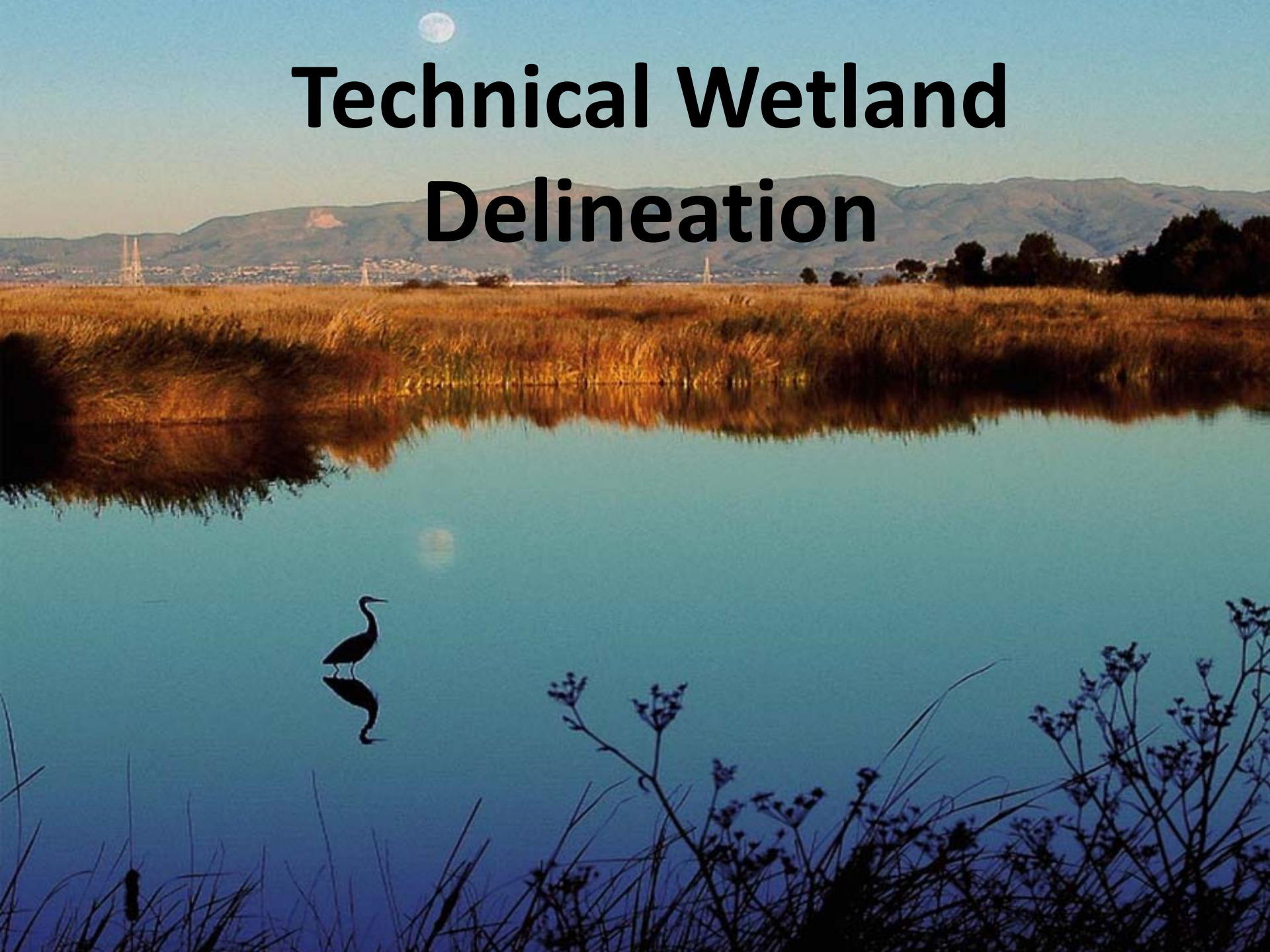
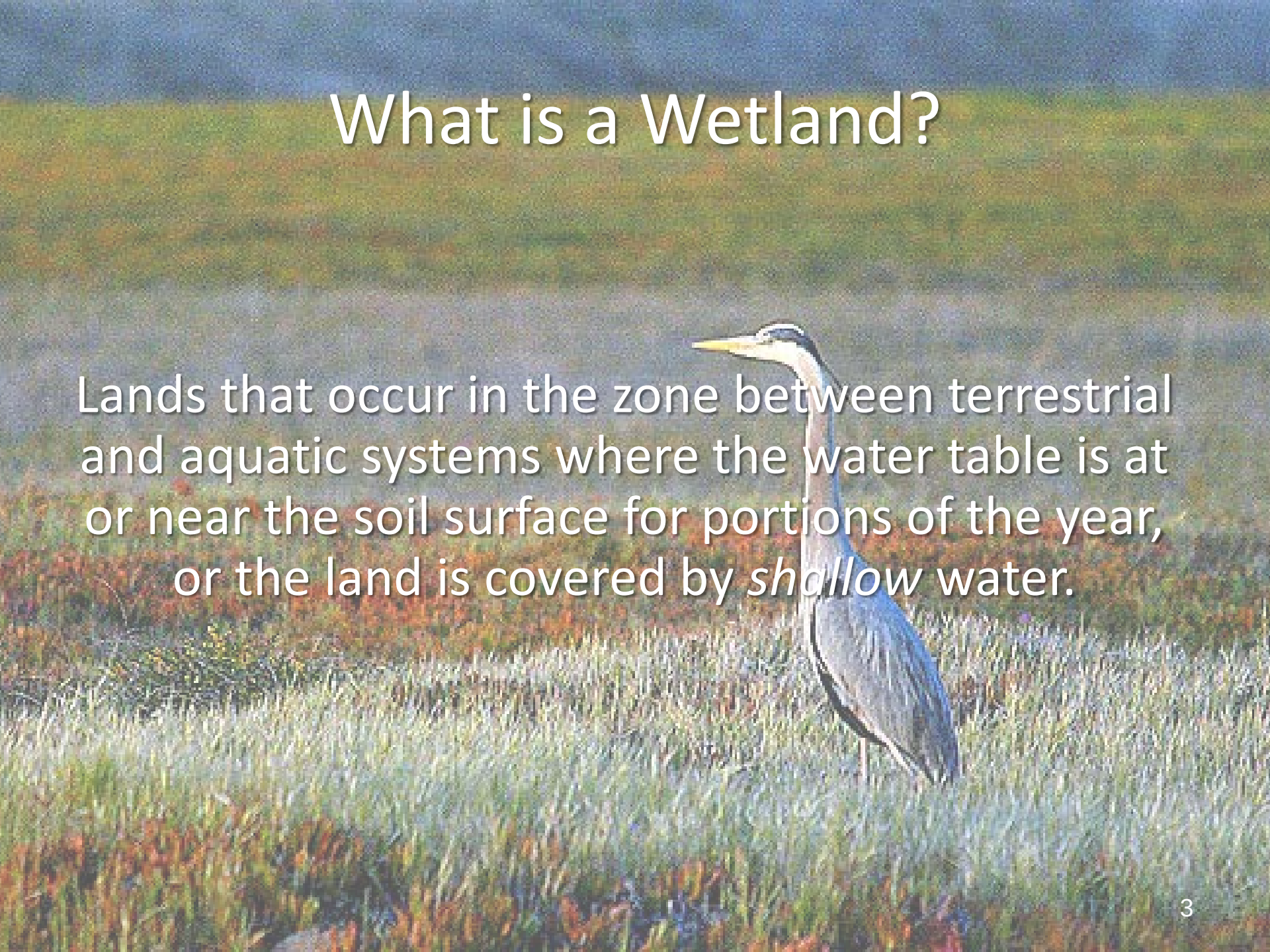
Technical Wetland Delineation



Today's Talk

- Wetland Definitions and Importance of Wetlands
- Overview of the Wetland Delineation Approach
- Vegetation Parameter
- Soils Parameter
- Hydrology Parameter
- Some Wetland Permits of the Past

What is a Wetland?



Lands that occur in the zone between terrestrial and aquatic systems where the water table is at or near the soil surface for portions of the year, or the land is covered by *shallow* water.

What is a Wetland – USACE Definition

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

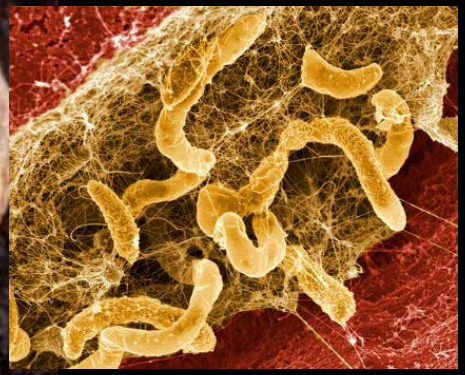
Wetlands Differ from Uplands in their Physical, Chemical and Biological Characteristics

Wetland Soils

Wetland Plants

Wetland Animals

Wetland Soil Microbes



Why Are Wetlands Important?

They provide habitat for many species and support high biodiversity.







Why Are Wetlands Important?

Filter impurities from water – improve water quality

Store Carbon

Why Are Wetlands Important?

Recreation opportunities for nature viewing.

Why Are Wetlands Important?

- Promote groundwater recharge
- Reduce erosion

Why Are Wetlands Important?

Buffer wave energy from storm surge

Dramatic Historical Loss of Wetlands in CA

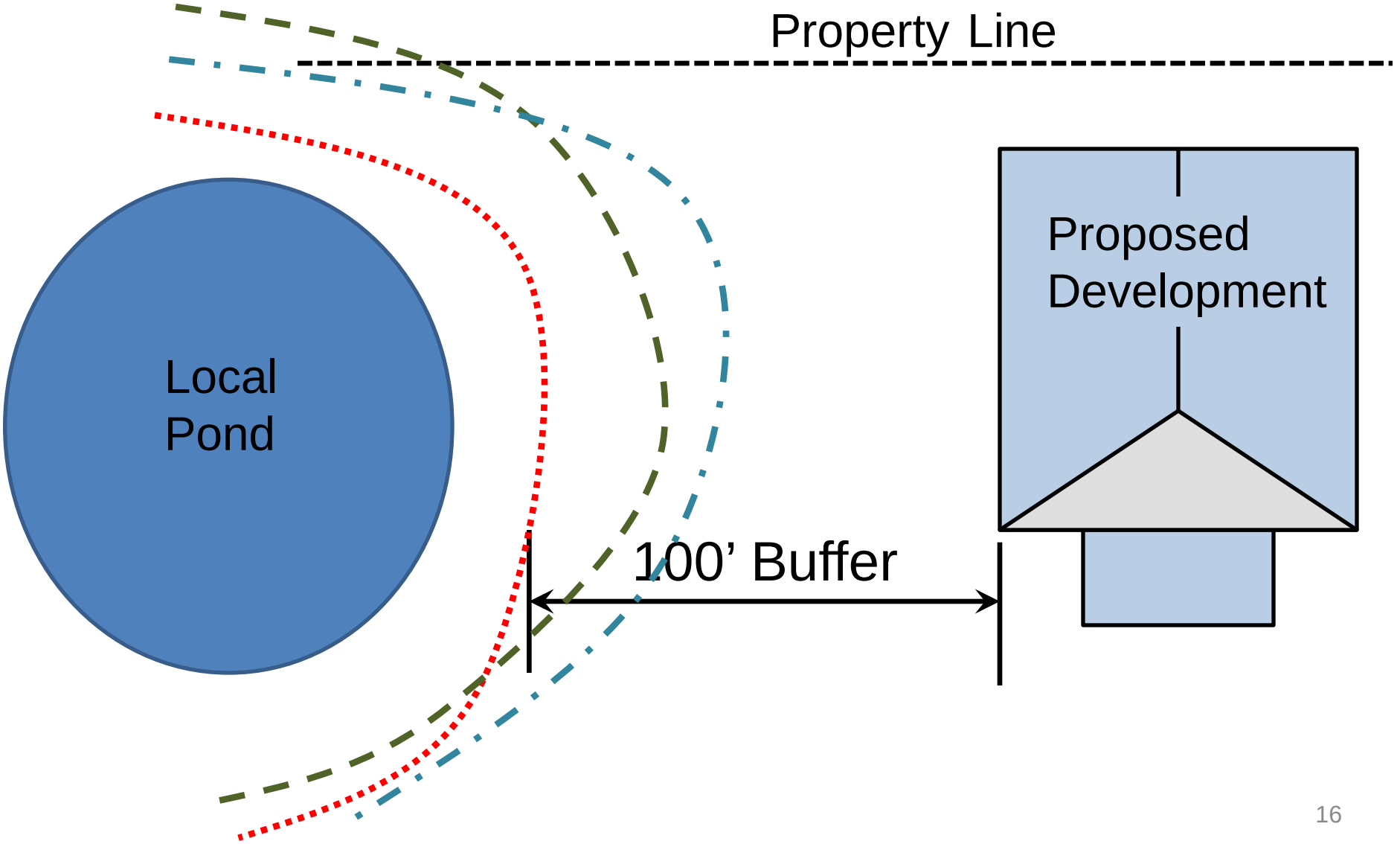
Overview of the Wetland Delineation Approach

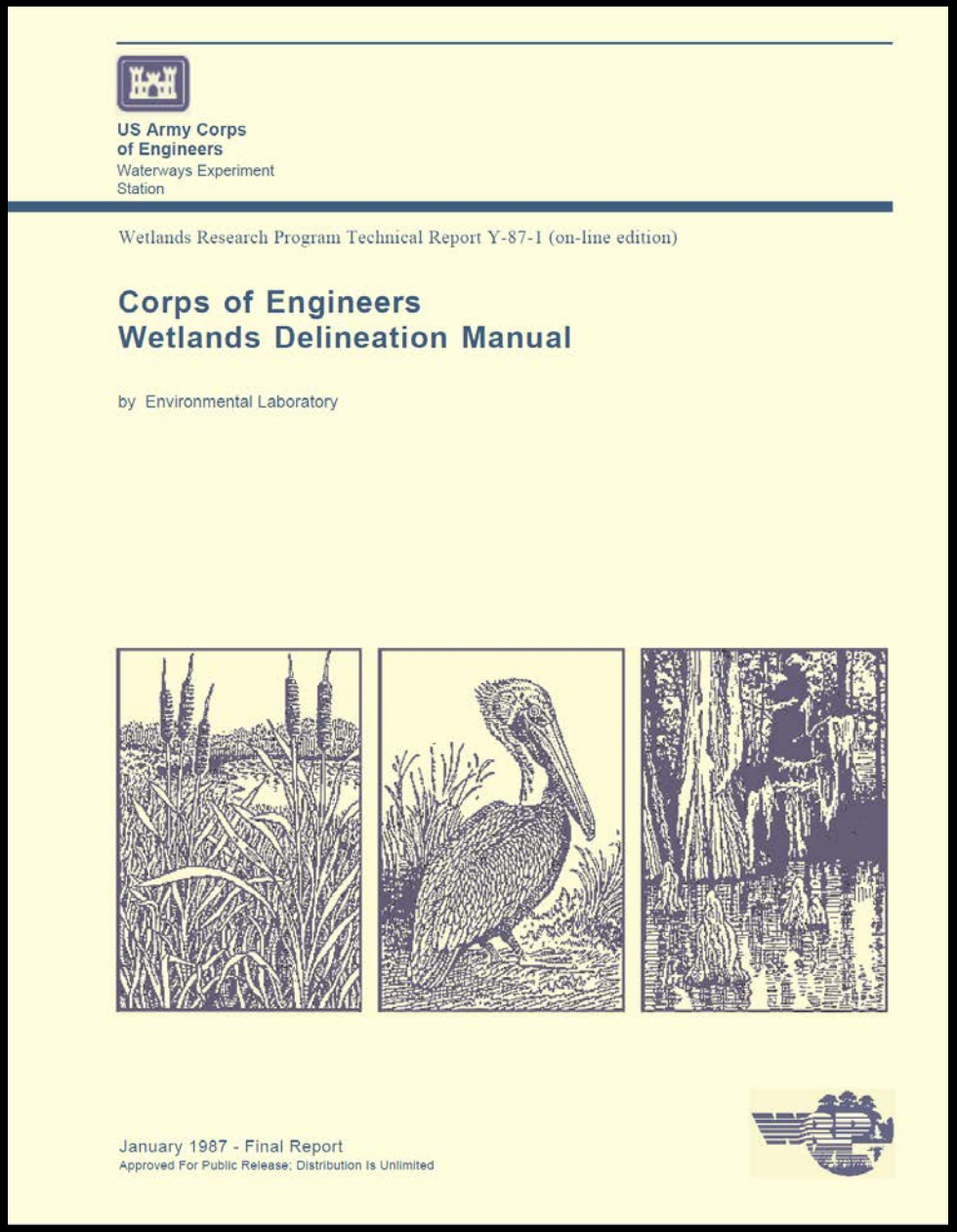
Many Different Types of Wetlands

Wetland Delineation

Wetland Delineation

Typical Delineation





1987 USACE Manual

1. Presents the technical guidelines for identifying wetlands and distinguishing them from aquatic habitats and other non-wetlands.

2. Provides the methods for applying the technical guidelines.

3. Provide supporting information useful in applying the technical guidelines.

Wetland Parameters

1. Wetland Vegetation (Hydrophytes)
2. Wetland Soils (Hydric Soils)
3. Wetland Hydrology

Different Wetland Definitions for Different Agencies

US Army Corps of Engineers	California Coastal Commission/ The USFWS/ CDFG Commission
Three parameter approach	**One** parameter approach:
Vegetation, Soil and Hydrology Parameters must be satisfied	Vegetation or Soils or Hydrology under certain conditions.

Coastal Commission Regulations

Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow, turbidity, high concentrations of salts or other substances in the substrate.

Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deep-water habitats.

Hydric Soil

Soil Parameter

Vegetation Parameter

Hydrology parameter

Does the Hydrology Parameter Apply?

Salt pan **wetland**
San Elijo Lagoon

Mud puddle
Not a wetland

Field Indicators

Field Indicators are physical, chemical, or biological features of an area that can be easily observed or assayed and that are usually correlated with the presence of a wetland parameter.

Field Indicators

The USACE Wetland Delineation Data Form

Site Description and Sampling Date

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 _____

Vegetation Parameter

Tree Stratum (Plot size: _____) % Cover Species? Status

1. _____
2. _____
3. _____
4. _____

Sapling/S

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 _____

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:

US Army Corps of Engineers — Arid West – Version 2.0

Indicators

Soil Parameter

SOIL

Sampling Point: _____

…sence of indicators.)

…ture Remarks

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 Parameter

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 _____

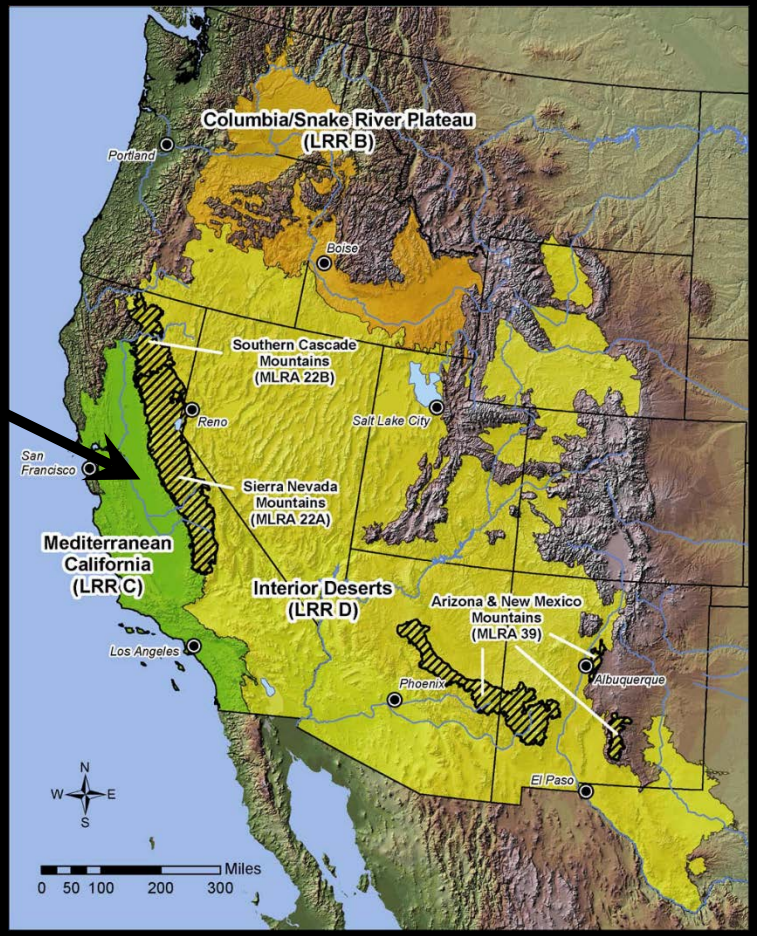
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

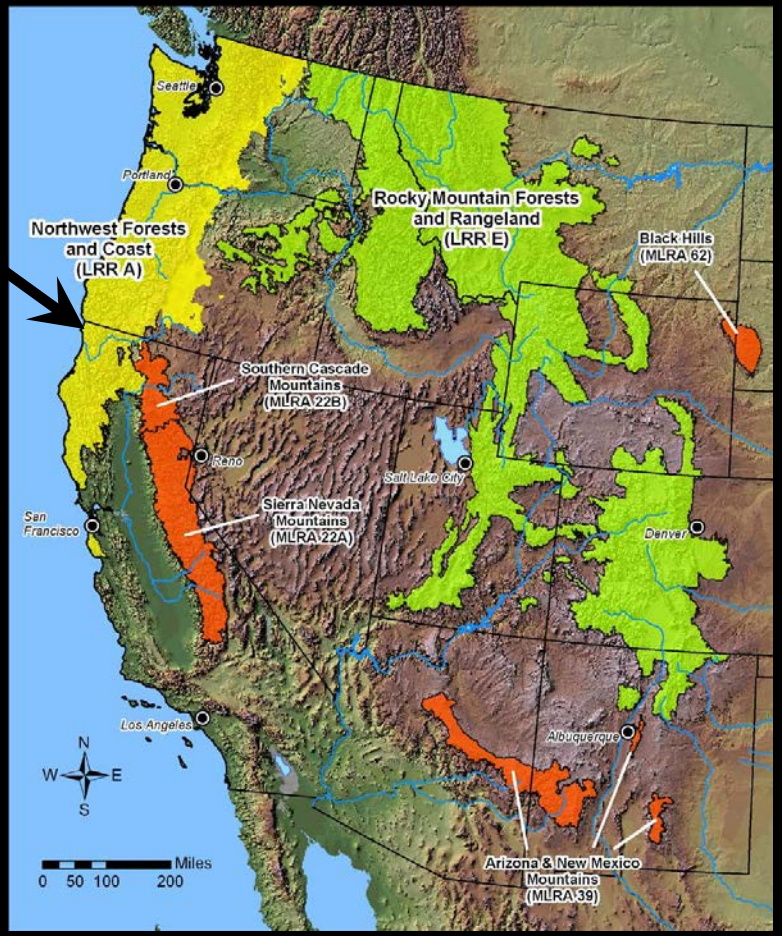
US Army Corps of Engineers — Arid West – Version 2.0

California Regions: Regional Supplements

Arid West



Western Mountains, Valleys, and Coast Region



Vegetation Parameter

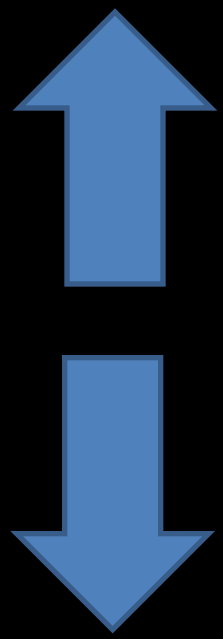
Wetland Vegetation

- Tolerant to fluctuations in water level
- Tolerant to low soil oxygen and frequent saturation
- Marine influenced plants are tolerant to saline or brackish water

Plant Classifications

Indicator Code	Indicator Status	Frequency of Occurrence in Wetlands
OBL	Obligate Wetland	>99%
FACW	Facultative Wetland	67% - 99%
FAC	Facultative	33% - 66%
FACU	Facultative Upland	1% - 33%
UPL	Obligate Upland	<1%

Hydrophyte



Upland Plant

Obligate (OBL)

(found in wetlands >99% of the time)

Smooth Cordgrass

Spartina alterniflora

California Bulrush

Schoenoplectus californicus

Facultative Wetland (FACW)

(found in wetlands 67 - 99% of the time)

Umbrella Sedge

Cyperus eragrostis

Spreading Rush

Juncus patens

Facultative (FAC)

(found in wetlands 33 - 67% of the time)

Fragile Sheath Sedge

Carex fracta

Western Larkspur

Delphinium hesperium

Upland Species (UPL)

(found in wetlands >1% of the time)

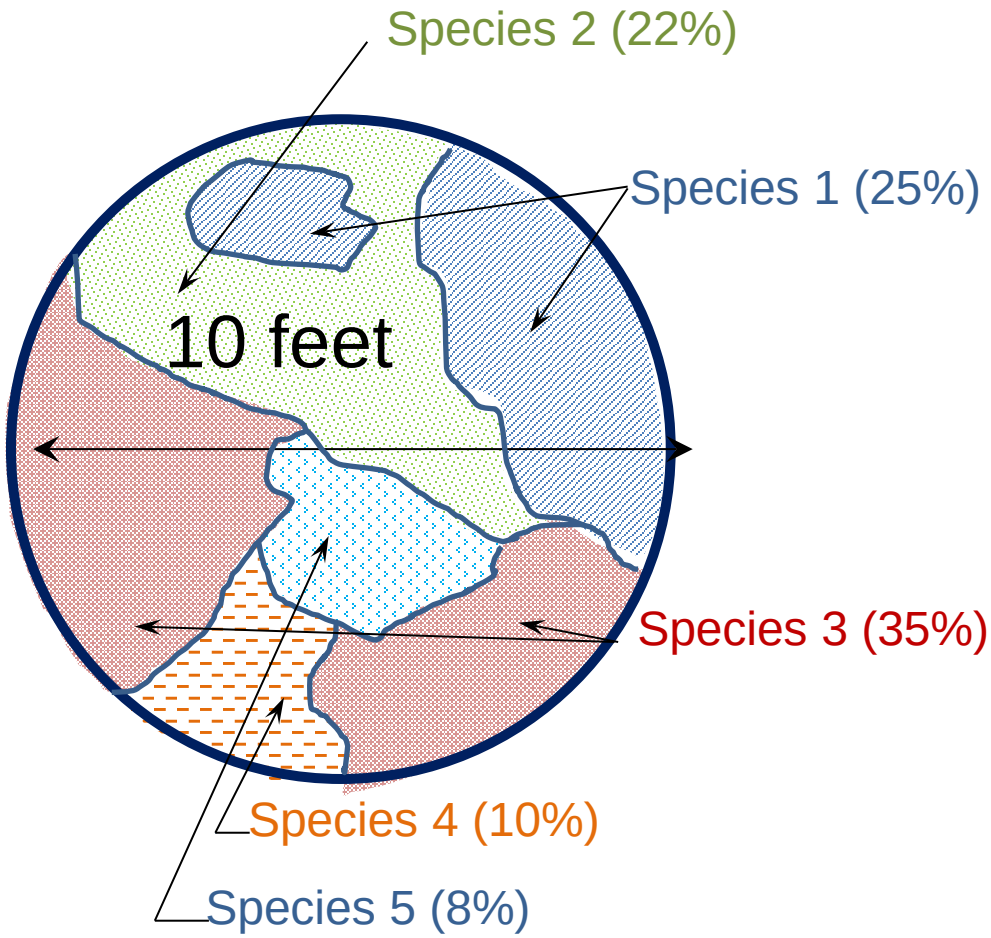
Coyote Brush

Baccharis pilularis

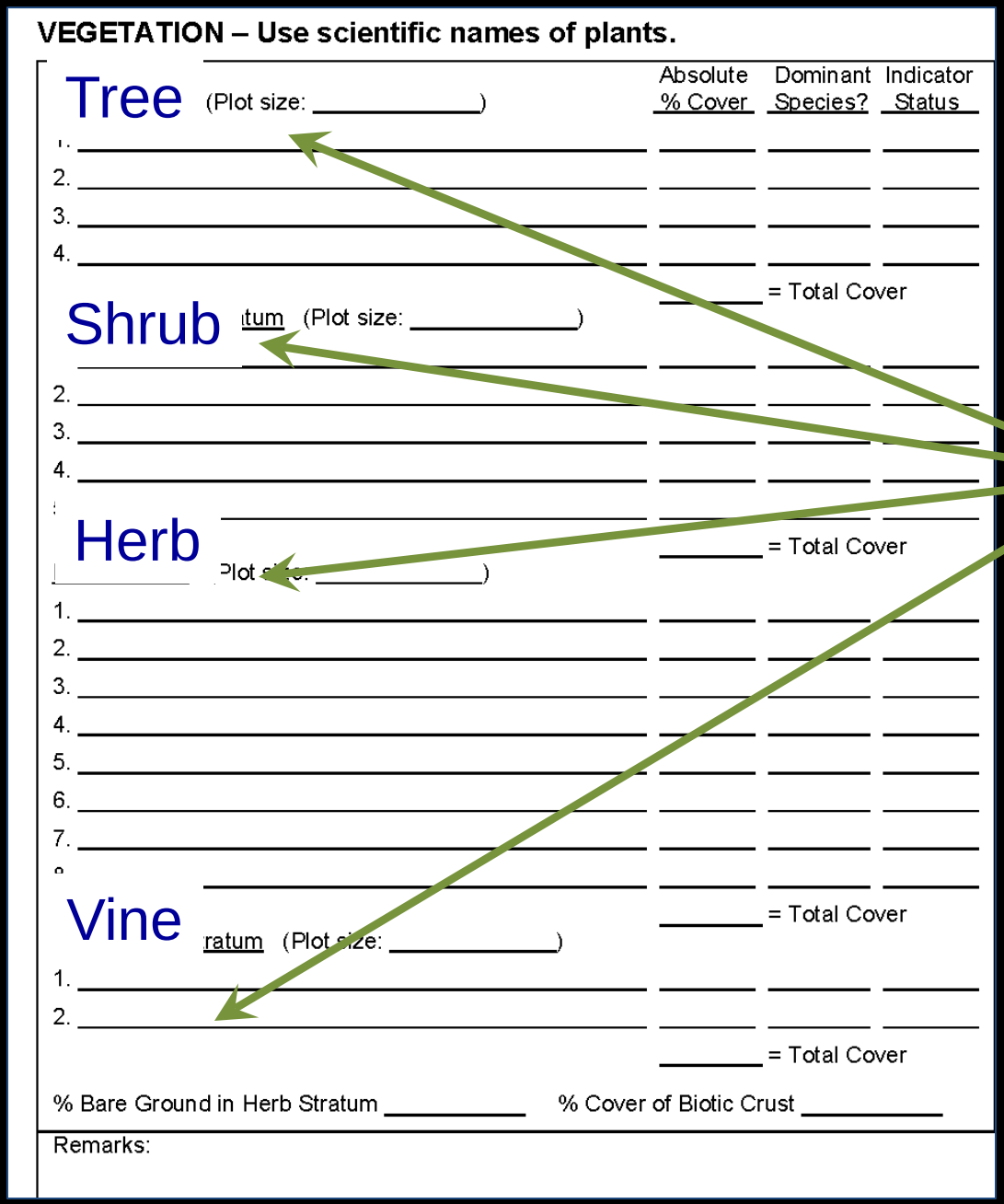
California Sage

Artemisia californica

Plant Layer: Grass/Herb Layer



Determining the Vegetation Parameter



VEGETATION – Use scientific names of plants.

Tree (Plot size: _____)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Shrub tum (Plot size: _____)

2.			
3.			
4.			
	= Total Cover		

Herb Plot size: _____)

1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Vine ratum (Plot size: _____)

1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Remarks:

50/20 Rule

- Species that make up 50% of each layer
- Any species with 20% or more cover.

Vegetation Layers

% Cover of Dominant Plants

Assessing Predominance

Dominance Test

There is a predominance of hydrophytes if more than 50 percent of the **dominant species** are classified as FAC, FACW, or OBL.

50 % of Species

- Species 3……..35% _____ FACW √
- Species 1……..25% _____ FACU
- Species 2……..22% _____ OBL √
- Species 4……..21% _____ UPL

2/3 Dominant species are FAC, FACW or OBL = 67%

Therefore, wetland vegetation parameter is met.

Soil Parameter

Identifying Hydric Soils

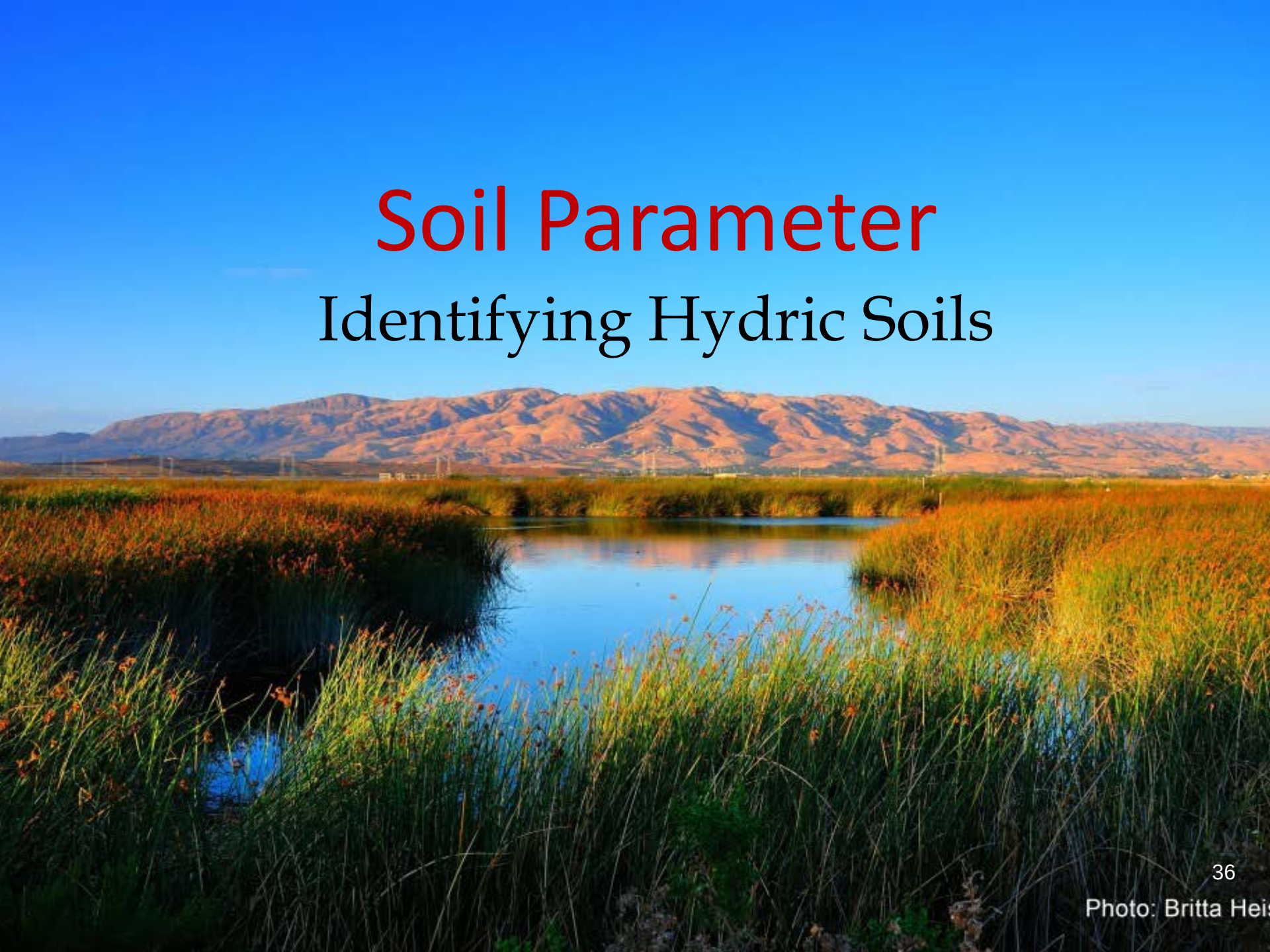
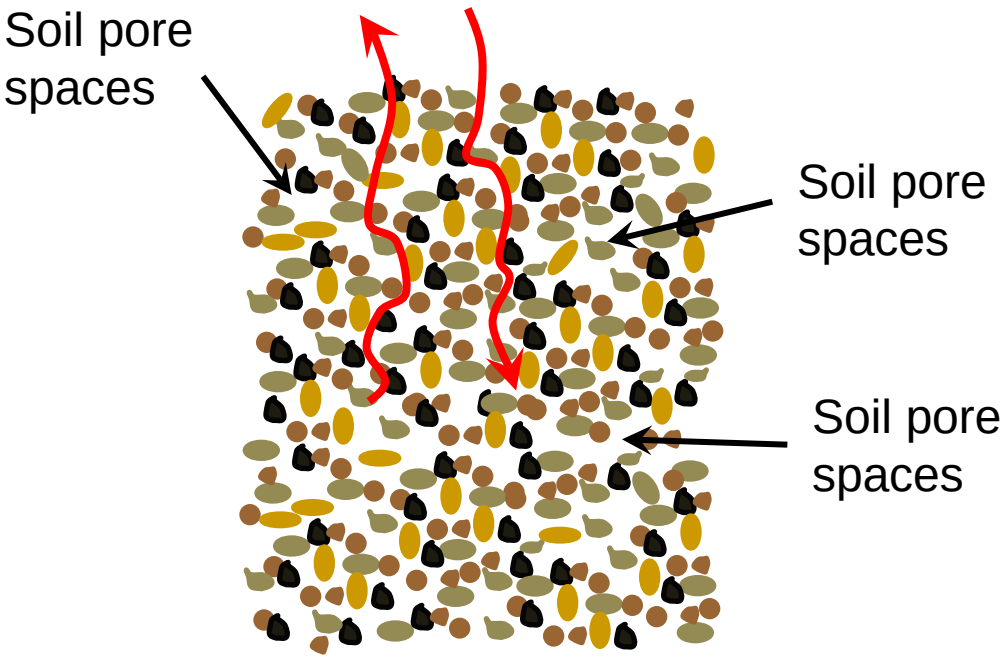


Photo: Britta Hei

Upland and Wetland Soils

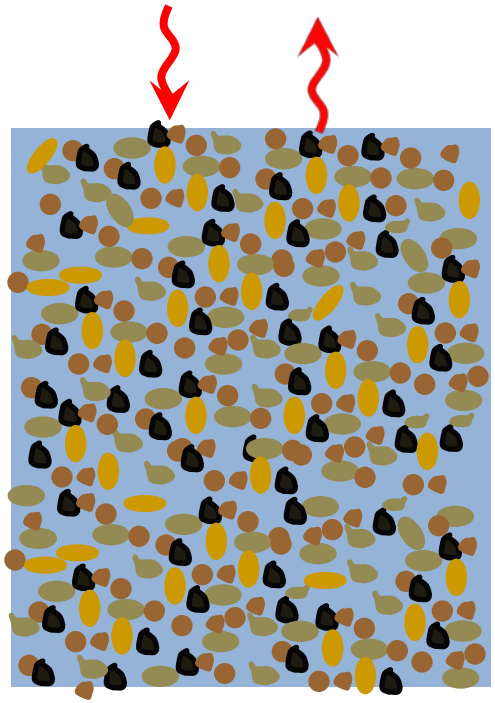
Dry Upland Soil

Air exchange with the atmosphere



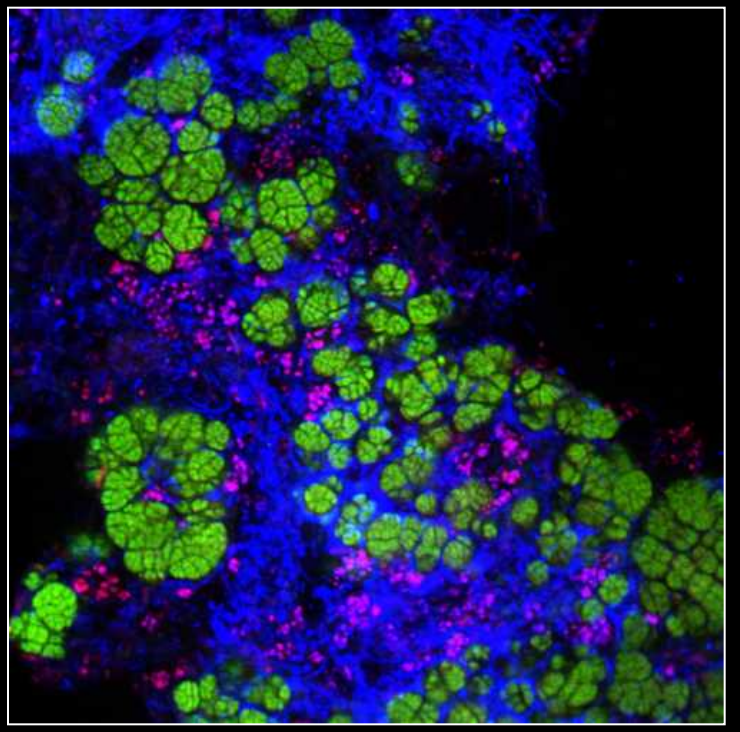
Saturated Wetland Soil

Air exchange with the atmosphere
Happens only at the surface



Pore spaces are filled with water

Switch in the Microbial Community After Soil Wetting

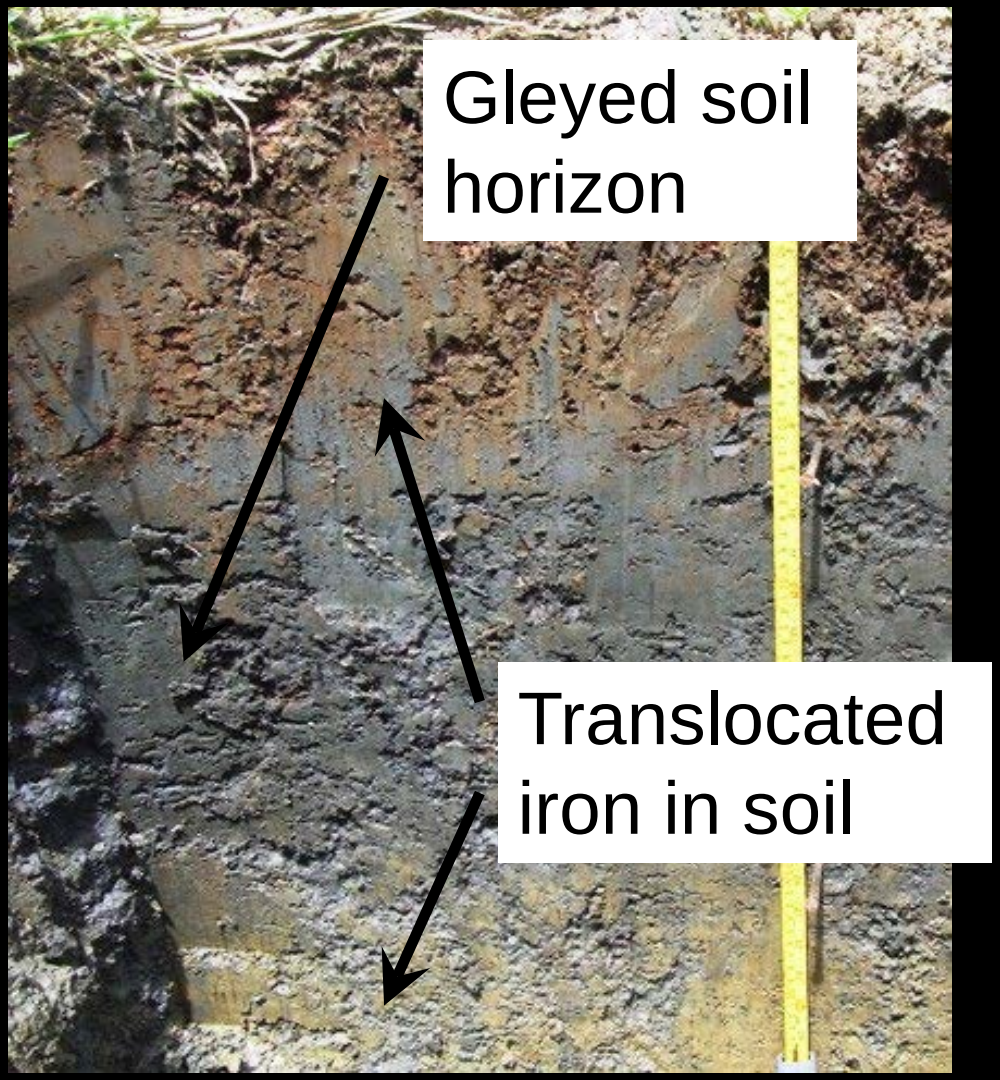


Aerobic Bacteria and Fungi

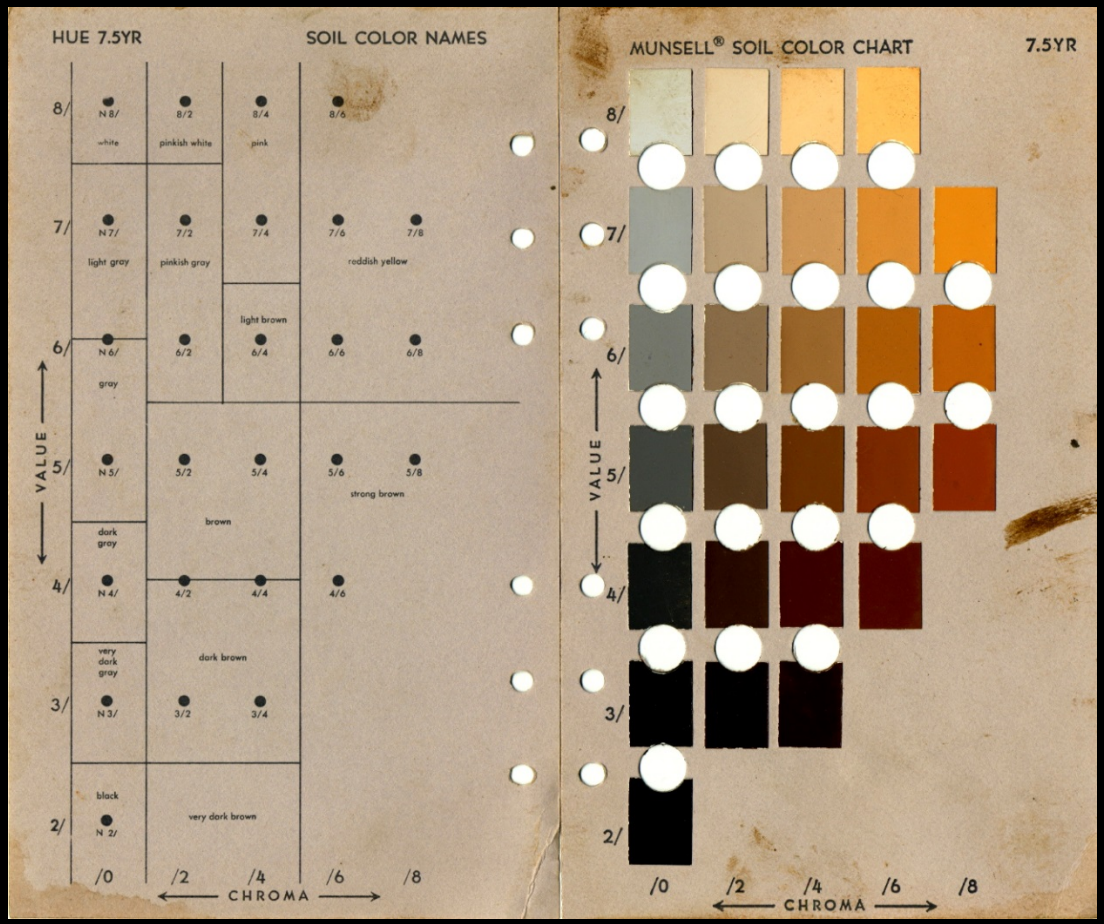
Anaerobic Bacteria and other Micro-organisms

Accumulation of Organic Materials in Frequently Saturated Soils – Organic Soils

Observable Chemical Changes in Hydric Soils



Munsell Soil Color Book



Soil Parameter

Sampling Point: _____

ed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

Soil Matrix Attributes

Mottle Attributes

[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.)

Indicators for Problematic Hydric Soils[3]:

___ Histosol (A1)

___ Histic Epipedon (

___ Black Histic (A3)

___ Hydrogen Sulfide

___ Stratified Layers

___ 1 cm Muck (A9) (

___ Depleted Below

___ Thick Dark Surfa

___ Sandy Mucky Mir

___ Sandy Gleyed Ma

Sandy Redox (S5)

1 cm Muck (A9) (LRR C)

and

nt,

Field Indicators for Hydric Soils

- Hydrogen Sulfide
- Sandy Mucky Matrix

Restrictive Layer (if present):

Type: _____

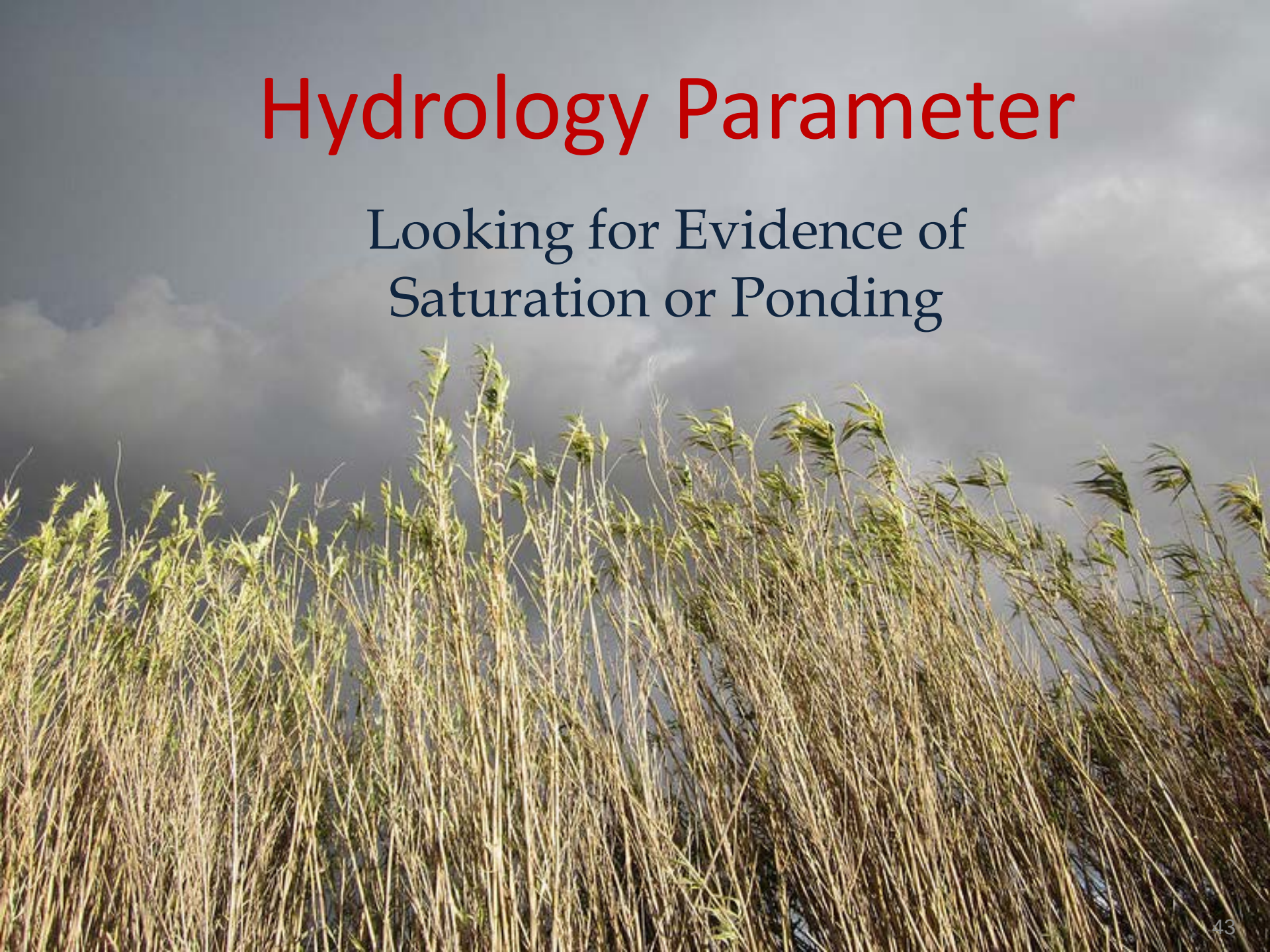
Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

Hydrology Parameter

Looking for Evidence of Saturation or Ponding



Evidence of Hydrology

Evidence of Hydrology: Oxidized Rhizosphere and Shallow Water Table

Oxidized Rhizosphere

Water Table Near Surface

Evidence of Hydrology: Wetland Species

Santa Rosa
Fairy Shrimp

Vernal Pool
Tadpole Shrimp

CA Tiger Salamander
Metamorphic Stage
(Early Stage of Development)

Hydrology

Hydrology Parameter

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Tabl
___ Saturation (A3)
___ Water Marks (B1
___ Sediment Depos
___ Drift Deposits (B
___ Surface Soil Cra
___ Inundation Visibl
___ Water-Stained L

___ Salt Crust (B11)
12)
ebrates (B13)
fide Odor (C1)
ospheres along Living Roots (C
Reduced Iron (C4)
eduction in Tilled Soils (C6)
rface (C7)
___ in Remarks)

- High water table
- Drift deposits
- Surface soil cracks
- …

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

- Crayfish burrows
- Shallow aquitard
- Water stained leaves
- …

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:

Primary Hydrology Indicators (Need 1)

Secondary Hydrology Indicators (Need 2)

Factors that Influence the Reliability of Field Indicators of Hydrophytic Vegetation

- Atypical situations where the vegetation has been removed or altered by human activities
- Facultative (FAC) species dominate the vegetation
- Community characterization based on only one or two species
- Delineation during the dry season when upland species may be abundant in seasonal wetlands
- Vegetation present following disturbance may not be characteristic of the long-term community

Coastal Commission Approach to Problem Areas

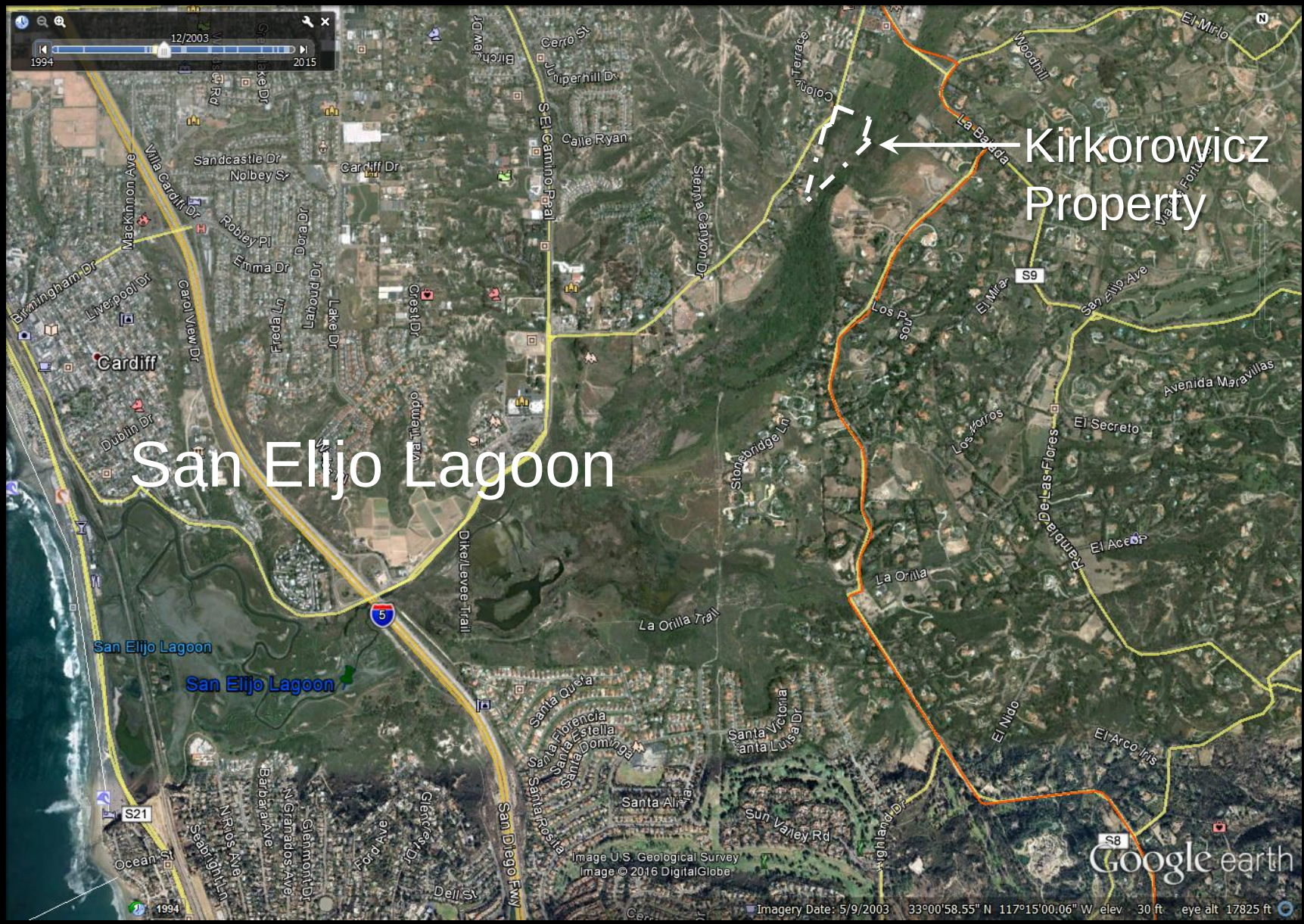
- Species listed as OBL, FACW, or FAC are presumed to be growing as “hydrophytes”
- Where there is a predominance of OBL, FACW, or FAC species, the area is presumed to be a wetland
- In problem areas, the wetland presumption is rebuttable by compelling evidence of upland conditions.
- All pertinent evidence may be brought to bear on problem situations, but direct observations of hydrology during normal or unusually wet rainy seasons is most useful

Highway 90 Median Area

Sand Spurry

Rabbit's foot Grass

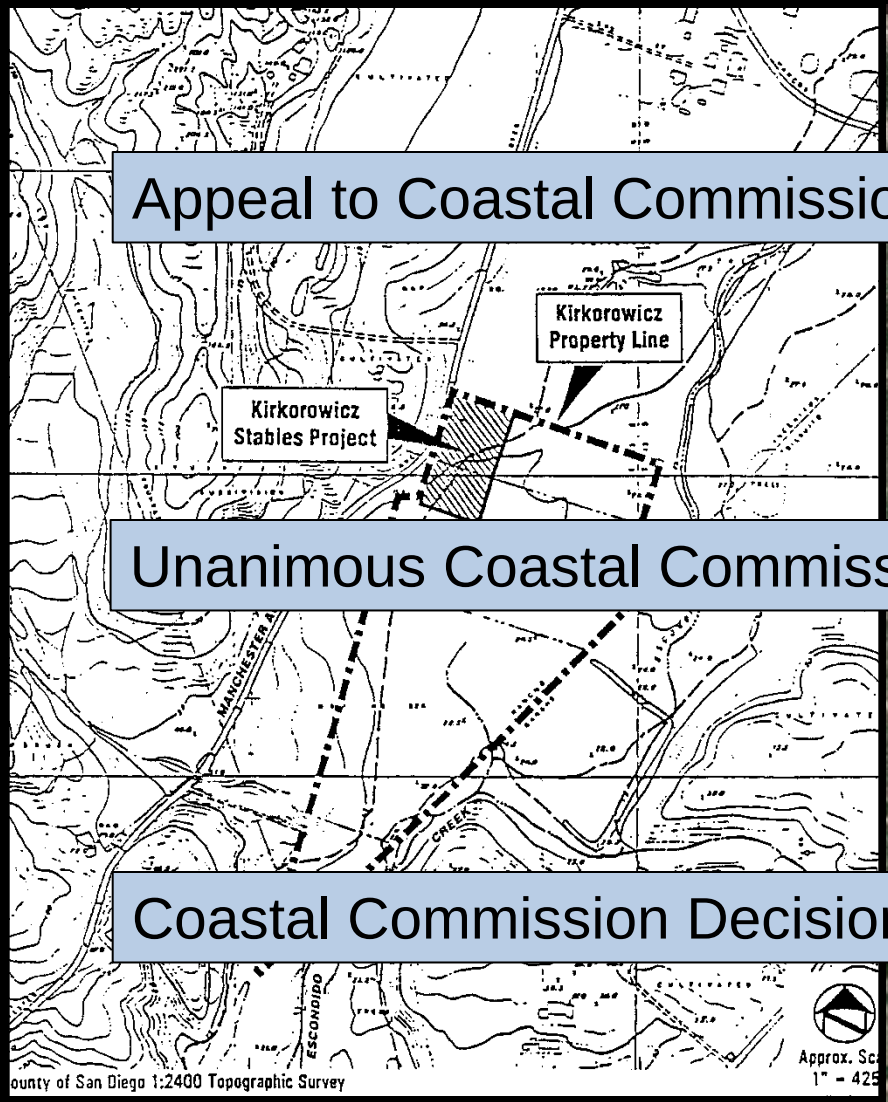
San Elijo Lagoon Watershed

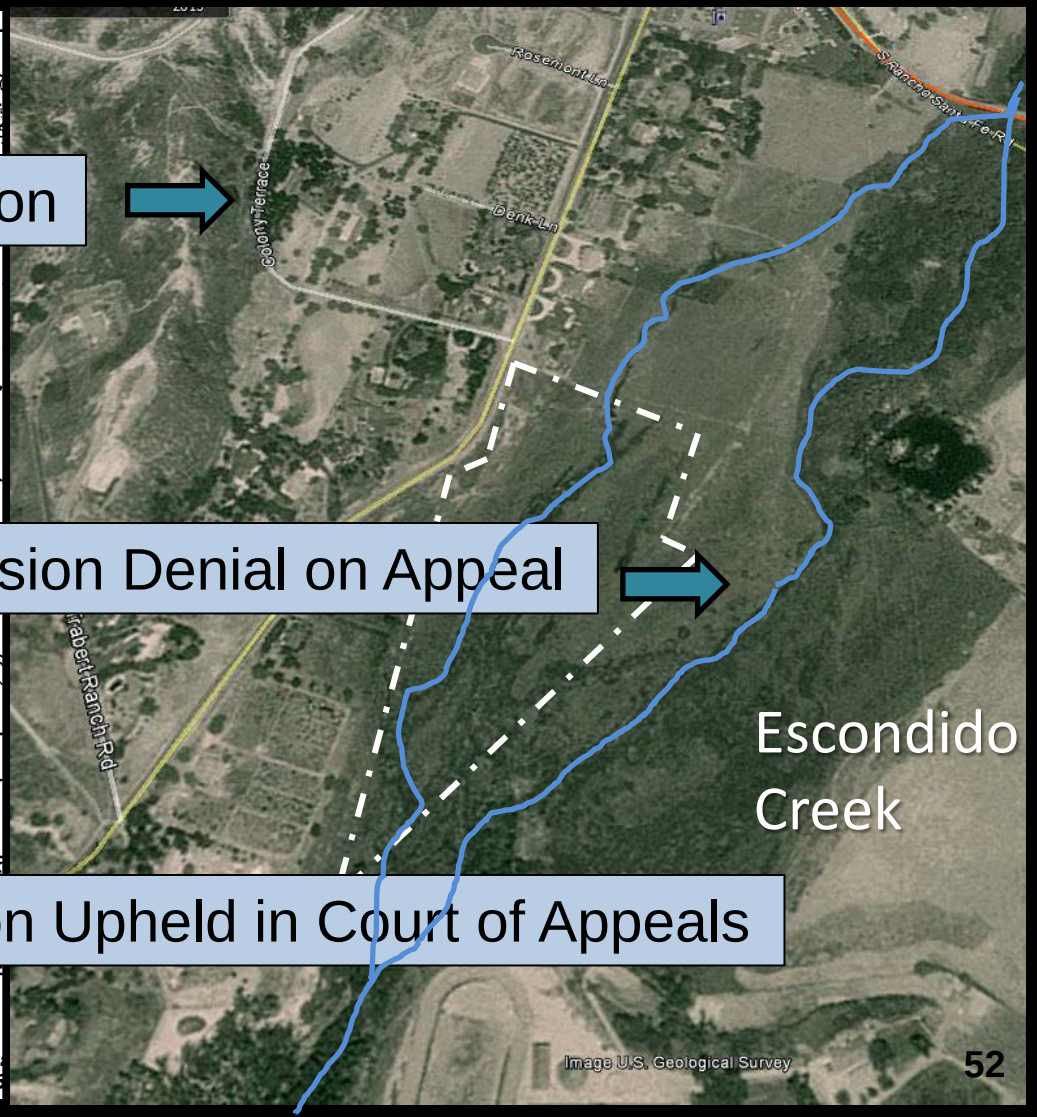


Kirkorowicz Permit Application

From CDP W8a – 10 - 1997

From Google Earth ~ May 1994





Appeal to Coastal Commission

Unanimous Coastal Commission Denial on Appeal

Coastal Commission Decision Upheld in Court of Appeals

Thank You