California Rapid Assessment Method for Wetlands

(CRAM)

Depressional Training Module

Steps of CRAM Assessment

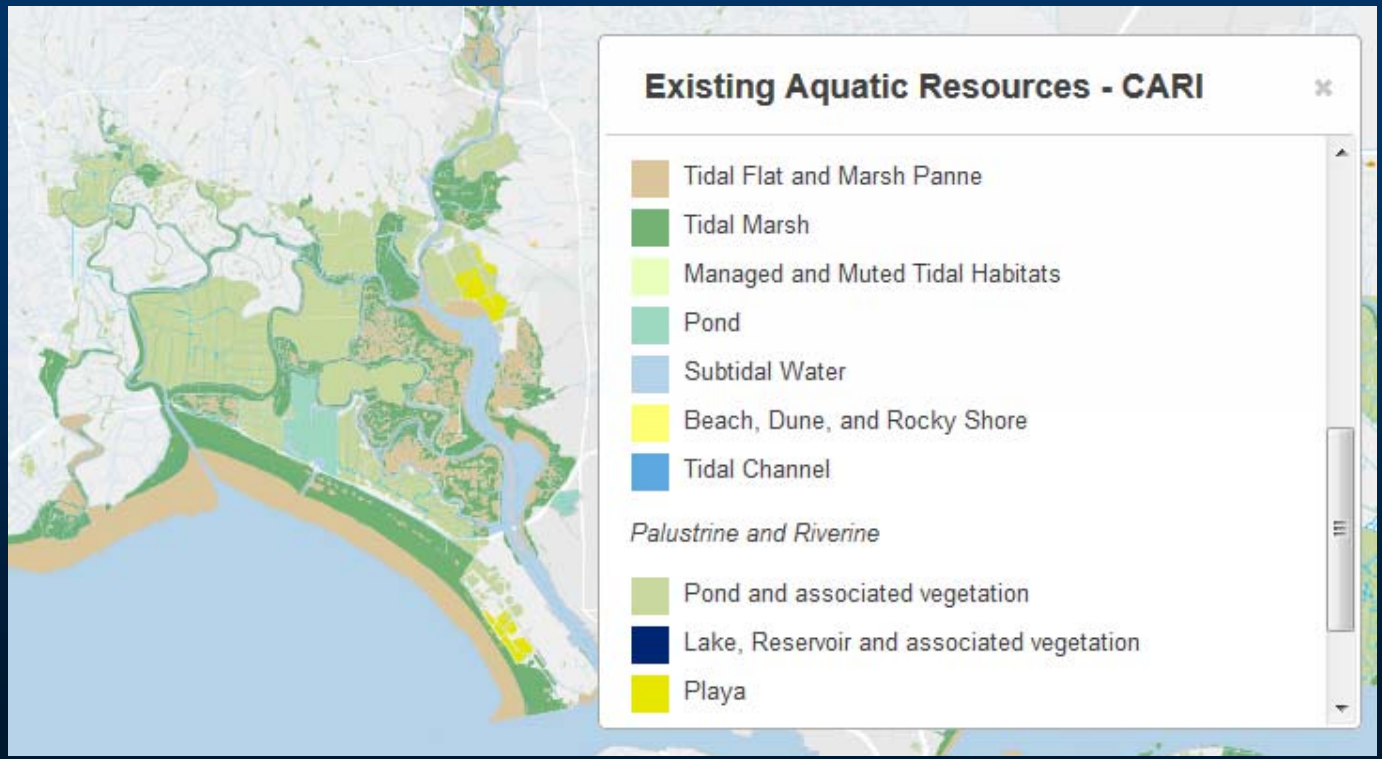
Step 1: Assemble background information
Step 2: Classify wetland
Step 3: Verify the appropriate season
Step 4: Sketch the CRAM Assessment Area (AA)
Step 5: Conduct the office assessment of AA
Step 6: Conduct the field assessment of AA
Step 7: Complete CRAM QA/QC
Step 8: Submit assessment results using *e*CRAM

Assemble Background Information

- 1-3m pixel resolution digital geo-rectified site imagery with a scale
- Preliminary map of assessment area (AA)
- Reports on hydrology, ecology, chemistry
- List of common plants
- Access permission (if needed)
- Map/directions to site

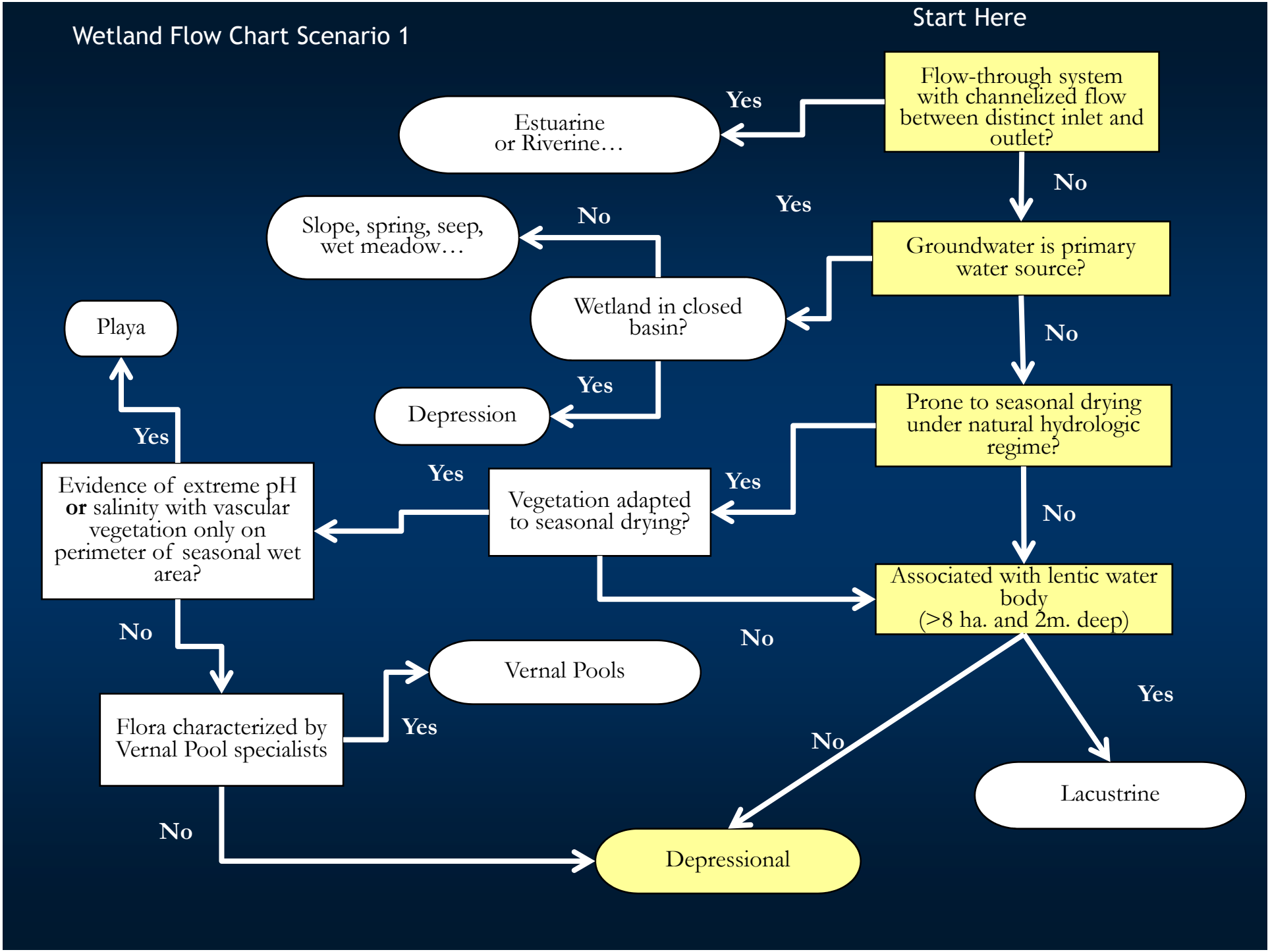
Sources of Background Information

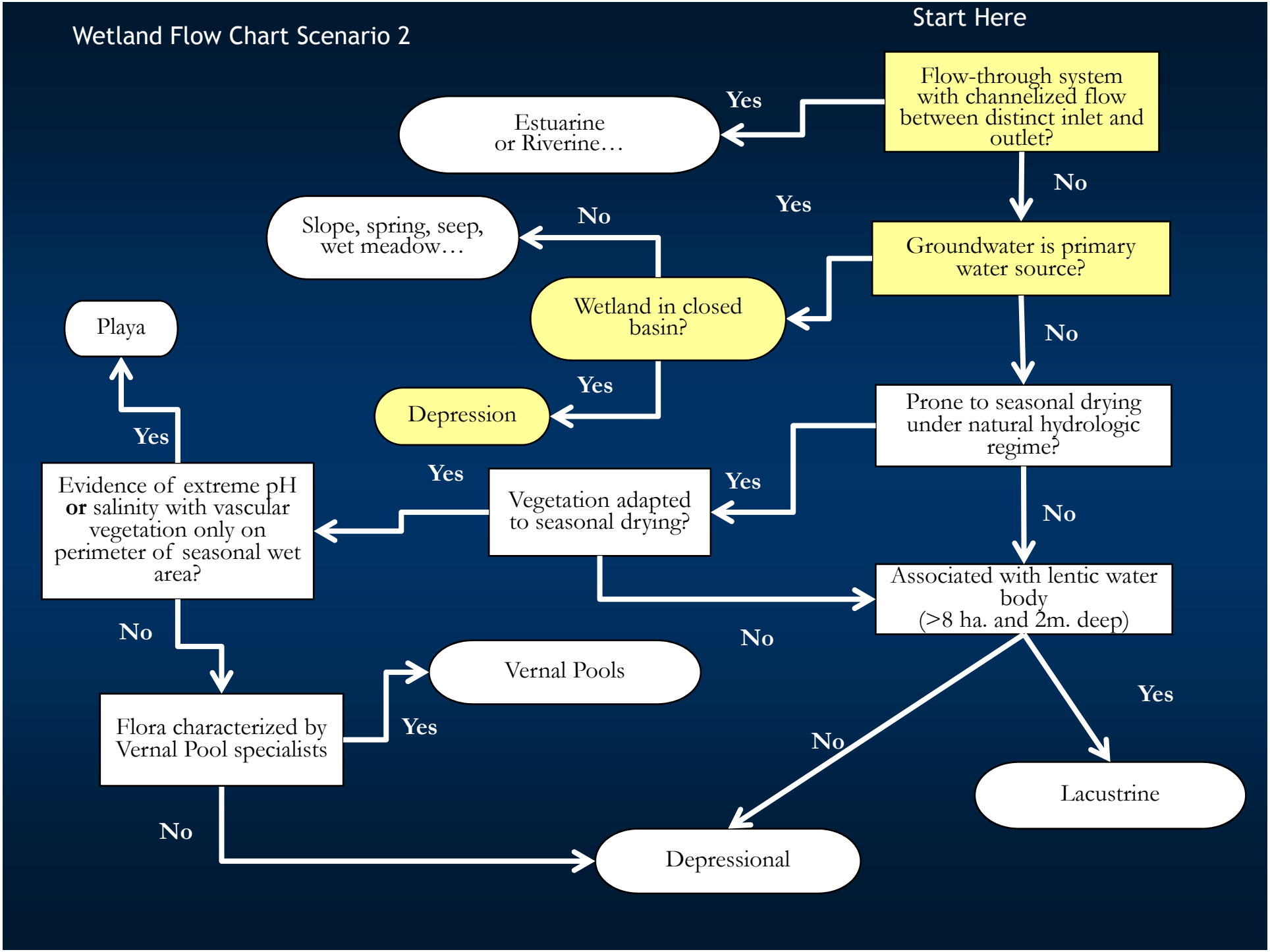
- Wetland maps (EcoAtlas, NWI)
- Other maps (topography, geology, soils, vegetation)
- Project reports (e.g. monitoring reports)
- Phone interviews

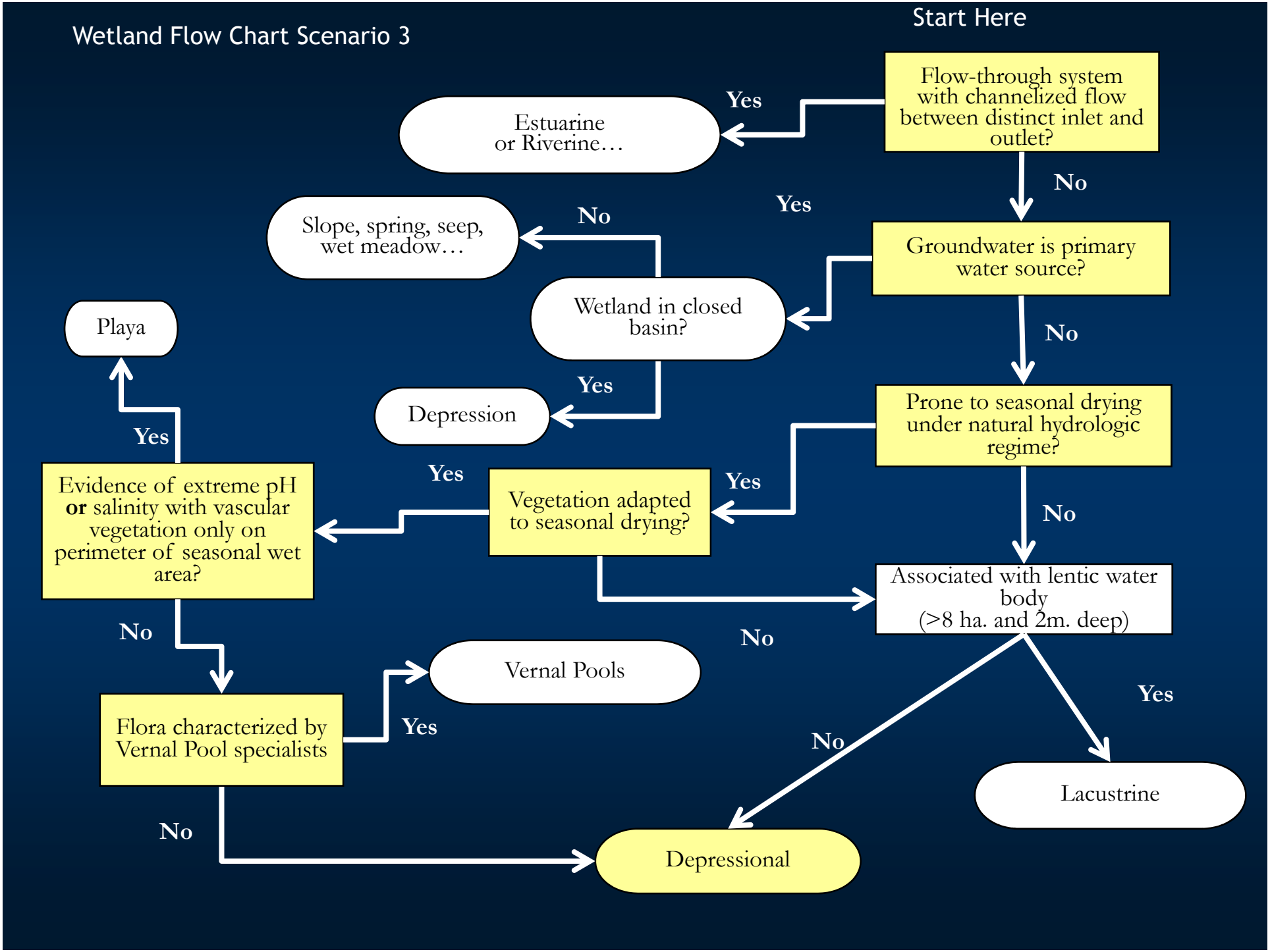


Depressional Wetlands

- Seasonal or perennial hydrology
- Exist in topographic lows
- Precipitation, groundwater, and runoff are main water sources
- Various types: sag ponds, snowmelt ponds, perennial ponds, cut-off oxbows, floodplain depressions, stock ponds, duck ponds, etc.


Wetland Flow Chart Scenario 1
Start Here
Flow-through system with channelized flow between distinct inlet and outlet?
Yes
Estuarine or Riverine…
No
Groundwater is primary water source?
Yes
Slope, spring, seep, wet meadow…
No
Wetland in closed basin?
Yes
Depression
No
Prone to seasonal drying under natural hydrologic regime?
Yes
Vegetation adapted to seasonal drying?
Yes
Evidence of extreme pH or salinity with vascular vegetation only on perimeter of seasonal wet area?
Yes
Playa
No
Flora characterized by Vernal Pool specialists
Yes
Vernal Pools
No
Depressional
No
Associated with lentic water body (>8 ha. and 2m. deep)
No
Yes
Lacustrine


Wetland Flow Chart Scenario 2
Start Here
Flow-through system with channelized flow between distinct inlet and outlet?
Yes
Estuarine or Riverine…
No
Groundwater is primary water source?
Yes
Slope, spring, seep, wet meadow…
No
Wetland in closed basin?
Yes
Depression
No
Prone to seasonal drying under natural hydrologic regime?
Yes
Vegetation adapted to seasonal drying?
Yes
Evidence of extreme pH or salinity with vascular vegetation only on perimeter of seasonal wet area?
Yes
Playa
No
Flora characterized by Vernal Pool specialists
Yes
Vernal Pools
No
Depressional
No
Associated with lentic water body (>8 ha. and 2m. deep)
No
Yes
Lacustrine


Wetland Flow Chart Scenario 3
Start Here
Flow-through system with channelized flow between distinct inlet and outlet?
Yes
Estuarine or Riverine…
No
Groundwater is primary water source?
Yes
Slope, spring, seep, wet meadow…
No
Wetland in closed basin?
Yes
Depression
No
Prone to seasonal drying under natural hydrologic regime?
Yes
Vegetation adapted to seasonal drying?
Yes
Evidence of extreme pH or salinity with vascular vegetation only on perimeter of seasonal wet area?
Yes
Playa
No
Flora characterized by Vernal Pool specialists
Yes
Vernal Pools
No
Depressional
No
Associated with lentic water body (>8 ha. and 2m. deep)
No
Yes
Lacustrine

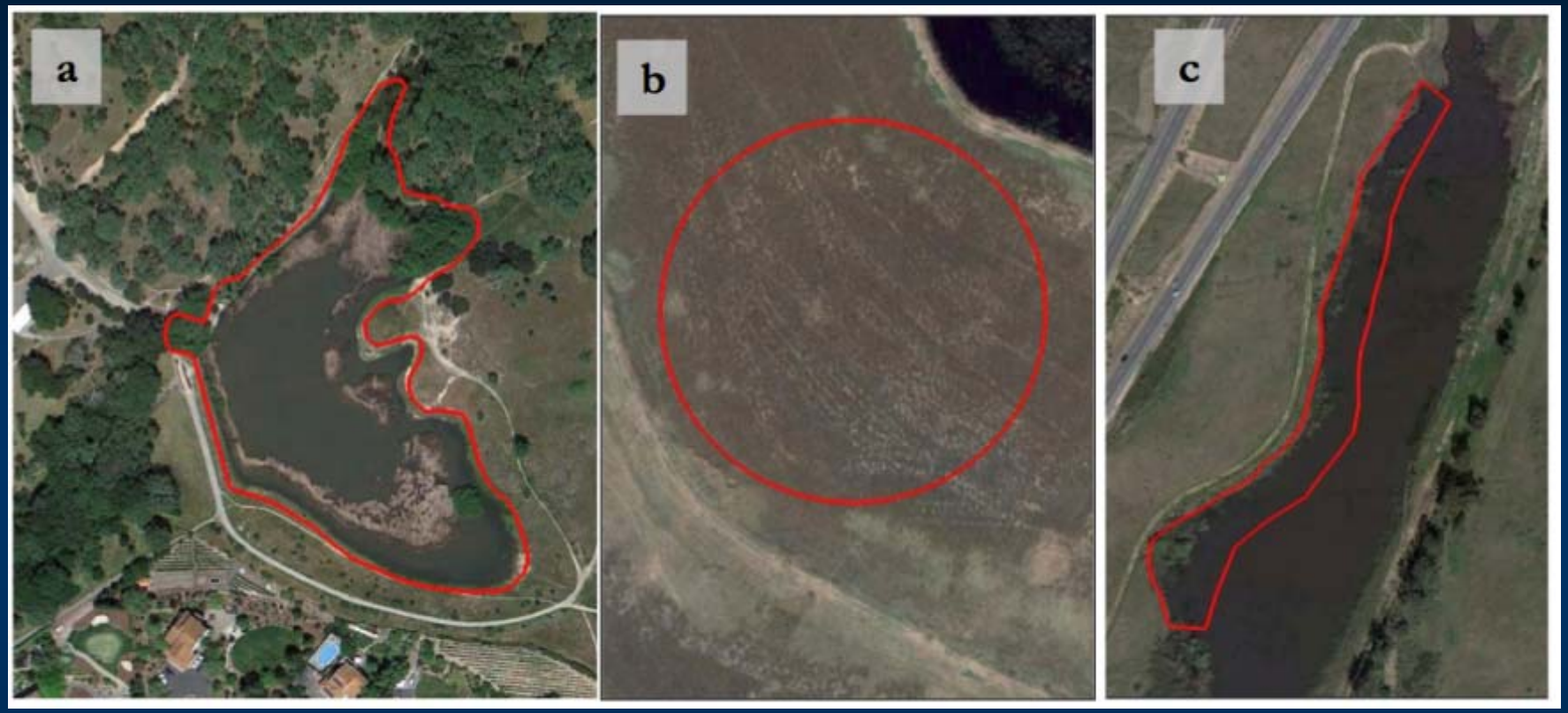
CRAM Assessment Window

- Growing season of plants
  - Usually March – September
    - New growth to senescence
    - Shorter at higher altitudes
    - Later with snow

Considerations for defining the AA

- Purpose of Assessment
  - Project (multiple AAs to cover site)
  - Ambient (AA located at probabilistic draw point)
- Hydrogeomorphic Integrity
  - Bounded by changes in flow and sediment regimes
  - Maximize detection of management effects
- Size Limits for AAs
  - Larger AAs have higher or more variable scores
  - Larger AAs take longer to assess

Sketch the AA



- Subject to field verification
- 1 ha recommended size
- No minimum size, maximum size = 2.0 ha

Identifying AA boundaries

- Extend from the foreshore to the backshore (high water) plus overhanging riparian or 2m
- If open water is present, extend AA 10m beyond the foreshore
- Should NOT cross: levees, open water >30m wide, uplands, weirs
- CAN cross: roads/trails at grade, bare ground, property boundaries, jurisdictional boundaries

Office Assessment

The scoring of some metrics benefit from checking additional background information or aerial photographic investigation completed in the office

- Buffer and Landscape Context Attribute
  - Aquatic Area Abundance
  - Percent of AA with Buffer
  - Average Buffer Width
- Hydrology Attribute
  - Water Source

Field Assessment Procedure

1. Bring printed aerial photographs
2. Walk the wetland and draw the AA
3. Walk through entire AA making mental notes and recording important plant species
4. Fill out datasheets
5. Walk again to clarify uncertainties
6. Finalize field scores

Basic Information Datasheet

Basic Information Sheet: Depressional Wetlands

Assessment Area Name:	
Project Name:	
Assessment Area ID #:	
Project ID #:	**Date:**
Assessment Team Members for This AA	
AA Location: **Latitude:** **Longitude:** **Datum:**	
AA Category: □ Pre-Restoration □ Post-Restoration □ Pre-Mitigation □ Post-Mitigation □ Pre-Impact □ Post-Impact □ Training □ Ambient □ Reference □ Other:	
Origin of Wetland (if known): □ Natural system □ Artificial system	
Type of Management (if known): □ waterfowl/birds □ amphibians □ general wildlife □ sediment □ water quality □ stormwater □ water supply (agriculture) □ water supply (livestock) □ not managed □ other:	
Which best describes the type of depressional wetland? □ freshwater marsh □ alkaline marsh □ brackish marsh □ other (specify):	
AA Encompasses: □ entire wetland □ portion of the wetland	
Which best describes the hydrologic state of the wetland at the time of assessment? □ ponded/inundated □ saturated soil, but no surface water □ dry	

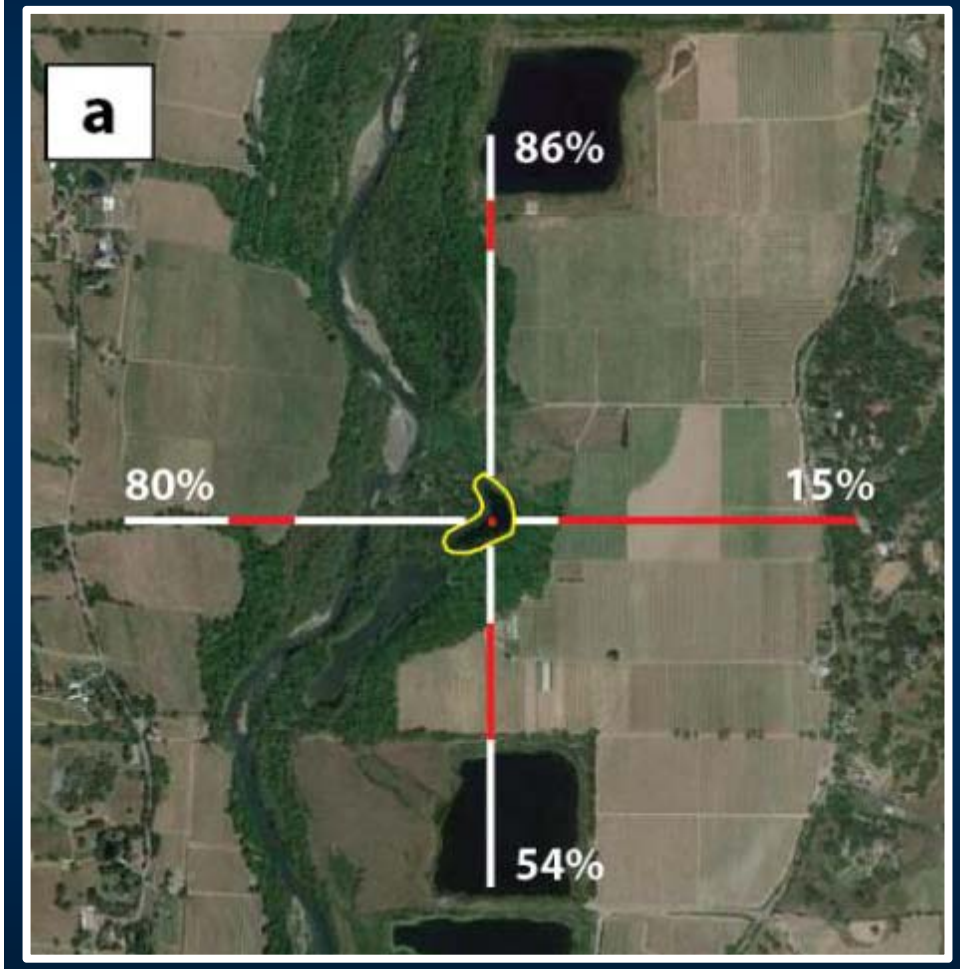
Buffer and Landscape Context Attribute

- *Spatial connection to other aquatic resources*
- *The size and quality of buffer surrounding the AA*

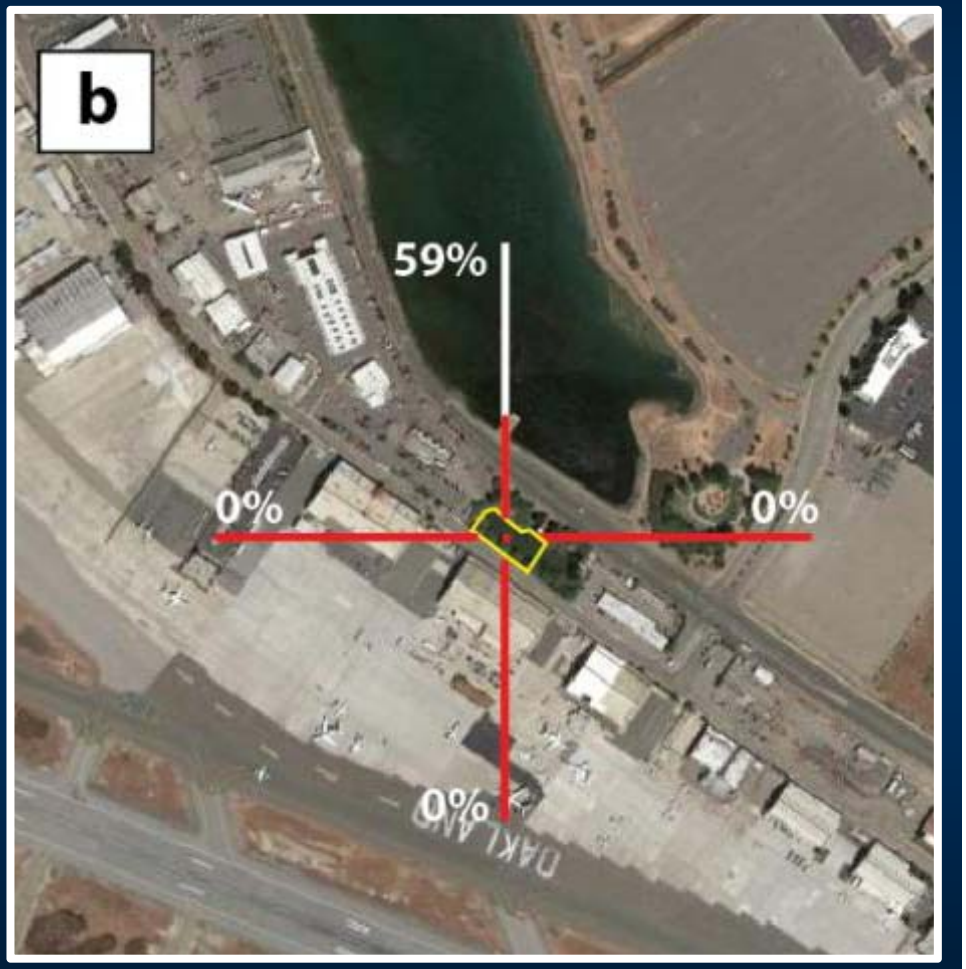
Aquatic Area Abundance

Percent of transect lines (500m) that contains an aquatic feature of any kind	
Segment Direction	Percent of transect length that crosses an aquatic feature
North	
South	
East	
West	
Avg % of transect	

Aquatic Area Abundance



A



D

Rating for Aquatic Area Abundance

Rating	Alternative States
A	An average of 46-100 % of the transects is an aquatic feature of any kind
B	An average of 30-45 % of the transects is an aquatic feature of any kind
C	An average of 16-30 % of the transects is an aquatic feature of any kind
D	An average of 0-15 % of the transects is an aquatic feature of any kind

Buffer Metric

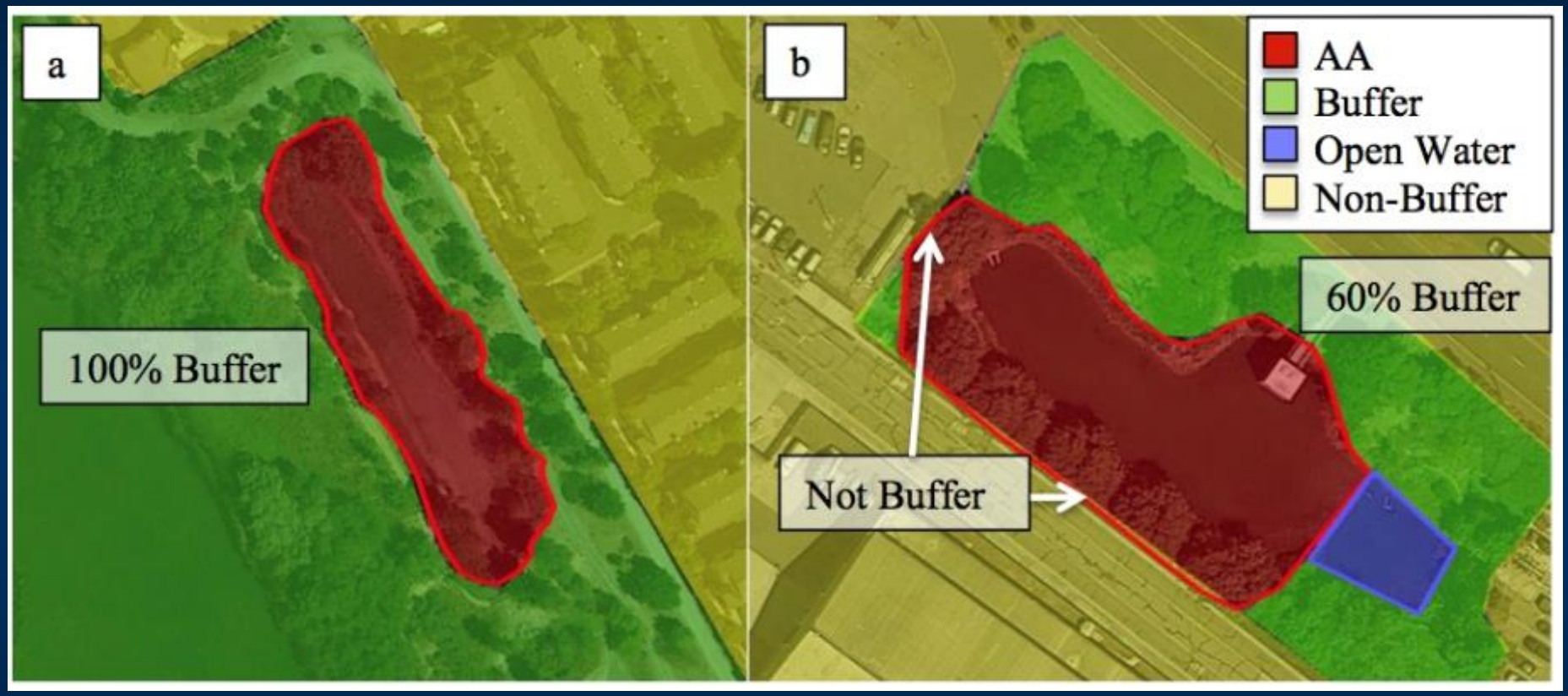
Buffers:

- Natural or semi-natural area adjoining the AA
- Must be 5m wide and extend at least 5m along AA perimeter
- "Adjoining" areas of open water ≥ 30m are neutral (non-adjoining open water is buffer)

Guidelines for identifying wetland buffers and breaks in buffers

Examples of Land Covers Included in Buffers	Examples of Land Covers Excluded from Buffers Notes: buffers do not cross these land covers; areas of open water adjacent to the AA are not included in the assessment of the AA or its buffer.
• at-grade bike and foot trails, or trails (with light traffic) • horse trails • natural upland habitats • nature or wildland parks • range land and pastures • railroads (with infrequent use: 2 trains per day or less) • roads not hazardous to wildlife, such as seldom used rural roads, forestry roads or private roads • swales and ditches • vegetated levees	• commercial developments • fences that interfere with the movements of wildlife (i.e. food safety fences that prevent the movement of deer, rabbits and frogs) • intensive agriculture (row crops, orchards and vineyards) • golf courses • paved roads (two lanes or larger) • active railroads (more than 2 trains per day) • lawns • parking lots • horse paddocks, feedlots, turkey ranches, etc. • residential areas • sound walls • sports fields • urbanized parks with active recreation • pedestrian/bike trails (with heavy traffic)

% of AA with Buffer



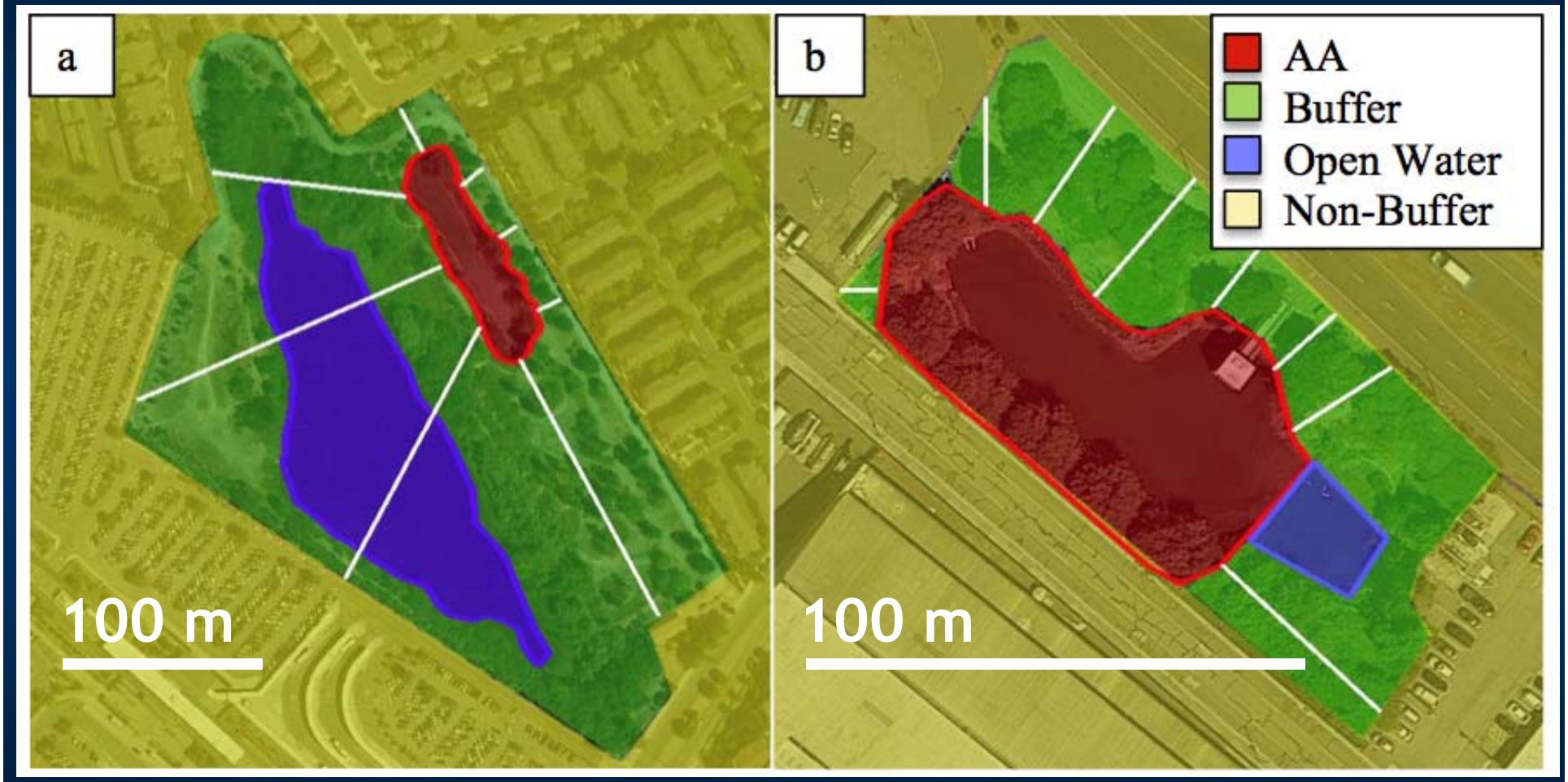
A

B

% of AA with Buffer

Rating	Alternative States
A	Buffer is > 75% of AA perimeter
B	Buffer is 50-74% of AA perimeter
C	Buffer is 25-49% of AA perimeter
D	Buffer is <25% of AA perimeter

Average Buffer Width



C D

Average Buffer Width

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m

Buffer Condition

- Buffer characteristics examined:
  - Native vs non-native vegetation
  - Soil disturbance or compaction
  - Intensity of human visitation

Assess based on field indicators only

Buffer Condition

Rating for Buffer Condition

Rating	Alternative States
A	Buffer for AA is dominated by **native vegetation**, has **undisturbed soils**, and is apparently subject to **little or no human visitation**.
B	Buffer for AA is characterized by an **intermediate mix** of non-native and native vegetation (25% to 75% non-native), but **mostly undisturbed** soils, and is apparently subject to **little or low impact** human visitation OR
B	Buffer for AA is dominated by **native vegetation**, but shows **some soil disturbance**, and is apparently subject to **little or low impact human visitation**.
C	Buffer for AA is characterized by **substantial amounts** (>75%) of non-native vegetation, AND there is at least a **moderate degree** of soil disturbance/compaction, and/or there is evidence of at least **moderate intensity** of human visitation.
D	Buffer for AA is characterized by **barren ground** and/or **highly compacted or otherwise disturbed** soils, and/or there is evidence of **very intense** human visitation.

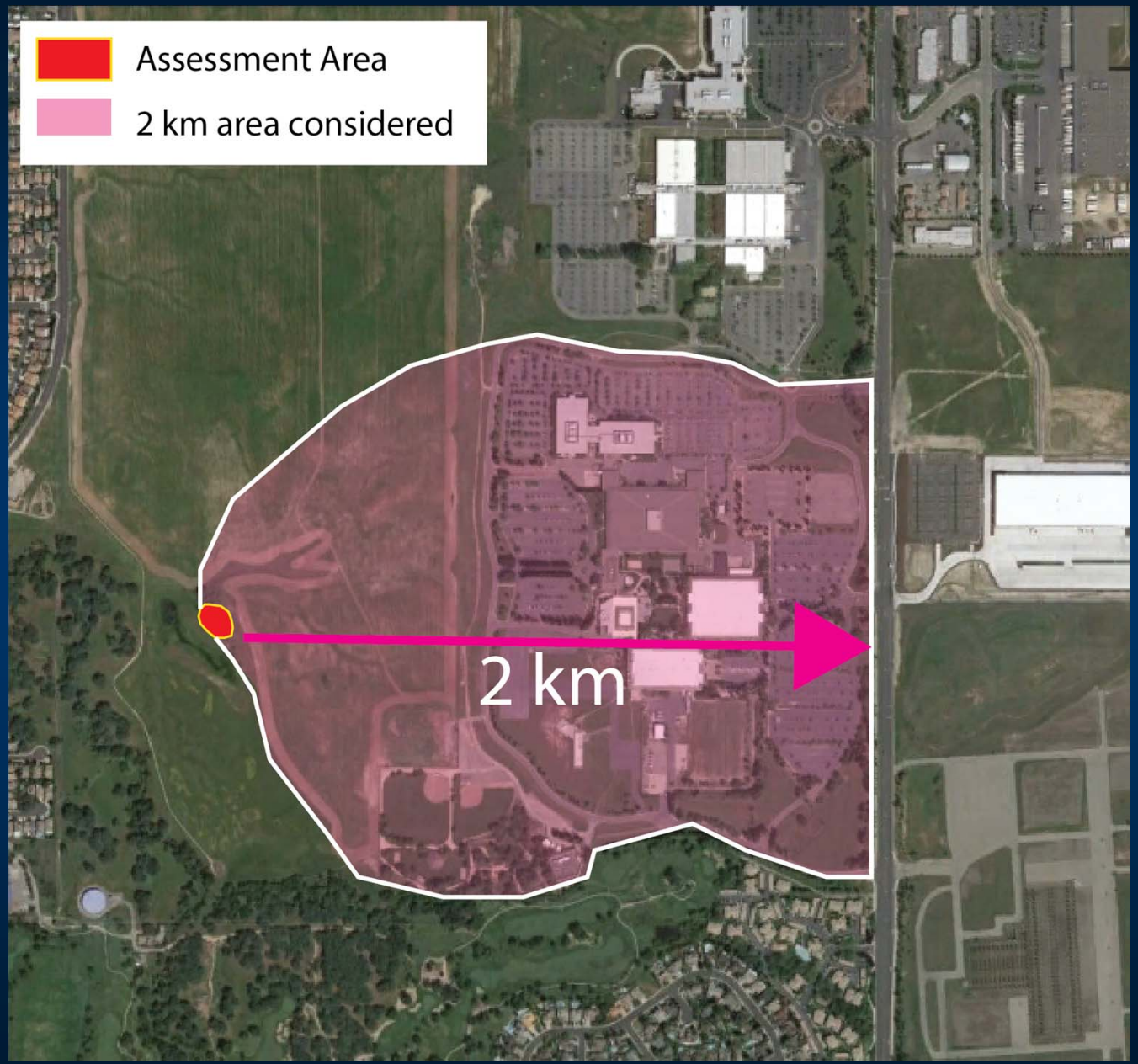
Buffer Condition

Hydrology Attribute

- *Water Source: wetland's primary source of water*
- *Hydroperiod: duration of inundation*
- *Hydrologic connectivity: connection to surrounding area*

Water Source

- Consider fresh water source(s)
- Determine anthropogenic inputs, diversions, or modified hydrology within the upstream immediate drainage basin (within 2km)
- Consult information sources
  - watershed reports
  - local experts
  - maps or imagery


Assessment Area
2 km area considered
2 km

Water Source

"…irrigation runoff from landscaped areas make up the base flow in Big Canyon, and given the consistent volume of irrigation water, this runoff can be expected to be a reliable and constant source of water…

Big Canyon Creek Restoration Plan
City of Newport Beach
Upper Newport Bay, Orange County, CA
April 2004
http://newport-beach.ca.us/CMO/BigCanyonCreekRestorationProject.htm

Rating for Water Source

Rating	Alternative States
A	Freshwater sources that affect the dry season condition of the AA, such as its flow characteristics, hydroperiod, or salinity regime, are precipitation, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the dry season. There is **no indication** that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season condition of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises **less than** 20% of the immediate drainage basin within about 2 km upstream of the AA, or that is characterized by the presence of a few small stormdrains or scattered homes with septic systems. No large point sources or dams control the overall hydrology of the AA.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation or flooding, pumped water, artificially impounded water, water remaining after diversions, regulated releases of water through a dam, or other artificial hydrology. Indications of substantial artificial hydrology include developed or irrigated agricultural land that comprises **more than** 20% of the immediate drainage basin within about 2 km upstream of the AA, or the presence of major point source discharges that obviously control the hydrology of the AA. OR Freshwater sources that affect the dry season conditions of the AA are **substantially controlled** by known diversions of water or other withdrawals directly from the AA, its encompassing wetland, or from its drainage basin.
D	Natural, freshwater sources that affect the dry season conditions of the AA have **been eliminated** based on the following indicators: impoundment of all possible wet season inflows, diversion of all dry-season inflow, predominance of xeric vegetation, etc.

Hydroperiod

The characteristic frequency and duration of inundation or saturation of wetland during a typical year

Direct Engineering Evidence	Indirect Ecological Evidence
Reduced Extent and Duration of Inundation or Saturation	
•Active water control structures at the outlet or inlet (culverts, flashboard dams, slide gates, etc.) •Upstream spring boxes •Upstream Impoundments •Pumps, diversions, ditching that move water *out of* the wetland	•Evidence of aquatic wildlife mortality •Encroachment of terrestrial vegetation •Stress or mortality of hydrophytes •Compressed or reduced plant zonation

Hydroperiod

The characteristic frequency and duration of inundation or saturation of wetland during a typical year

Direct Engineering Evidence	Indirect Ecological Evidence
Increased Extent and Duration of Inundation or Saturation	
•Active water control structures at the outlet or inlet (culverts, flashboard dams, slide gates, etc.) •Pumps, diversions, ditching that move water *into* the wetland	•Late-season vitality of annual vegetation •Recently drowned riparian vegetation •Extensive fine grained deposits

Rating of Hydroperiod

	Alternative States
A	Hydroperiod in AA is characterized by mostly **natural patterns of inundation and drawdown.**
B	**Inundation patterns of the AA are of greater quantity** or duration than natural but the **drawdown is natural.**
C	**Inundation** patterns of the AA are **natural** but the **drawdown** pattern is **more rapid or extreme than natural.** **OR** **Inundation patterns of the AA are of substantially lower magnitude** or duration than natural but the **drawdown is a natural pattern.**
D	Both **inundation and drawdown patterns of the AA deviate from natural patterns.**

Hydrologic Connectivity

- Ability of water to flow into or out of the wetland that contains the AA
- The existence of a transition zone between the wetland and the upland
- Ability to accommodate rising flood waters without large changes in water level
- Hydrologic restrictions include:
  - Roads
  - Levees
  - Concrete walls

Hydrologic Connectivity

	Alternative States
A	Rising water in the wetland that contains the AA has mostly **unrestricted access** to adjacent areas, without levees or other obstructions to the lateral movement of flood waters**.**
B	Unnatural features such as levees or road grades limit lateral movement of water along **less than 50%** of the boundary of the wetland that contains the AA.
C	Unnatural features such as levees or road grades limit lateral movement of water along **50-90%** of the boundary of the wetland that contains the AA.
D	Unnatural features such as levees or road grades limit lateral movement of water along **more than 90%** of the boundary of the wetland that contains the AA.


Transition zone present
No Transition zone

Physical Structure Attribute

Considers …

- *complexity of form and structure affecting biodiversity*
- *Includes two Metrics:*
  - *Structural Patch Richness*
  - *Topographic Complexity*

Structural Patch Richness

STRUCTURAL PATCH TYPE (circle for presence)	Depressional
Minimum Patch Size	**3 m^2**
Abundant wrack or organic debris in channel, on floodplain, or across depressional wetland plain	
Animal mounds and burrows	
Bank slumps or undercut banks in channels or along shoreline	
Cobbles and Boulders	
Concentric or parallel high water marks	
Filamentous macroalgae or algal mats	
Islands (mostly above high-water)	
Large woody debris	
Non-vegetated flats or bare ground (sandflats, mudflats, gravel flats, etc.)	
Open water	
Plant hummocks and/or sediment mounds	
Soil cracks	
Standing snag(s) (1 or more at least 3 m tall)	
Submerged vegetation	
Swales on floodplain or along shoreline	
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	
Woody vegetation in water	
Total Possible	**17**
No. Observed Patch Types (enter here and use in Table 15 below)	

Soil Cracks

Standing Snags

Non-vegetated flats or bare ground

Concentric or parallel high water marks

Algal mats

Animal burrow

Plant Hummock

Woody vegetation in water

Structural Patch Richness

Rating	# of patches present
A	≥ 9
B	7 - 8
C	4 - 6
D	≤ 3

Variegated (left) and Non-variegated (right) shores

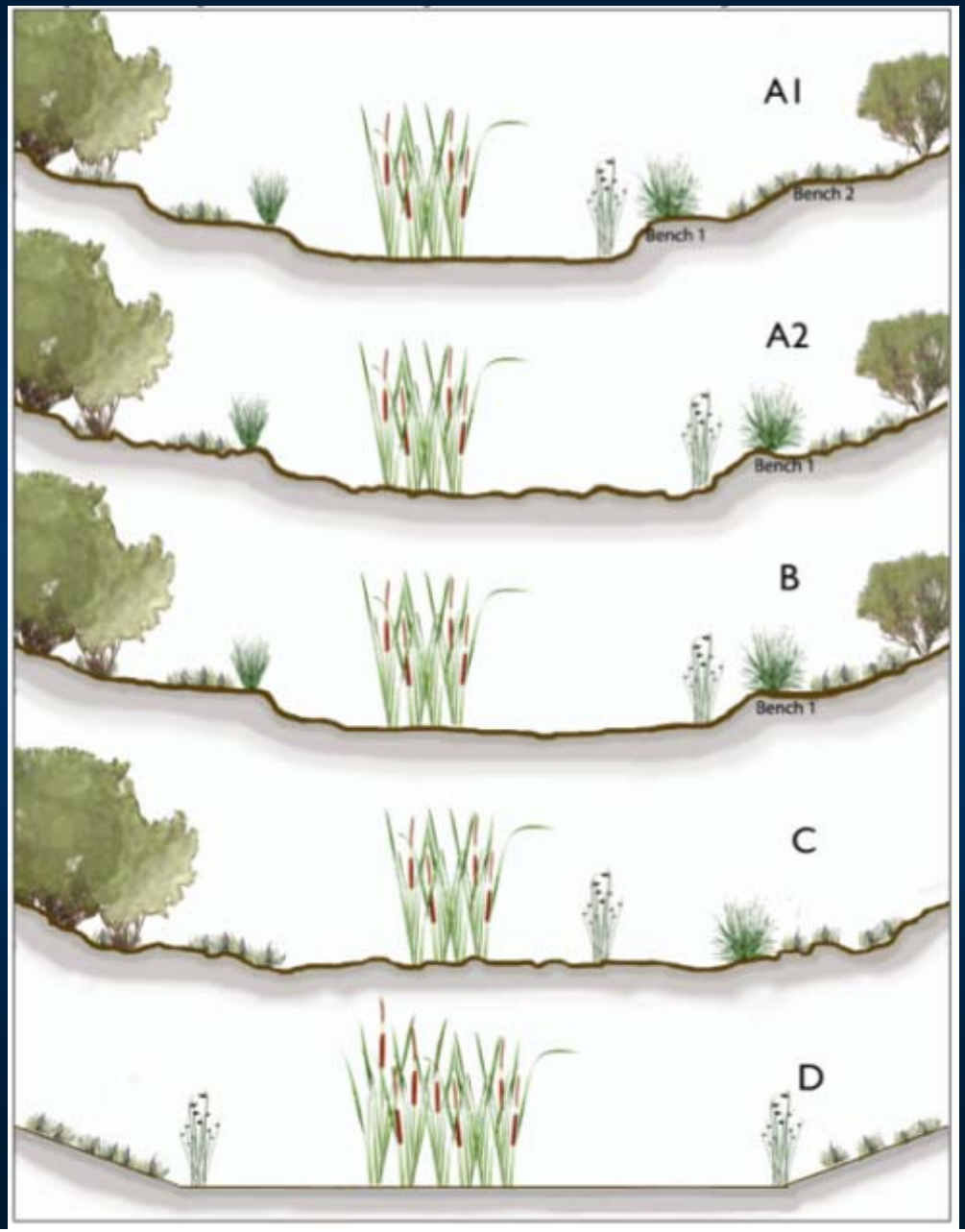
Topographic Complexity

Refers to the micro- and macro-topographic relief and variety of elevations within a wetland due to physical features and elevation gradients.

- *Step 1-observe your AA for indicators of topographic complexity*
- *Step 2- draw cross sections*
- *Step 3- compare your cross sections to the diagram and scoring rationale*

Topographic Complexity

- *Macrotopography*
- *Microtopography*



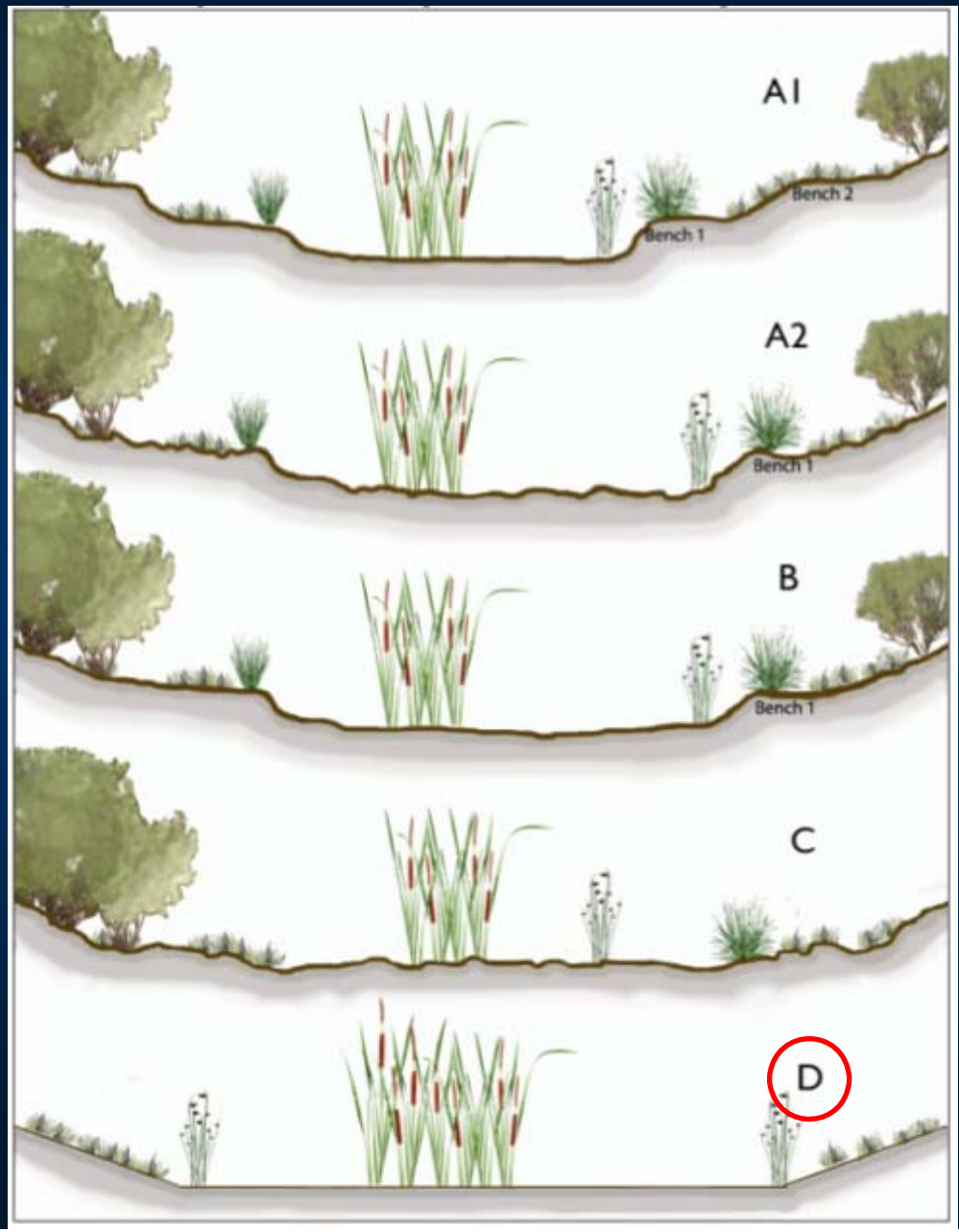
Topographic Complexity

Type	Examples of Topographic Features
Depressional	pools, islands, cobbles, boulders, mounds or hummocks, variegated shorelines, soil cracks, partially buried debris, animal tracks

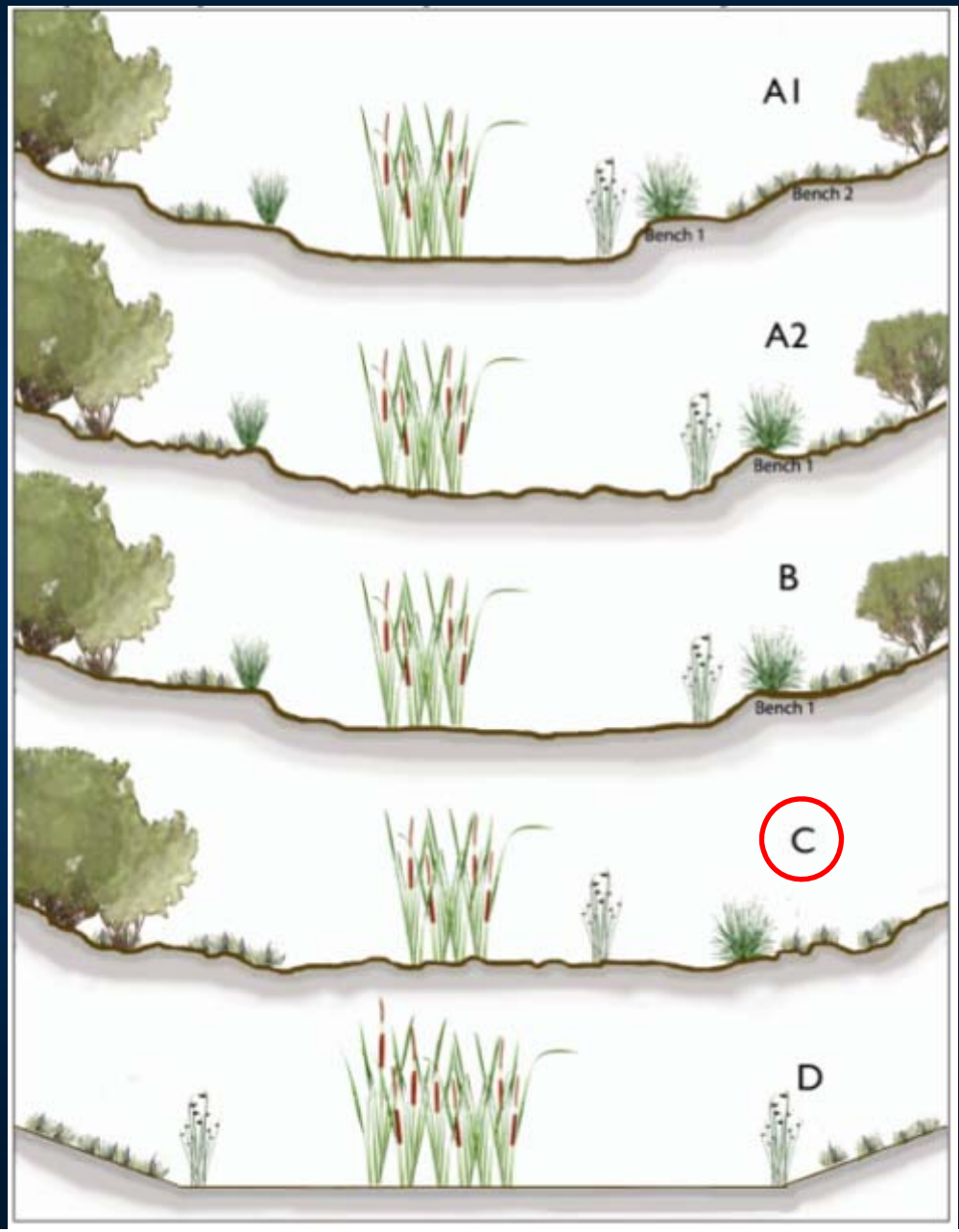
Topographic Complexity

Rating	Alternative States
A	AA as viewed along a typical cross-section has **two or more** benches above the middle area or bottom zone of the AA, but these benches, and the slopes between them, **lack abundant** micro-topographic relief or variability as illustrated in profile A2 of Figure 6.
	OR
	AA as viewed along a typical cross-section has **one or more** benches above the middle area or bottom zone of the AA, and the bench(es), plus the slopes between them contain physical patch types or features that contribute to **abundant** micro-topographic relief or variability as illustrated in profile A1 of Figure 6.
B	AA has **one bench** above the middle area or bottom zone of the AA, but this bench **lacks abundant** micro-topographic relief. The AA resembles profile B of Figure 6.
C	AA **lacks any obvious bench**, and is best characterized by a single slope that has at least a **moderate** amount of micro-topographic complexity, as illustrated in profile C of Figure 6.
D	AA has a single, **uniform slope** with **little or no** micro-topographic complexity, as illustrated in profile D of Figure 6.

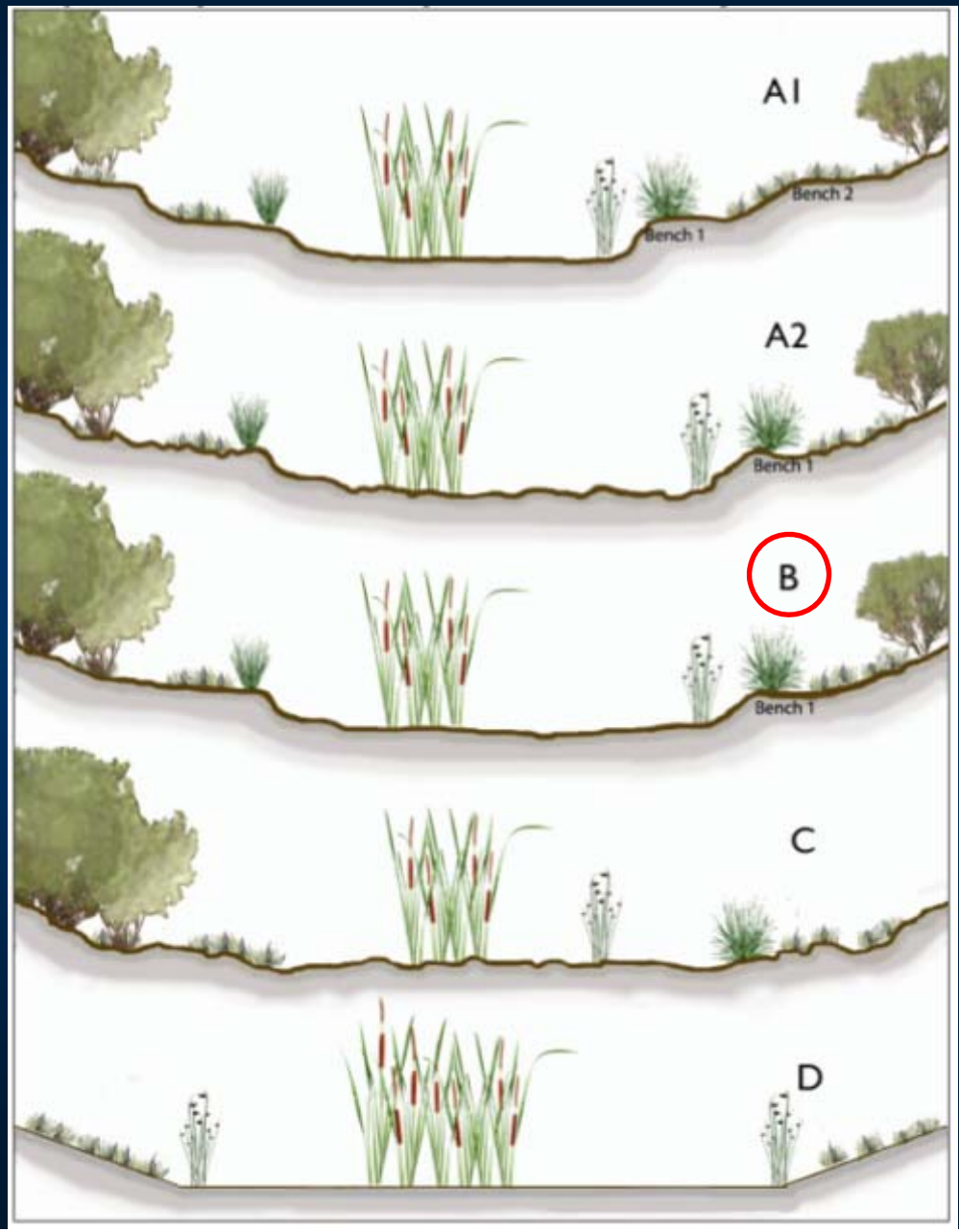
Topographic Complexity



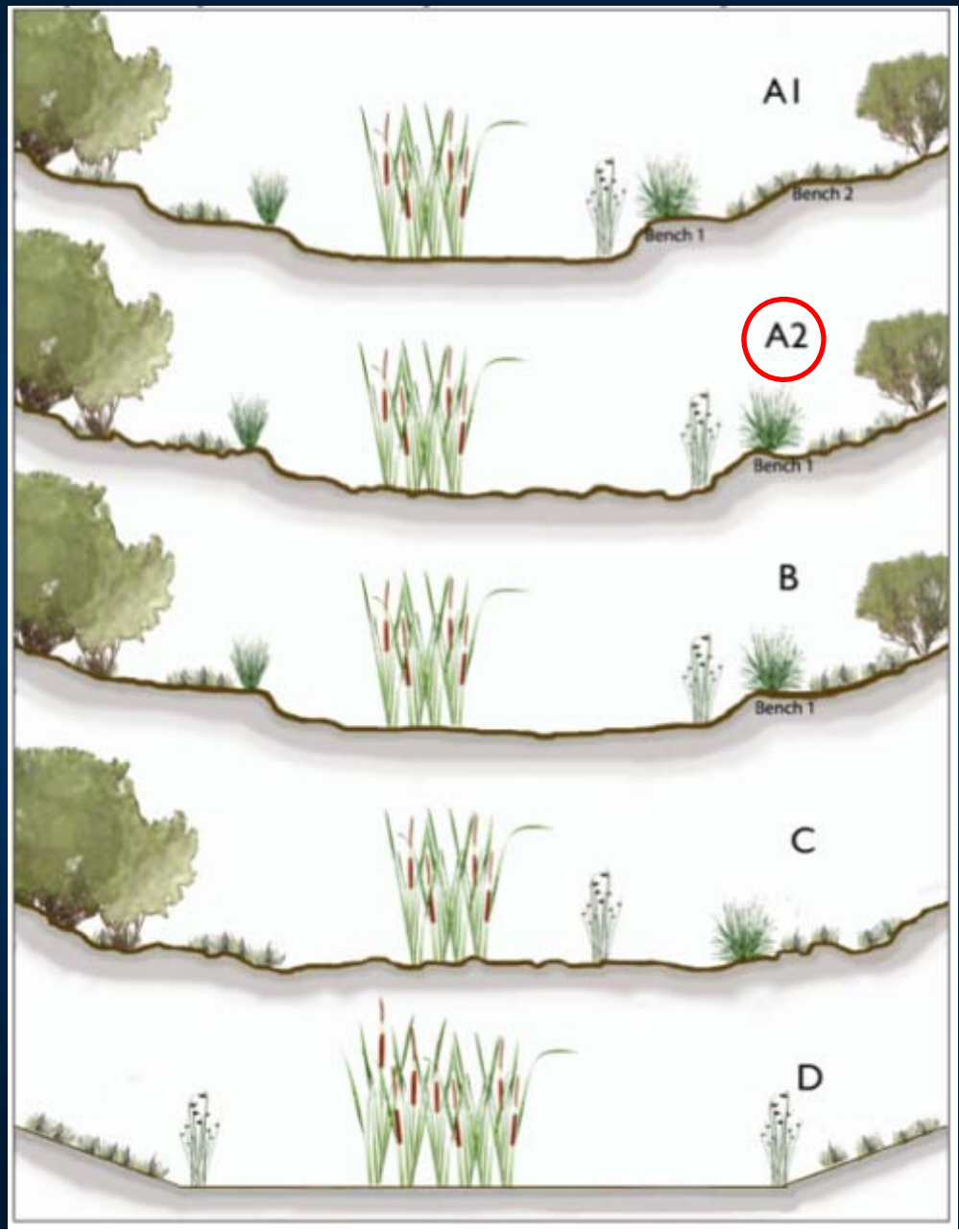
Topographic Complexity



Topographic Complexity



Topographic Complexity

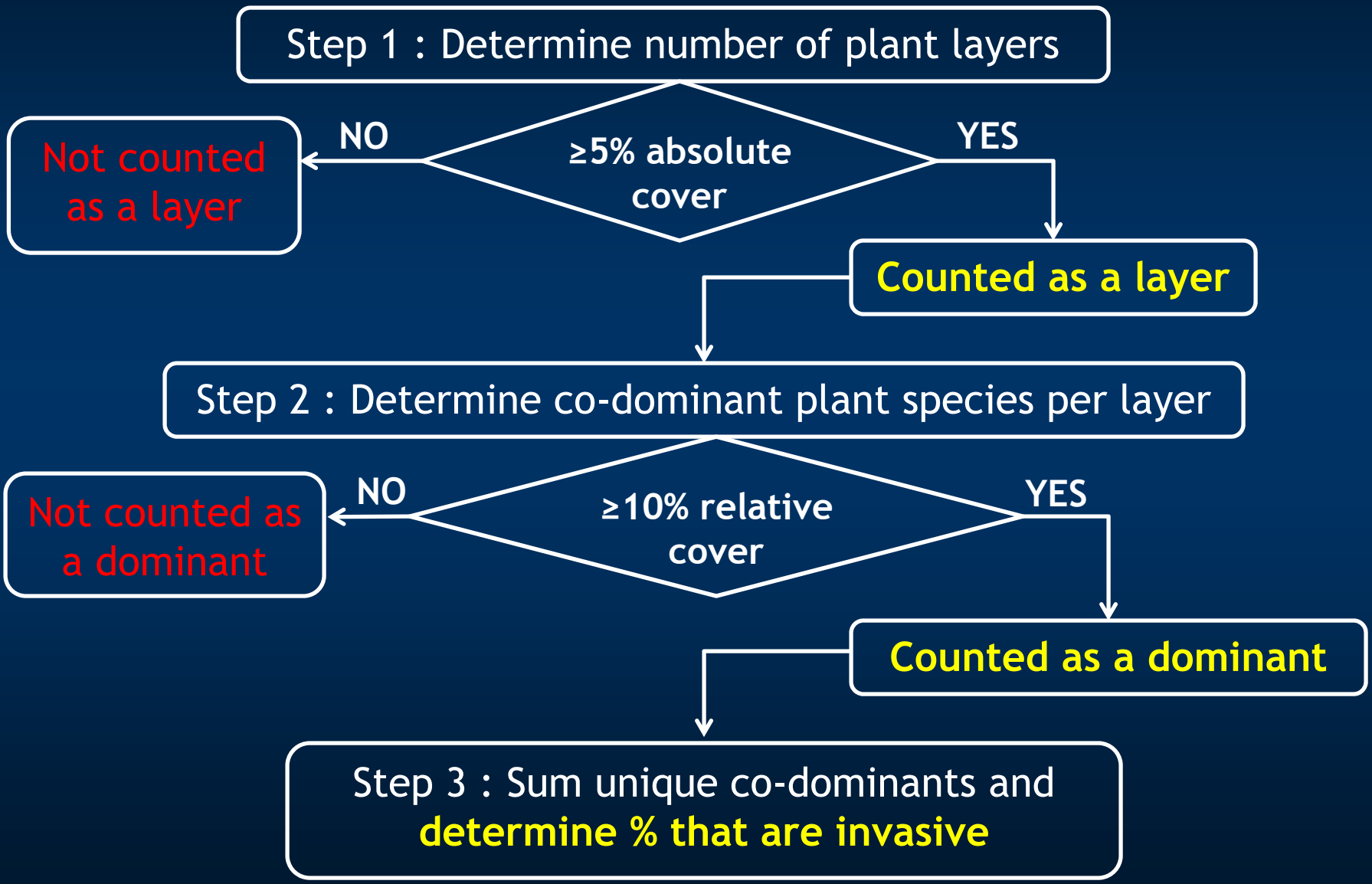


Biotic Structure Attribute

Considers:

- *Ecological complexity of plant communities*
- *Includes three metrics:*
  - *Plant Community Composition*
    - *Number of Plant Layers Present*
    - *Number of Co-dominant Species*
    - *Percent Invasion*
  - *Horizontal Interspersion and Zonation*
  - *Vertical Biotic Structure*

Determining Plant Community Submetrics



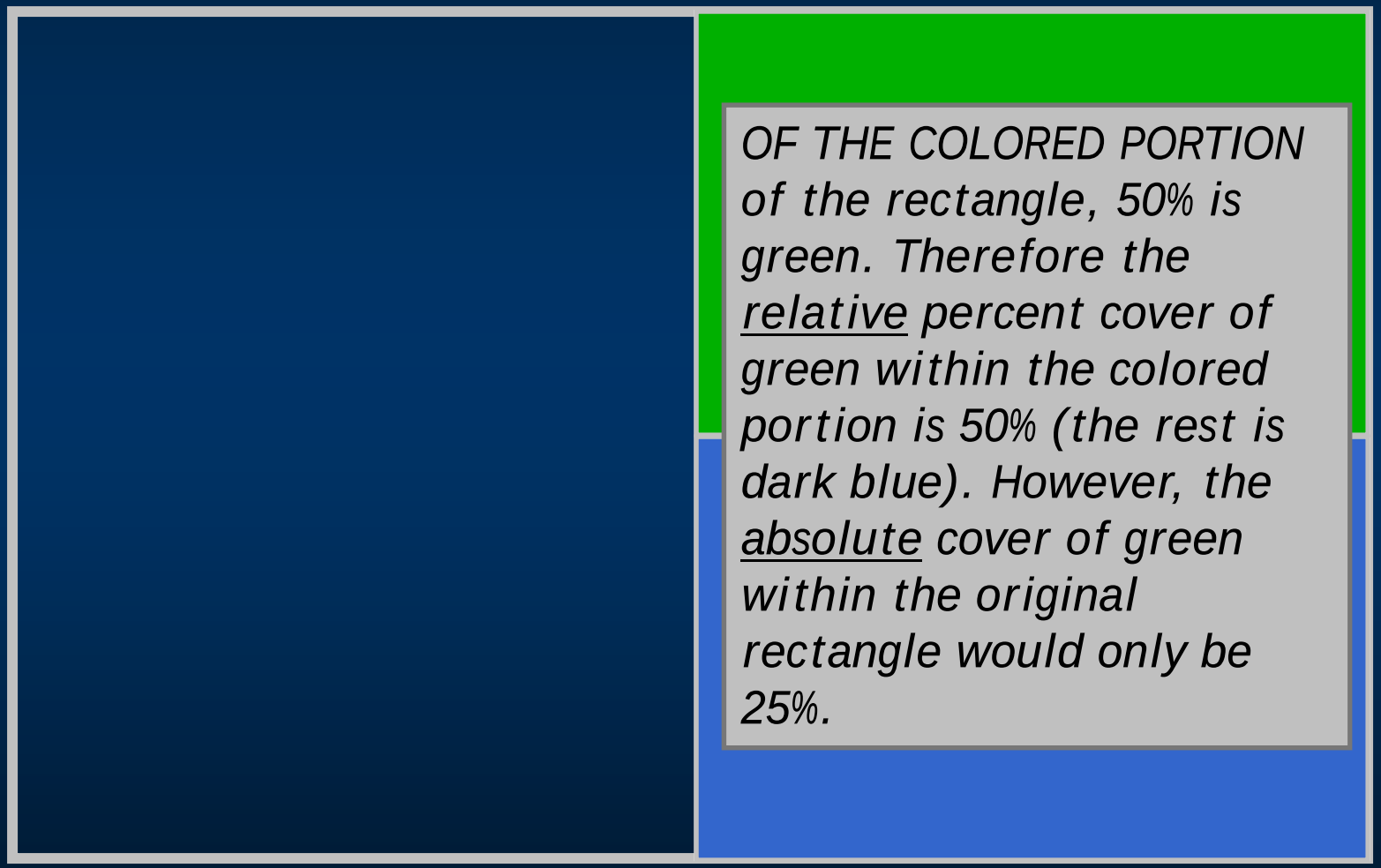
Rules for Plant Community Metric

- Plant Layers:
  - identified by actual plant heights, regardless of the growth potential of the species
- Co-dominant Species:
  - can exist in multiple layers, a given plant species is counted only once when calculating total number of co-dominants and percent invasive spp.
- Dead vegetation can count as a layer, but is not included in the dominant species count
- Vines are counted in the layer of vegetation they are covering

Absolute vs. Relative % Cover

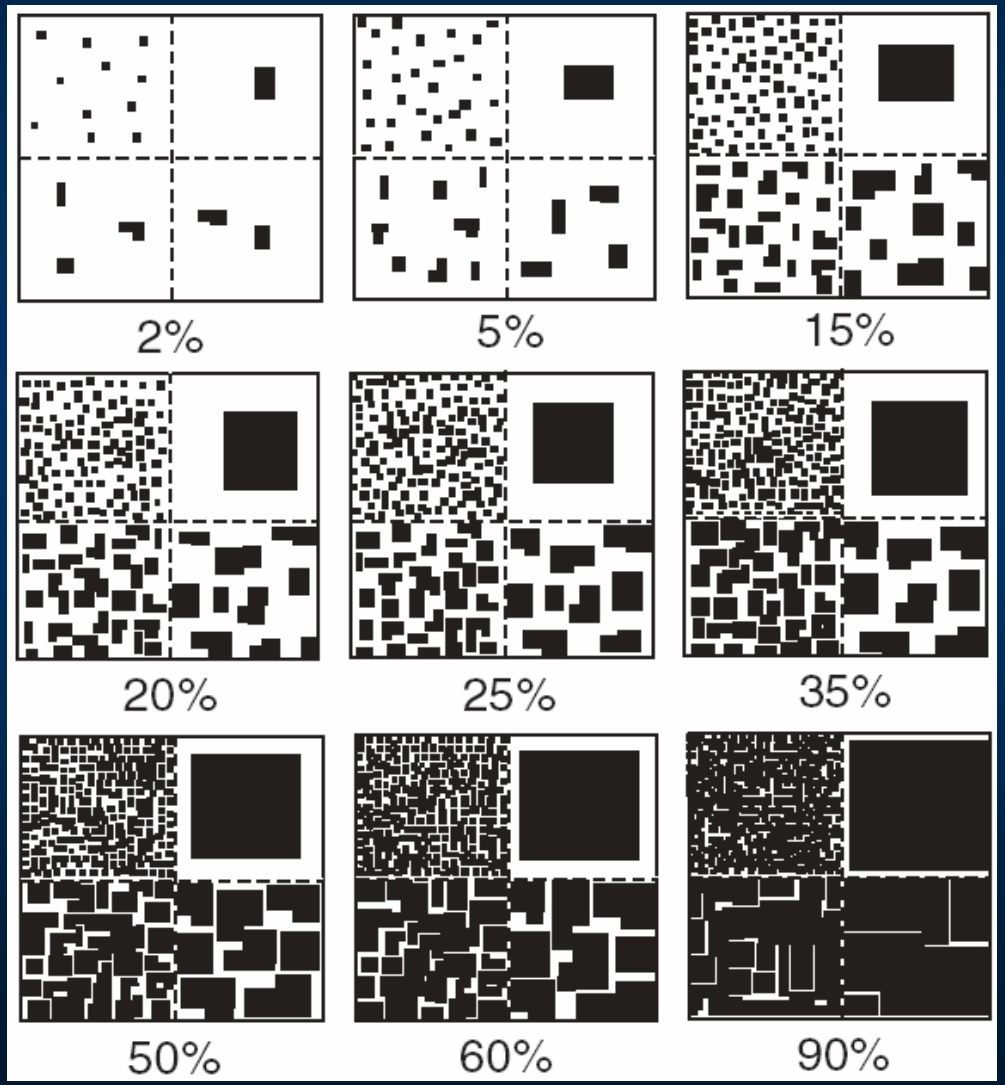
50 % of the rectangle is colored. Therefore, the absolute percent cover of color in the rectangle is 50%.

Absolute vs. Relative % Cover



Estimating Percent Aerial Cover

It's worthwhile to "calibrate your eyes" to different percent cover situations



Plant Community Sub-Metric: Plant Layers

	Plant Layers				
Depressional	Aquatic	Semi-aquatic and Riparian			
	Floating *on water surface*	Short <.5m	Medium (.5-1.5)	Tall (1.5-3)	Very Tall (>3m)

Plant Community Sub-Metric: Number of Layers

Very Tall Layer

Salix gooddingii & *Salix laevigata*

Tall Layer

Schoenoplectus californicus

Medium Layer

Carex spissa & *Typha latifolia*

Plant Community Sub-Metrics worksheet

Floating or Canopy-forming (non-confined only)	Invasive?	Short (<0.5 m)	Invasive?
Medium (0.5-1.5 m)	**Invasive?**	**Tall (1.5-3.0 m)**	**Invasive?**
Carex spissa		Schoenoplectus californicus	
Typha latifolia			
Very Tall (>3.0 m)	**Invasive?**	**Total number of co-dominant species for all layers combined (enter here and use in Table 18)**	5
Salix gooddingii			
Salix laevigata			
		Percent Invasion *Round to the nearest integer* (enter here and use in Table 18)	0%

Plant Community Sub-Metrics

	# of Plant Layers	# Co-dominant Species	% Co-dominant Invasive Species
A	4-5	≥ 9	0 – 10%
B	3	7 – 8	11 – 20%
C	2	5 – 6	21 – 30%
D	0-1	0 – 4	31 – 100%

Horizontal Interspersion

- Interspersion: the number of distinct plant zones and the amount of edge between them
  - Scoring is based upon field observation and aerial image interpretation
- Plant zones: plant monocultures or multi-species associations
  - Remain relatively constant in makeup throughout the AA
  - Arrayed along gradients of elevation, moisture, etc., that affect the plant community organization in 2-D plan view

Scoring Horizontal Interspersion

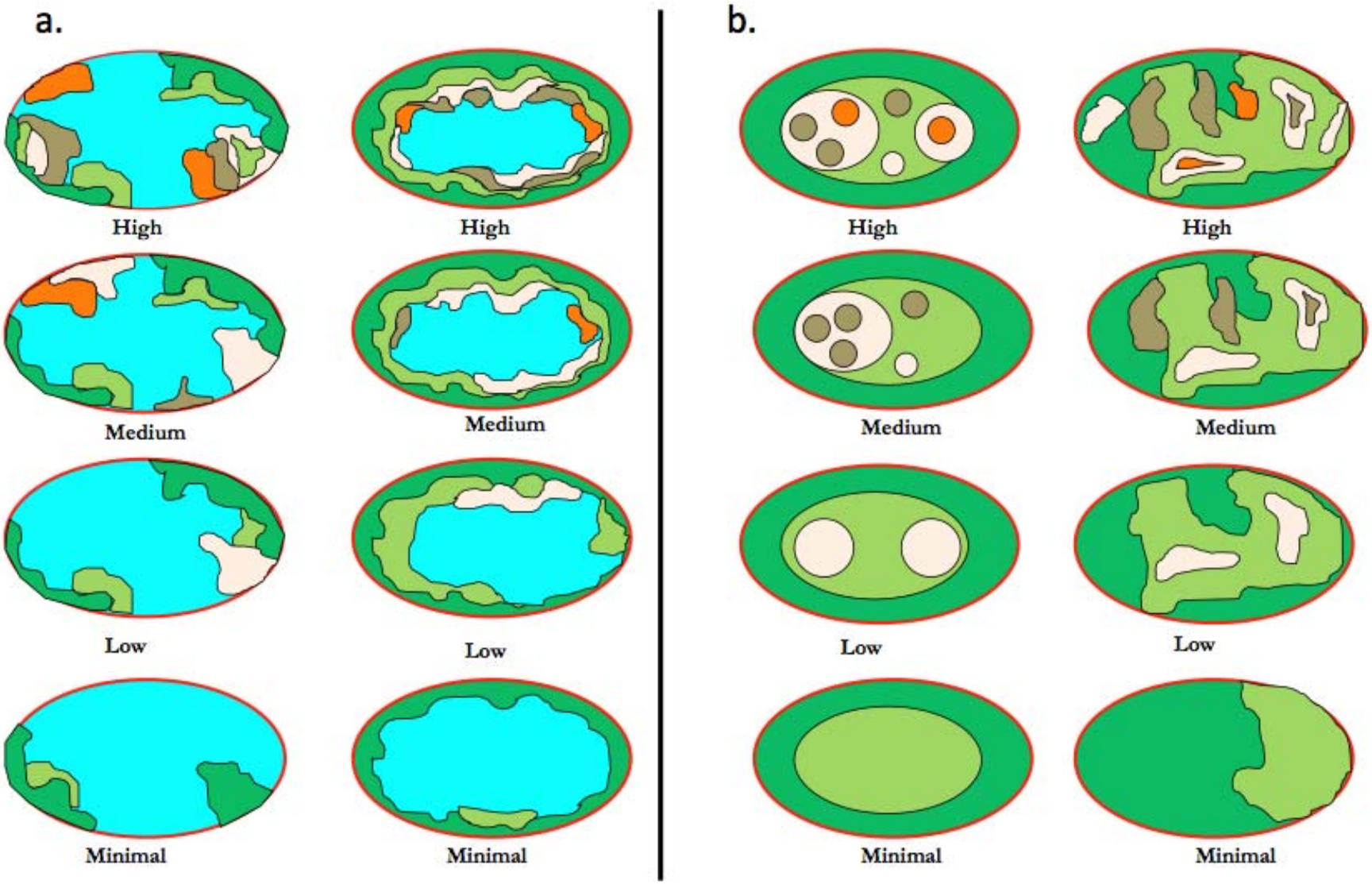
- An "A" condition means BOTH more zones AND a greater degree of interspersion, and the departure from the "A" condition is proportional to BOTH the reduction in both the numbers of zones AND their interspersion.

Rating for Horizontal Interspersion

Based on Worksheet drawing and
Figure 10 of field book

Rating	Alternative States
A	AA has a high degree of plan-view interspersion.
B	AA has a moderate degree of plan-view interspersion.
C	AA has a low degree of plan-view interspersion.
D	AA has minimal or no plan-view interspersion.

Horizontal Interspersion



Horizontal Interspersion and Zonation

AA has no plan-view interspersion

Horizontal Interspersion and Zonation

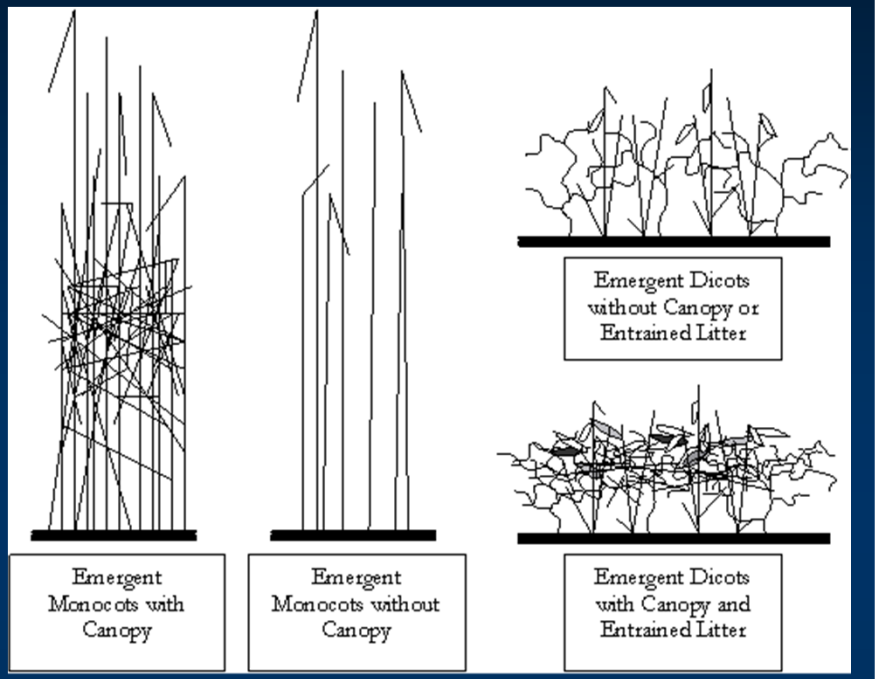
AA has a high degree of plan-view interspersion

Vertical Biotic Structure: two possible methods

- *Method 1: Systems dominated by emergent monocots but lacking large woody vegetation*

- *Method 2: Systems dominated by overlap of multiple plant layers*

Vertical Biotic Structure- Method 1

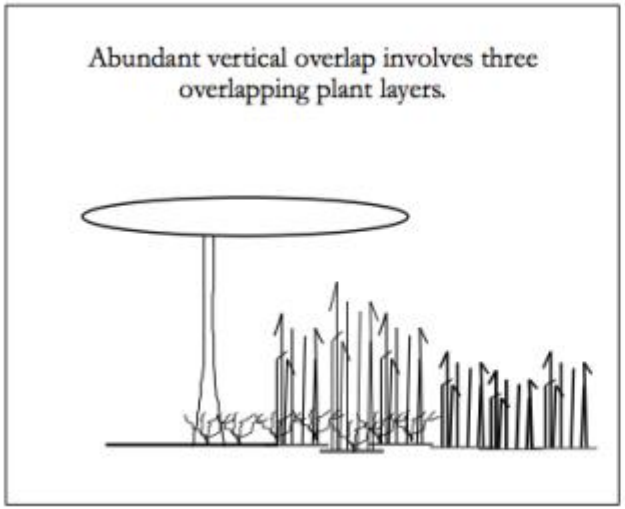


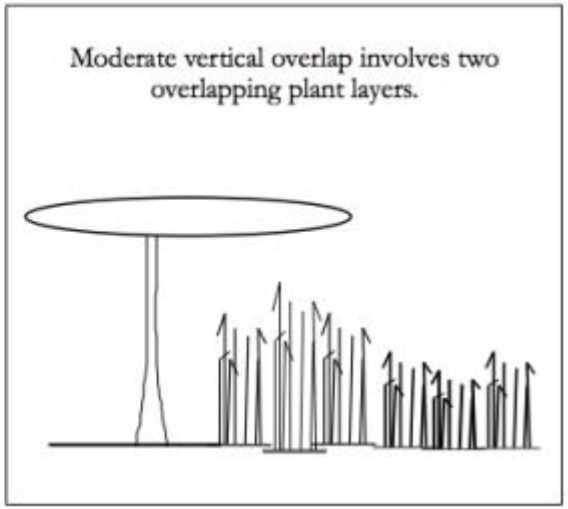
Diagrams of plant canopies and entrained litter used to assess Vertical Biotic Structure in wetlands dominated by emergent monocots

Vertical Biotic Structure- Method 1

Rating	Alternative States
A	Most of the vegetated plain of the AA has a dense canopy of living vegetation or entrained litter or detritus forming a "ceiling" of cover above the wetland surface that shades the surface and can provide abundant cover for wildlife.
B	Less than half (25-50%) of the vegetated plain of the AA has a dense canopy of vegetation or entrained litter or detritus as described in "A" above; OR Most of the vegetated plain has a sparse canopy of vegetation or entrained litter or detritus.
C	25-50% of the vegetated plain of the AA has a sparse canopy of vegetation or entrained litter or detritus.
D	Most of the AA (>75%) lacks a canopy of living vegetation or entrained litter or detritus.

Vertical Biotic Structure- Method 2





Diagrams of plant canopies used to assess Vertical Biotic Structure in wetlands dominated overlap of multiple layers

Vertical Biotic Structure- Method 2

Rating	Alternative States
A	More than 50% of the vegetated area supports abundant overlap of plant layers
B	More than 50% of the vegetated area supports at least moderate overlap of plant layers
C	25–50% of the of the vegetated area supports at least moderate overlap of plant layers
D	Less than 25% of the vegetated area supports moderate overlap of plant layers, **or** the AA is sparsely vegetated overall.

Steps of CRAM Assessment

Step 1: Assemble background information
Step 2: Classify the wetland
Step 3: Verify the appropriate season
Step 4: Sketch the CRAM Assessment Area (AA)
Step 5: Conduct the office assessment of AA
Step 6: Conduct the field assessment of AA
Step 7: Complete CRAM QA/QC
Step 8: Submit assessment results using *e*CRAM

CRAM Initial QAQC

- Review map of AA
- Review CRAM results
  - Complete all CRAM data fields
- Add comments as needed
- Complete stressor checklist
- Ensure photographs, GPS points and any plant voucher specimens have been collected

Basic Information Sheet

Basic Information Sheet: Depressional Wetlands

Assessment Area Name:	
Project Name:	
Assessment Area ID #:	
Project ID #:	**Date:**
Assessment Team Members for This AA	
AA Location: **Latitude:** **Longitude:** **Datum:**	
AA Category: □ Pre-Restoration □ Post-Restoration □ Pre-Mitigation □ Post-Mitigation □ Pre-Impact □ Post-Impact □ Training □ Ambient □ Reference □ Other:	
Origin of Wetland (if known): □ Natural system □ Artificial system	
Type of Management (if known): □ waterfowl/birds □ amphibians □ general wildlife □ sediment □ water quality □ stormwater □ water supply (agriculture) □ water supply (livestock) □ not managed □ other:	
Which best describes the type of depressional wetland? □ freshwater marsh □ alkaline marsh □ brackish marsh □ other (specify):	
AA Encompasses: □ entire wetland □ portion of the wetland	
Which best describes the hydrologic state of the wetland at the time of assessment? □ ponded/inundated □ saturated soil, but no surface water □ dry	

Scoring Sheet

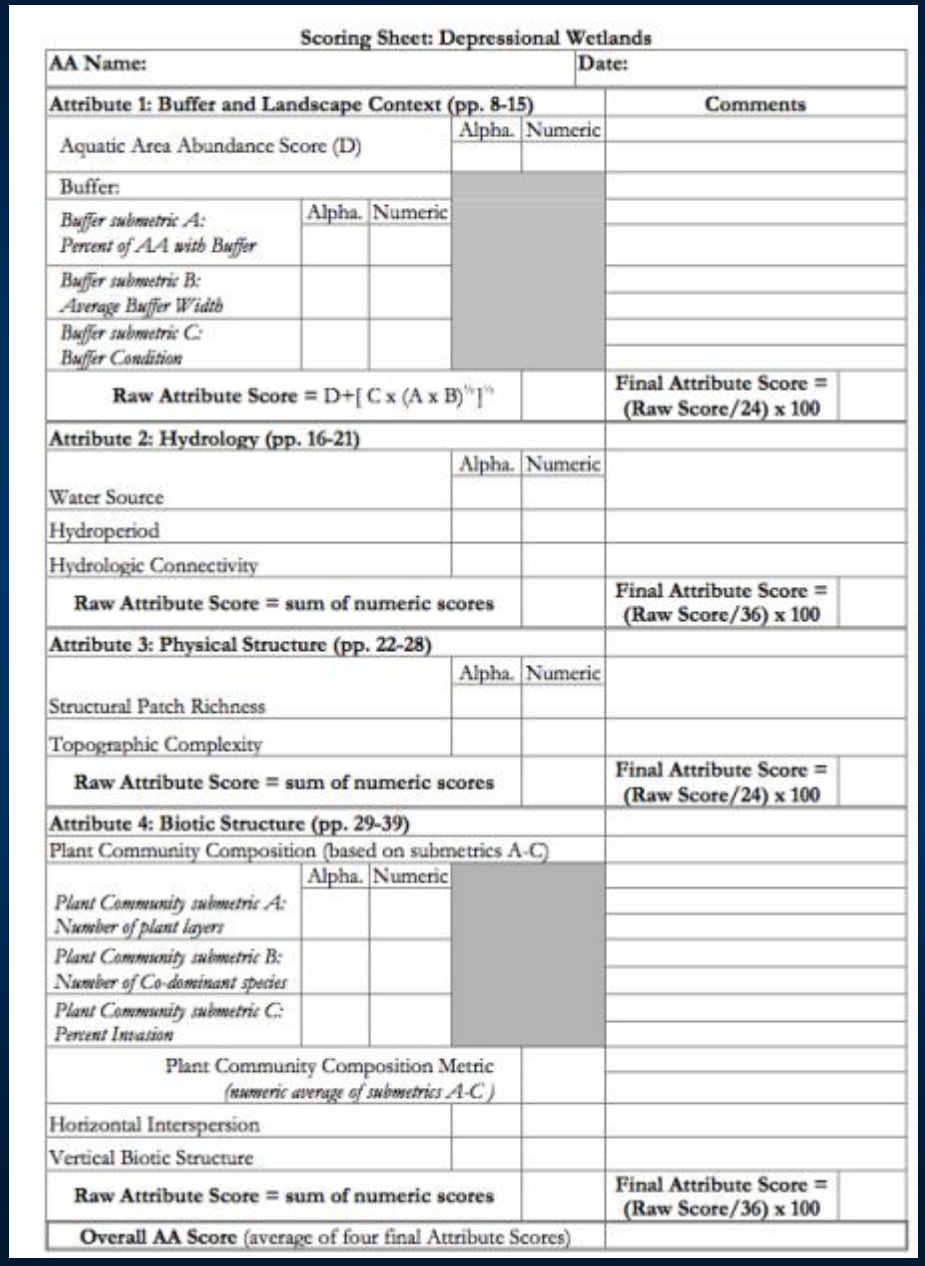
Buffer and Landscape Context Attribute

Hydrology Attribute

Physical Structure Attribute

Biotic Structure Attribute

Overall AA Score



Scoring Sheet: Depressional Wetlands

AA Name:			**Date:**	
Attribute 1: Buffer and Landscape Context (pp. 8-15)				**Comments**
Aquatic Area Abundance Score (D)			Alpha.	Numeric
Buffer:				
Buffer submetric A: Percent of AA with Buffer	Alpha.	Numeric		
Buffer submetric B: Average Buffer Width				
Buffer submetric C: Buffer Condition				
Raw Attribute Score = D+[C x (A x B)$^{1/2}$]$^{1/2}$				**Final Attribute Score = (Raw Score/24) x 100**
Attribute 2: Hydrology (pp. 16-21)				
			Alpha.	Numeric
Water Source				
Hydroperiod				
Hydrologic Connectivity				
Raw Attribute Score = sum of numeric scores				**Final Attribute Score = (Raw Score/36) x 100**
Attribute 3: Physical Structure (pp. 22-28)				
			Alpha.	Numeric
Structural Patch Richness				
Topographic Complexity				
Raw Attribute Score = sum of numeric scores				**Final Attribute Score = (Raw Score/24) x 100**
Attribute 4: Biotic Structure (pp. 29-39)				
Plant Community Composition (based on submetrics A-C)				
Plant Community submetric A: Number of plant layers	Alpha.	Numeric		
Plant Community submetric B: Number of Co-dominant species				
Plant Community submetric C: Percent Invasion				
Plant Community Composition Metric *(numeric average of submetrics A-C)*				
Horizontal Interspersion				
Vertical Biotic Structure				
Raw Attribute Score = sum of numeric scores				**Final Attribute Score = (Raw Score/36) x 100**
Overall AA Score (average of four final Attribute Scores)				

Wetland Disturbances

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	bar-built estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

Stressor Checklist

- Anthropogenic perturbation within the wetland or in the surrounding landscape with negative impact on condition and function
- Can be “present” or “significant”
- Four assumptions:
  - Stressor(s) can lead to deviation from best attainable condition
  - More stressors can cause a decline in condition
    - Linear, multiplicative, other non-linear model
  - Increase in intensity/proximity increases decline in condition
  - Continuous/chronic stress increases decline in condition

Stressor Checklist

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

Important to record the nature and degree of stressors for future module evaluation and development

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Thank you