or pore linings, or both, are required in soils with matrix values/chromas of 4/1, 4/2, and 5/2 (Figures 15 and 16). If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible. Redox concentrations are not required for soils with matrix value of 5 or more and chroma of 1, or value of 6 or more and chroma of 2 or 1. The low-chroma matrix must be caused by wetness and not be a relict or parent material feature. See the Glossary (Appendix A) for the definition of a depleted matrix.



Figure 15. Indicator F3, Depleted Matrix. Redox concentrations are present within a low-chroma matrix.



Figure 16. Redox concentrations at 2 in. (5 cm).

Indicator F6: Redox Dark Surface

Technical Description: A layer that is at least 4 in. (10 cm) thick, is entirely within the upper 12 in. (30 cm) of the mineral soil, and has a:

- Matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or
- Matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: This indicator is commonly used to delineate wetlands. Redox concentrations in high organic-content mineral soils with dark surfaces are often small and difficult to see (Figure 17). The organic matter masks some or all of the concentrations that may be present. Careful examination is required to see what are often brownish redox concentrations in the darkened materials. If the soil is saturated at the time of sampling, it may be necessary to let it dry at least to a moist condition for redox features to become visible. In some instances, further drying of the samples makes the concentrations (if present) easier to see. A hand lens may be helpful in seeing and describing small redox concentrations. Care should be taken to examine the interior of soil peds for redox concentrations. Dry colors, if used, also must have matrix chromas of 1 or 2, and the redox concentrations must be distinct or prominent.



Figure 17. Redox features can be small and difficult to see within a dark soil layer.

In soils that are wet because of subsurface saturation, the layer immediately below the dark epipedon will likely have a depleted or gleyed matrix (see the Glossary for definitions). Soils that are wet because of ponding or have a shallow, perched layer of saturation may not always have a depleted/gleyed matrix below the dark surface. This morphology has been observed in soils that have been compacted by tillage and other means. It is recommended that delineators evaluate the hydrologic source and

examine and describe the layer below the dark-colored epipedon when applying this indicator.

Indicator F7: Depleted Dark Surface

Technical Description: Redox depletions with a value of 5 or more and chroma of 2 or less in a layer that is at least 4 in. (10 cm) thick, is entirely within the upper 12 in. (30 cm) of the mineral soil (Figure 18), and has a:

- Matrix value of 3 or less and chroma of 1 or less and 10 percent or more redox depletions, or
- Matrix value of 3 or less and chroma of 2 or less and 20 percent or more redox depletions.

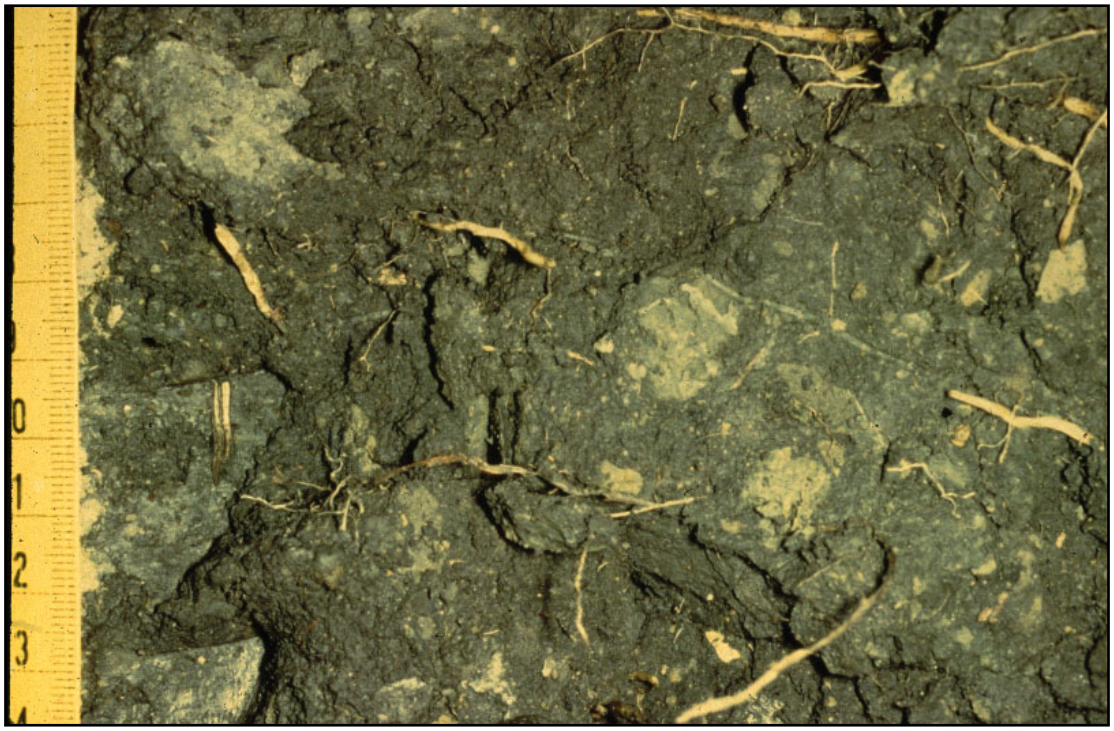


Figure 18. Redox depletions (lighter colored areas) scattered within the darker matrix.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: Care should be taken not to mistake the mixing of eluvial layers that have high value and low chroma (E horizon) or illuvial layers that have accumulated carbonates (calcic horizon) into the surface layer as depletions. Mixing of layers can be caused by burrowing animals or cultivation. Pieces of deeper layers that become incorporated into the

surface layer are not redox depletions. Knowledge of local conditions is required in areas where light-colored eluvial layers and/or layers high in carbonates may be present. In soils that are wet because of subsurface saturation, the layer immediately below the dark surface is likely to have a depleted or gleyed matrix. Redox depletions will usually have associated microsites with redox concentrations that occur as pore linings or masses within the depletion(s) or surrounding the depletion(s).

Indicator F8: Redox Depressions

Technical Description: In closed depressions subject to ponding, 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is 2 in. (5 cm) or more thick and is entirely within the upper 6 in. (15 cm) of the soil (Figure 19).



Figure 19. In this example, the layer of redox concentrations begins at the soil surface and is slightly more than 2 in. (5 cm) thick.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: This indicator occurs on depressional landforms, such as vernal pools, playa lakes, rainwater basins, and potholes; but not micro-depressions on convex landscapes. Closed depressions often occur within flats or floodplain landscapes. *Note that there is no color requirement for*

the soil matrix. The layer containing redox concentrations may extend below 6 in. (15 cm) as long as at least 2 in. (5 cm) occurs within 6 in. (15 cm) of the surface. If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible. See the Glossary for definitions of distinct and prominent.

Indicator F9: Vernal Pools

Technical Description: In closed depressions that are subject to ponding, presence of a depleted matrix with 60 percent or more chroma of 2 or less in a layer 2 in. (5 cm) thick entirely within the upper 6 in. (15 cm) of the soil.

Applicable Subregions: Applicable throughout the Arid West Region (LRR B, C, and D).

User Notes: Most often soils pond water for two reasons: they occur in landscape positions that collect water (Figure 20) and they have a restrictive layer that prevents water from moving downward through the soil. Normally this indicator occurs at the soil surface. Redox concentrations including iron/manganese soft masses or pore linings, or both, are required in soils that have matrix values/chromas of 4/1, 4/2, and 5/2. If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible. See the Glossary for the definition of a depleted matrix.



Figure 20. Inundation in a vernal pool.

Hydric soil indicators for problem soils

The following indicators are not currently recognized for general application by the NTCHS, or they are not recognized in the specified geographic area. However, these indicators may be used in problem wetland situations in the Arid West where there is evidence of wetland hydrology and hydrophytic vegetation, and the soil is believed to meet the definition

of a hydric soil despite the lack of other indicators of a hydric soil. To use these indicators, follow the procedure described in the section on Problematic Hydric Soils in Chapter 5. If any of the following indicators is observed, it is recommended that the NTCHS be notified by following the protocol described in the "Comment on the Indicators" section of *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006b).

Indicator A9: 1 cm Muck

Technical Description: A layer of muck 0.5 in. (1 cm) or more thick with a value of 3 or less and chroma of 1 or less, starting within 6 in. (15 cm) of the soil surface.

Applicable Subregions: For use with problem soils in the Mediterranean California Subregion (LRR C).

User Notes: See the User Notes for Indicator A10 below.

Indicator A10: 2 cm Muck

Technical Description: A layer of muck 0.75 in. (2 cm) or more thick with a value of 3 or less and chroma of 1 or less, starting within 6 in. (15 cm) of the soil surface.

Applicable Subregions: For use with problem soils in the Columbia/Snake River Plateau Subregion (LRR B).

User Notes: Normally the muck layer is at the soil surface; however, it may occur at any depth within 6 in. (15 cm) of the surface. Muck is sapric soil material with at least 12 to 18 percent organic carbon. Organic soil material is called muck if virtually all of the material has undergone sufficient decomposition to limit recognition of the plant parts. Hemic (mucky peat) and fibric (peat) soil materials do not qualify. To determine if muck is present, first remove loose leaves, needles, bark, and other easily identified plant remains. This is sometimes called leaf litter, a duff layer, or a leaf or root mat. Then examine for decomposed organic soil material. Generally, muck is black and has a greasy feel; sand grains should not be evident (see the Concepts section of this chapter for field methods to identify organic soil materials). Determination of this indicator is made below the leaf or root mat; however, root mats that meet the definition of hemic or

fibric soil material are included in the decision-making process for indicators A1 (Histosols) and A2 (Histic Epipedon).

Indicator F18: Reduced Vertic

Technical Description: In Vertisols and Vertic intergrades, a positive reaction to alpha, alpha-dipyridyl that:

- Is the dominant (60 percent or more) condition of a layer at least 4 in. (10 cm) thick within the upper 12 in. (30 cm) (or at least 2 in. (5 cm) thick within the upper 6 in. (15 cm)) of the mineral or muck soil surface,
- Occurs for at least 7 continuous days and 28 cumulative days, and
- Occurs during a normal (within 16 to 84 percent of probable precipitation) or drier season and month.

Applicable Subregions: For use with problem soils throughout the Arid West Region (LRR B, C, and D).

User Notes: The time requirements for this indicator were identified from research in MLRA 150A in LRR T (Gulf Coastal Prairies); these or slightly modified time requirements may be found to identify wetland Vertisols and Vertic intergrades in other parts of the nation. These soils usually have thick dark surface horizons but indicators A11, A12, and F6 are often lacking, possibly due to masking of redoximorphic features by organic carbon. Follow the procedures and note the considerations in Hydric Soil Technical Note 8 (http://soils.usda.gov/use/hydric/ntchs/tech_notes/index.html).

Indicator TF2: Red Parent Material

Technical Description: In parent material with a hue of 7.5YR or redder, a layer at least 4 in. (10 cm) thick with a matrix value and chroma of 4 or less and 2 percent or more redox depletions and/or redox concentrations occurring as soft masses and/or pore linings. The layer is entirely within 12 in. (30 cm) of the soil surface. The minimum thickness requirement is 2 in. (5 cm) if the layer is the mineral surface layer.

Applicable Subregions: For use with problem soils throughout the Arid West Region (LRR B, C, and D).

User Notes: Redox features that are most noticeable in red material include redox depletions and soft manganese masses that are black or dark reddish black. If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible.

4 Wetland Hydrology Indicators

Introduction

Wetland hydrology indicators are used in combination with indicators of hydric soil and hydrophytic vegetation to determine whether an area is a wetland under the Corps Manual. Indicators of hydrophytic vegetation and hydric soil generally reflect a site's medium- to long-term wetness history. They provide readily observable evidence that episodes of inundation or soil saturation lasting more than a few days during the growing season have occurred repeatedly over a period of years and that the timing, duration, and frequency of wet conditions have been sufficient to produce a characteristic wetland plant community and hydric soil morphology. If hydrology has not been altered, vegetation and soils provide strong evidence that wetland hydrology is present (National Research Council 1995). Wetland hydrology indicators provide evidence that the site has a *continuing* wetland hydrologic regime and that hydric soils and hydrophytic vegetation are not relicts of a past hydrologic regime. Wetland hydrology indicators confirm that an episode of inundation or soil saturation occurred recently, but may provide little additional information about the timing, duration, or frequency of such events (National Research Council 1995).

Hydrology indicators are often the most transitory of wetland indicators. Those involving direct observation of surface water or saturated soils are usually present only during the normal wet portion of the growing season and may be absent during the dry season or during drier-than-normal years. The Arid West is characterized by extended dry seasons in most years and by extreme temporal and spatial variability in rainfall, even in "normal" years. Many wetlands in the region are dry for much of the year and, at those times, may lack hydrology indicators entirely. Therefore, *lack of an indicator is not evidence for the absence of wetland hydrology*. See Chapter 5 (Difficult Wetland Situations in the Arid West) for help in identifying wetlands that may lack wetland hydrology indicators during the dry season or in drought years. On the other hand, some indicators could be present on a non-wetland site immediately after a heavy rain or during a period of unusually high precipitation, river stages, runoff, or snowmelt. Therefore, it is important to consider weather conditions prior to the site visit to minimize both false-positive and false-negative wetland hydrology

decisions. An understanding of normal seasonal and annual variations in rainfall, temperature, and other climatic conditions is essential in interpreting hydrology indicators in the Arid West. Some useful sources of climatic data are described in Chapter 5.

Areas that have hydrophytic vegetation and hydric soils generally also have wetland hydrology unless the hydrologic regime has changed due to natural events or human activities (National Research Council 1995). Therefore, when wetland hydrology indicators are absent from an area that has indicators of hydric soil and hydrophytic vegetation, further information may be needed to determine whether or not wetland hydrology is present. If possible, one or more site visits should be scheduled to coincide with the normal wet portion of the growing season, the period of the year when the presence or absence of wetland hydrology indicators is most likely to reflect the true wetland/non-wetland status of the site. In addition, aerial photography or remote sensing data, stream gauge data, runoff estimates, scope-and-effect equations for ditches and subsurface drain lines, or groundwater modeling may help to determine whether wetland hydrology is present when indicators are equivocal or lacking (e.g., USDA Natural Resources Conservation Service 1997). On highly disturbed or problematic sites, direct hydrologic monitoring may be needed to determine whether wetland hydrology is present. The U.S. Army Corps of Engineers (2005) provides a technical standard for monitoring hydrology on such sites. This standard requires 14 or more consecutive days of flooding or ponding, or a water table 12 in. (30 cm) or less below the soil surface, during the growing season at a minimum frequency of 5 years in 10 (50 percent or higher probability) (National Research Council 1995). See Chapter 5 for further information on these techniques.

Growing season

Beginning and ending dates of the growing season may be needed to evaluate certain wetland indicators, such as visual observations of flooding, ponding, or shallow water tables on potential wetland sites. In addition, growing season dates are needed in the event that recorded hydrologic data, such as stream gauge or water-table monitoring data, must be analyzed to determine whether wetland hydrology is present on highly disturbed or problematic sites.

Depletion of oxygen and the chemical reduction of nitrogen, iron, and other elements in saturated soils during the growing season is the result of

biological activity occurring in plant roots and soil microbial populations (National Research Council 1995). Two indicators of biological activity that are readily observable in the field are (1) above-ground growth and development of vascular plants, and (2) soil temperature. Therefore, if information about the growing season is needed and on-site data gathering is practical, the following approaches should be used in this region to determine growing season dates in a given year. The growing season has begun and is ongoing if either of these conditions is met. Therefore, the beginning of the growing season in a given year is indicated by whichever condition occurs earlier, and the end of the growing season is indicated by whichever condition persists later.

1. The growing season has begun on a site in a given year when two or more different non-evergreen vascular plant species growing in the wetland or surrounding areas exhibit one or more of the following indicators of biological activity:

    a. Emergence of herbaceous plants from the ground.
    b. Appearance of new growth from vegetative crowns (e.g., in graminoids, bulbs, and corms).
    c. Coleoptile/cotyledon emergence from seed.
    d. Bud burst on woody plants (i.e., some green foliage is visible between spreading bud scales).
    e. Emergence or elongation of leaves of woody plants.
    f. Emergence or opening of flowers.

    This determination should not include evergreen species. Observations should be made in the wetland or in surrounding areas subject to the same climatic conditions (e.g., similar elevation and aspect); however, soil moisture conditions may differ. Supporting data should be reported on the data form, in field notes, or in the delineation report, and should include the species observed (if identifiable), their abundance and location relative to the potential wetland, and type of biological activity observed.

    A one-time observation of biological activity during a single site visit is sufficient, but is not required unless growing season information is necessary to evaluate particular wetland hydrology indicators. However, if long-term hydrologic monitoring is planned, then plant growth, maintenance, and senescence should be monitored for

continuity over the same period. Early plant senescence due to the initiation of the summer dry season does not necessarily indicate the end of the growing season and alternative procedures (e.g., soil temperature) should be used.

2. The growing season has begun in spring, and is still in progress, when soil temperature measured at the 12-in. (30-cm) depth is 41 °F (5 °C) or higher. A one-time temperature measurement during a single site visit is sufficient, but is not required unless growing season information is necessary to evaluate particular wetland hydrology indicators. However, if long-term hydrologic monitoring is planned, then soil temperature should also be monitored to ensure that it remains continuously at or above 41 °F during the monitoring period. Soil temperature can be measured directly in the field by inserting a soil thermometer into the wall of a freshly dug soil pit.

If the timing of the growing season based on vegetation growth and development and/or soil temperature is unknown and on-site data collection is not practical, such as when analyzing previously recorded stream-gauge or monitoring-well data, then growing season dates may be approximated by the median dates (i.e., 5 years in 10, or 50 percent probability) of 28 °F (–2.2 °C) air temperatures in spring and fall, based on long-term records gathered at National Weather Service meteorological stations (U.S. Army Corps of Engineers 2005). These dates are reported in WETS tables available from the NRCS National Water and Climate Center (http://www.wcc.nrcs.usda.gov/climate/wetlands.html) for the nearest appropriate weather station.

Wetland hydrology indicators

In this chapter, wetland hydrology indicators are presented in four groups. Indicators in Group A are based on the direct observation of surface water or groundwater during a site visit. Group B consists of evidence that the site is subject to flooding or ponding, although it may not be inundated currently. These indicators include water marks, drift deposits, sediment deposits, and similar features. Group C consists of other evidence that the soil is saturated currently or was saturated recently. Some of these indicators, such as oxidized rhizospheres surrounding living roots and the presence of reduced iron or sulfur in the soil profile, indicate that the soil has been saturated for an extended period. Group D consists of vegetation and soil features that indicate contemporary rather than historical wet

conditions. Wetland hydrology indicators are intended as one-time observations of site conditions that are sufficient evidence of wetland hydrology in areas where hydric soils and hydrophytic vegetation are present. All indicators are applicable throughout the Arid West Region.

Within each group, indicators are divided into two categories – *primary* and *secondary* – based on their estimated reliability in this region. One primary indicator from any group is sufficient to conclude that wetland hydrology is present; the area is a wetland if indicators of hydric soil and hydrophytic vegetation are also present. In the absence of a primary indicator, two or more secondary indicators from any group are required to conclude that wetland hydrology is present. Indicators of wetland hydrology include, but are not necessarily limited to, those listed in Table 11 and described on the following pages. Other evidence of wetland hydrology may also be used with appropriate documentation.

Table 11. Wetland hydrology indicators for the Arid West.

Indicator	Category	
	Primary	Secondary
Group A – Observation of Surface Water or Saturated Soils		
A1 – Surface water	X	
A2 – High water table	X	
A3 – Saturation	X	
Group B – Evidence of Recent Inundation		
B6 – Surface soil cracks	X	
B7 – Inundation visible on aerial imagery	X	
B9 – Water-stained leaves	X	
B11 – Salt crust	X	
B12 – Biotic crust	X	
B13 – Aquatic invertebrates	X	
B1 – Water marks	X	X (riverine)
B2 – Sediment deposits	X	X (riverine)
B3 – Drift deposits	X	X (riverine)
B10 – Drainage patterns		X
Group C – Evidence of Current or Recent Soil Saturation		
C1 – Hydrogen sulfide odor	X	
C3 – Oxidized rhizospheres along living roots	X	
C4 – Presence of reduced iron	X	
C6 – Recent iron reduction in tilled soils	X	
C7 – Thin muck surface	X	
C2 – Dry-season water table		X
C8 – Crayfish burrows		X
C9 – Saturation visible on aerial imagery		X
Group D – Evidence from Other Site Conditions or Data		
D3 – Shallow aquitard		X
D5 – FAC-neutral test		X

Group A – Observation of Surface Water or Saturated Soils

Indicator A1: Surface water

Category: Primary

General Description: This indicator consists of the direct, visual observation of surface water (flooding or ponding) during a site visit (Figure 21).

Cautions and User Notes: Care must be used in applying this indicator because surface water may be present in non-wetland areas immediately after a rainfall event or during periods of unusually high precipitation, runoff, tides, or river stages. Furthermore, some non-wetlands flood frequently for brief periods. Surface water observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. If this is questionable and other hydrology indicators are absent, a follow-up visit during the growing season may be needed. Note that surface water may be absent from a wetland during the normal dry season or during extended periods of drought. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability). In addition, groundwater-dominated wetland systems may never or rarely contain surface water.



Figure 21. Wetland with surface water present.

Indicator A2: High water table

Category: Primary

General Description: This indicator consists of the direct, visual observation of the water table 12 in. (30 cm) or less below the surface in a soil pit, auger hole, or shallow monitoring well (Figure 22). This indicator includes water tables derived from perched water, throughflow, and discharging groundwater (e.g., in seeps) that may be moving laterally near the soil surface.

Cautions and User Notes: Sufficient time must be allowed for water to infiltrate into a newly dug hole and to stabilize at the water-table level. The required time will vary depending upon soil texture. In some cases, the water table can be determined by examining the wall of the soil pit and identifying the upper level at which water is seeping into the pit. A water table within 12 in. of the surface observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Care must be used in interpreting this indicator because water-table levels normally vary seasonally and are a function of both recent and long-term precipitation. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability). For an accurate determination of the water-table level, the soil pit, auger hole, or well should not penetrate any restrictive soil layer capable of perching water near the surface.



Figure 22. High water table observed in a soil pit.

Indicator A3: Saturation

Category: Primary

General Description: Visual observation of saturated soil conditions 12 in. (30 cm) or less from the soil surface as indicated by water glistening on the surfaces and broken interior faces of soil samples removed from the pit or auger hole (Figure 23). This indicator must be associated with an existing water table located immediately below the saturated zone; however, this requirement is waived under episaturated conditions if there is a restrictive soil layer or bedrock within 12 in. (30 cm) of the surface.

Cautions and User Notes: Glistening is evidence that the soil sample was taken either below the water table or within the saturated capillary fringe above the water table. Recent rainfall events and the proximity of the water table at the time of sampling must be considered in applying and interpreting this indicator. Water observed in soil cracks or on the faces of soil aggregates (peds) does not meet this indicator unless ped interiors are also saturated. A water table is not required below the saturated zone under episaturated conditions if the restrictive layer or bedrock is within 12 in. (30 cm) of the surface. Note the restrictive layer in the soils section of the data form. The restrictive layer may be at the surface.



Figure 23. Water glistens on the surface of a saturated soil sample.

Group B – Evidence of Recent Inundation

Indicator B6: Surface soil cracks

Category: Primary

General Description: Surface soil cracks consist of shallow cracks that form when fine-grained mineral or organic sediments dry and shrink, often creating a network of cracks or small polygons (Figure 24).

Cautions and User Notes: Surface soil cracks are often seen in recent fine sediments and in concave landscape positions where water has ponded long enough to destroy surface soil structure, such as in seasonally ponded depressions, lake fringes, tidal flats, and floodplains. Use caution, however, as they may also occur in temporary ponds and puddles in non-wetlands; these situations are easily distinguished by the absence of hydrophytic vegetation and/or hydric soils. This indicator does not include deep cracks due to shrink-swell action in clay soils (e.g., Vertisols). This indicator is distinguished from biotic crusts by the lack of visible algal layers, remains, or flakes on the soil surface.

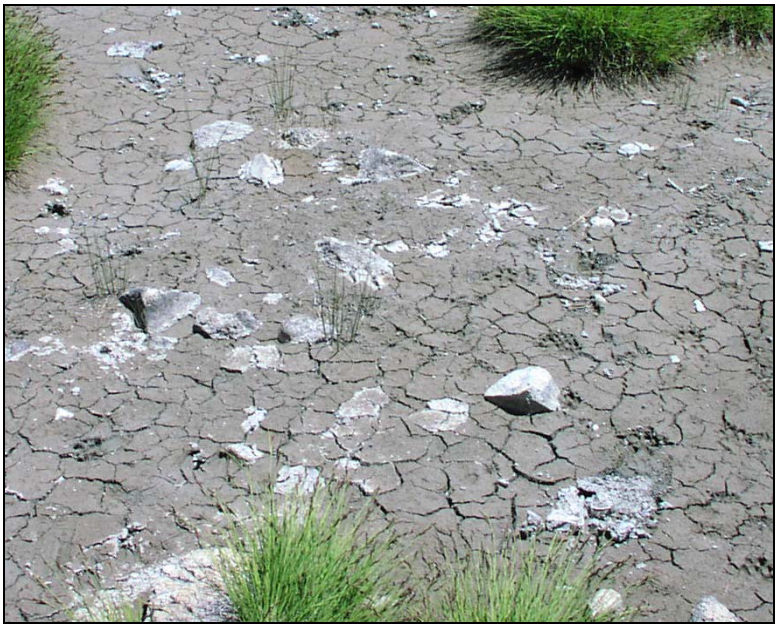


Figure 24. Surface soil cracks in a seasonally ponded wetland.

Indicator B7: Inundation visible on aerial imagery

Category: Primary

General Description: One or more recent aerial photographs or satellite images show the site to be inundated.

Cautions and User Notes: Care must be used in applying this indicator because surface water may be present on a non-wetland site immediately after a heavy rain or during periods of unusually high precipitation, runoff, tides, or river stages. See Chapter 5 for procedures to evaluate the normality of precipitation prior to the photo date. Surface water observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Surface water may be absent from a wetland during the normal dry season or during extended periods of drought. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability). If available, it is recommended that multiple years of photography be evaluated. If 5 or more years of aerial photography are available, the procedure described by the USDA Natural Resources Conservation Service (1997, section 650.1903) is recommended.

Indicator B9: Water-stained leaves

Category: Primary

General Description: Water-stained leaves are fallen or recumbent dead leaves that have turned grayish or blackish in color due to inundation for long periods.

Cautions and User Notes: Water-stained leaves are not commonly seen in arid areas but can be found in depressional wetlands and along streams in shrub-dominated or forested habitats; they may also occur in herbaceous communities. Staining often occurs in leaves that are in contact with the soil surface while inundated for long periods. Water-stained leaves maintain their blackish or grayish colors when dry. They should contrast strongly with fallen leaves in nearby non-wetland landscape positions.

Indicator B11: Salt crust

Category: Primary

General Description: Salt crusts are hard or brittle deposits of salts formed on the ground surface due to the evaporation of saline surface water.

Cautions and User Notes: Hard or brittle salt crusts form in ponded depressions, seeps, and lake fringes when saline surface waters evaporate (Jones 1965, Boettinger 1997) (Figure 25). They may form a white ring at the high-water line as the water recedes. Salt crusts do not include fluffy or powdery salt deposits or efflorescences resulting from capillary rise and evaporation of saline groundwater that may be derived from a deep water table.



Figure 25. A hard salt crust in a dry temporary pool (25-cent coin for scale).

Indicator B12: Biotic crust

Category: Primary

General Description: This indicator includes ponding-remnant biotic crusts, benthic microflora, and the dried remains of free-floating algae left on or near the soil surface after dewatering.

Cautions and User Notes: Biotic crusts (also known as cryptobiotic or cryptogamic crusts) are soil aggregates held together by microorganisms and the substances they produce. Organisms producing these crusts include blue-green and green algae, diatoms, lichens, and fungi. Ponding-remnant crusts form in areas that previously held standing water, such as around the margins of drying wetland pans (Brostoff 2002, Lichvar et al. 2006) (Figures 26-28). Upon drying, they often form polygons with characteristic upturned edges and often have a darker surface layer than the soil materials below. They develop in open areas where vegetation is patchy or scattered and are common in sparsely vegetated playas and pans. Benthic microflora (also known as microphytobenthos) are algae or diatoms that form soil aggregates or layers in coastal or saline wetlands (Figure 29). In addition, free-floating algae (Figure 30) may leave dried remains on the soil surface or on low vegetation after dewatering. Certain types of biotic crusts, such as rough-surfaced or pedicellate crusts (Figure 31) and asphalt-like crusts (Figure 32), do not develop or are destroyed in areas that become inundated. They are not indicators of wetland hydrology.



Figure 26. Ponding-remnant biotic crusts on the surfaces of mud-crack polygons. Biotic crusts often have up-turned edges with the surface layer darker than the underlying material.



Figure 27. Ponding-remnant biotic crust showing polygons and curls detached from the underlying sediments.



Figure 28. Ponding-remnant biotic crust, showing dried algal caps on a domed mud-crack surface.



Figure 29. Dark-colored material is benthic microflora consisting of blue-green and green algae in a hypersaline intertidal marsh.



Figure 30. Remains of floating algal material in a seasonally inundated *Juncus*-dominated marsh.



Figure 31. Rough or pedicellate crust indicates no recent history of standing water. *This type of crust is not an indicator of wetland hydrology.*

Indicator B13: Aquatic invertebrates

Category: Primary

General Description: Presence of numerous live individuals, diapausing insect eggs or crustacean cysts, or dead remains of aquatic invertebrates, such as clams, snails, insects, ostracods, shrimp, and other crustaceans, either on the soil surface or clinging to plants or other emergent objects (Figures 33 and 34).



Figure 32. Asphalt-like crust (rectangular areas were experimentally removed) indicates no recent history of standing water. *This type of crust is not an indicator of wetland hydrology.*

Cautions and User Notes: Examples of dead remains include clam shells, chitinous exoskeletons, insect head capsules, and aquatic snail shells. Invertebrates or their remains should be reasonably abundant; one or two individuals are not sufficient. Use caution in areas where invertebrate remains may have been transported by high winds, unusually high water, or other animals into non-wetland areas. Shells and exoskeletons are resistant to tillage but may be moved by equipment beyond the boundaries of the wetland. They may also persist in the soil for years after dewatering. Use caution in areas containing relict ostracod shells and other remains, such as on historic lake terraces in the Great Basin.



Figure 33. Shells of aquatic snails in a seasonally ponded fringe wetland.



Figure 34. Carapaces of tadpole shrimp (*Triops* sp.) and clam shrimp (*Leptestheria compleximanus*) in dried sediments of an ephemeral pool. Photo by Brian Lang (New Mexico Dept. of Game & Fish).

Indicator B1: Water marks

Category: Primary (Secondary in riverine situations)

General Description: Water marks are discolorations or stains on the bark of woody vegetation, rocks, bridge supports, buildings, fences, or other fixed objects as a result of inundation (Figure 35).

Cautions and User Notes: When several water marks are present, the highest reflects the maximum extent of inundation. Water marks indicate a water-level elevation and can be extrapolated from nearby objects across lower elevation areas. Use caution with water marks that may have been caused by extreme, infrequent, or very brief flooding events. In regulated systems, such as reservoirs, water-level records can be used to distinguish unusually high pools from normal operating levels. Streams and dry washes in arid regions tend to have highly variable flows, responding quickly to rainfall events and returning to more normal levels in a few hours or days. Therefore, water marks in riverine situations often reflect higher-than-normal flows and should be considered secondary indicators of wetland hydrology in this region.



Figure 35. Water marks on a boulder (upper edge indicated by the arrow).

Indicator B2: Sediment deposits

Category: Primary (Secondary in riverine situations)

General Description: Sediment deposits are thin layers or coatings of fine-grained mineral material (e.g., silt or clay) or organic matter (e.g., pollen), sometimes mixed with other detritus, remaining on tree bark, plant stems or leaves, rocks, and other objects after surface water recedes.

Cautions and User Notes: Sediment deposits generally occur in ponded situations where water has stood for sufficient time to allow suspended sediment to settle (Figure 36). Sediment deposits may remain for a considerable period before being removed by precipitation or subsequent inundation. Sediment deposits on vegetation or other objects indicate the minimum inundation level. This level can be extrapolated across lower elevation areas. Use caution with sediment left after infrequent high flows or very brief flooding events. This indicator does not include thick accumulations of sand or gravel in fluvial channels that may reflect historic flow conditions or extreme events. Streams and dry washes in arid regions tend to have highly variable flows, responding quickly to rainfall events and returning to more normal levels in a few hours or days. Therefore, sediment deposits in riverine situations may reflect higher-than-normal flows and should be considered secondary indicators of wetland hydrology in this region.



Figure 36. Sediment deposits (tan coloration) on tree bases in a seasonally flooded area (upper edge indicated by the arrow).

Indicator B3: Drift deposits

Category: Primary (Secondary in riverine situations)

General Description: Drift deposits consist of rafted debris that has been deposited on the ground surface or entangled in vegetation or other fixed objects. Debris consists of remnants of vegetation (e.g., branches, stems, and leaves), man-made litter, or other waterborne materials. Drift material may be deposited at or near the high-water line in ponded or flooded areas, piled against the upstream side of trees, rocks, and other fixed objects (Figure 37), or widely distributed within the dewatered area.



Figure 37. Drift deposit on the upstream side of a sapling in a floodplain wetland.

Cautions and User Notes: Deposits of drift material are often found adjacent to streams or other sources of flowing water in wetlands. They also occur in tidal marshes, along lake shores, and in other ponded areas. The elevation of a drift line can be extrapolated across lower elevation areas. Use caution with drift lines that may have been caused by extreme, infrequent, or very brief flooding events. Streams and dry washes in arid areas tend to have highly variable flows, responding quickly to rainfall events and returning to more normal levels in a few hours or days. Therefore, drift deposits in riverine situations may reflect higher-than-normal flows and should be considered secondary indicators of wetland hydrology in this region. Use caution as drift material can persist for many years in an arid climate.

Indicator B10: Drainage patterns

Category: Secondary

General Description: This indicator consists of flow patterns visible on the soil surface or eroded into the soil, low vegetation bent over in the

direction of flow, absence of leaf litter or small woody debris due to flowing water, and similar evidence that water flowed across the ground surface.

Cautions and User Notes: Drainage patterns are usually seen in areas where water flows broadly over the surface and is not confined to a channel, such as in areas adjacent to streams (Figure 38), in seeps, vegetated swales, and tidal flats. Use caution in areas subject to high winds or affected by recent extreme or unusual flooding events.



Figure 38. Vegetation bent over in the direction of water flow across a stream terrace.

Group C – Evidence of Current or Recent Soil Saturation

Indicator C1: Hydrogen sulfide odor

Category: Primary

General Description: A hydrogen sulfide (rotten egg) odor within 12 in. (30 cm) of the soil surface.

Cautions and User Notes: Hydrogen sulfide is a gas produced by soil microbes in response to prolonged saturation in soils where oxygen, nitrogen, manganese, and iron have been largely reduced and there is a source of sulfur. It is sometimes detected in saline and brackish tidal marshes, and other wet habitats. For hydrogen sulfide to be detectable, the soil must be saturated at the time of sampling and must have been

saturated long enough to become highly reduced. These soils are often permanently saturated and anaerobic at or near the surface. To apply this indicator, dig the soil pit no deeper than 12 in. to avoid release of hydrogen sulfide from deeper in the profile. Hydrogen sulfide odor serves as both an indicator of hydric soil and wetland hydrology. This one observation proves that the soil meets the definition of a hydric soil (i.e., anaerobic in the upper part), plus has an ongoing wetland hydrologic regime. Often these soils have a high water table (wetland hydrology indicator A2), but the hydrogen sulfide odor provides further proof that the soil has been saturated for a long time.

Indicator C3: Oxidized rhizospheres along living roots

Category: Primary

General Description: Presence of a layer containing 2 percent or more iron-oxide coatings or plaques on the surfaces of living roots and/or iron-oxide coatings or linings on soil pores immediately surrounding living roots within 12 in. (30 cm) of the soil surface (Figure 39).

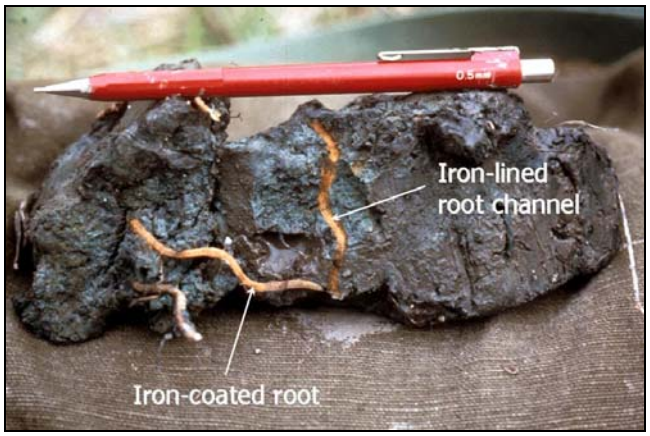


Figure 39. Iron oxide plaque (orange coating) on a living root.
Iron also coats the channel or pore from which the root was removed.

Cautions and User Notes: Oxidized rhizospheres are the result of oxygen leakage from living roots into the surrounding anoxic soil, causing oxidation of ferrous iron present in the soil solution. They are evidence of saturated and reduced soil conditions during the plant's lifetime. Iron concentrations or plaques may form on the immediate root surface or may coat the soil pore adjacent to the root. In either case, the oxidized iron must be associated with living roots to indicate contemporary wet conditions and to distinguish these features from other pore linings. Care must

be taken to distinguish iron oxide coatings from organic matter associated with plant roots. Viewing with a hand lens may help distinguish mineral from organic material. Iron coatings sometimes show concentric layers in cross section and may transfer iron stains to the fingers when rubbed. Note the location and abundance of oxidized rhizospheres in the soil profile description or remarks section of the data form. There is no minimum thickness requirement for the layer containing oxidized rhizospheres. Oxidized rhizospheres must occupy at least 2 percent of the volume of the layer.

Indicator C4: Presence of reduced iron

Category: Primary

General Description: Presence of a layer containing reduced (ferrous) iron in the upper 12 in. (30 cm) of the soil profile, as indicated by a ferrous iron test or by the presence of a soil that changes color upon exposure to the air.

Cautions and User Notes: The reduction of iron occurs in soils that have been saturated long enough to become anaerobic and chemically reduced. Ferrous iron is converted to oxidized forms when saturation ends and the soil reverts to an aerobic state. Thus, the presence of ferrous iron indicates that the soil is saturated and anaerobic at the time of sampling, and has been saturated for an extended period. The presence of ferrous iron can be verified with alpha, alpha-dipyridyl dye (Figure 40) or by observing a soil that changes color upon exposure to air (i.e., reduced matrix). A positive reaction to alpha, alpha-dipyridyl dye should occur over more than 50 percent of the soil layer in question. The dye does not react when wetlands are dry; therefore, a negative test result is not evidence that the soil is not reduced at other times of year. Soil samples should be tested or examined immediately after opening the soil pit because ferrous iron may oxidize and colors change soon after the sample is exposed to the air. Soils that contain little weatherable iron may not react even when saturated and reduced. There are no minimum thickness requirements or initial color requirements for the soil layer in question.



Figure 40. When alpha, alpha-dipyridyl dye is applied to a soil containing reduced iron, a positive reaction is indicated by a pink or red coloration to the treated area.

Indicator C6: Recent iron reduction in tilled soils

Category: Primary

General Description: Presence of a layer containing 2 percent or more redox concentrations as pore linings or soft masses in the tilled surface layer of soils cultivated within the last two years. The layer containing redox concentrations must be within the tilled zone or within 12 in. (30 cm) of the soil surface, whichever is shallower.

Cautions and User Notes: Cultivation breaks up or destroys redox features in the plow zone. The presence of continuous and unbroken redox features indicates that the soil was saturated and reduced since the last episode of cultivation (Figure 41). Redox features often form around organic material, such as crop residue, incorporated into the tilled soil. Use caution with older features that may be broken up but not destroyed by tillage. Newly formed redox concentrations should have diffuse boundaries. The indicator is most reliable in areas that are cultivated regularly, so that soil aggregates and older redox features are more likely to be broken up. If not obvious, information about the timing of last cultivation may be available from the land owner, other knowledgeable individuals, aerial photography, or the Farm Service Agency. A plow zone 6 to 8 in. (15 to 20 cm) in depth is typical but may extend deeper. There is

no minimum thickness requirement for the layer containing redox concentrations.



Figure 41. Redox concentrations in a recently cultivated soil.

Indicator C7: Thin muck surface

Category: Primary

General Description: This indicator consists of a layer of muck 1 in. (2.5 cm) or less thick on the soil surface.

Cautions and User Notes: Muck is highly decomposed organic material (see the Concepts section of Chapter 3 for guidance on identifying muck). In a dry climate, muck accumulates only where soils are saturated to the surface for long periods each year. Thick muck layers can persist for years after wetland hydrology is effectively removed; therefore, a muck layer greater than 1 in. thick does not qualify for this indicator. However, thin muck surfaces disappear quickly or become incorporated into mineral

horizons when wetland hydrology is withdrawn. Therefore, the presence of a thin muck layer on the soil surface indicates an active wetland hydrologic regime.

Indicator C2: Dry-season water table

Category: Secondary

General Description: Visual observation of the water table between 12 and 24 in. (30 and 60 cm) below the surface during the normal dry season or during a drier-than-normal year.

Cautions and User Notes: Due to normal seasonal fluctuations, water tables in wetlands often drop below 12 in. during the summer dry season. A water table between 12 and 24 in. during the dry season, or during an unusually dry year, indicates a normal wet-season water table within 12 in. of the surface. Sufficient time must be allowed for water to infiltrate into a newly dug hole and to stabilize at the water-table level. The required time will vary depending upon soil texture. In some cases, the water table can be determined by examining the wall of the soil pit and identifying the upper level at which water is seeping into the pit. For an accurate determination of the water-table level, the soil pit, auger hole, or well should not penetrate any restrictive soil layer capable of perching water near the surface. Water tables in wetlands often drop well below 24 in. during dry periods. Therefore, a dry-season water table below 24 in. does not necessarily indicate a lack of wetland hydrology. See Chapter 5 (section on Wetlands that Periodically Lack Indicators of Wetland Hydrology) for determining average dry-season dates and drought periods.

Indicator C8: Crayfish burrows

Category: Secondary

General Description: Presence of crayfish burrows, as indicated by openings in soft ground up to 2 in. (5 cm) in diameter, often surrounded by chimney-like mounds of excavated mud.

Cautions and User Notes: Both native and introduced crayfishes are found in the Arid West. Crayfish breathe with gills and require at least periodic contact with water. Some species dig burrows for refuge and breeding (Figure 42). Crayfish burrows are usually found near streams, ditches,

and ponds in areas that are seasonally inundated or have seasonal high water tables at or near the surface. They are also found in wet meadows and pastures where there is no open water. Crayfish may extend their burrows 10 ft (3 m) or more in depth to maintain contact with a falling water table; thus, the eventual depth of the burrow does not reflect the level of the seasonal high water table.



Figure 42. Crayfish burrow.

Indicator C9: Saturation visible on aerial imagery

Category: Secondary

General Description: One or more recent aerial photographs or satellite images indicate soil saturation. Saturated soil signatures must correspond to field-verified hydric soils, depressions or drainage patterns, differential crop management, or other evidence of a seasonal high water table.

Cautions and User Notes: This indicator is useful when plant cover is sparse or absent and the ground surface is visible from above. Saturated areas generally appear as darker patches within the field (Figure 43). Inundated (indicator B7) and saturated areas may be present in the same field; if they cannot be distinguished, then use indicator C9 for the entire wet area. Care must be used in applying this indicator because saturation may be present on a non-wetland site immediately after a heavy rain or during periods of abnormally high precipitation, runoff, tides, or river

stages. Saturation observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Saturation may be absent from a wetland during the normal dry season or during extended periods of drought. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability). If available, it is recommended that multiple years of photography be evaluated. If 5 or more years of aerial photography are available, the procedure described by the Natural Resources Conservation Service (1997, section 650.1903) is recommended. Use caution, as similar signatures may be caused by factors other than saturation. This indicator requires onsite verification that saturation signatures seen on photos correspond to hydric soils or other evidence of a seasonal high water table.

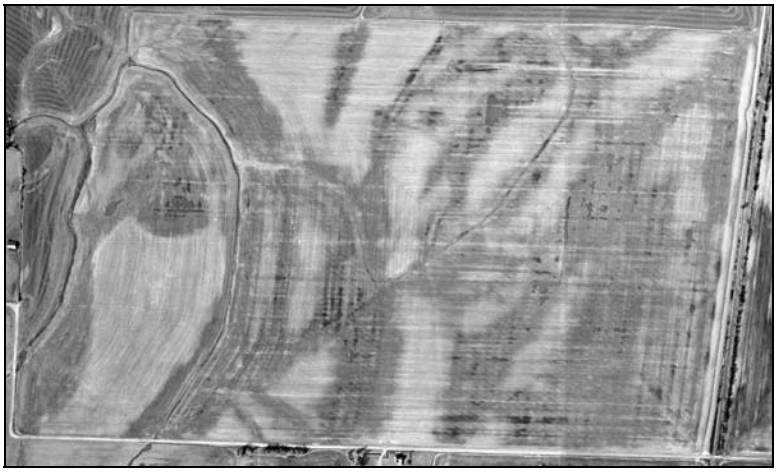


Figure 43. Aerial photograph of an agricultural field with saturated soils indicated by darker colors.

Group D – Evidence from Other Site Conditions or Data

Indicator D3: Shallow aquitard

Category: Secondary

General Description: This indicator occurs in and around the margins of depressions, such as temporary pools, and consists of the presence of an aquitard within the soil profile that is potentially capable of perching water within 12 in. (30 cm) of the surface. Indicators of hydrophytic vegetation and hydric soil must also be present.

Cautions and User Notes: An aquitard is a relatively impermeable soil layer or bedrock that slows the downward infiltration of water and can produce a perched water table, generally in flat or depressional landforms. In some cases, the aquitard may be at the surface and cause water to pond on the surface. Potential aquitards include fragipans, cemented layers, dense glacial till, lacustrine deposits, and clay layers, and can often be identified by the lack of root penetration through the layer. Redoximorphic features often are evident in the layer(s) above the aquitard. Local experience and professional judgment should indicate that the perched water table is likely to occur during the growing season for sufficient duration in most years.

Indicator D5: FAC-neutral test

Category: Secondary

General Description: The plant community passes the FAC-neutral test.

Cautions and User Notes: The FAC-neutral test is performed by compiling a list of dominant plant species across all strata in the community, and dropping from the list any species with a Facultative indicator status (i.e., FAC, FAC–, and FAC+). The FAC-neutral test is met if more than 50 percent of the remaining dominant species are rated FACW and/or OBL. This indicator may be used in communities that contain no FAC dominants. If there are an equal number of dominants that are OBL and FACW versus FACU and UPL, nondominant species should be considered. This indicator is only applicable to wetland hydrology determinations.

5 Difficult Wetland Situations in the Arid West

Introduction

Some wetlands can be difficult to identify because wetland indicators may be missing due to natural processes or recent disturbances. This chapter provides guidance for making wetland determinations in difficult-to-identify wetland situations in the Arid West. It includes regional examples of problem area wetlands and atypical situations as defined in the Corps Manual, as well as other situations that can make wetland delineation more challenging. Problem area wetlands are naturally occurring wetland types that lack indicators of hydrophytic vegetation, hydric soil, or wetland hydrology periodically due to normal seasonal or annual variability, or permanently due to the nature of the soils or plant species on the site. Atypical situations are wetlands in which vegetation, soil, or hydrology indicators are absent due to recent human activities or natural events. The chapter is organized into the following sections:

- Problematic Hydrophytic Vegetation
- Problematic Hydric Soils
- Wetlands that Periodically Lack Indicators of Wetland Hydrology

The list of difficult wetland situations presented in this chapter is not intended to be exhaustive and other such situations may exist in the region. See the Corps Manual for general guidance. Furthermore, more than one wetland factor (i.e., vegetation, soil, and/or hydrology) may be disturbed or problematic on a given site. In general, *wetland determinations on difficult or problematic sites must be based on the best information available to the field inspector, interpreted in light of his or her professional experience and knowledge of the ecology of wetlands in the region.*

Problematic hydrophytic vegetation

Description of the problem

Many factors affect the structure and composition of plant communities in the Arid West, including climatic variability, ephemeral water sources,

saline soils, and human land-use practices. As a result, some wetlands may exhibit indicators of hydric soil and wetland hydrology but lack any of the hydrophytic vegetation indicators presented in Chapter 2, at least at certain times. To identify and delineate these wetlands may require special procedures or additional analysis of factors affecting the site. To the extent possible, the hydrophytic vegetation decision should be based on the plant community that is normally present during the wet portion of the growing season in a normal rainfall year. The following procedure addresses several examples of problematic vegetation situations in the Arid West.

Procedure

Problematic hydrophytic vegetation can be identified and delineated using a combination of observations made in the field and/or supplemental information from the scientific literature and other sources. These procedures should be applied only where indicators of hydric soil and wetland hydrology are present, unless one or both of these factors is also disturbed or problematic, but no indicators of hydrophytic vegetation are evident. The following procedures are recommended:

1. Verify that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present. If indicators of either hydric soil or wetland hydrology are absent, the area is likely non-wetland unless soil and/or hydrology are also disturbed or problematic. If indicators of hydric soil and wetland hydrology are present (or are absent due to disturbance or other problem situations), proceed to step 2.
2. Verify that the area is in a landscape position that is likely to collect or concentrate water. Appropriate settings are listed below. If the landscape setting is appropriate, proceed to step 3.

    a. Concave surface (e.g., depression or swale).
    b. Floodplain.
    c. Level or nearly level area (e.g., 0- to 3-percent slope).
    d. Toe slope or an area of convergent slopes.
    e. Fringe of another wetland or water body.
    f. Area with a restrictive soil layer or aquitard within 24 in. (60 cm) of the surface.
    g. Area where groundwater discharges (e.g., a seep).
    h. Other (explain in field notes why this area is likely to be inundated or saturated for long periods).

3. Use one or more of the approaches described in step 4 (Specific Problematic Vegetation Situations below) or step 5 (General Approaches to Problematic Hydrophytic Vegetation on page 94) to determine whether the vegetation is hydrophytic. In the remarks section of the data form or in the delineation report, explain the rationale for concluding that the plant community is hydrophytic even though indicators of hydrophytic vegetation described in Chapter 2 were not observed.

4. Specific Problematic Vegetation Situations:

   a. *Temporal shifts in vegetation*. As described in Chapter 2, the species composition of some wetland plant communities in the Arid West can change in response to seasonal weather patterns and long-term climatic fluctuations. Wetland types that are influenced by these shifts include vernal pools, playa edges, seeps, and springs. Lack of hydrophytic vegetation during dry periods should not immediately eliminate a site from further consideration as a wetland. A site qualifies for further consideration if the plant community at the time of sampling does not exhibit hydrophytic vegetation indicators, but indicators of hydric soil and wetland hydrology are present. The following sampling and analytical approaches are recommended in these situations:

      (1) Seasonal Shifts in Plant Communities:

         (a) If possible, return to the site during the normal wet portion of the growing season and re-examine the site for indicators of hydrophytic vegetation.
         (b) Examine the site for identifiable plant remains, either alive or dead, or other evidence that the plant community that was present during the normal wet portion of the growing season was hydrophytic.
         (c) Use off-site data sources to determine whether the plant community that is normally present during the wet portion of the growing season is hydrophytic. Appropriate data sources include early growing season aerial photography, NWI maps, soil survey reports, remotely sensed data, public interviews, and previous reports about the site. If necessary, re-examine the site at a later date to verify the hydrophytic vegetation determination.

(d) If the vegetation on the site is substantially the same as that on a wetland reference site having similar soils, landscape position, and known wetland hydrology, then consider the vegetation to be hydrophytic (see step 5b in this procedure (page 95) for more information).

(2) Drought Conditions (lasting more than one growing season):

(a) Investigate climate records (e.g., WETS tables, drought indices) to determine if the area is under the influence of a drought (for more information, see the section on "Wetlands that Periodically Lack Indicators of Wetland Hydrology" later in this chapter). If so, evaluate any offsite data that provide information on the plant community that exists on the site during normal years, including aerial photography, NWI maps, other remote sensing data, soil survey reports, public interviews, and previous site reports. Determine whether the vegetation that is present during normal years is hydrophytic.

(b) If the vegetation on the drought-affected site is substantially the same as that on a wetland reference site in the same general area having similar soils and known wetland hydrology, then consider the vegetation to be hydrophytic (see step 5b (page 95) in this procedure).

b. *Sparse and patchy vegetation*. Many wetlands in the Arid West have sparse or patchy vegetation cover. Examples include some playas, clay pans, and saline wetlands that may be influenced by seasonal ponding of water or discharge of groundwater along their edges. These areas may have indicators of hydric soils and wetland hydrology, but the vegetation is not continuous across or along the boundary of the wetland. Delineation of these areas can be confusing due to the interspersion of wetlands and other potential waters of the United States. For delineation purposes, an area should be considered vegetated (and a potential wetland) if there is 5 percent or more areal cover of plants at the peak of the growing season. Unvegetated areas have less than 5 percent plant cover. Patchy vegetation is a mosaic of both vegetated and unvegetated areas (Figure 44). In some cases, the unvegetated portions of a site may be considered as other waters of the United States if they exhibit ordinary high water (OHW) indicators (33 CFR 328.3). Approved OHW indicators may be available from the

appropriate District regulatory office. Contact information for District regulatory offices is available at the Corps Headquarters web site (http://www.usace.army.mil/inet/functions/cw/cecwo/reg/district.htm).

Playas are one example of this problematic situation. Playas typically are located at the bottom of the drainage area in a basin or watershed. Their surfaces can be classified generally into two types: hard and soft (Stone 1956, Lichvar et al. 2006). In many locations, the main or central part of the playa surface is unvegetated and may not show the redoximorphic features of a hydric soil. The unvegetated parts of hard playas are potential waters of the United States if they exhibit OHW indicators. However, the edges of soft playas and some hard playas are vegetated and may have wetland features. These edges can have sparse or patchy vegetation cover.

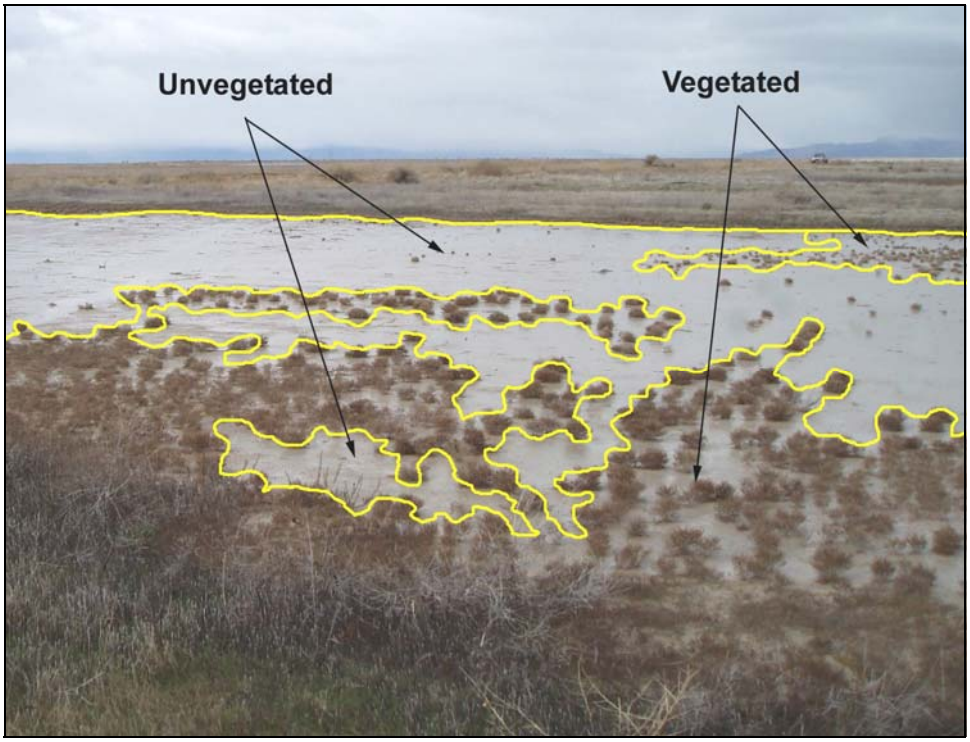


Figure 44. Example of sparse and patchy plant cover in a wetland. Areas labeled as vegetated have 5 percent or more plant cover.

The following procedure is recommended in these situations:

(1) Develop a site map showing the vegetated and unvegetated areas of concern. Sampling points should be placed in representative locations within both the vegetated and unvegetated areas.
(2) In the vegetated areas (i.e., 5 percent or more plant cover), begin by using the standard three-factor approach for identifying wetlands. If indicators of hydrophytic vegetation, hydric soil, and wetland hydrology are present, then these areas are wetlands. Use caution when vegetation, soils, or hydrology are problematic.
(3) In unvegetated areas (less than 5 percent plant cover), and in vegetated areas that fail the three-factor wetland test, examine the site for OHW indicators. If OHW indicators are present, these areas should be identified as potential non-wetland waters of the United States.
(4) If present, identify any unvegetated areas that lack OHW indicators but have indicators of hydric soil and wetland hydrology. These areas should be included in the delineation if they are part of a mosaic with vegetated wetlands and other waters.
(5) The final delineation should encompass (a) all vegetated areas determined to be wetlands (i.e., indicators of hydrophytic vegetation, hydric soil, and wetland hydrology are present), (b) areas that are potential other waters of the United States (i.e., OHW indicators are present), and (c) interspersed areas that are unvegetated but have indicators of hydric soils and wetland hydrology.

c. *Riparian areas*. Riparian ecosystems are highly variable across the Arid West, and can contain both wetland and non-wetland components. Riparian corridors can be lined with hydrophytic vegetation, upland vegetation, unvegetated areas, or a mosaic of these types. Soils may lack hydric soil indicators in recently deposited materials (i.e., Entisols) even when indicators of hydrophytic vegetation and wetland hydrology are present. Surface hydrology can vary from perennial to intermittent and, after a flooding event, water tables can drop quickly to low levels. Therefore, wetland delineation in western riparian areas is often a challenge and should consider the potential interspersion of wetlands and other potential waters of the United States. In addition, many riparian areas contain remnant stands of tree species that may have germinated during unusually high water events or under wetter conditions than currently exist at the site (Figure 45).

Examples of species that occur in these situations include cottonwoods (e.g., *Populus deltoides*, *P. fremontii*) and tree-forming willows (e.g., *Salix gooddingii*, *S. laevigata*). These areas may have a high frequency of phreatophytic species that, when mature, are able to exploit groundwater that is too deep to support wetlands.



Figure 45. Mature *Populus deltoides* stand with a xeric understory on the Arikaree River, Colorado.

In such situations, there may be a hydrophytic overstory and a non-hydrophytic understory. If the soils are Entisols lacking hydric soil features and/or wetland hydrology is problematic, more emphasis should be placed on the understory, which may be more indicative of current wetland or non-wetland conditions.

d. *Areas affected by grazing*. Both short- and long-term grazing can cause shifts in dominant species in the vegetation. Grazers can influence the abundance of plant species in several ways. For instance, trampling by large herbivores can cause soil compaction, altering soil permeability and infiltration rates and affecting the plant community. In addition, selective grazing can reduce the abundance of certain species while increasing other species. Shifts in species composition due to grazing can influence the hydrophytic vegetation determination. Be aware that shifts in both directions, favoring either wetland species or upland species, can occur in these situations. Limited grazing does not necessarily affect the outcome of a hydrophytic vegetation decision.

However, the following procedure is recommended in cases where the hydrophytic vegetation determination would be unreliable or misleading due to the effects of grazing.

(1) Examine the vegetation on a nearby, ungrazed reference site having similar soils and hydrologic conditions. Ungrazed areas may be present on adjacent properties or in fenced exclosures or streamside management zones. If soils and hydrology are comparable, assume that the same plant community would exist on the grazed site in the absence of grazing.
(2) If feasible, remove livestock or fence representative livestock exclusion areas to allow the vegetation time to recover from grazing, and reevaluate the vegetation during the next growing season.
(3) If an appropriate ungrazed area cannot be located or if the ungrazed vegetation condition cannot be determined, make the wetland determination based on indicators of hydric soil and wetland hydrology.

e. *Managed plant communities*. Many natural plant communities throughout the Arid West have been altered and are managed to meet human goals. Examples include clearing of woody vegetation on rangelands, periodic disking or plowing, mowing, planting of native and non-native species (including cultivars or planted species that have escaped and become established on other sites), irrigation of pastures and hayfields, suppression of wildfires, and the use of herbicides. These actions can result in elimination of certain species and their replacement with other species, changes in abundance of certain plants, and shifts in dominant species, possibly influencing a hydrophytic vegetation determination. The following procedure is recommended if the natural vegetation has been altered through management to such an extent that a hydrophytic vegetation determination may be unreliable:

(1) Examine the vegetation on a nearby, unmanaged reference site having similar soils and hydrologic conditions. Assume that the same plant community would exist on the managed site in the absence of human alteration.
(2) For recently cleared or plowed areas (not planted or seeded), leave representative areas unmanaged for at least one growing season with normal rainfall and reevaluate the vegetation.

(3) If management was initiated recently, use offsite data sources such as aerial photography, NWI maps, and interviews with the land owner and other persons familiar with the area to determine what plant community was present on the site before the management occurred.
(4) If the unmanaged vegetation condition cannot be determined, make the wetland determination based on indicators of hydric soil and wetland hydrology.

f. *Areas affected by fires, floods, and other natural disturbances*. Wildfires, floods, and other catastrophic disturbances can dramatically alter the vegetation on a site. Vegetation can be completely or partially removed, or its composition altered, depending upon the intensity of the disturbance. Limited disturbance does not necessarily affect the investigator's ability to determine whether the plant community is or is not hydrophytic. However, if the vegetation on a site has been removed or made unidentifiable by a recent fire, flood, or other disturbance, then one or more of the following procedures may be used to determine whether the vegetation present before the disturbance was hydrophytic. Additional guidance can be found in Part IV, Section F (Atypical Situations) of the Corps Manual.

(1) Examine the vegetation on a nearby, undisturbed reference site having similar soils and hydrologic conditions. Assume that the same plant community would exist on the disturbed site in the absence of disturbance.
(2) Use offsite information sources such as aerial photography, NWI maps, and public interviews to determine the plant community present on the site before the disturbance.
(3) If the undisturbed vegetation condition cannot be determined, make the wetland determination based on indicators of hydric soil and wetland hydrology.

g. *Vigor and stress responses to wetland conditions*. Plant responses to wet site conditions are often easily observable. Many plants develop stress-related features, such as stunting in agricultural crops and browning or yellowing of native or planted vegetation, when subjected to long periods of soil saturation in the root zone. Crop stress in wet agricultural fields is identifiable both in the field and on aerial photography. In addition, many species show increased abundance or

plant vigor when growing on wet sites, particularly later in the growing season when adjacent areas are drying out but moist soils are still present in wetlands. These responses are not species specific or easily measurable but are evident when the vegetation of wetlands and adjacent non-wetlands is compared. The following procedure can help determine whether an observed increase or decrease in plant vigor or stress is the result of growing in wetlands. The procedure assumes that indicators of hydric soil and wetland hydrology are present in the potential wetland area. Use caution in areas where variations in plant vigor or stress may be due to variations in salinity or other soil conditions, uneven application of fertilizers or herbicides, or other factors not related to wetness.

(1) Compare and describe in field notes the size, vigor, or other stress-related characteristics of individuals of the same species between the potential wetland area and the immediately surrounding non-wetlands. Emphasize features that can be measured or photographed and include this information in the field report. To qualify for this procedure, most individuals of the affected species must show vigor/stress responses in the wet area. If there are clear differences in plant vigor/stress responses between potential wetland and adjacent non-wetland areas, proceed to step 2.
(2) Observe and describe trends in plant vigor or stress conditions along the topographic or wetness gradient from the potential wetland to the adjacent non-wetland areas. Trends in plant vigor/stress responses must reflect the distribution of hydric soils, wetland hydrology indicators, topography, and/or landscape conditions relevant to wetlands. If so, proceed to step 3.
(3) Consider the area containing indicators of hydric soil, wetland hydrology, and evidence of increased plant vigor or stress to be a wetland. Determine the wetland boundary based on the spatial patterns in these features plus topography and landscape characteristics.

5. General Approaches to Problematic Hydrophytic Vegetation – The following general procedures are provided to identify hydrophytic vegetation in difficult situations not necessarily associated with specific vegetation types or management practices, including wetlands dominated by FACU, NI, NO, or unlisted species that are functioning as hydrophytes. These procedures should be applied only where indicators of hydric soil and

wetland hydrology are present (or are absent due to disturbance or other problem situations) but indicators of hydrophytic vegetation are not evident. The following approaches are recommended:

a. *Direct hydrologic observations*. Verify that the plant community occurs in an area subject to prolonged inundation or soil saturation during the growing season. This can be done by visiting the site at 2- to 3-day intervals during the portion of the growing season when surface water is most likely to be present or water tables are normally high. Hydrophytic vegetation is considered to be present, and the site is a wetland, if surface water is present and/or the water table is 12 in. (30 cm) or less from the surface for 14 or more consecutive days during the growing season during a period when antecedent precipitation has been normal or drier than normal. If necessary, microtopographic highs and lows should be evaluated separately. The normality of the current year's rainfall must be considered in interpreting field results, as well as the likelihood that wet conditions will occur on the site at least every other year (for more information, see the section on "Wetlands that Periodically Lack Indicators of Wetland Hydrology" in this chapter).
b. *Reference sites*. If indicators of hydric soil and wetland hydrology are present, the site may be considered to be a wetland if the landscape setting, topography, soils, and vegetation are substantially the same as those on nearby wetland reference areas. Hydrologic characteristics of wetland reference areas should be documented through long-term monitoring or by repeated application of the procedure described in item 5a above. Reference sites should be minimally disturbed and provide long-term access. Soils, vegetation, and hydrologic conditions should be thoroughly documented and the data kept on file in the district or field office.
c. *Technical literature*. Published and unpublished scientific literature may be used to support a decision to treat specific FACU species or species with no assigned indicator status (e.g., NI, NO, or unlisted) as hydrophytes or certain plant communities as hydrophytic. Preferably, this literature should discuss the species' natural distribution along the moisture gradient, its capabilities and adaptations for life in wetlands, wetland types in which it is typically found, or other wetland species with which it is commonly associated.

Problematic hydric soils

Description of the problem

Soils with faint or no indicators

Some soils that meet the hydric soil definition may not exhibit any of the indicators presented in Chapter 3. These problematic hydric soils exist for a number of reasons and their proper identification requires additional information, such as landscape position, presence or absence of restrictive soil layers, or information about hydrology. This section describes several soil situations in the Arid West Region that are considered to be hydric if additional requirements are met. In some cases, these hydric soils may appear to be non-hydric due to the color of the parent material from which the soils developed. In others, the lack of hydric soil indicators is due to conditions that inhibit the development of redoximorphic features despite prolonged soil saturation and anoxia. In addition, recently developed wetlands may lack hydric soil indicators because insufficient time has passed for their development. In general, the development of hydric soil indicators in arid areas is not as well understood as in other regions. Additional work is needed to assess the need for new or revised indicators. Examples of problematic hydric soils in the Arid West include, but are not limited to, the following:

1. **Moderately to Very Strongly Alkaline Soils.** The formation of redox concentrations and depletions requires that soluble iron, manganese, and organic matter be present in the soil. In a neutral to acidic soil, iron and manganese readily enter into solution as reduction occurs and then precipitate in the form of redox concentrations as the soil becomes oxidized. Identifiable iron or manganese features do not readily form in saturated soils with high pH. High pH (7.9 or higher) can be caused by many factors. In the Arid West, salt content is a common cause of high soil pH. If the pH is high, indicators of hydrophytic vegetation and wetland hydrology are present, and landscape position is consistent with wetlands in the area, then the soil may be hydric even in the absence of a recognized hydric soil indicator. In the absence of an approved indicator, thoroughly document soil conditions, including pH, in addition to the rationale for identifying the soil as hydric (e.g., landscape position, vegetation, evidence of hydrology, etc.). The concept of high pH includes the USDA terms

Moderately Alkaline, Strongly Alkaline, and Very Strongly Alkaline (USDA Natural Resources Conservation Service 2002).

2. **Volcanic Ash.** Soils of volcanic origin that have high levels of volcanic ash (silica) are inherently low in iron, manganese, and sulfur. Many hydric soil indicators are formed predominantly by the accumulation or loss of iron, manganese, or sulfur and, therefore, cannot form in these soils. In the absence of an approved indicator, soil and landscape conditions should be documented thoroughly, along with the rationale for considering the soil to be hydric (e.g., landscape position, vegetation, evidence of hydrology, etc.). A soil scientist with local experience may be needed to help determine whether soils are volcanic in origin.
3. **Vegetated Sand and Gravel Bars within Floodplains.** Coarse-textured soils commonly occur on vegetated bars above the active channel of rivers and streams. In some cases, these soils lack hydric soil indicators due to seasonal or annual deposition of new soil material, low iron or manganese content, and low organic matter content. Redox concentrations can sometimes be found on the bottoms of coarse fragments and should be examined closely to see if they satisfy an indicator.
4. **Recently Developed Wetlands.** Recently developed wetlands include mitigation sites, wetland management areas (e.g., for waterfowl), other wetlands intentionally or unintentionally produced by human activities, and naturally occurring wetlands that have not been in place long enough to develop hydric soil indicators.
5. **Seasonally Ponded Soils.** Seasonally ponded, depressional wetlands occur in basins and valleys throughout the Arid West. Most are perched systems, with water ponding above a restrictive soil layer, such as a hardpan or clay layer, that is at or near the surface (e.g., in Vertisols). Some of these wetlands lack hydric soil indicators due to limited saturation depth, saline conditions, or other factors.

Soils with relict or induced hydric soil indicators

Some soils in the Arid West exhibit redoximorphic features and hydric soil indicators that formed in the recent or distant past when conditions may have been wetter than they are today. These features have persisted even though wetland hydrology may no longer be present. For example, relict redoximorphic features can be found throughout the former lake basins of the Great Basin that were inundated during the Pleistocene epoch. In addition, wetlands that were drained for agricultural purposes starting in the

1800s, such as large areas of California's Central Valley, may contain persistent hydric soil features. Wetland soils drained during historic times are still considered to be hydric but they may no longer support wetlands. Relict hydric soil features may be difficult to distinguish from contemporary features. However, if indicators of hydrophytic vegetation and wetland hydrology are present, then hydric soil indicators can be assumed to be contemporary.

There are also areas where hydric soil features have developed in former uplands due to human activities, such as the diversion of water for irrigation or other uses. The application of irrigation water to upland areas can create wetland hydrology and, given adequate time, induce the formation of hydric soil indicators. In some cases, a soil scientist can distinguish naturally occurring hydric soil features from those induced by irrigation. Characterizing the naturally occurring hydrology is often important to the determination, and the timing of field observations can be critical. Observations made during the early part of the growing season, when natural hydrology is often at its peak and irrigation has not yet begun, may help to differentiate naturally occurring and irrigation-induced hydric soil features.

Procedure

Soils that are thought to meet the definition of a hydric soil but do not exhibit any of the indicators described in Chapter 3 can be identified by the following recommended procedure. This procedure should be used only where indicators of hydrophytic vegetation and wetland hydrology are present (or are absent due to disturbance or other problem situations) but indicators of hydric soil are not evident.

1. Verify that one or more indicators of hydrophytic vegetation are present or that the vegetation is disturbed or problematic. If so, proceed to step 2.

2. Verify that at least one primary or two secondary indicators of wetland hydrology are present or that indicators are absent due to disturbance or other factors. If so, proceed to step 3. If indicators of hydrophytic vegetation and/or wetland hydrology are absent, then the area is probably non-wetland and no further analysis is required.

3. Thoroughly describe and document the soil profile and landscape setting. Verify that the area is in a landscape position that is likely to collect or

concentrate water. Appropriate settings are listed below. If the landscape setting is appropriate, proceed to step 4.

a. Concave surface (e.g., depression or swale).
b. Floodplain.
c. Level or nearly level area (e.g., 0- to 3-percent slope).
d. Toe slope or an area of convergent slopes.
e. Fringe of another wetland or water body.
f. Area with a restrictive soil layer or aquitard within 24 in. (60 cm) of the surface.
g. Area where groundwater discharges (e.g., a seep).
h. Other (explain in field notes why this area is likely to be inundated or saturated for long periods).

4. Use one or more of the following approaches to determine whether the soil is hydric. In the remarks section of the data form or in the delineation report, explain why it is believed that the soil lacks any of the NTCHS hydric soil indicators described in Chapter 3 and why it is believed that the soil meets the definition of a hydric soil.

   a. Determine whether one or more of the following indicators of problematic hydric soils is present. Descriptions of each indicator are given in Chapter 3. If one or more indicators is present, then the soil is hydric.

      (1) 1 cm Muck (A9) (applicable to LRR C).
      (2) 2 cm Muck (A10) (applicable to LRR B).
      (3) Reduced Vertic (F18) (applicable to LRR B, C, and D).
      (4) Red Parent Material (TF2) (applicable to LRR B, C, and D).

   b. Determine whether one or more of the following problematic soil situations is present. If present, consider the soil to be hydric.

      (1) Moderately to Very Strongly Alkaline Soils.
      (2) Volcanic Ash.
      (3) Vegetated Sand and Gravel Bars within Floodplains.
      (4) Recently Developed Wetlands.
      (5) Seasonally Ponded Soils.

(6) Other (in field notes, describe the problematic soil situation and explain why it is believed that the soil meets the hydric soil definition).

c. Soils that have been saturated for long periods and have become chemically reduced may change color when exposed to air due to the rapid oxidation of ferrous iron (Fe^{2+}) to Fe^{3+} (i.e., a reduced matrix) (Figures 46 and 47). If the soil contains sufficient iron, this can result in an observable color change, especially in hue or chroma. The soil is hydric if a mineral layer 4 in. (10 cm) or more thick starting within 12 in. (30 cm) of the soil surface that has a matrix value of 4 or more and chroma of 2 or less becomes redder by one or more pages in hue and/or increases one or more in chroma when exposed to air within 30 minutes (Vepraskas 1992).

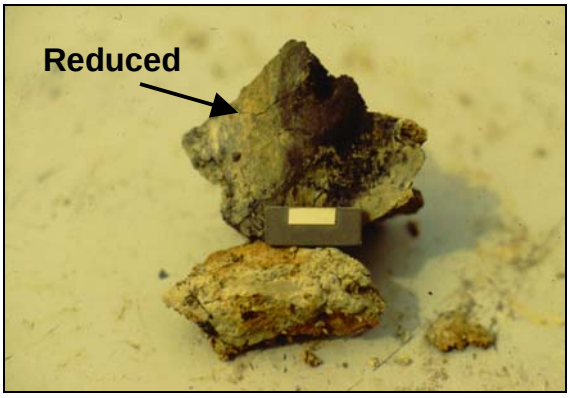


Figure 46. This soil exhibits colors associated with reducing conditions. Scale is 1 cm.

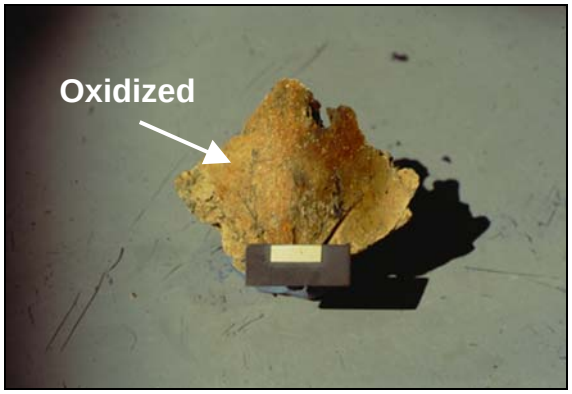


Figure 47. Soil in Figure 46 after exposure to the air and oxidation.

Care must be taken to obtain an accurate color of the soil sample immediately upon excavation. The colors should be observed closely and examined again after several minutes. Do not allow the sample to become dry. Dry soils will usually have a different color than wet or moist soils. As always, do not obtain colors while wearing sunglasses. Colors must be obtained in the field under natural light and not under artificial light.

d. If the soil is saturated at the time of sampling, alpha, alpha-dipyridyl dye can be used in the following procedure to determine if reduced

(ferrous) iron is present. If ferrous iron is present as described below, then the soil is hydric.

Alpha, alpha-dipyridyl is a dye that reacts with reduced iron. In some cases, it can be used to provide evidence that a soil is hydric when it lacks other hydric soil indicators. The soil is likely to be hydric if application of alpha, alpha-dipyridyl dye to mineral soil material in at least 60 percent of a layer at least 4 in. (10 cm) thick within a depth of 12 in. (30 cm) of the soil surface results in a positive reaction within 30 seconds evidenced by a pink or red coloration to the dye during the growing season.

Using a dropper, apply a small amount of dye to a freshly broken ped face to avoid any chance of a false positive test due to iron contamination from digging tools. Look closely at the treated soil for evidence of color change. If in doubt, apply the dye to a sample of known upland soil and compare the reaction to the sample of interest. A positive reaction will not occur in soils that lack iron and may not occur in soils with high pH. The lack of a positive reaction to the dye does not preclude the presence of a hydric soil. Specific information about the use of alpha, alpha-dipyridyl can be found in NRCS Hydric Soils Technical Note 8 (http://soils.usda.gov/use/hydric/ntchs/tech_notes/index.html).

e. Using gauge data, water-table monitoring data, or repeated direct hydrologic observations, determine whether the soil is ponded or flooded, or the water table is 12 in. (30 cm) or less from the surface, for 14 or more consecutive days during the growing season in most years (at least 5 years in 10, or 50 percent or higher probability) (U.S. Army Corps of Engineers 2005). If so, then the soil is hydric. Furthermore, any soil that meets the NTCHS hydric soil technical standard (NRCS Hydric Soils Technical Note 11, http://soils.usda.gov/use/hydric/ntchs/tech_notes/index.html) is hydric.

Wetlands that periodically lack indicators of wetland hydrology

Description of the problem

Wetlands are areas that are flooded or ponded or have soils that are saturated with water for long periods during the growing season in most years. If a site is visited during a period of normal precipitation amounts and it is inundated or the water table is near the surface, then the wetland hydrology determination is straightforward. However, the Arid West Region is characterized by long, hot summer dry seasons. During the dry season, surface water recedes from wetland margins, water tables drop, and many wetlands dry out completely. Superimposed on this seasonal variability are high spatial and annual variability in precipitation amounts. Wetlands in general are inundated or saturated in most years (at least 5 years in 10, or 50 percent or higher probability) over a long-term record. However, many wetlands in the Arid West do not become inundated or saturated in some years and, during drought cycles, may not inundate or saturate for several years in a row.

Wetland hydrology determinations are based on indicators, many of which were designed to be used during dry periods when the direct observation of surface water or a shallow water table is not possible. However, some wetlands may lack any of the listed hydrology indicators, particularly during the long dry season or in a dry year. The evaluation of wetland hydrology requires special care on any site where indicators of hydrophytic vegetation and hydric soil are present but hydrology indicators appear to be absent. Among other factors, this evaluation should consider the timing of the site visit in relation to normal seasonal and annual hydrologic variability, and whether the amount of rainfall prior to the site visit has been normal. This section describes a number of approaches that can be used to determine whether wetland hydrology is present on sites where indicators of hydrophytic vegetation and hydric soil are present but hydrology indicators may be lacking due to normal variations in rainfall or runoff, human activities that destroy hydrology indicators, and other factors.

Procedure

1. Verify that indicators of hydrophytic vegetation and hydric soil are present, or are absent due to disturbance or other problem situations. If so, proceed to step 2.

2. Verify that the site is in a landscape position that is likely to collect or concentrate water. Appropriate settings are listed below. If the landscape setting is appropriate, proceed to step 3.

    a. Concave surface (e.g., depression or swale).
    b. Floodplain.
    c. Level or nearly level area (e.g., 0- to 3-percent slope).
    d. Toe slope or an area of convergent slopes.
    e. Fringe of another wetland or water body.
    f. Area with a restrictive soil layer or aquitard within 24 in. (60 cm) of the surface.
    g. Area where groundwater discharges (e.g., a seep).
    h. Other (explain in field notes why this area is likely to be inundated or saturated for long periods).

3. Use one or more of the following approaches to determine whether wetland hydrology is present and the site is a wetland. In the remarks section of the data form or in the delineation report, explain the rationale for concluding that wetland hydrology is present even though indicators of wetland hydrology described in Chapter 4 were not observed.

    a. *Site visits during the dry season*. Determine whether the site visit occurred during the normal annual "dry season." The dry season, as used in this supplement, is the period of the year when soil moisture is normally being depleted and water tables are falling to low levels in response to decreased precipitation and/or increased evapotranspiration, usually during late spring and summer. It also includes the beginning of the recovery period in late summer or fall. The Web-Based Water-Budget Interactive Modeling Program (WebWIMP) is one source for approximate dates of wet and dry seasons for any terrestrial location based on average monthly precipitation and estimated evapotranspiration (http://climate.geog.udel.edu/~wimp/). In general, the dry season in a typical year is indicated when potential evapotranspiration exceeds precipitation (indicated by negative values of DIFF in the WebWIMP output), resulting in drawdown of soil moisture storage (negative values of DST) and/or a moisture deficit (positive values of DEF, also called the unmet atmospheric demand for moisture). Actual dates for the dry season vary by locale and year.

In many wetlands, direct observation of flooding, ponding, or a shallow water table would be unexpected during the dry season. Wetland hydrology indicators, if present, would most likely be limited to indirect evidence, such as water marks, drift deposits, or surface cracks. In some situations, hydrology indicators may be absent during the dry season. If the site visit occurred during the dry season on a site that contains hydric soils and hydrophytic vegetation and no evidence of hydrologic manipulation (e.g., no drainage ditches, dams, levees, water diversions, etc.), then consider the site to be a wetland. If necessary, revisit the site during the normal wet season and check again for the presence or absence of wetland hydrology indicators. The highly variable spatial and temporal distribution of rainfall in the Arid West makes generalities difficult. However, if wetland hydrology indicators are absent during the wet portion of the growing season in a normal or wetter-than-normal rainfall year, the site is probably non-wetland.

b. *Periods with below-normal rainfall.* Determine whether the amount of rainfall that occurred in the 2-3 months preceding the site visit was normal, above normal, or below normal based on the normal range reported in WETS tables. WETS tables are provided by the NRCS National Water and Climate Center (http://www.wcc.nrcs.usda.gov/climate/wetlands.html) and are calculated from long-term (30-year) weather records gathered at National Weather Service meteorological stations. To determine whether precipitation was normal prior to the site visit, actual rainfall in the current month and previous 2-3 months should be compared with the normal ranges for each month given in the WETS table (USDA Natural Resources Conservation Service 1997, Sprecher and Warne 2000). The lower and upper limits of the normal range are indicated by the columns labeled "30% chance will have less than" and "30% chance will have more than" in the WETS table. The USDA Natural Resources Conservation Service (1997, Section 650.1903) also gives a procedure that can be used to weight the information from each month and determine whether the entire period was normal, wet, or dry. In mountainous areas, average precipitation amounts can vary considerably over short distances. Therefore, use caution in areas where elevation, aspect, rain shadow effects, or other conditions differ between the site of interest and the location of the nearest weather station. Sometimes a more distant station is more representative of the site in question.

When precipitation has been below normal, wetlands may not flood, pond, or develop shallow water tables even during the typical wet portion of the growing season and may not exhibit other indicators of wetland hydrology. Therefore, if precipitation was below normal prior to the site visit, and the site contains hydric soils and hydrophytic vegetation and no evidence of hydrologic manipulation (e.g., no drainage ditches, dams, levees, water diversions, etc.), it should be identified as a wetland. If necessary, the site can be revisited during a period of normal rainfall and checked again for hydrology indicators.

c. *Drought years*. Determine whether the area has been subject to drought. Droughts lasting two to several years in a row are common in the Arid West. Drought periods can be identified by comparing annual rainfall totals with the normal range of annual rainfall given in WETS tables or by examining trends in drought indices, such as the Palmer Drought Severity Index (PDSI) (Sprecher and Warne 2000). PDSI takes into account not only precipitation but also temperature, which affects evapotranspiration, and soil moisture conditions. The index is usually calculated on a monthly basis for major climatic divisions within each state. Therefore, the information is not site-specific. PDSI ranges generally between –6 and +6 with negative values indicating dry periods and positive values indicating wet periods. An index of –1.0 indicates mild drought, –2.0 indicates moderate drought, –3.0 indicates severe drought, and –4.0 indicates extreme drought. Time-series plots of PDSI values by month or year are available from the National Climatic Data Center (http://www.ncdc.noaa.gov/oa/climate/onlineprod/drought/xmgr.html#ds). If wetland hydrology indicators appear to be absent on a site that has hydrophytic vegetation and hydric soils, no evidence of hydrologic manipulation (e.g., no drainage ditches, dams, levees, water diversions, etc.), and the region has been affected by drought, then the area should be identified as a wetland.

d. *Years with unusually low winter snowpack*. Determine whether the site visit occurred following a winter with unusually low snowpack. Some wetlands in the Arid West, particularly those located in or near mountain ranges, depend upon the melting winter snowpack as a major water source. In areas where the snowpack persists throughout the winter, water availability in spring and early summer depends in part on winter water storage in the form of snow and ice. Therefore,

springtime water availability in a given year can be evaluated by comparing the liquid equivalent of snowfall over the previous winter (e.g., October through April) against 30-year averages calculated for NRCS Snowpack Telemetry (SNOTEL) sites (http://www.wcc.nrcs.usda.gov/factpub/ads/) or for National Weather Service meteorological stations (may require a fee, http://lwf.ncdc.noaa.gov/oa/ncdc.html). This procedure may not be reliable in areas where the snowpack is not persistent and water is released intermittently throughout the winter.

In years when winter snowpack is appreciably less than the long-term average, wetlands that depend on snowmelt as an important water source may not flood, pond, or develop shallow water tables and may not exhibit other wetland hydrology indicators. Under these conditions, a site that contains hydric soils and hydrophytic vegetation and no evidence of hydrologic manipulation should be considered to be a wetland. If necessary, the site can be revisited following a winter with normal snowpack conditions and checked again for wetland hydrology indicators.

e. *Reference sites*. If indicators of hydric soil and hydrophytic vegetation are present on a site that lacks wetland hydrology indicators, the site may be considered to be a wetland if the landscape setting, topography, soils, and vegetation are substantially the same as those on nearby wetland reference areas. Hydrology of wetland reference areas should be documented through long-term monitoring (see item *g* below) or by repeated application of the procedure described in item *5a* on page 95 (Direct Hydrologic Observations) of the procedure for Problematic Hydrophytic Vegetation in this chapter. Reference sites should be minimally disturbed and provide long-term access. Soils, vegetation, and hydrologic conditions should be thoroughly documented and the data kept on file in the district or field office.

f. *Hydrology tools*. The "Hydrology Tools" (USDA Natural Resources Conservation Service 1997) is a collection of methods that can be used to determine whether wetland hydrology is present on a potential wetland site that lacks indicators due to disturbance or other reasons, particularly on lands used for agriculture. Generally they require additional information, such as aerial photographs or stream-gauge data, or involve hydrologic modeling and approximation techniques. They should be used only when an indicator-based wetland hydrology

determination is not possible or would give misleading results. A hydrologist may be needed to help select and carry out the proper analysis. The seven hydrology tools are used to:

(1) Analyze stream and lake gauge data.
(2) Estimate runoff volumes to determine duration and frequency of ponding in depressional areas.
(3) Evaluate the frequency of wetness signatures on repeated aerial photography.
(4) Model water-table fluctuations in fields with parallel drainage systems using the DRAINMOD model.
(5) Estimate the "scope and effect" of drainage ditches or subsurface drain lines.
(6) Use NRCS state drainage guides to estimate the effectiveness of agricultural drainage systems.
(7) Analyze data from groundwater monitoring wells (see item *g* below for additional information).

g. *Long-term hydrologic monitoring*. On sites where the hydrology has been manipulated by man (e.g., with ditches, dams, levees, water diversions, land grading) or where natural events (e.g., downcutting of streams, volcanic activity) have altered conditions such that hydrology indicators may be missing or misleading, direct monitoring of surface and groundwater may be needed to determine the presence or absence of wetland hydrology. The U.S. Army Corps of Engineers (2005) provides minimum standards for the design, construction, and installation of water-table monitoring wells, and for the collection and interpretation of groundwater monitoring data, in cases where direct hydrologic measurements are needed to determine whether wetlands are present on highly disturbed or problematic sites. This standard calls for 14 or more consecutive days of flooding, ponding, or a water table 12 in. (30 cm) or less below the soil surface during the growing season at a minimum frequency of 5 years in 10 (50 percent or higher probability), unless a different standard has been established for a particular geographic area or wetland type. A disturbed or problematic site that meets this standard has wetland hydrology. This standard is not intended (1) to overrule an indicator-based wetland determination on a site that is not disturbed or problematic, or (2) to test or validate existing or proposed wetland indicators.

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Appendix A: Glossary

This glossary is intended to supplement those given in the Corps Manual and other available sources. See the following publications for terms not listed here:

- Corps Manual (Environmental Laboratory 1987) (http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf).
- Field Indicators of Hydric Soils in the United States (USDA Natural Resources Conservation Service 2006b) (http://soils.usda.gov/use/hydric/).
- National Soil Survey Handbook, Part 629 (USDA Natural Resources Conservation Service 2005) (ftp://ftp-fc.sc.egov.usda.gov/NSSC/Soil_Survey_Handbook/629_glossary.pdf).

Absolute cover. In vegetation sampling, the percentage of the ground surface that is covered by the aerial portions (leaves and stems) of a plant species when viewed from above. Due to overlapping plant canopies, the sum of absolute cover values for all species in a community or stratum may exceed 100 percent. In contrast, "relative cover" is the absolute cover of a species divided by the total coverage of all species in that stratum, expressed as a percent. Relative cover cannot be used to calculate the prevalence index.

Aquitard. A layer of soil or rock that retards the downward flow of water and is capable of perching water above it. For the purposes of this supplement, the term aquitard also includes the term aquiclude, which is a soil or rock layer that is incapable of transmitting significant quantities of water under ordinary hydraulic gradients.

Contrast. The color difference between a redox concentration and the dominant matrix color. Differences are classified as faint, distinct, or prominent and are defined in the glossary of USDA Natural Resources Conservation Service (2006b) and illustrated in Table A1.

Depleted matrix. The volume of a soil horizon or subhorizon from which iron has been removed or transformed by processes of reduction and translocation to create colors of low chroma and high value. A, E, and calcic horizons may have low chromas and high values and may therefore

be mistaken for a depleted matrix. However, they are excluded from the concept of a depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present. In some places the depleted matrix may change color upon exposure to air (reduced matrix); this phenomenon is included in the concept of a depleted matrix. The following combinations of value and chroma identify a depleted matrix:

- Matrix value of 5 or more and chroma of 1, with or without redox concentrations occurring as soft masses and/or pore linings, or
- Matrix value of 6 or more and chroma of 2 or 1, with or without redox concentrations occurring as soft masses and/or pore linings, or
- Matrix value of 4 or 5 and chroma of 2, with 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings, or
- Matrix value of 4 and chroma of 1, with 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings (USDA Natural Resources Conservation Service 2006b).

Common (2 to less than 20 percent) to many (20 percent or more) redox concentrations (USDA Natural Resources Conservation Service 2002) are required in soils with matrix colors of 4/1, 4/2, and 5/2 (Figure A1). Redox concentrations include iron and manganese masses and pore linings (Vepraskas 1992). See “contrast” in this glossary for the definitions of “distinct” and “prominent.”

Table A1. Tabular key for contrast determinations using Munsell notation.

Hues are the same (Δ h = 0)			Hues differ by 2 (Δ h = 2)		
Δ Value	Δ Chroma	Contrast	Δ Value	Δ Chroma	Contrast
0	≤1	Faint	0	0	Faint
0	2	Distinct	0	1	Distinct
0	3	Distinct	0	≥2	Prominent
0	≥4	Prominent	1	≤1	Distinct
1	≤1	Faint	1	≥2	Prominent
1	2	Distinct	≥2	---	Prominent
1	3	Distinct			
1	≥4	Prominent			
≤2	≤1	Faint			
≤2	2	Distinct			
≤2	3	Distinct			
≤2	≥4	Prominent			
3	≤1	Distinct			
3	2	Distinct			
3	3	Distinct			
3	≥4	Prominent			
≥4	---	Prominent			
Hues differ by 1 (Δ h = 1)			Hues differ by 3 or more (Δ h ≥ 3)		
Δ Value	Δ Chroma	Contrast	Δ Value	Δ Chroma	Contrast
0	≤1	Faint	Color contrast is prominent, except for low chroma and value.		Prominent
0	2	Distinct			
0	≥3	Prominent			
1	≤1	Faint			
1	2	Distinct			
1	≥3	Prominent			
2	≤1	Distinct			
2	2	Distinct			
2	≥3	Prominent			
≥3	---	Prominent			

Note: If both colors have values of ≤3 and chromas of ≤2, the color contrast is faint (regardless of the difference in hue).

Adapted from USDA Natural Resources Conservation Service (2002)

Diapause. A period during which growth or development is suspended and physiological activity is diminished, as in certain aquatic invertebrates in response to drying of temporary wetlands.

Distinct. See Contrast.

Episaturation. Condition in which the soil is saturated with water at or near the surface, but also has one or more unsaturated layers below the saturated zone. The zone of saturation is perched on top of a relatively impermeable layer.

Fragmental soil material. Soil material that consists of 90 percent or more rock fragments; less than 10 percent of the soil consists of particles 2 mm or smaller (USDA Natural Resources Conservation Service 2006b).

Gleyed matrix. A gleyed matrix has one of the following combinations of hue, value, and chroma and the soil is not glauconitic (Figure A2):

- 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more and chroma of 1; or
- 5G with value of 4 or more and chroma of 1 or 2; or
- N with value of 4 or more (USDA Natural Resources Conservation Service 2006b).

Growing season. In the Arid West Region, growing season dates are determined through onsite observations of the following indicators of biological activity in a given year: (1) above-ground growth and development of vascular plants, and/or (2) soil temperature (see Chapter 4 for details). If onsite data gathering is not practical, growing season dates may be approximated by using WETS tables available from the NRCS National Water and Climate Center to determine the median dates of 28 °F (−2.2 °C) air temperatures in spring and fall based on long-term records gathered at the nearest appropriate National Weather Service meteorological station.



Figure A1. Illustration of values and chromas that require 2 percent or more distinct or prominent redox concentrations and those that do not, for hue 10YR, to meet the definition of a depleted matrix. *Due to inaccurate color reproduction, do not use this page to determine soil colors in the field.* Background image from the Munsell Soil Color Charts reprinted courtesy of Munsell Color Services Lab, a part of X-Rite, Inc.



Figure A2. For hydric soil determinations, a gleyed matrix has the hues and chroma identified in this illustration with a value of 4 or more. *Due to inaccurate color reproduction, do not use this page to determine soil colors in the field.* Background image from the Munsell Soil Color Charts reprinted courtesy of Munsell Color Services Lab, a part of X-Rite, Inc.

Halophyte. A plant adapted to saline or alkaline soils.

High pH. pH 7.9 or higher. Includes Moderately Alkaline, Strongly Alkaline, and Very Strongly Alkaline (USDA Natural Resources Conservation Service 2002).

Nodules and concretions. Irregularly shaped, firm to extremely firm accumulations of iron and manganese oxides. When broken open, nodules have uniform internal structure whereas concretions have concentric layers (Vepraskas 1992).

Phreatophyte. A deep-rooted plant that obtains water from the water table or permanent groundwater source.

Prominent. See Contrast.

Reduced matrix. Soil matrix that has a low chroma in situ due to presence of reduced iron, but whose color changes in hue or chroma when exposed to air as Fe^{2+} is oxidized to Fe^{3+} (Vepraskas 1992).

Saturation. For wetland delineation purposes, a soil layer is saturated if virtually all pores between soil particles are filled with water (National Research Council 1995, Vepraskas and Sprecher 1997). This definition includes part of the capillary fringe above the water table (i.e., the tension-saturated zone) in which soil water content is approximately equal to that below the water table (Freeze and Cherry 1979).

Appendix B: Point-Intercept Sampling Procedure for Determining Hydrophytic Vegetation

The following procedure for point-intercept sampling is an alternative to plot-based sampling methods to estimate the abundance of plant species in a community. The approach may be used with the approval of the appropriate Corps of Engineers District to evaluate vegetation as part of a wetland delineation. Advantages of point-intercept sampling include better quantification of plant species abundance and reduced bias compared with visual estimates of cover. The method is useful in communities with high species diversity, and in areas where vegetation is patchy or heterogeneous, making it difficult to identify representative locations for plot sampling. Disadvantages include the increased time required for sampling and the need for vegetation units large enough to permit the establishment of one or more transect lines within them. The approach also assumes that soil and hydrologic conditions are uniform across the area where transects are located. In particular, transects should not cross the wetland boundary. Point-intercept sampling is generally used with a transect-based prevalence index (see below) to determine whether vegetation is hydrophytic.

In point-intercept sampling, plant occurrence is determined at points located at fixed intervals along one or more transects established in random locations within the plant community or vegetation unit. If a transect is being used to sample the vegetation near a wetland boundary, the transect should be placed parallel to the boundary and should not cross either the wetland boundary or into other communities. Usually a measuring tape is laid on the ground and used for the transect line. Transect length depends upon the size and complexity of the plant community and may range from 100 to 300 ft (30 to 90 m) or more. Plant occurrence data are collected at fixed intervals along the line, for example every 2 ft (0.6 m). At each interval, a “hit” on a species is recorded if a vertical line at that point would intercept the stem or foliage of that species. Only one “hit” is recorded for a species at a point even if the same species would be intercepted more than once at that point. Vertical intercepts can be determined using a long pin or rod protruding into and through the various vegetation

layers, a sighting device (e.g., for the canopy), or an imaginary vertical line. The total number of "hits" for each species along the transect is then determined. The result is a list of species and their frequencies of occurrence along the line (Mueller-Dombois and Ellenberg 1974, Tiner 1999). Species are then categorized by wetland indicator status (i.e., OBL, FACW, FAC, FACU, or UPL), the total number of hits determined within each category, and the data used to calculate a transect-based prevalence index. The formula is similar to that given in Chapter 2 for the plot-based prevalence index (see Indicator 2), except that frequencies are used in place of cover estimates. The community is hydrophytic if the prevalence index is 3.0 or less. To be valid, more than 80 percent of "hits" on the transect must be of species that have been identified correctly and placed in an indicator category.

The transect-based prevalence index is calculated using the following formula:

$$PI = \frac{F_{OBL} + 2F_{FACW} + 3F_{FAC} + 4F_{FACU} + 5F_{UPL}}{F_{OBL} + F_{FACW} + F_{FAC} + F_{FACU} + F_{UPL}}$$

where:

PI = Prevalence index
F_{OBL} = Frequency of obligate (OBL) plant species
F_{FACW} = Frequency of facultative wetland (FACW) plant species
F_{FAC} = Frequency of facultative (FAC) plant species
F_{FACU} = Frequency of facultative upland (FACU) plant species
F_{UPL} = Frequency of upland (UPL) plant species.

Appendix C: Data Form

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** _____

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No** _____

Remarks:

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

REPORT DOCUMENTATION PAGE

Form Approved
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1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
September 2008	Final report	

4. TITLE AND SUBTITLE

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

U.S. Army Corps of Engineers

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

U.S. Army Engineer Research and Development Center
Environmental Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

8. PERFORMING ORGANIZATION REPORT NUMBER

ERDC/EL TR-08-28

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Headquarters, U.S. Army Corps of Engineers
Washington, DC 20314-1000

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual, which provides technical guidance and procedures for identifying and delineating wetlands that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. The development of Regional Supplements is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. This supplement is applicable to the Arid West Region, which consists of all or portions of 12 states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming.

15. SUBJECT TERMS

Delineation
Hydrology
Plant Communities
Soil
Vegetation
Wetlands

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED		133	

US Army Corps of Engineers
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Final Map and Drawing Standards for the South Pacific Division Regulatory Program

Posted 8/6/2012

CESPD

ATTACHMENTS

- Aquatic Resources Spreadsheet
- Mitigation SPD
- Impacts Spreadsheet
- Mitigation Map Example

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Introduction: This notice establishes final standards and guidelines for maps and drawings submitted as part of delineations and applications for U.S. Army permits and jurisdictional determinations. The intent of these standards is to improve the quality and consistency of maps and drawings and simplify and improve review and processing by Corps Regulatory project managers. We estimate that at least 70-80% of maps and drawings submitted to the Corps Regulatory Program in South Pacific Division (comprised of Albuquerque, San Francisco, Sacramento, and Los Angeles districts) already meet the majority of these standards. By adhering to a single standard for maps and drawings, applicants and consultants should have a clear and concise product, and project managers should be able to provide permit decisions and jurisdictional determinations in a more consistent and timely manner. In addition, electronic mapping of permit-related maps and drawings will enable data sharing with other resource agencies for coordination of mitigation decision-making.

Applicability: These standards apply to all submittals to Regulatory Divisions, within the Districts of the Corps' South Pacific Division, and supersede all previous SPD district-specific standards related to map and drawing requirements. At the Corps' discretion, these standards may be modified or waived on a case by case basis, for example, projects or activities with small or temporary impacts to waters of the U.S. (for example, less than a tenth of an acre of permanent impact), projects where the applicant possesses limited financial resources (for example, private homeowners and small land owners), emergencies, and restoration projects with limited grant funding. Additional examples where these standards may be modified or waived include reauthorization of previously-authorized work and maintenance, repair, and/or rehabilitation projects where the original authorization included adequate drawings that are available. In general, compensatory mitigation plans must adhere to these standards, regardless of whether the standards are waived for the overall project.

Standards:

1) General:

a. Documents must include at a minimum: location (vicinity) map(s) and plan view map(s). Mitigation plans and construction drawings should also include representative cross-sectional views. Delineation maps must be provided for the project area, staging areas, disposal sites, access routes, and proposed mitigation sites, etc.

b. The orientation of the map on the page (as it is read) must be the same for all maps submitted.

c. By convention, North will normally be toward the top of the page.

d. For plan view maps where specific elevations are shown, and for all cross sections, the reference elevation datum (e.g. North American Vertical Datum of 1988, National Geodetic Vertical Datum of 1929, etc.) must be indicated.

e. Procedure: the Corps will review submitted maps and drawings for conformance with these standards. Documents not meeting the standards may be returned for revision.

f. Base maps:

a. If aerial photographs are used, these must be orthrectified, date-stamped, and with the imagery source identified on the map.

b. Date of imagery must be chosen such that aquatic resources have maximum visibility (e.g., during wet season).

c. At least one map showing topography must be included.

g. Format:

a. Both paper and electronic versions of documents are required; however, submittal of electronic documents may be waived on a project-specific basis for applicants without access to the appropriate software. For electronic documents, Adobe PDF format is preferred.

b. Size: If larger than 11 x 17 inches, documents must be folded to fit within a 8.5 x 11 inch binder.

c. GIS: All GIS data and associated metadata shall be provided on a digital medium (for example, CD or DVD), preferably using the Environmental Systems Research Institute (ESRI) shapefile format. Other data types may be accepted at the Corps project manager’s discretion.

h. Plan view :

a. At least two control points on opposite corners with latitude and longitude clearly annotated.

b. North arrow.

c. Bar scale and text scale (e.g., "1 inch = 100 ft").

d. Legend for any relevant items shown (e.g., wetlands and/or other water types), including the area (acres or square feet) in parenthesis for all relevant items shown on the map (e.g. project boundary, project construction footprint, waters of the U.S., impacts to waters of the U.S., etc.). Such items must be clearly identified in the legend. Annotate clearly showing the location of cross-sectional views (e.g., "A-A' ")

e. Date prepared/revised.

f. Name and organization of map preparer.

g. Appropriate landmarks (on-site and nearby roads, prominent structures and/or topographic features, etc.).

i. Cross-sectional view:

a. Must include a bar scale and text scale (e.g., "1 inch = 100 ft") for horizontal and vertical dimensions.

b. If there are tidal areas within the survey area, identify the location and elevation of Mean High Water and the High Tide Line on all maps and cross-section drawings when appropriate.

2) Location (vicinity) map(s):

a. One or more vicinity maps must be submitted, at least one of which must use a USGS 7.5-minute quadrangle sheet as its basemap (if no USGS quadrangle is available, another accurate local map may be used as a basemap) with the project study boundary clearly outlined and the quadrangle name included on the map.

b. Does not need to be to-scale, but must include commonly recognizable landmark(s).

c. Must include north arrow.

d. Project location must be clearly marked and annotated.

e. Must include adjacent local roadways.

3) Proposed projects:

a. Show all proposed fills, structures, and /or limits of work within and adjacent to potential waters of the U.S., including wetlands.

b. Clearly annotate all fills, structures, and /or limits of work as either permanent or temporary.

c. Pre-construction drawings (grading plans) and post-construction drawings (as-built plans) must include name, company/agency, and signature of preparer, date signed, drawing title, and total number of sheets.

d. Both plan view and cross-sectional view maps must be provided.

4) Post-construction drawings (as-built plans):

a. Both plan view and cross-sectional view maps must be provided.

b. Must be the same size and alignment (spatial) as authorized grading plans (i.e., grading plans and as-built plans must overlay such that structures, boundaries, etc. align).

c. Show any deviations from the fills and/or structures authorized as part of an approved pre-construction drawing in red.

5) Delineations of waters of the U.S.:

a. Plan view maps must be provided.

b. Cross-sectional view drawings must be provided at the Corps project manager's cretion. Examples of when cross-sectional view drawings would be appropriate include stream or wetland restorations, stream crossings, proposed structures, and delineations of tidal areas.

c. Clearly show location and extent of all areas potentially meeting the criteria for waters of the U.S., including special aquatic sites (e.g., wetlands, sanctuaries and refuges, mudflats, vegetated shallows, and riffle and pool complexes), and/or navigable waters. Each type of boundary (for example, ordinary high water mark, mean high water, wetlands or other special aquatic sites, and high tide line) must be clearly annotated and/or symbolized to ensure they are differentiable on the map..

d. The survey area boundary must be clearly annotated and/or symbolized and must include all potential waters of the U.S. The survey area boundary encloses the spatial area for which a Corps jurisdictional determination is being requested. Show locations of any wetland delineation or ordinary high water mark data points, labeled according to the number of the corresponding wetland delineation form or ordinary high water mark data sheet. Generally, a wetland boundary must be based on sets of at least two wetland delineation data points, one within the proposed wetland boundary and one outside it.

e. Include representative ordinary high water mark (OHWM) widths where measured in the field (averages may be acceptable for uniform channel reaches). OHWM widths must be shown with a transect/profile line (e.g., A-A') labeled with the corresponding width measurement in feet. In some cases, a corresponding cross section may be required, in which case the cross section must include the corresponding OHWM elevations.

f. Include information not directly related to a delineation of waters of the U.S. on a separate map(s).

g. If there are tidal areas within the survey area, identify the location and elevation of Mean High Water and the High Tide Line on all maps and cross-section drawings.

h. Each line or polygon representing a water of the U.S. must be labeled with a unique name (for example, WL1, WL2, VP1, VP2, STR1, STR2, etc.). The delineation report must be accompanied by the attached Aquatic Resources.xlsx table (Excel file format).
i. If impact areas within waters of the U.S. are shown, those must also be labeled with a unique name (for example,). In this case, the delineation report must also be accompanied by the attached Impacts.xlsx table (Excel file format).

j. If submitted, delineation-related GIS data must use the unique names as described above and conform to the Aquatic Resources.xlsx and Impacts.xlsx data tables and must include a text file of metadata, including datum, projection, and mapper contact information.

6) Mitigation plans and long-term preservation (LTP) maps (see attached example map):

a. Both plan view and cross-sectional view maps must be provided.

b. Mitigation boundaries must be clearly differentiable based on mitigation type: establishment, re-establishment, rehabilitation, enhancement, and preservation only. Establishment boundaries must use a dotted line. Re-establishment boundaries must use a dashed line. Rehabilitation boundaries must use an alternating dash-dot-dash line. Enhancement areas must use a hatched line. LTP boundaries (preservation) must use a single, bolded line. For a definition of mitigation terms, see 2008 Mitigation Rule (33 CFR Part 332).

c. All mitigation sites and LTP boundaries must be clearly labeled (e.g., site A, B, and C).

d. Locations of mitigation sites must be shown relative to other landscape features and habitat types (e.g., riparian corridor, wetland complex, etc.).

e. Each line or polygon representing a mitigation site must be labeled with a unique name (for example, MIT1, MIT2, etc.). The delineation report must be accompanied by the attached Mitigation.xlsx table (Excel file format).

f. If submitted, mitigation-related GIS data must use the unique names as described above and conform to the Mitigation_SPD.xlsx data table and must include a text file of metadata, including datum, projection, and mapper contact information..

7) Mitigation monitoring report maps:

a. Any ground photographs included in a mitigation monitoring report must be accompanied by a map of photo-points. Each photopoint must be annotated by number and the compass direction in which the photograph was taken (e.g., a dot with an arrow). Each photograph must a include a legend with its number, as labeled on the map, as well as its geographic coordinates (latitude, longitude), the compass direction in which the photograph was taken (e.g., N, NW, etc.), and a brief explanation of the photograph's relevance.

b. Each discrete mitigation site (i.e., polygon) must be shown on a map, annotated or symbolized to indicate the target habitat type and the mitigation type.

c. Any sampling presented in the monitoring report must be shown on a map, including locations and extent of sampling points, transects, quadrats, etc.

Updates: These standards may be updated periodically. The most current version will be posted on each district's website.

MINIMUM STANDARDS FOR ACCEPTANCE OF AQUATIC RESOURCES DELINEATION REPORTS

U.S. ARMY CORPS OF ENGINEERS **BUILDING STRONG®**

January 2016

The U.S Army Corps of Engineers, through its Regulatory Program, regulates certain activities in waters of the United States. Waters of the U.S. are defined under 33 CFR Part 328. In order for the Corps to determine the amount and extent of waters of the United States at a site, aquatic resources must first be delineated in accordance with established regulatory standards, guidance and protocol, such as the 1987 Corps of Engineers Wetlands Delineation Manual and appropriate regional supplements. Before making any permit decision, the Corps is responsible for conducting or verifying the delineation and determining which of the aquatic resources have the potential to fall under federal jurisdiction.

Due to limited staffing and resources, the Corps' Sacramento District recommends permit applicants employ the services of individuals experienced in delineating aquatic resources. Permit applicants are further encouraged early in the project planning stages to submit the delineation, along with a request for a preliminary or approved jurisdictional determination, and engage in a pre-application consultation with their local District office. Early consultation may help identify potential concerns and result in a quicker permit decision.

The District has established minimum standards for delineation reports to insure consistency and accuracy in the delineation of aquatic resources, which will minimize potential delays. The standards are based on years of experience conducting and verifying delineations, as well as the best practices of environmental consultants. Delineations submitted for verification must follow the standards, unless determined to not be practical on a case-by-case basis. Situations where adherence to the standards may not be practical include activities with small permanent or temporary impacts to aquatic resources (under 0.10 acre), applicants with limited financial resources, and emergencies. The District will notify the requestor for delineation submittals that do not contain sufficient information to accurately identify the limits of waters of the U.S.

Aquatic resources delineation reports submitted to the District must include the following:

☐ A cover letter requesting a jurisdictional determination. The letter must specify whether a preliminary or approved jurisdiction determination is requested.

☐ A signed statement from the property owner(s) allowing Corps personnel to enter the property and to collect samples during normal business hours. If the property is land-locked, the owner or proponent must obtain permission from the adjacent property owner(s) to provide access for Corps personnel.

☐ A statement that the delineation has been conducted in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and appropriate regional supplement(s). The regional supplement(s) used must be identified. For ordinary high water mark (OHWM) delineations, a statement indentifying the use of the OHWM field guide must be included.

☐ Directions to the survey area.

☐ Contact information for the applicant(s), property owner(s), and agent(s).

☐ A narrative describing all aquatic resources at the site and an explanation for the mapped boundaries, especially for resources containing complex transition zones. If the site contains resources that meet one or two wetland criteria or do not exhibit a clear OHWM, describe the rationale for not delineating these features. Examples include erosional features, upland swales, and other upland areas that appear “wet” on satellite or aerial imagery.

☐ The total acreage of the survey area.

☐ Date(s) field work was completed.

☐ A table listing all aquatic resources. The table will include the name of each aquatic resource, its Cowardin type, acreage, and location (latitude/longitude). For linear features, the table must show both acreage and linear feet.

☐ A description of existing field conditions. The field condition description may include current land use, flood/drought conditions, irrigation practices, modifications to the site, and any characteristics considered atypical.

☐ A discussion of the hydrology at the site, including all known surface or subsurface sources, drainage gradients, surface water connections to the nearest traditional navigable waterway or interstate water, and any potential influence for manmade water sources, such as irrigation. The discussion should also identify the nearest “blue-line” waterway or other feature found on the most recent USGS map.

☐ If remote sensing was used in the delineation, provide an explanation of how it was used and include the name, date and source of the tools used and copies of applicable maps/photographs.

☐ A discussion of plant communities and habitat types present at the site and a list of the scientific name, common name, and wetland indicator status of all plants.

☐ Soil descriptions, soil map(s), and a discussion of hydric soils or soils with hydric inclusions at the site.

☐ Any observed or documented interstate or foreign commerce associated with aquatic resources found on the site, specifically recreation or other use by interstate or foreign travelers, sale of fish or shellfish in interstate or foreign commerce, and use by industries operating in interstate or foreign commerce.

☐ A site location map on a 7.5-minute USGS quadrangle. The map must provide the name of the USGS quadrangle, Section, Township, Range, the UTM or latitude and longitude.

☐ A completed copy of the *Aquatic Resources Excel* spreadsheet must be submitted. The current version of the spreadsheet can be found at the following website: *www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/WetlandDelineations.aspx*

☐ A map of all delineated aquatic resources ("Aquatic Resouces Delineation Map") in accordance with the *Final Map and Drawing Standards for the South Pacific Division Regulatory Program* (Mapping Standards) and showing the following:

- ☐ All aquatic resources delineated must be clearly shown on the map. Because only the Corps determines the regulatory status of each aquatic resource, the map must not include any labeling about jurisdiction. If the requestor believes one or more aquatic resources are not jurisdictional, the rationale should be included in the delineation report and the resource(s) should be identified on the map.
- ☐ At least one set of paired data points, documented in data forms, for each aquatic resource or complex. The paired data points must be located close to the delineated boundary. Additional data points may be necessary, and should be shown on the map, depending on various factors including the size and shape of the aquatic resource, changes in vegetation communities, and slope.
- ☐ A reference block that identifies the site or project name, individual(s) who conducted the delineation, date of the map, and date(s) of any revisions.

☐ Completed data forms including all essential information to make a decision.

☐ A description of the methods used to survey the aquatic resource boundaries. For most delineations, the Sacramento District requires GPS equipment for the collection of data. At a minimum the GPS equipment must have the capability of sub-meter (<=1 meter) level accuracy. If other methods are used, the report must contain a rationale for this deviation.

☐ Digital data for the site, aquatic resource boundaries, and data point locations must be provided in a geographic information system (GIS) format, with ESRI Shape-files being the preferred format. Each GIS data file must be accompanied by a metadata file containing the appropriate geographic coordinate system, projection, and datum. If GIS data is unavailable or otherwise cannot be produced and the Corps determines a site visit is necessary, the aquatic resource boundaries must be physically marked with numbered flags or stakes before the Sacramento District can complete a delineation verification.

Often, additional information can expedite the verification of a delineation. Particularly helpful data includes site specific topographic maps, National Wetland Inventory (NWI), Light Detection and Ranging (LIDAR), satellite, aerial and ground photographs, floodplain maps, and related reports.

The Corps' Sacramento District developed a suggested format for aquatic resources delineation reports, which is attached to this document. This format is not required but rather is intended to assist requestors with the preparation of a delineation report in accordance with these minimum standards.

More information regarding aquatic resource delineations, including reference materials, the *Aquatic Resources Excel* spreadsheet, and the suggested format for the aquatic resources delineation report can be found on our website at: *www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/WetlandDelineations.aspx*.

DRAFT/FINAL AQUATIC RESOURCE DELINEATION REPORT

Survey Name
Date

Prepared By:

Author's Name, Title
Consulting Company /Region/Cooperating Agency Name
Address
Phone Number
email

Prepared For:

Name (Role)
Company
Address
Phone Number
email

Executive Summary

Provide the following information:

- A statement that the delineation has been conducted in accordance with the 1987 "Corps of Engineers Wetland Delineation Manual" and appropriate regional supplement(s), with the identification of what supplement was used.

AND/OR

- A statement that the delineation has been conducted in accordance with the 2008 “A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States”

- One paragraph summary of aquatic resource findings including:
  - Number and total area of aquatic resources within project area.
  - Total acreage of the survey area
  - Dominant aquatic resource classifications and general condition of aquatic resources.

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Acronyms and Abbreviations

BMP	best management practice
cfs	cubic feet per second
LIDAR	Light Detection and Ranging
LWD	large woody debris
MP	Mile Post
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OHWM	ordinary high water mark
PEM	palustrine emergent
PFO	palustrine forested
PSS	palustrine scrub-shrub
ROW	right-of-way
SR	State Route
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator coordinate system
WRIA	Water Resource Inventory Area

[add or delete acronyms and abbreviations as needed]

Chapter 1. Introduction

- Identify contact information for the applicant(s), property owner(s), and agent(s).
- Survey area description
- The purpose of this report is to identify and describe aquatic resources and, to identify known possible sensitive plant, fish, wildlife species, and cultural/historic properties in the survey area. This report facilitates efforts to:
    1. Avoid or minimize impacts to aquatic resources during the design process.
    2. Document aquatic resource boundary determinations for review by regulatory authorities.
    3. Provide early indications of known sensitive species and historic/cultural properties within the survey area.
    4. Provide background information.

Chapter 2. Location

Identify the county and state where the project is located. Also include nearest town, as well as the street address or nearest intersection, and the Section, Township and Range the UTM or latitude and longitude. Provide driving directions to the survey area.

Chapter 3. Methods

- Describe all methods used to delineate and survey aquatic resources.
- Include any deviations from standard methods. Make sure methods comply with appropriate U.S. Army Corps of Engineers Guidelines.
- If remote sensing tools were used to aid in delineation, list what tools were used and provide a copy of the maps if possible.

Chapter 4. Existing Conditions

4.1 Landscape Setting

Describe in 1-2 paragraphs the topography, geological features, major water bodies, surface water flow, community types, existing vegetation, current land use, and major recent or historical disturbances – such as logging, mining, and farming.

Include:

- The total acreage of the survey area.
- A description of existing field conditions including current land use, time of season the site visit(s) were conducted, flood/drought conditions, irrigation practices, modifications to the site, and any characteristics considered atypical.
- A discussion of whether the entire survey area was field verified. If entire survey area was not visited, identify which areas were visited and a rationale for why the entire site was not visited.

4.2 Aquatic Resources

4.2.1 Overview

Provide brief overview of the existing aquatic resource conditions:

Include the following information:

- Describe all aquatic resources depicted on the Aquatic Resources Delineation Map within the survey site (Appendix A). Provide an explanation for the mapped boundaries, especially for resources containing complex transition zones. If the site contains resources that meet one or two wetland criteria or do not exhibit a clear OHWM, describe the rationale for not delineating these features. Examples include erosional features, upland swales, and other upland areas that appear "wet" on satellite or aerial imagery.
- Provide a table listing all Aquatic Resources (Table 1). The table will include the name of each aquatic resource, its Cowardin type, acreage and location (latitude/longitude). For linear features, such as stream channels and ditches, the table must show both acreage and linear feet.
- Discuss site hydrology, including any surface or subsurface sources, drainage gradients, surface water connections to the nearest traditional navigable waterway or interstate water, and any potential influence for manmade water sources, such as irrigation. The discussion should also identify the nearest "blue-line" waterway or other feature found on the most recent USGS map.
- Describe soils including a discussion of hydric soils and soils with hydric inclusions (Appendix B).
- Provide a general discussion of plant communities and habitat types, including both scientific and common names, and the wetland indicator status of all plants (Appendix D).
- Describe any observed or documented interstate or foreign commerce associated with aquatic resources found on the site, specifically recreation or other use by

interstate or foreign travelers, sale of fish or shellfish in interstate or foreign commerce, and use by industries operating in interstate or foreign commerce.

Table 1. Aquatic Resources within the Survey Area

Aquatic Resource Name	Aquatic Resources Classification		Aquatic Resource Size (acre) Required for all resources	Aquatic Resource Size (linear feet) Required for only stream channels
	Cowardin	Location (lat/long)		
Total				

Chapter 5. References

Books, Journal Articles, Reports: [Author(s). YEAR Title. Publisher/Source. Volume: Page begin-Page end].

Correspondence: [Author(s). Date. Subject. Agency/Company. Pp. (pages)].

Phone: [Contact Name. Date. Subject. Agency/Company. Phone Number. Result/Action].

E-mail: [Contact Name. Date. Subject. Agency/Company. E-mail address. Result/Action].

Appendix A - Aquatic Resource Delineation Maps

A map of all delineated aquatic resources ("Aquatic Resources Delineation Map") in accordance with the *Final Map and Drawing Standards for the South Pacific Division Regulatory Program* (Mapping Standards) and showing the following:

- All aquatic resources delineated must be clearly shown on the map. Because only the Corps determines the regulatory status of each aquatic resource, the map must not include any labeling about jurisdiction. If the requestor believes one or more aquatic resources are not jurisdictional, the rationale should be included in the delineation report and the resource(s) should be identified on the map.
- Location of all data and photo points.
- A reference block that identifies the site or project name, individual(s) who conducted the delineation, date of the map, and date(s) of any revisions.

Appendix B - Supporting Maps

This appendix must include a 7.5 USGS quadrangle location map and a soil survey map. Other helpful data should be included, such as a NWI map, site specific topographic maps, LIDAR map, satellite/aerial/ground photographs, floodplain maps, and other related maps. The survey area should be identified on all maps.

Appendix C - Photographs

All photographs should be referenced with the location and the direction the photograph was taken, along with identifying the resources present within the photograph.

Appendix D - Plant List

Plant species found within the survey area.

Use USDA Plants Database and National Wetland Plant List for the most up-to-date scientific name and Wetland Indicator Status.

Genus	Species	Common Name	WIS*

* Wetland Indicator Status (WIS):

OBL	=	occurs in aquatic resources > 99% of time
FACW	=	occurs in aquatic resources 67-99% of time
FAC	=	occurs in aquatic resources 34-66% of time
FACU	=	occurs in aquatic resources 1-33% of time
UPL	=	occurs in uplands > 99% of time
NI	=	indicator status not known in this region
~	=	unsure as to FAC or FACU

Appendix E - Wetland Data Sheets

This appendix must contain at least one set of paired data points, documented in data forms, for each aquatic resource or complex. The paired data points must be located close to the delineated boundary. Additional data points may be necessary, and should be shown on the map, depending on various factors including the size and shape of the aquatic resource, changes in vegetation communities, and slope.

Data forms may be modified from the Corps' standard form but must contain all essential information to make a decision.

Appendix F - OHWM Data Sheets

This appendix includes the OHWM data sheets. Please insure to include a map identifying the location of the data points. Data forms may be modified from the Corps' standard form but must contain all essential information to make a decision.

Appendix G - A signed statement from the property owner(s) allowing access

This appendix must contain a signed statement from the property owner(s) allowing Corps personnel to enter the property and collect samples during normal business hours. If the property is land-locked, the owner or proponent must obtain permission from the adjacent property owner(s) in order to provide access.

Appendix H — Aquatic Resource Excel Sheet

The completion and submittal of the *Aquatic Resources Excel* spreadsheet is a required component to Sacramento District's Minimum Standards for Acceptance of Aquatic Resources Delineation Reports. This spreadsheet will assist the Corps' in efficient and accurate data entry of the aquatic resources into the Corps' database. The current version of the spreadsheet can be found at the following website:
www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/WetlandDelineations.aspx

The *Aquatic Resources Excel* spreadsheet contains a validation tool to ensure accuracy of the data. To run the validation tool, first enter all data in the appropriate columns and tabs. Once you have completed entering the data and have saved the document in a .csv format, click the gold shield at the top of the workbook window. The tool has a tooltip showing "Validate Worksheets." After clicking this button, validation of data is performed and any possible errors are added to the Validation tab. This tab is opened after the process is complete to allow the user to see the output. The validation output includes the tab (data type), column, and cell for where the possible error was found and a brief explanation of the issue.

Appendix I — Aquatic Resource Functional Assessment Forms (If Applicable)

If a functional assessment was completed, this appendix includes the aquatic resources functional assessment form of each aquatic resource delineated along with a description of the results of the assessment.