California Rapid Assessment Method for Wetlands

(CRAM)

Riverine Training Module

Steps of CRAM Assessment

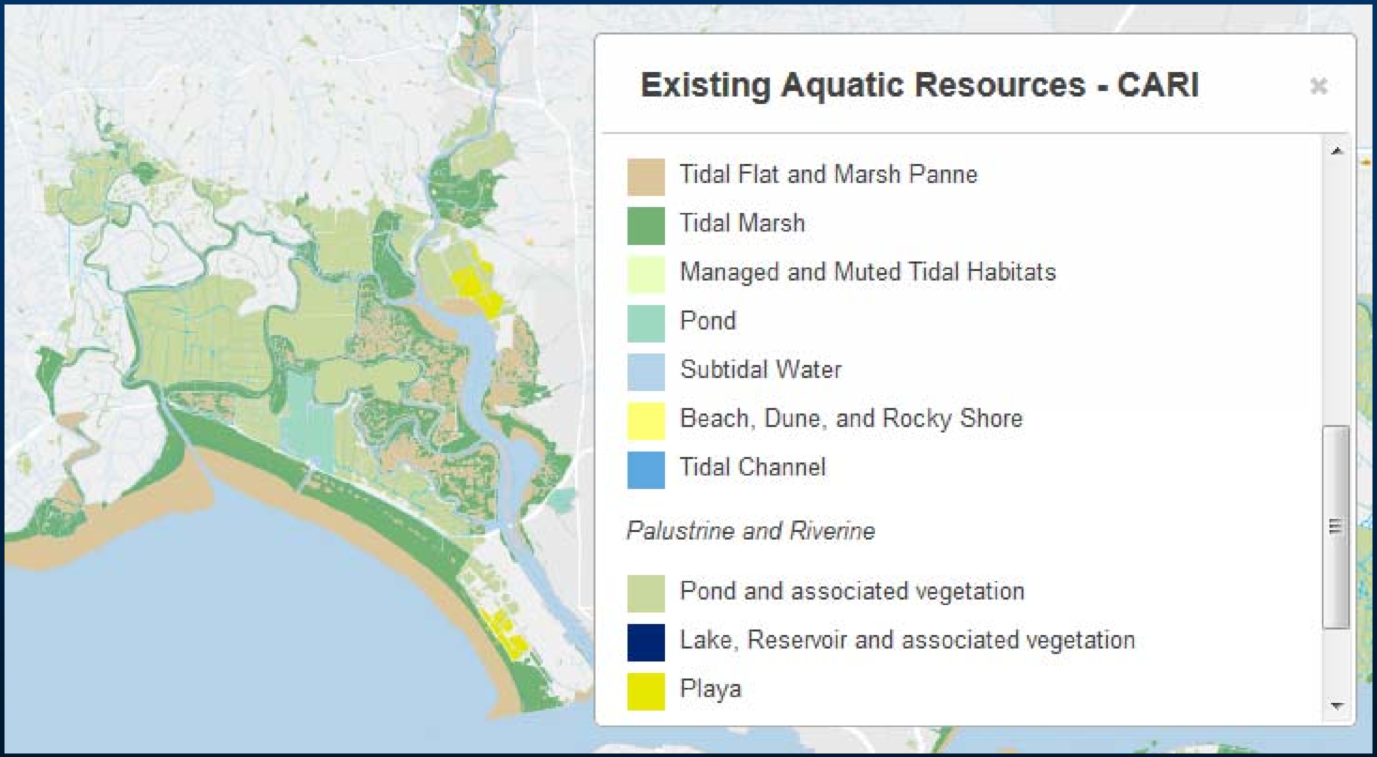
Step 1: Assemble background information
Step 2: Classify wetland
Step 3: Verify the appropriate season
Step 4: Sketch the CRAM Assessment Area (AA)
Step 5: Conduct the office assessment of AA
Step 6: Conduct the field assessment of AA
Step 7: Complete CRAM QA/QC
Step 8: Submit assessment results using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

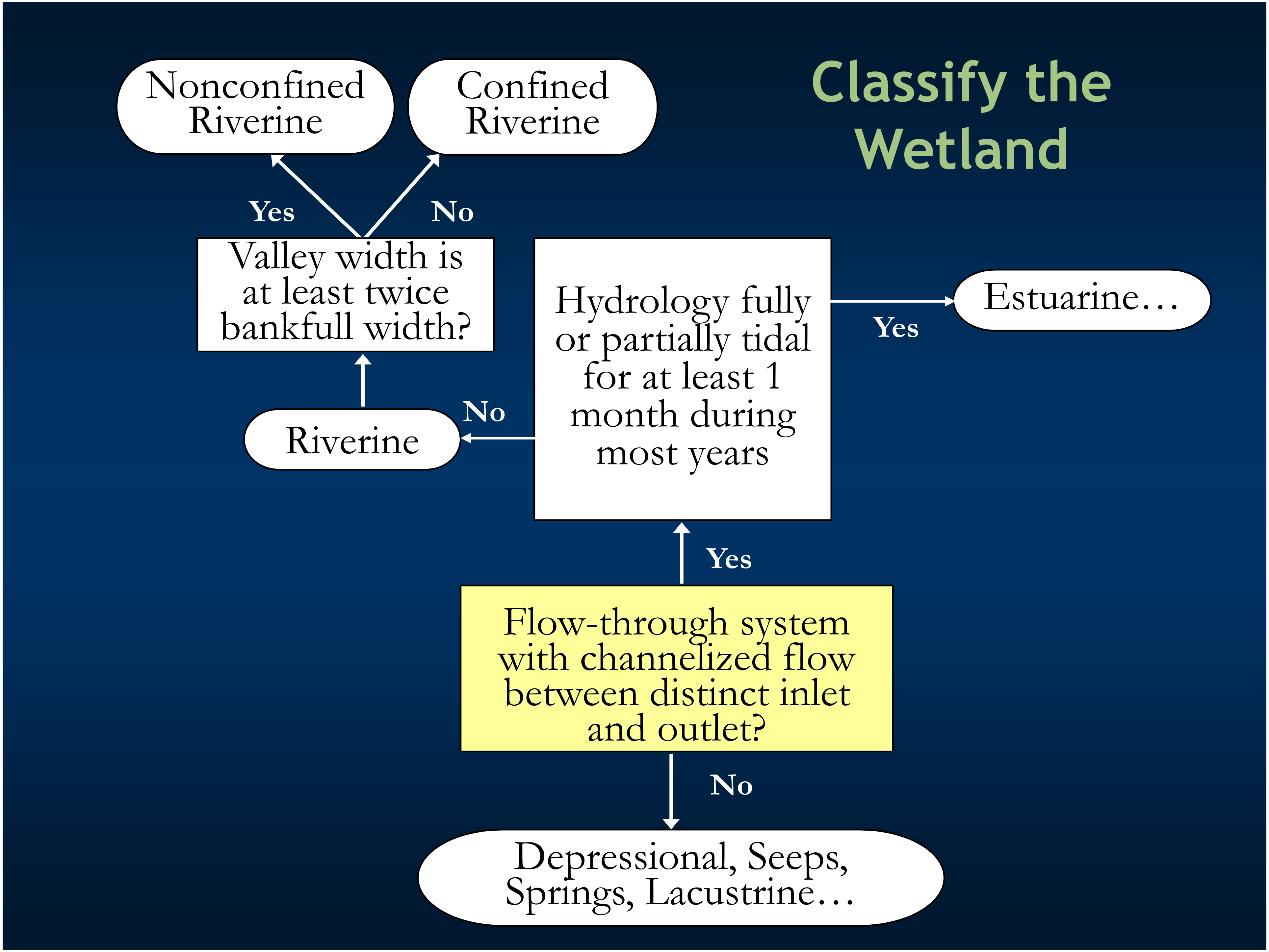
Assemble Background Information

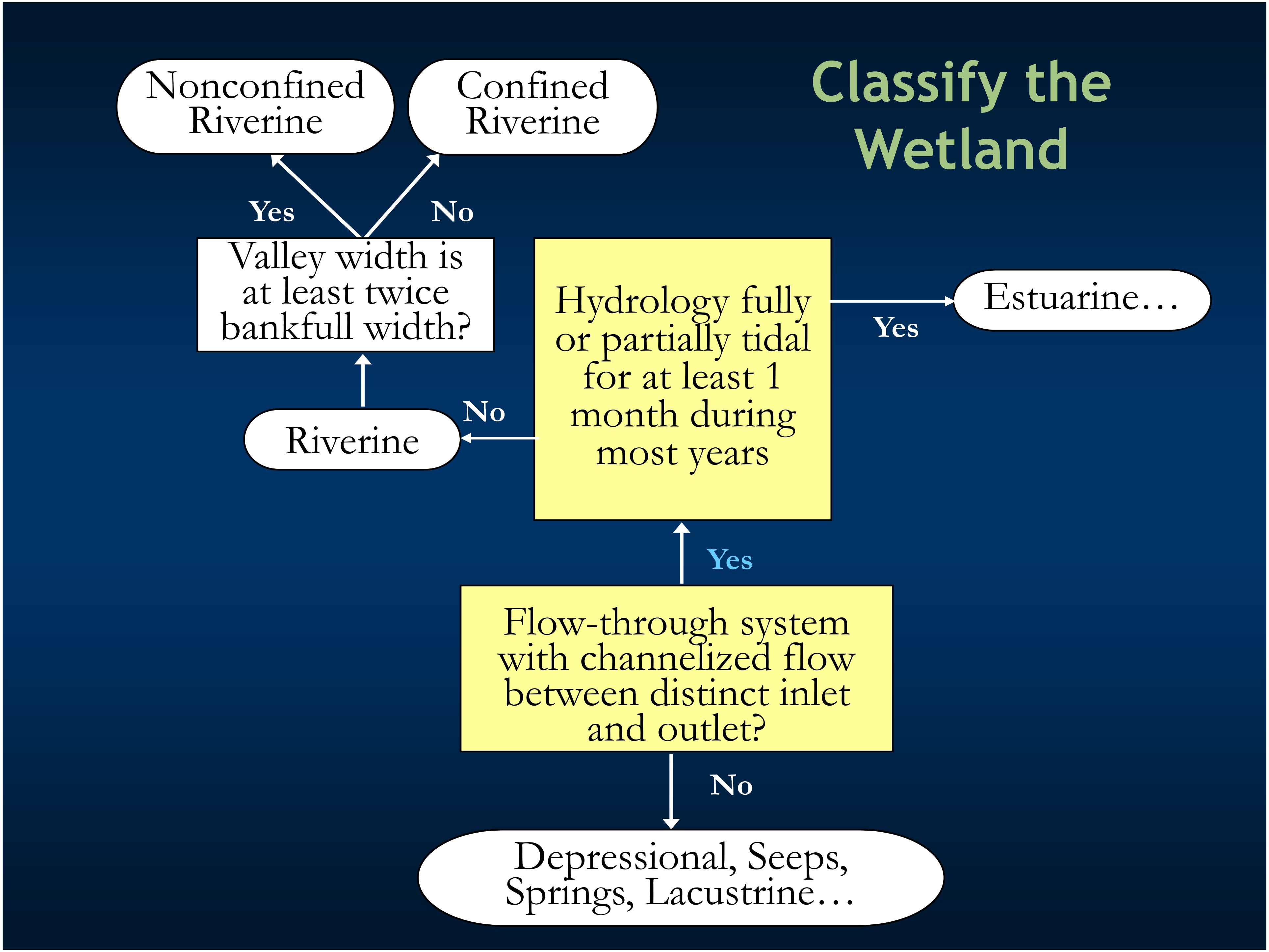
- 1-3m pixel resolution digital geo-rectified site imagery with a scale
- Preliminary map of assessment area (AA)
- Reports on hydrology, ecology, chemistry
- List of common plants
- Access permission (if needed)
- Map/directions to site

Sources of Background Information

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




Classify the Wetland
Nonconfined Riverine
Confined Riverine
Yes
No
Valley width is at least twice bankfull width?
Hydrology fully or partially tidal for at least 1 month during most years
Yes
Estuarine…
No
Riverine
Yes
Flow-through system with channelized flow between distinct inlet and outlet?
No
Depressional, Seeps, Springs, Lacustrine…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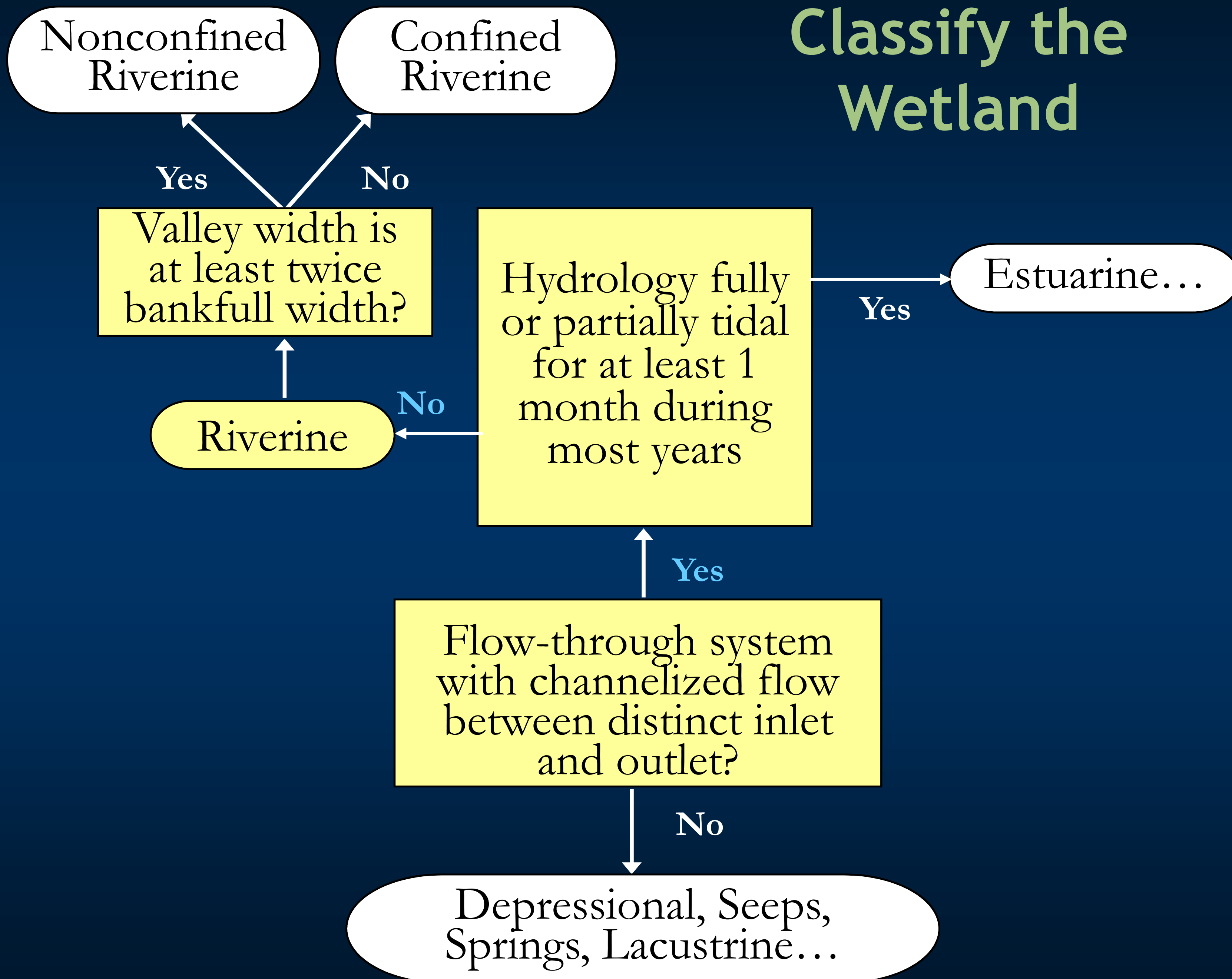
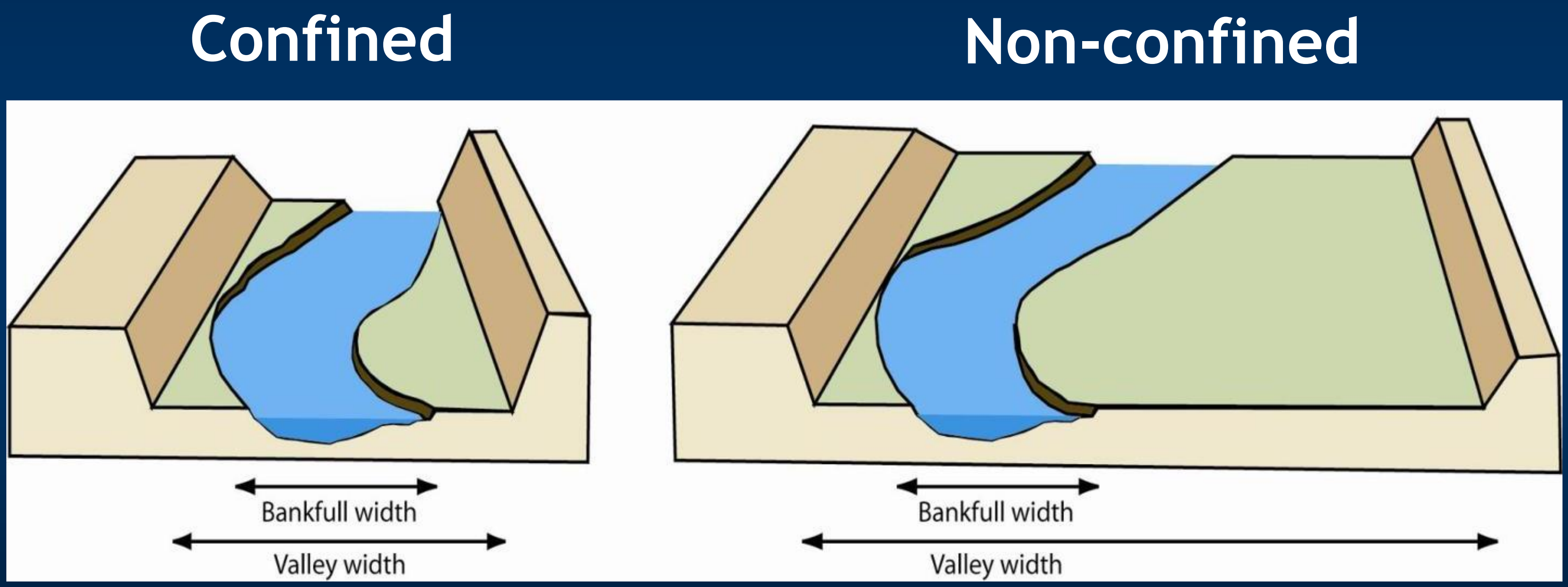
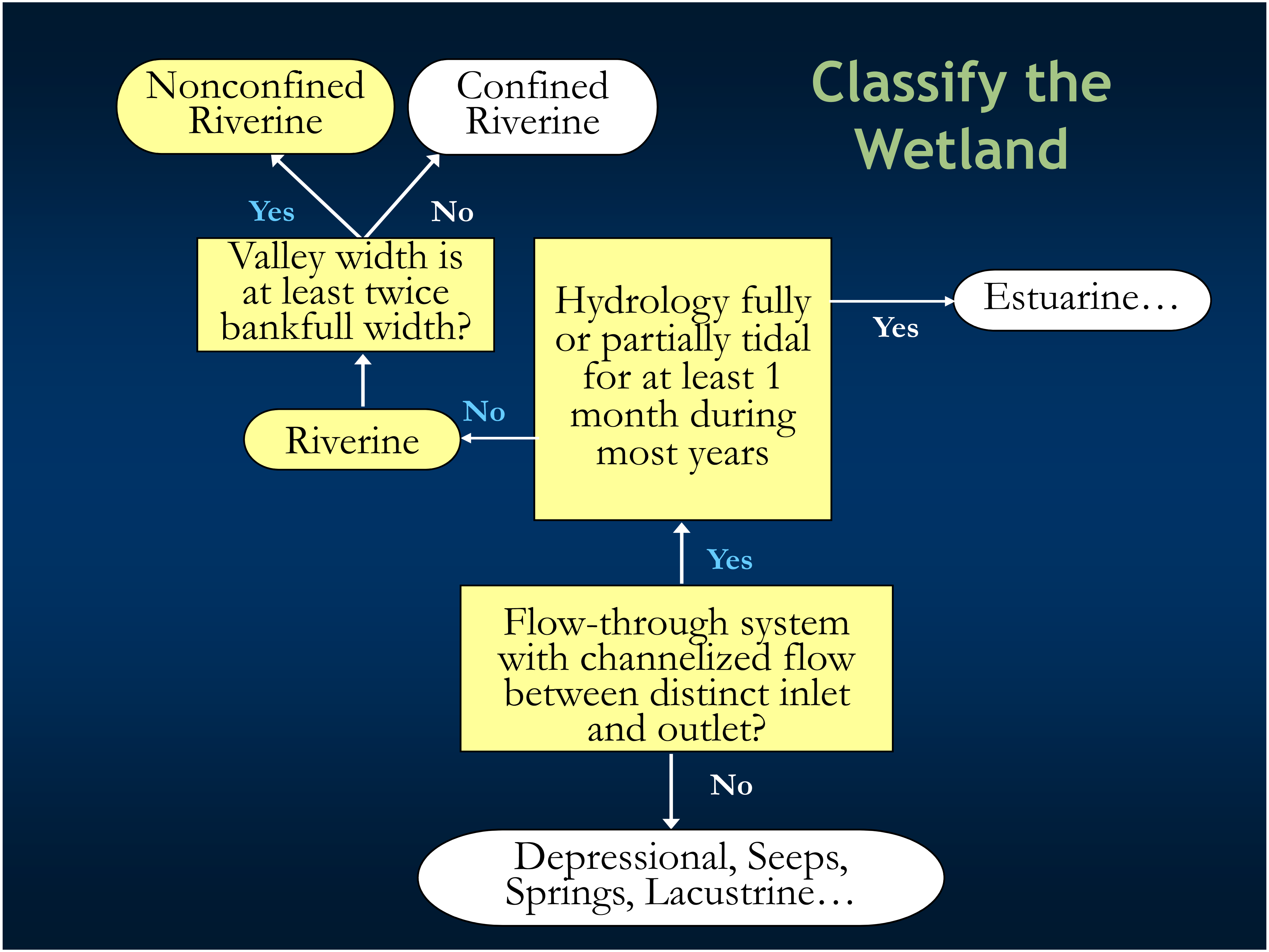
Classify the Wetland



Channel Confinement

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Depressional, Seeps, Springs, Lacustrine…

CRAM Assessment Window

- Growing season of plants
  - Usually March – September
    - New growth to senescence
    - Shorter at higher altitudes
    - Later with snow
    - Riverine not during high water

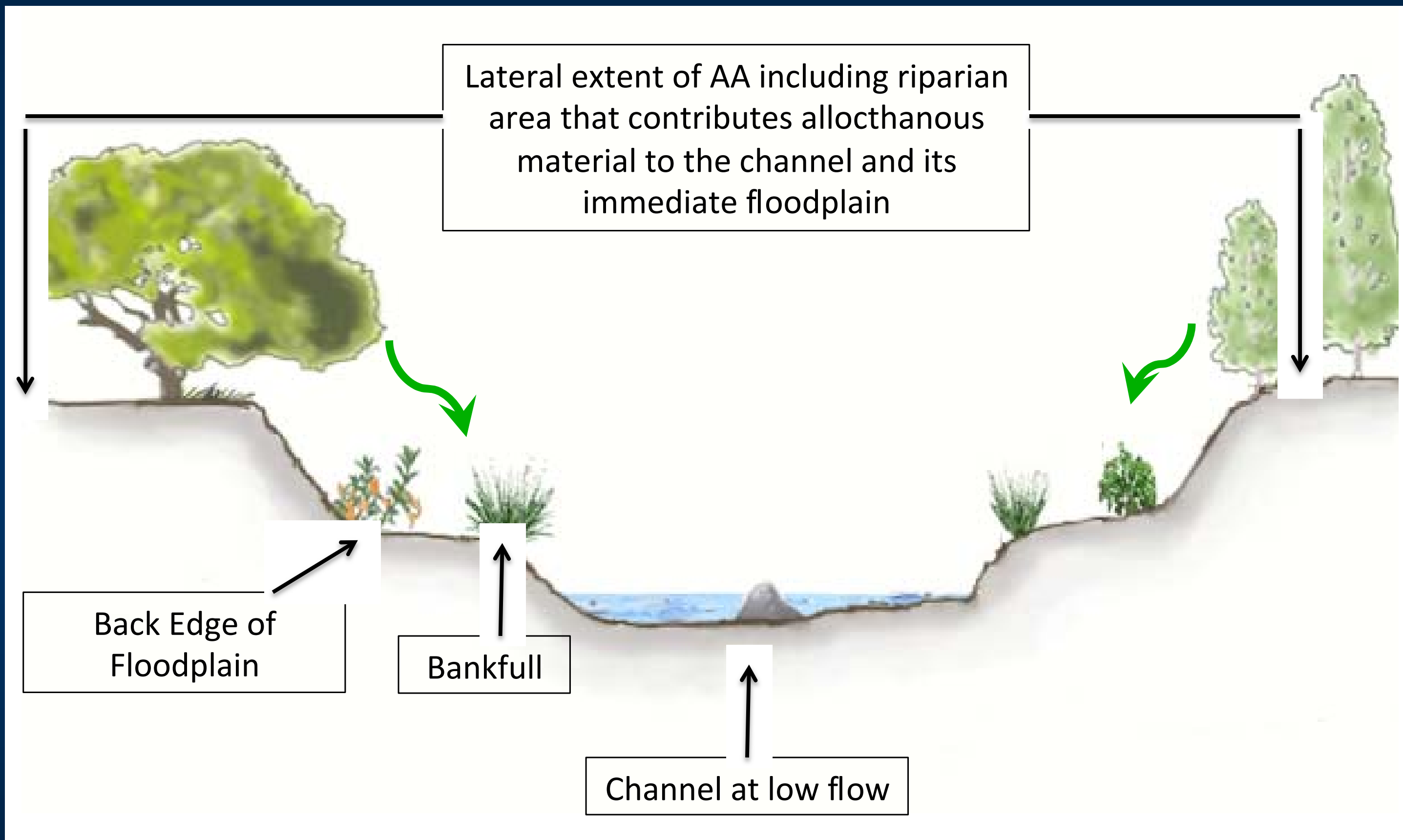
Considerations for defining the AA

- 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

- AA is the channel, its active floodplain, and essential riparian area
- Length = 10x mean BF width within limits of 100m and 200m

AA includes portion of riparian area directly affecting channel



AA lateral width includes portion of riparian area that directly provides allochthonous input to the channel and immediate floodplain (2m min. width)

Special Considerations for Certain Systems

- **<u>Large</u>** systems with very broad floodplains (10-20 X average channel width)
  - Examples of large systems include:
    - Santa Ana River, San Joaquin River, Sacramento River, etc

- Narrow systems in a steep valley lacking a floodplain

In these systems, make lateral extent of AA no more than 2 times bankfull width on each side of the channel.

Special Considerations for Certain Systems

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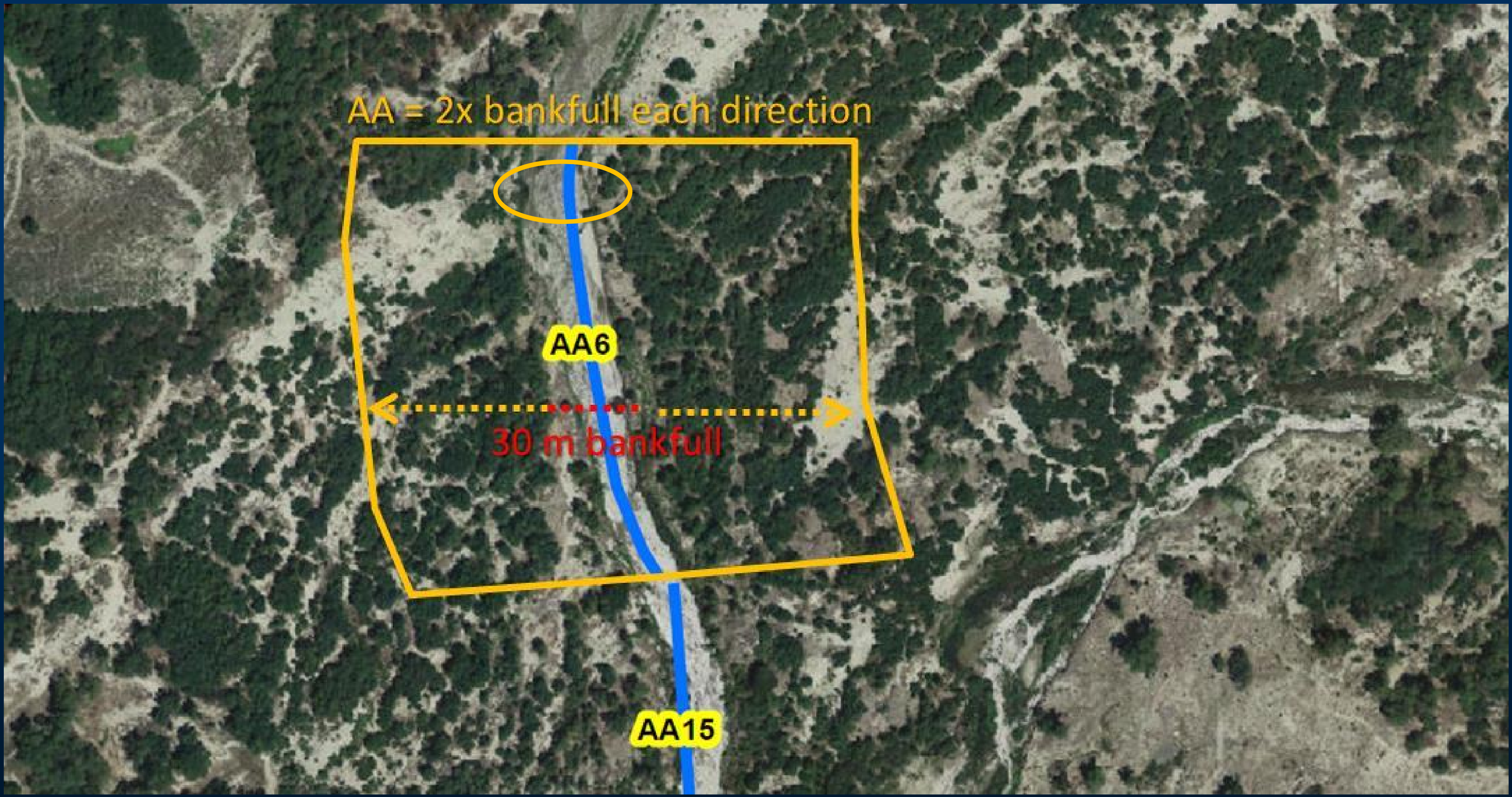


Ground view of large system. Examples include:

- Santa Ana and Santa Margarita Rivers in southern California
- Sacramento River and Eel River in northern California

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: Riverine Wetlands

Assessment Area Name:	
Project Name:	
Assessment Area ID #:	
Project ID #:	**Date:**
Assessment Team Members for This AA:	
Average Bankfull Width:	
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):	
Upstream Point Latitude:	**Longitude:**
Downstream Point Latitude:	**Longitude:**

Wetland Sub-type:

☐ Confined ☐ Non-confined

AA Category:

☐ Restoration ☐ Mitigation ☐ Impacted ☐ Ambient ☐ Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☐ yes ☐ no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

☐ perennial ☐ intermittent ☐ ephemeral

Buffer and Landscape Context Attribute

- *Upstream and downstream continuity of stream corridor*
- *Size and quality of buffer surrounding AA*

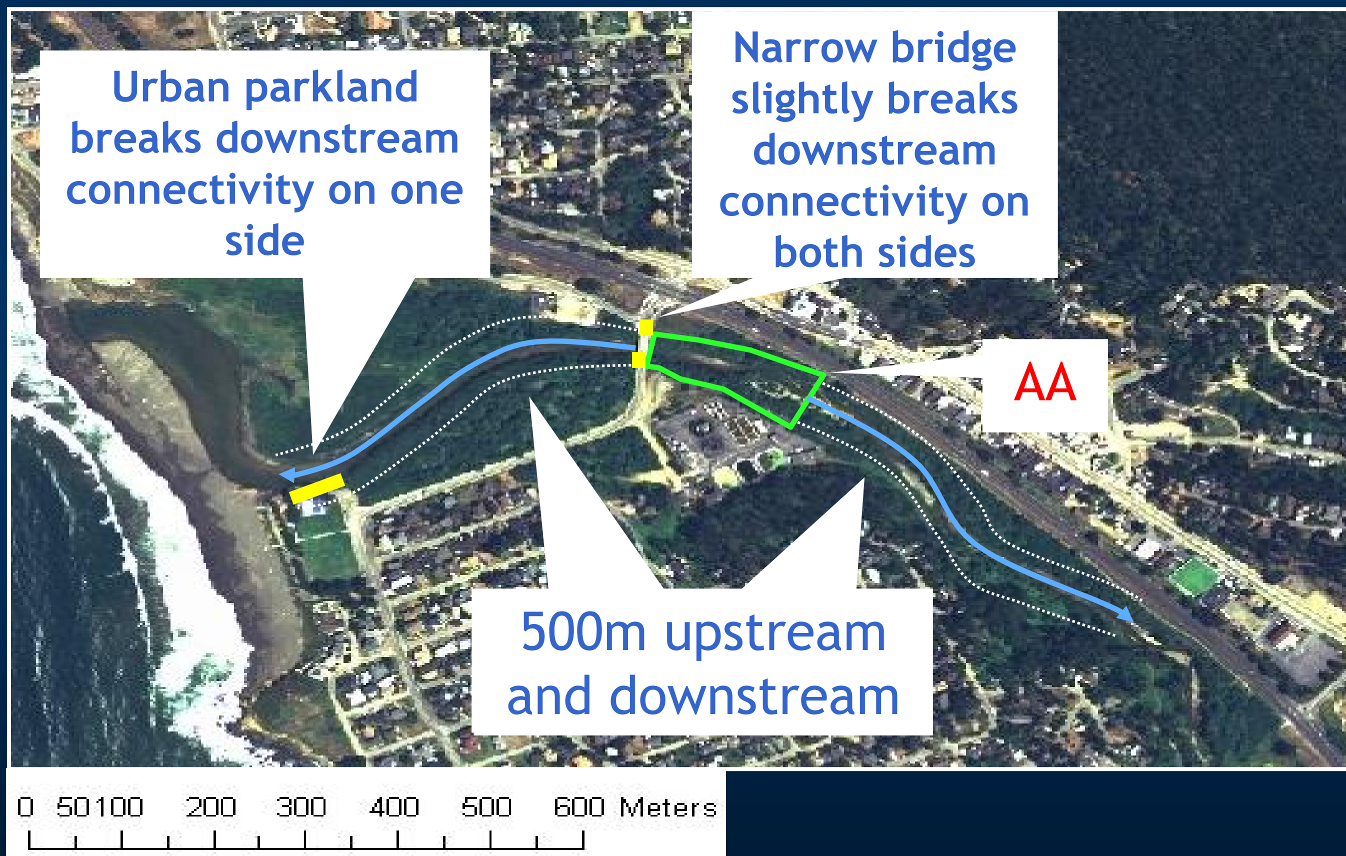
Stream Corridor Continuity

(Aquatic Area Abundance Metric)

- Assume riparian area average width is the same upstream and downstream of the AA as it is within the AA
- To be a concern, a segment of “non-buffer” cover must:
  - extend across at least one side of the riparian area
  - extend at least 10 m along the channel
  - break on both sides (ex. from a bridge) gets counted twice, once for each side
- For systems that cannot be waded, assess the riparian corridor on the side of the river being assessed
- For wadeable systems assess the riparian continuity on both sides of the stream

Stream Corridor Continuity

Assess the total length of non-buffer segments 500m upstream and 500m downstream of the AA

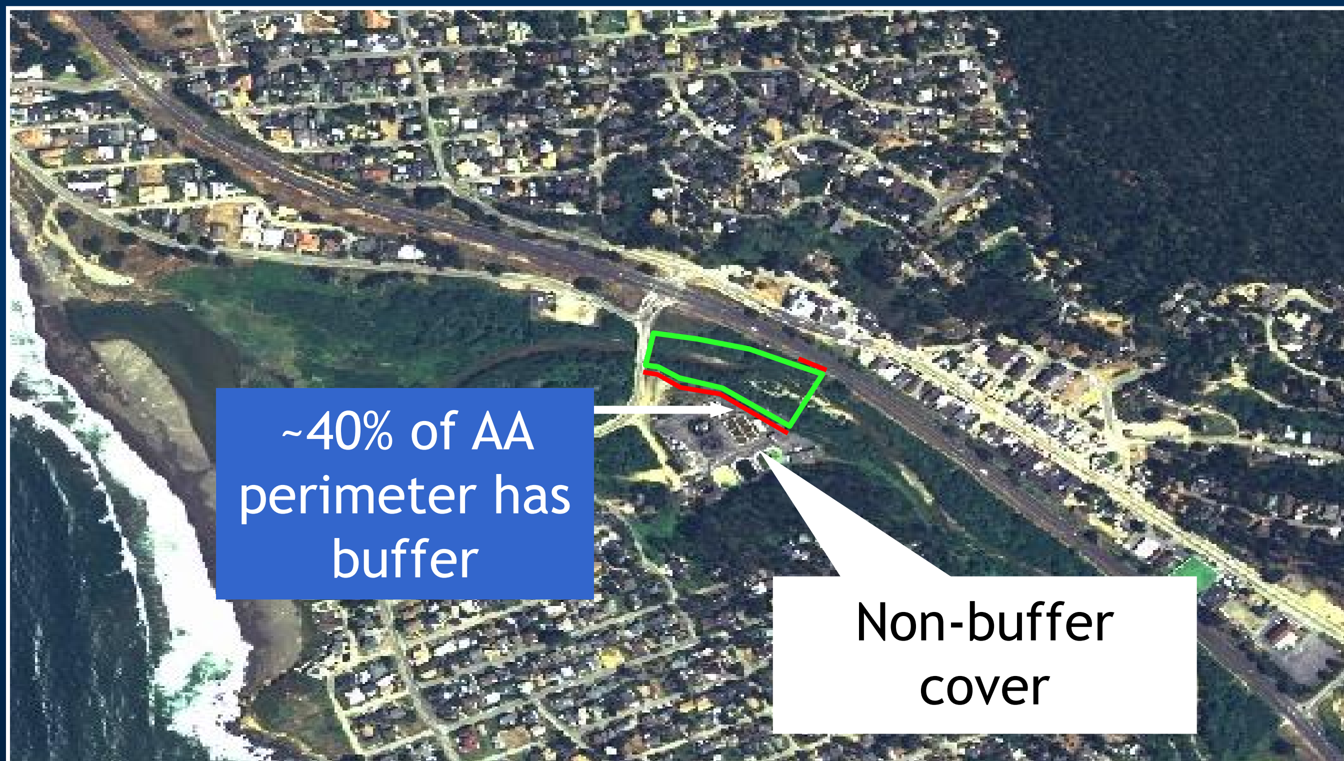


Rating for Stream Corridor Continuity

Rating	Aggregate length of non-buffer segments upstream 500m of AA	Aggregate length of non-buffer segments downstream 500m of AA
A	Less than 100m	Less than 100m
B	Less than 100m	Between 100m and 200m
	or	
B	Between 100m and 200m	Less than 100m
C	Between 100m and 200m	Between 100m and 200m
D	Greater than 200m	Any condition
	or	
D	Any condition	Greater than 200m (2 sided)

Percent of AA with Buffer

Estimate percent of the AA perimeter adjoining non-buffer land cover that is at least 5m wide and 5m long.



Guidelines for Identifying 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 trailswith 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)

Rating for Percent of AA with Buffer

Rating	Alternative State
A	Buffer is 75 - 100% 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

100m

Line A = 45m
Line B = 35m
Line C = 30m
Line D = 25m
Line E = 20m
Line F = 15m
Line G = 10m
Line H = 5m
Avg. 185/8 = 23m

Rating for Average Buffer Width

Rating	Alternative State
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

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.

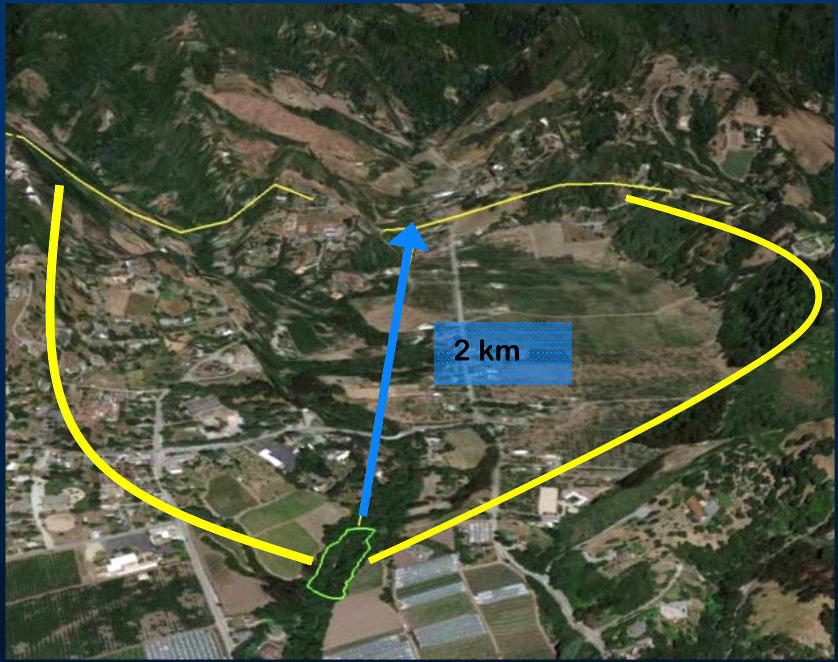
Buffer Condition

Hydrology Attribute

- *Primary source of water*
- *Stability of channel*
- *Restriction of lateral movement of floodwaters*

Water Source

- Consider fresh water source(s)
- Determine anthropogenic inputs, diversions, or modified hydrology within the upstream immediate drainage basin
- Consult information sources
  - Watershed reports
  - Local experts
  - Maps or imagery



Water Source

"…Stream diversion by the City of Watsonville causes the creek to run dry in summer (late July) just below the town of Corralitos. Small tributaries, or field runoff, add water to the creek bed downstream of this point…

Coastal Watershed Council
CORRALITOS CREEK WATERSHED
FINAL ANNUAL REPORT
JULY-DECEMBER 2003

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.

Channel Stability

Consider indicators of channel stability, aggradation, and degradation (incision)

Channel Stability

Field Indicators: Equilibrium

Abundant perennial vegetation above bankfull contour

Leaf litter in pools

Well defined bankfull contour

Well-sorted bed material

Abundant mosses

Non-planar bed

Channel Stability

Field Indicators: Aggradation

Partially buried culvert/bridge

Planar bed lacking pools

Buried living tree trunks

Channel Stability

Field Indicators: Degradation

Exposed roots

Deeply undercut banks

Vegetation falling into channel

Rating for Channel Stability

Rating	Alternative State
A	**Most of the channel** through the AA is **characterized by equilibrium conditions**, with little evidence of aggradation or degradation. Based on the indicators of condition, typical sediment transport processes are occurring.
B	**Most of the channel** through the AA is **characterized by some aggradation or degradation, none of which is severe**. The channel may be approaching or moving away from equilibrium. Based on the indicators of condition, typical sediment transport processes are occurring, however the reach is trending toward excess transport or deposition due to moderate disequilibrium conditions.
C	There is evidence of **severe aggradation or degradation of most of the channel** through the AA **o**r the channel bed is **artificially hardened through less than half** of the AA. Based on the indicators of condition, typical sediment transport processes are severely altered.
D	The channel bed is **concrete or otherwise artificially hardened through most of AA**.

Hydrologic Connectivity

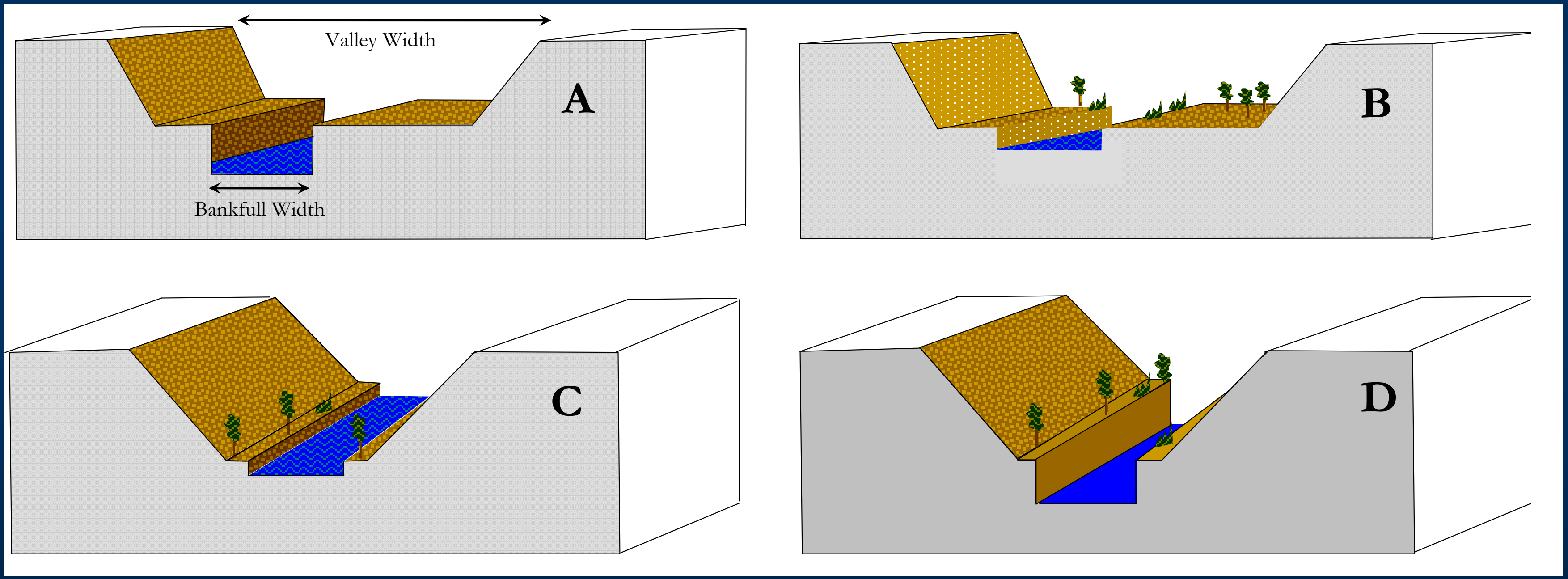
Degree of entrenchment is used to assess lateral connections between the channel and its floodplain

Step 1: Estimate **bankfull width** (bfw)	
Step 2: Estimate maximum **bankfull depth**	
Step 3: Estimate **flood prone depth**	
Step 4: Estimate **flood prone width** (fpw)	
Step 5: Calculate **entrenchment ratio (fpw/bfw)**	
Step 6: Average of three ratio measurements	

Riverine Confinement and Entrenchment

A. Non-confined
Entrenched

B. Non-confined
Not Entrenched



C. Confined
Not Entrenched

D. Confined
Entrenched

Identifying Bankfull Width

Suite of field indicators for Bankfull

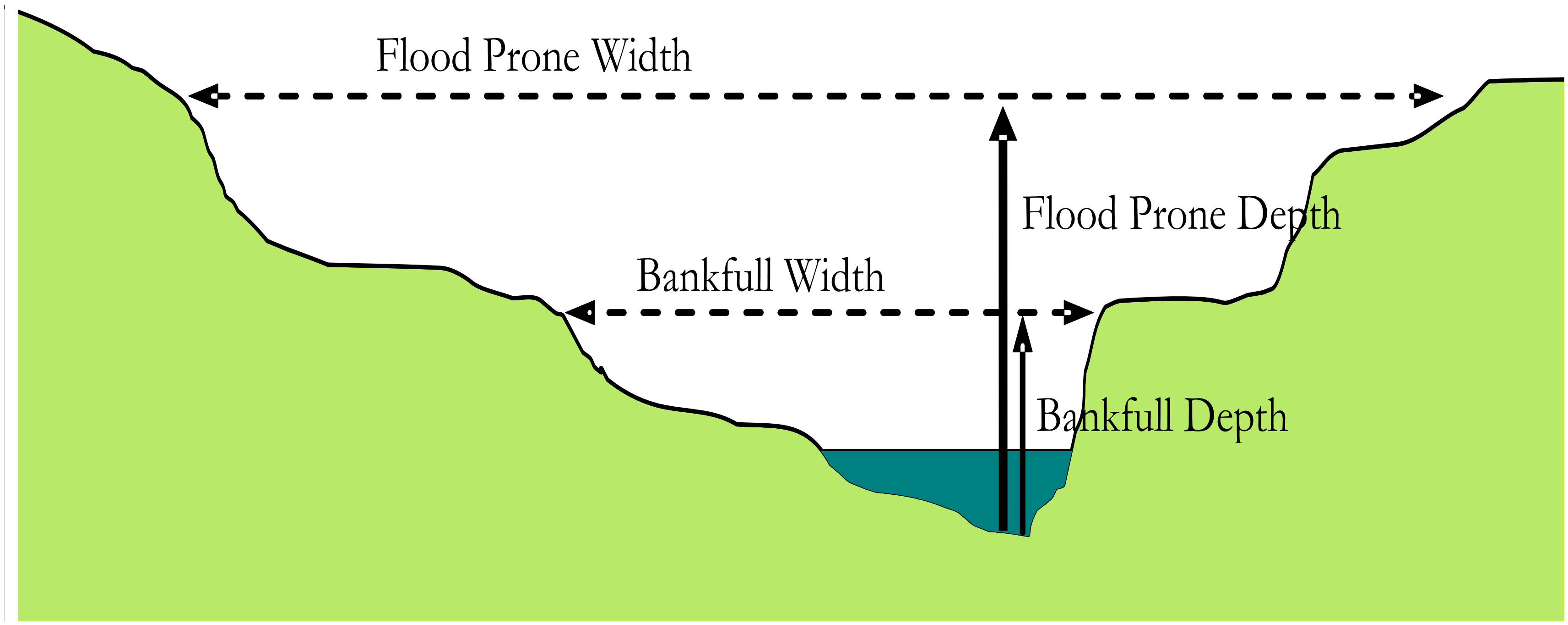
- Inner Edge of floodplain
- Top elevation of point bars
- Lower limit of bank vegetation
- Lower limit of riparian litter

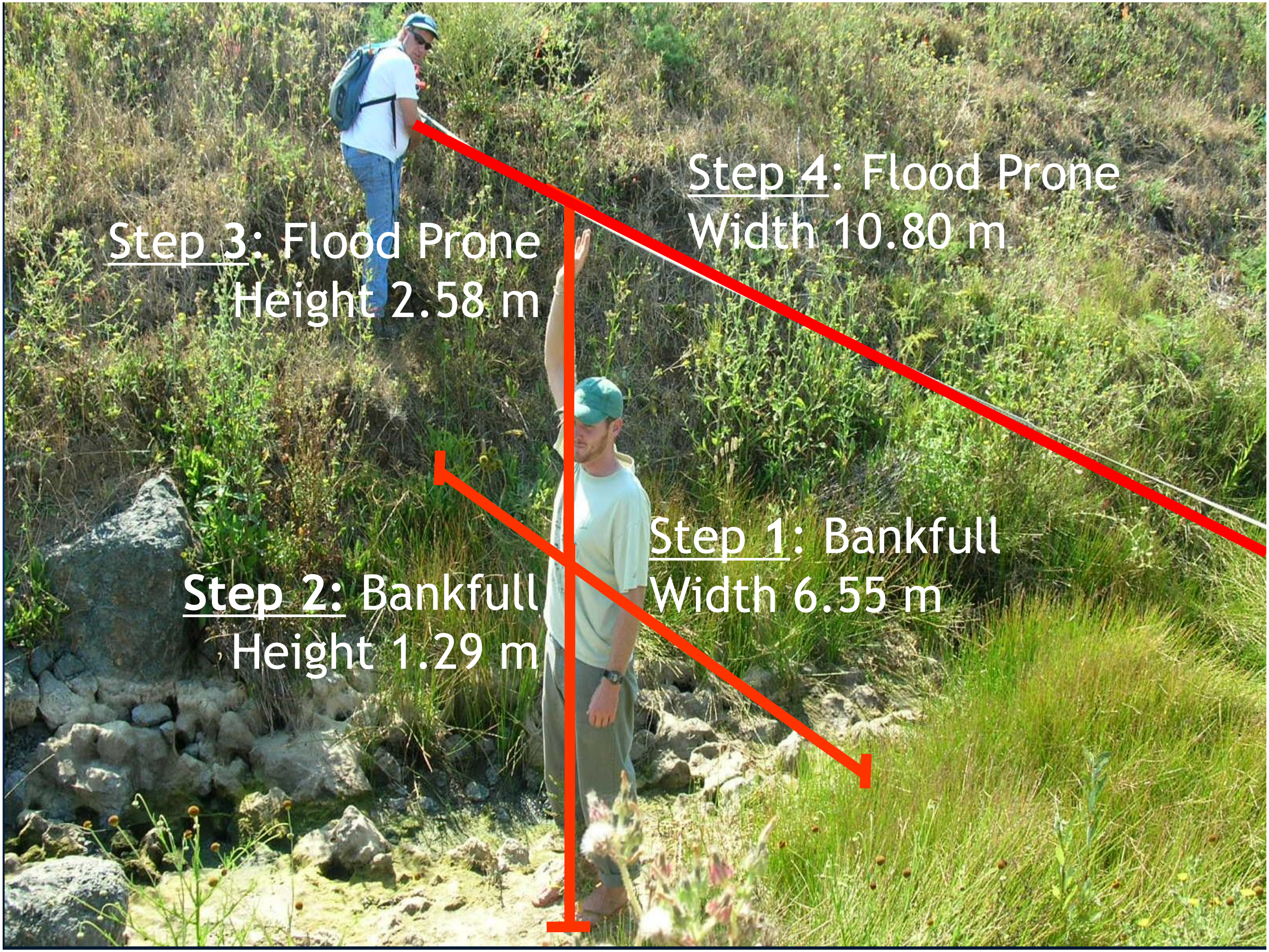
Identifying Bankfull Width

Bankfull can be difficult to discern

- Most difficult in unstable reaches
- Best on straight reaches of uniform slope
- Multiple observers
- Multiple points of measurement
- See the tips page on CRAM website
- Video -“A Guide for Field Identification of Bankfull Stage in the Western United States” US Forest Service

Measuring Entrenchment to Score Hydrologic Connectivity




Step 4: Flood Prone
Width 10.80 m
Step 3: Flood Prone
Height 2.58 m
Step 1: Bankfull
Width 6.55 m
Step 2: Bankfull
Height 1.29 m

Hydrologic Connectivity

Step 1: Estimate bankfull width (bfw).	6.55
Step 2: Estimate maximum bankfull depth.	1.29
Step 3: Estimate flood prone depth.	2.58
Step 4: Estimate flood prone width (fpw).	10.80
Step 5: Calculate entrenchment ratio (fpw/bfw).	1.65
Step 6: Average of three ratio measurements	1.59

Rating of Hydrologic Connectivity for Non-Confined Riverine

Rating	Alternative State - based on the entrenchment ratio calculation
A	Entrenchment ratio is > 2.2
B	Entrenchment ratio is 1.9 to 2.2
C	Entrenchment ratio is 1.5 to 1.8
D	Entrenchment ratio is <1.5

Rating of Hydrologic Connectivity for Confined Riverine

Rating	Alternative State - based on the entrenchment ratio calculation
A	Entrenchment ratio is > 1.8.
B	Entrenchment ratio is 1.6 to 1.8.
C	Entrenchment ratio is 1.2 to 1.5.
D	Entrenchment ratio is < 1.2.

Physical Structure Attribute

- Richness of structural surfaces reflects diversity of physical processes:
  - Energy dissipation
  - Water storage
  - Groundwater exchange
  - Flood attenuation

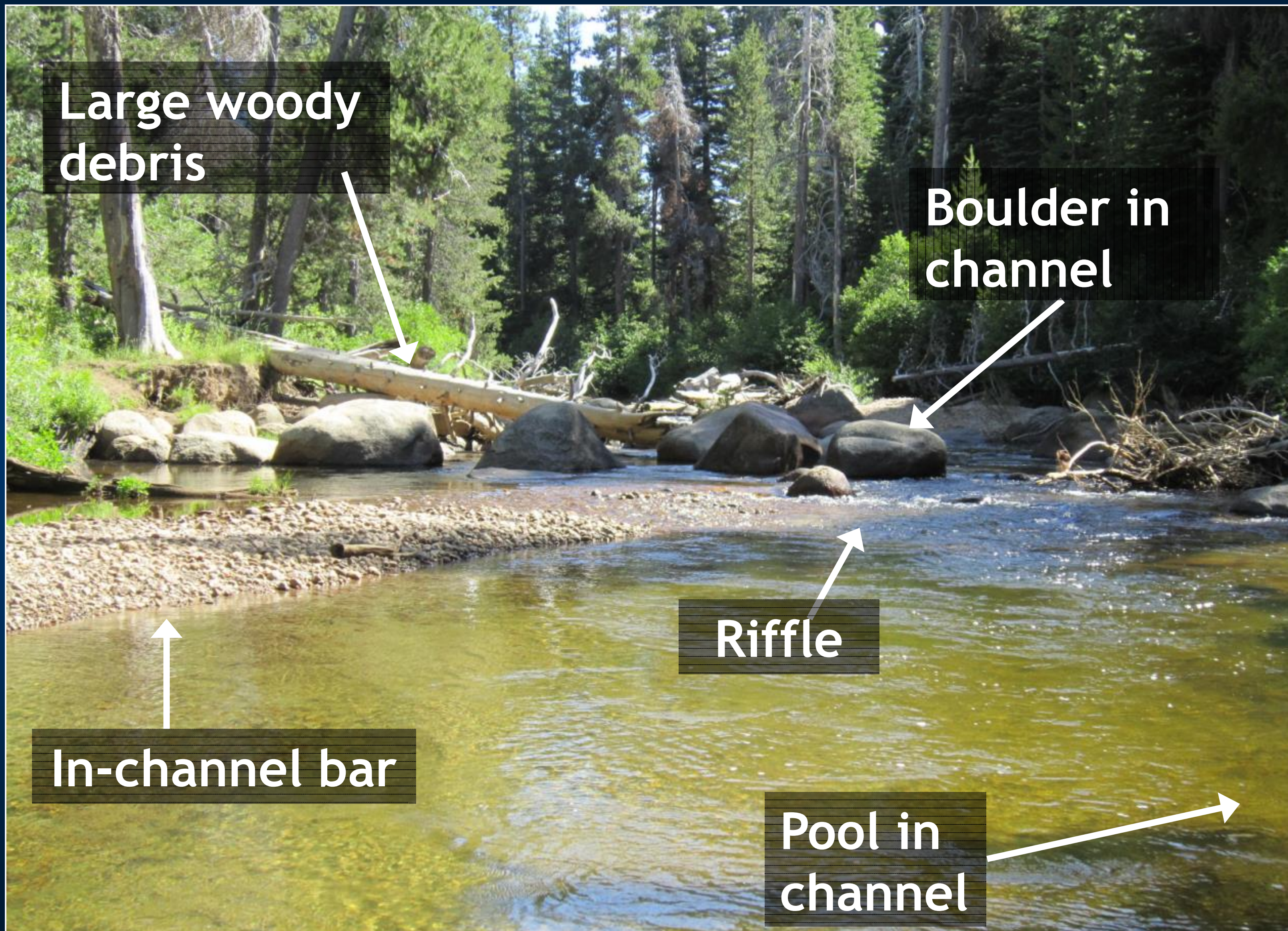
- Physical complexity promotes ecological complexity and increases:
  - Ecological functions
  - Beneficial uses
  - Overall condition

Physical Structure Attribute

Composed of two metrics:

- *Structural patch richness*
  - *Number of patch types within AA*
  - *Different for confined and non-confined*
- *Topographic complexity*
  - *Variety of elevations (benches) and extent of microtopography within AA*

Structural Patch Richness



Structural Patch Richness

Patch Type Table

STRUCTURAL PATCH TYPE (circle for presence)	Riverine (Non-confined)	Riverine (Confined)
Minimum Patch Size	$3\ m^2$	$3\ m^2$
Abundant wrackline or organic debris in channel, on floodplain	1	1
Bank slumps or undercut banks in channels or along shoreline	1	1
Cobbles and/or Boulders	1	1
Debris jams	1	1
Filamentous macroalgae or algal mats	1	1
Large woody debris	1	1
Pannes or pools on floodplain	1	N/A
Plant hummocks and/or sediment mounds	1	1
Point bars and in-channel bars	1	1
Pools or depressions in channels (wet or dry channels)	1	1
Riffles or rapids (wet or dry channels)	1	1
Secondary channels on floodplains or along shorelines	1	N/A
Standing snags (at least 3 m tall)	1	1
Submerged vegetation	1	N/A
Swales on floodplain or along shoreline	1	N/A
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	1	1
Vegetated islands (mostly above high-water)	1	N/A
Total Possible	17	12
No. Observed Patch Types (enter here and use in Table 14 below)		

Debris Jam

Hummocks

Rating for Structural Patch Richness

(non-confined riverine shown here)

Rating	Alternative States
A	≥ 12 of the possible patches types present
B	9-10 of the possible patches types present
C	6-7 of the possible patches types present
D	≤ 5 of the possible patches types present

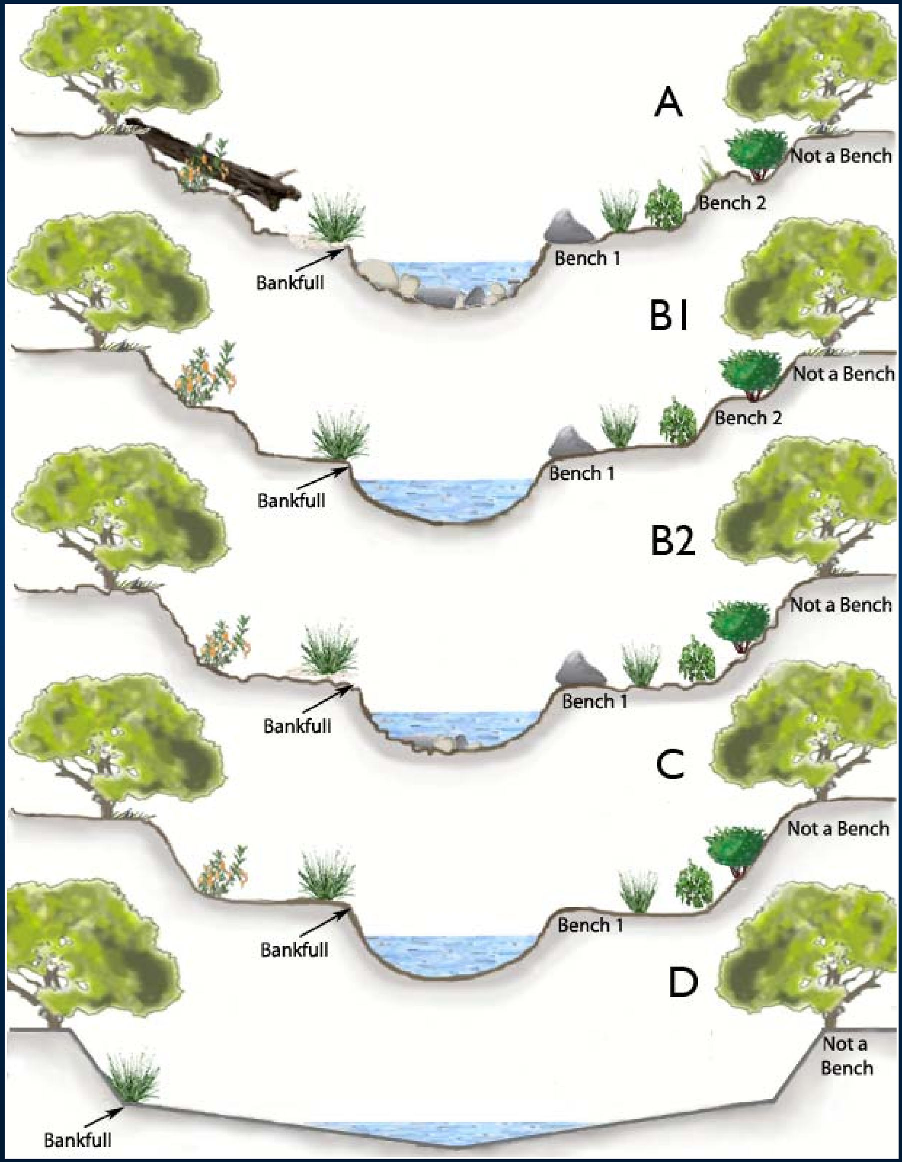
Variegated Shore

Non-Variegated Shore

Topographic Complexity

Assess from lateral edge of AA to lateral edge of AA

- *Macrotopography*
- *Microtopography*



Rating of Topographic Complexity

Rating	Alternative States (based on worksheet and diagrams in Figure 10 above)
A	AA as viewed along a typical cross-section has **at least two benches at different elevations** (not including the channel bottom or high riparian terraces not influenced by fluvial processes). Features below the bankfull elevation are part of the active channel and cannot be considered benches. **Additionally, each of these benches**, plus the slopes between the benches, **contain physical patch types or micro-topographic features** such as boulders or cobbles, partially buried woody debris, undercut banks, secondary channels and debris jams that contribute to abundant micro-topographic relief as illustrated in profile A.
B	AA has **at least two benches above bankfull elevation**, but these benches mostly **lack abundant micro-topographic complexity**. The AA resembles profile B1. **OR** AA has **one bench above bankfull elevation**, and this bench has **abundant micro-topographic complexity** as described in the A condition above. The AA resembles profile B2.
C	AA has a **single bench that lacks abundant micro-topographic complexity**, as illustrated in profile C.
D	AA as viewed along a typical cross-section **lacks any obvious bench**. The cross-section is best characterized as a **single, uniform slope with or without micro-topographic complexity**, as illustrated in profile D (includes concrete channels).

Macro-topographic Indicators

Micro-topographic Indicators

Pools, pits, bars, debris jams

Cobble, bank slumps, tree fall holes

Biotic Structure Attribute

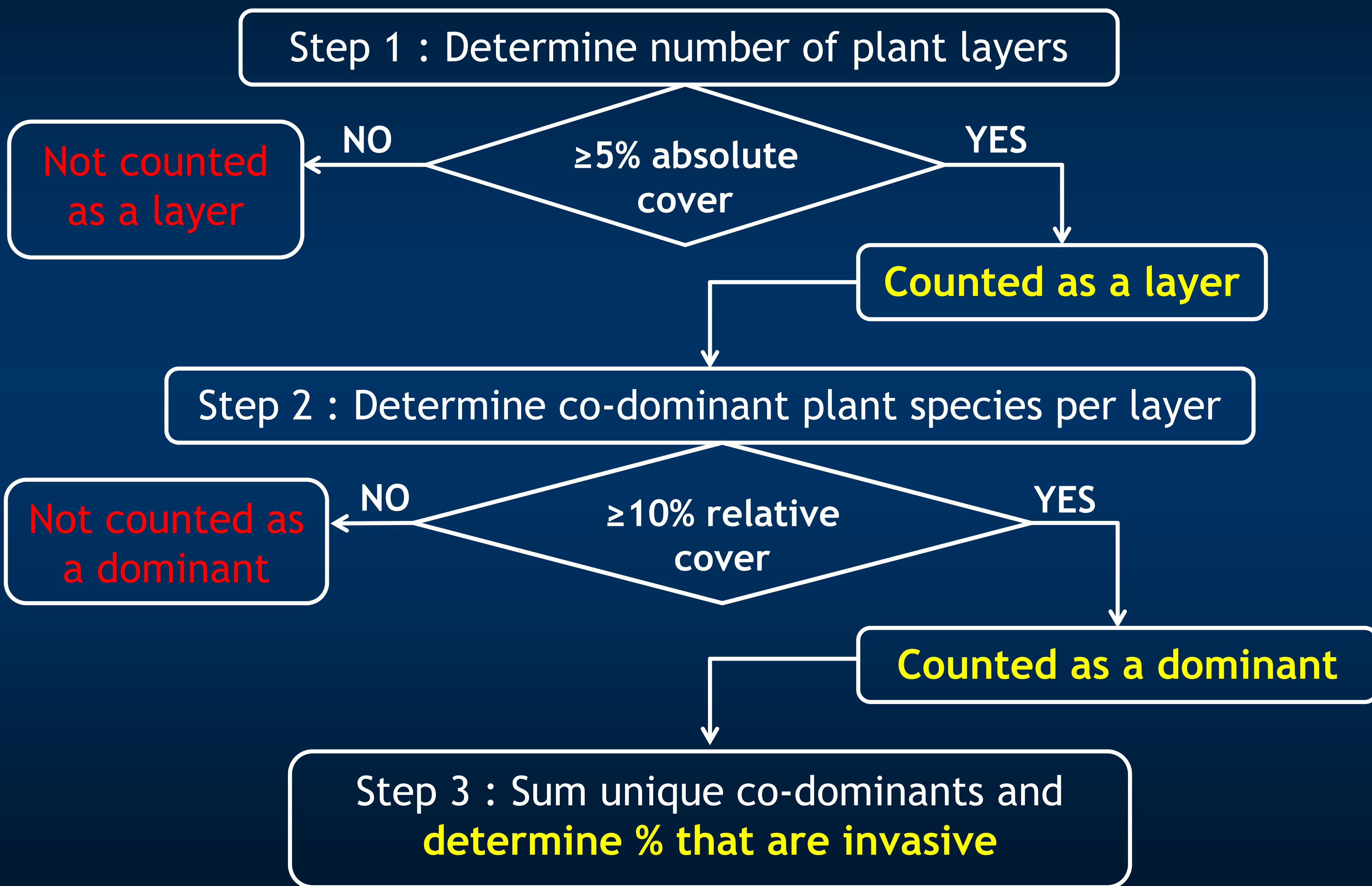
Considers…

- *Overall ecological complexity of plant community of the wetland*
- *Three metrics:*
  - *Plant Community Composition*
  - *Horizontal Interspersion and Zonation*
  - *Vertical Biotic Structure*

Plant Community Metric Submetrics

- *Number of Plant Layers Present*
  - A layer must cover at least 5% of *the portion of the AA that is suitable for the layer*
- *Number of Co-dominant Species*
  - **For each plant layer**, every species represented by **living vegetation** that comprises **at least 10% relative cover** within the layer is considered to be dominant in that layer.
- *Percent Invasion*
  - The number of invasive co-dominant species for all plant layers combined is assessed as a percentage of the total number of co-dominants.
  - The invasive status for California wetland and riparian plant species is based on the Cal-IPC list.

Determining Plant Community Submetrics



Defining Plant Layers

Wetland Type	Plant Layers				
	Aquatic	Semi-aquatic and Riparian			
	Floating	Short	Medium	Tall	Very Tall
Non-confined Riverine	On Water Surface	<0.5 m	0.5 – 1.5 m	1.5 - 3.0 m	>3.0 m
Confined Riverine	NA	<0.5 m	0.5 – 1.5 m	1.5 – 3.0 m	>3.0 m

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

Plant Community Metric 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?**
Very Tall (>3.0 m)	**Invasive?**	Total number of co-dominant species for all layers combined (enter here and use in Table 18)	
		Percent Invasion *Round to the nearest integer* (enter here and use in Table 18)	

Ratings for submetrics of Plant Community Metric

Rating	Number of Plant Layers Present	Number of Co-dominant Species	Percent Invasion
Non-confined Riverine Wetlands			
A	4 – 5	≥ 12	0 – 15%
B	3	9 – 11	16 – 30%
C	2	6 – 8	31 – 45%
D	0-1	0 – 5	46 – 100%
Confined Riverine Wetlands			
A	4	≥ 11	0 – 15%
B	3	8 – 10	16 – 30%
C	2	5 – 7	31 – 45%
D	0-1	0 – 4	46 – 100%

Horizontal Interspersion

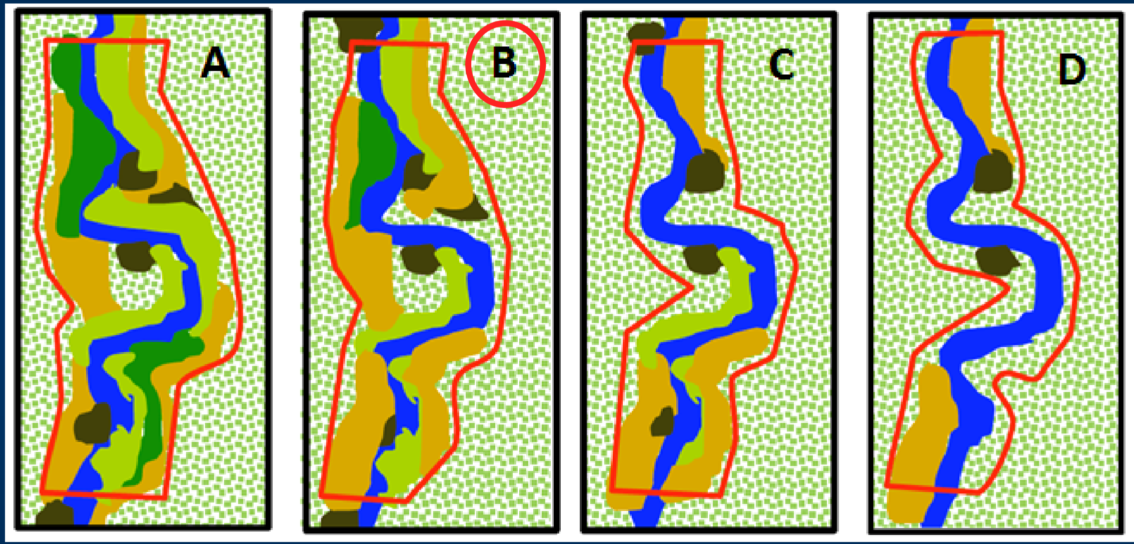
- Interspersion: the number of distinct plant zones and the amount of edge between them
  - Scoring is based upon field observation and aerial image interpretation
- Plant zones: plant monocultures or multi-species associations
  - Remain relatively constant in makeup throughout the AA
  - Arrayed along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

Rating for Horizontal Interspersion

Based on Worksheet drawing and
Figure 10 of field book

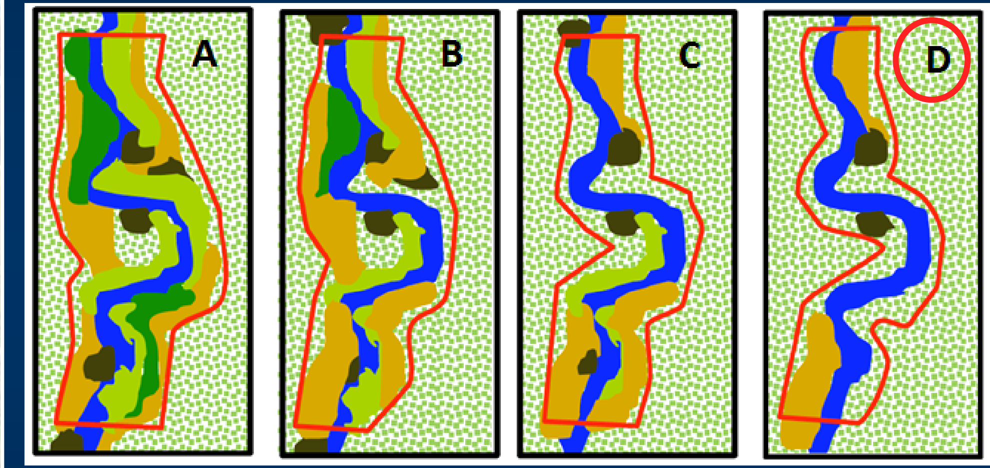
Rating	Alternative States
A	AA has a high degree of plan-view interspersion.
B	AA has a moderate degree of plan-view interspersion.
C	AA has a low degree of plan-view interspersion.
D	AA has minimal plan-view interspersion.

Horizontal Interspersion



High → Minimal

Horizontal Interspersion

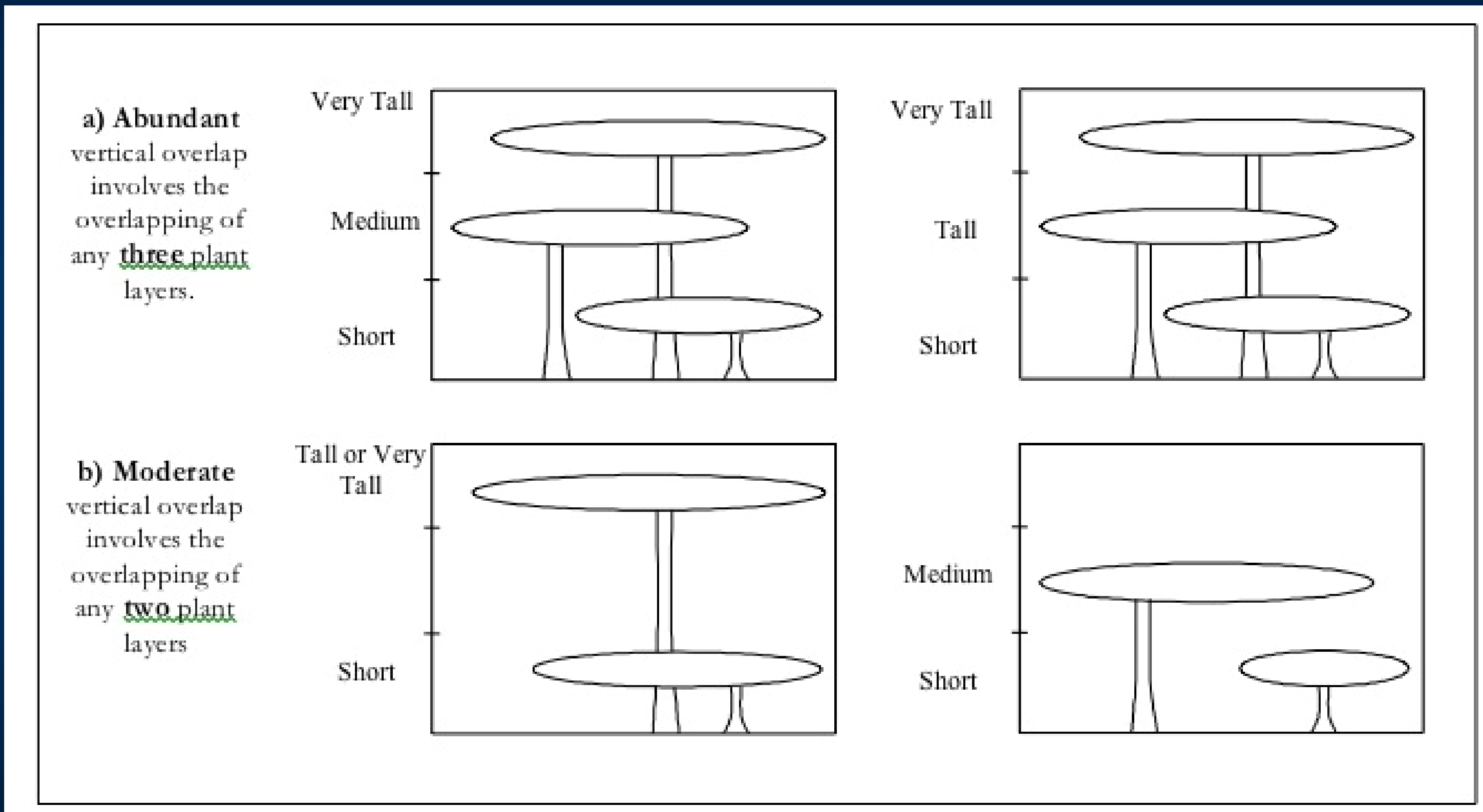


High → Minimal

Vertical Biotic Structure

- Assesses the degree of overlap among plant layers.
- The same plant layers used to assess the Plant Community Composition Metrics are used to assess Vertical Biotic Structure.

Vertical Biotic Structure



Vertical Biotic Structure

Vertical Biotic Structure

Rating for Vertical Biotic Structure

Rating	Alternative States
A	**More than 50% of the vegetated area** of the AA supports **abundant overlap** of 3 plant layers.
B	**More than 50% of the vegetated area** of the AA supports at least **moderate overlap** of 2 plant layers.
C	**25%-50% of the vegetated area** of the AA supports at least **moderate overlap** of 2 plant layers
D	**Less than 25% of the vegetated area** of the AA supports **moderate overlap** of 2 plant layers OR AA is **sparsely vegetated** overall.

CRAM Initial QA/QC

- 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

Scoring Sheet: Riverine Wetlands

Buffer and Landscape Context Attribute

Hydrology Attribute

Physical Structure Attribute

Biotic Structure Attribute

Overall AA Score

AA Name:			**Date:**
Attribute 1: Buffer and Landscape Context (pp. 11-19)			**Comments**
	Alpha.	Numeric	
Stream Corridor Continuity (D)			
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 = $D+[C \times (A \times B)^{½}]^{½}$			**Final Attribute Score = (Raw Score/24) x 100**
Attribute 2: Hydrology (pp. 20-26)			
	Alpha.	Numeric	
Water Source			
Channel Stability			
Hydrologic Connectivity			
Raw Attribute Score = sum of numeric scores			**Final Attribute Score = (Raw Score/36) x 100**
Attribute 3: Physical Structure (pp. 27-33)			
	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. 34-41)			
Plant Community Composition (based on sub-metrics 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

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 nature and degree of stressors
- Contributes to interpretation of CRAM score and future trends or predictions for AA
- May contribute to future module evaluation and development

Upload CRAM Results

- Enter data using eCRAM online
- Benefits of Statewide database:
  - Increasingly required for regulatory applications
  - Contributes to statewide dataset
  - Enables comparisons to other cases


Thank You