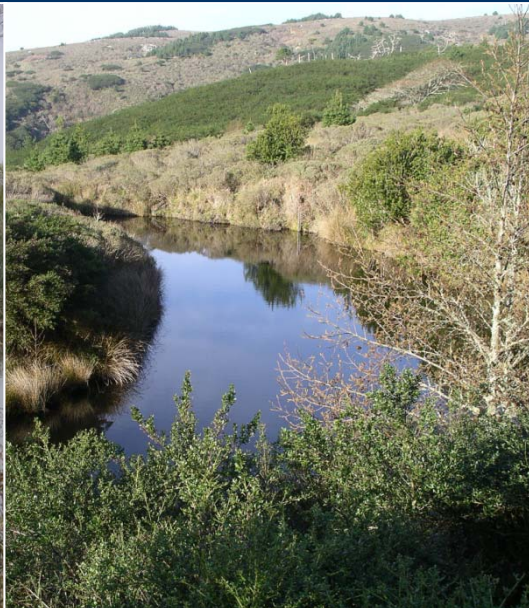


# California Rapid Assessment Method for Wetlands (CRAM)

## Introduction



## What *is* CRAM?

CRAM is a field-based “walk and talk” diagnostic tool that, when used as directed, provides rapid, repeatable, numeric assessment of the *overall condition* of a wetland based on visible indicators of its form, structure, and setting, relative to the least impacted reference condition.

## What *is overall condition*?

Overall condition is the capacity or potential of a wetland to provide the functions and services expected for the same type of wetland in its natural setting, assessed relative to “best” reference condition.

## What is *rapid*?

CRAM requires a team of 2-3 trained practitioners less than 3 hours, maximum, to assess a representative wetland area. That's 3 hours from the car to final results.

## What qualifies a *trained practitioner*?

A trained practitioner has completed a CRAM training course that satisfies criteria adopted by the California Wetland Monitoring Workgroup. Practitioners must demonstrate that they can achieve an acceptable precision for each type of wetland they assess.

# What CRAM is *NOT*

- CRAM is not a wetland identification or delineation methodology.
- CRAM is not a wetland classification system.
  - CRAM *is* based loosely on the HGM classification system.
- Although CRAM does not directly measure functions, it does measure the capacity for those functions to occur.
  - If the condition is “excellent”, then the functions associated with that condition are presumed to exist.



# Geographic Scope of CRAM

## All Wetlands in California

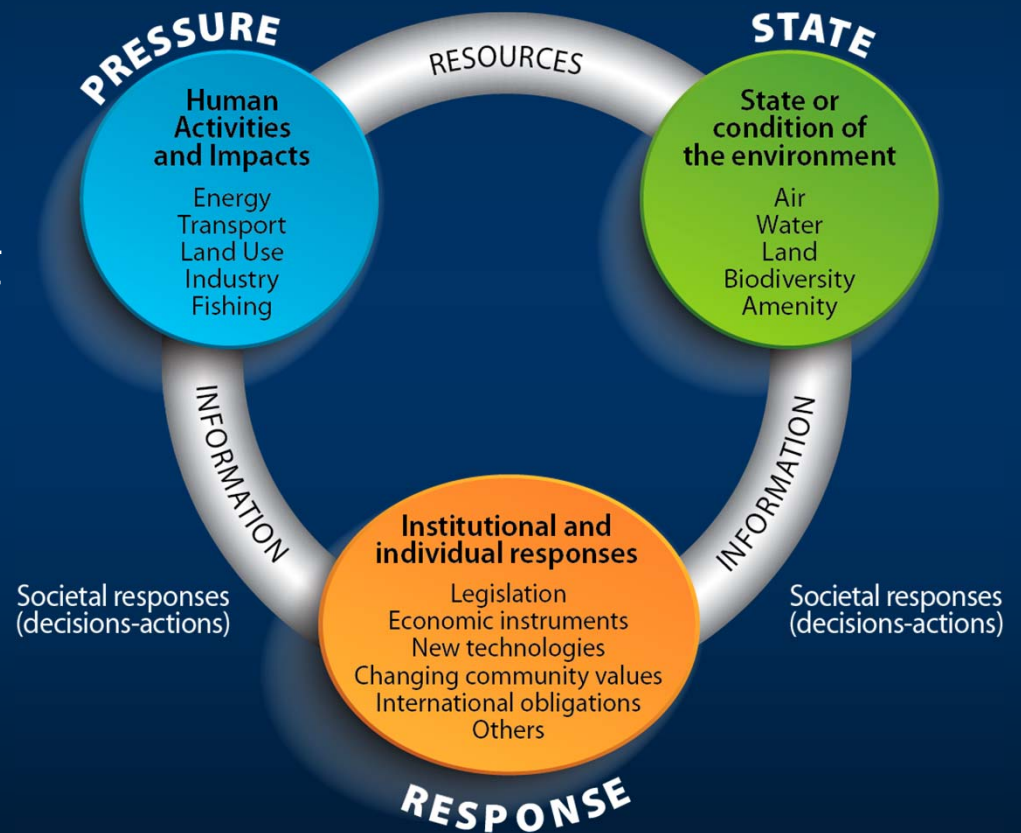
- Riverine Wetlands
  - Confined and Non-Confined
  - Arid
- Depressional Wetlands
  - Vernal Pools
  - Playas
- Lakes
- Estuarine Wetlands
  - Saline and Non-Saline
  - Bar-built (Seasonal)
- Slope Wetlands
  - Channeled and Non-Channeled Meadows
  - Seeps/Springs
  - Forested Slope



# Key Assumption: Wetlands in the Management Landscape

## Pressure-State-Response Model (PSR)

- Natural processes (disturbance) and human operations (stressors) put *pressure* on wetlands.
- Pressure affects wetland *state* (condition).
- Degraded states trigger management *response* to reduce pressure by adjusting stressors.



# Key Assumption: Wetlands in the Physical Landscape

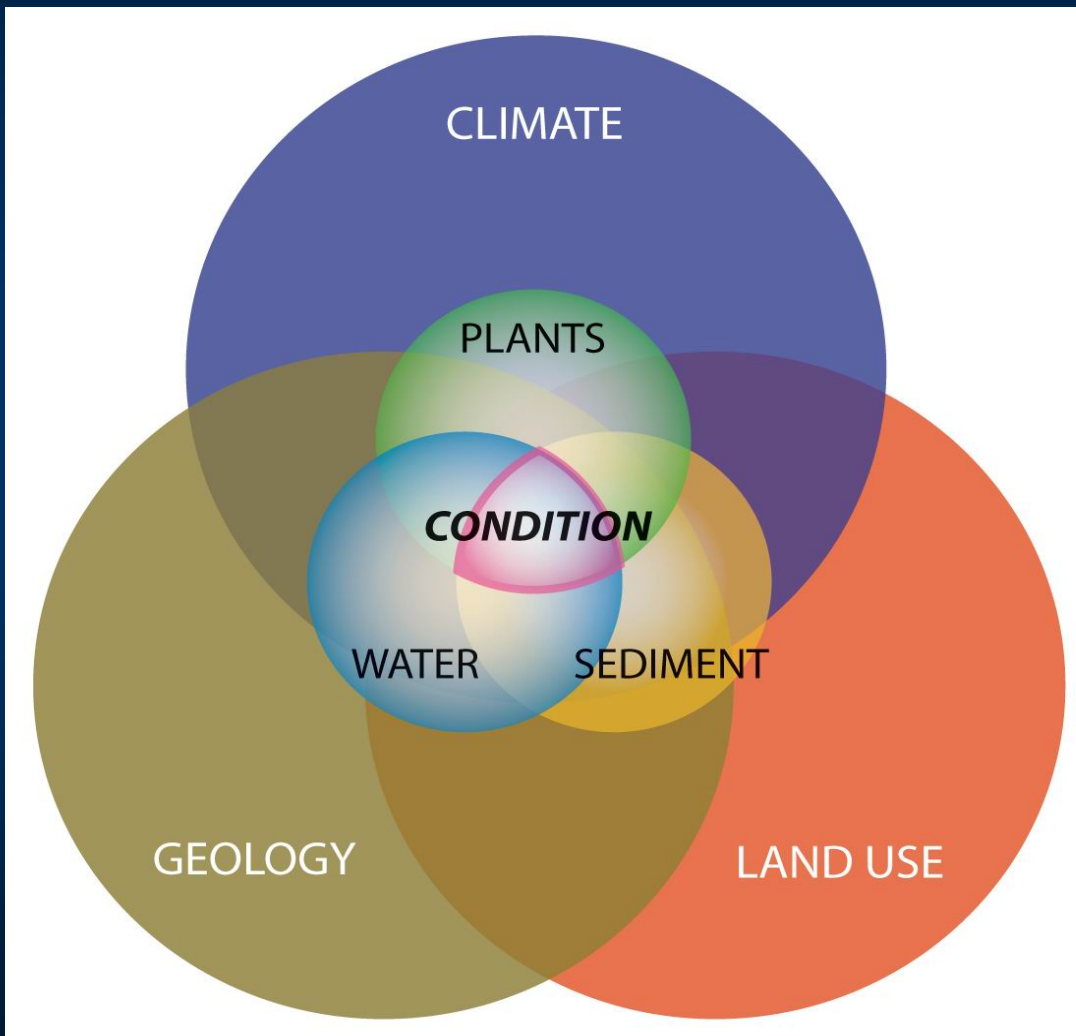
State of *landscape stressors* is assessed outside the buffer

*Condition is assessed at all three scales*

*Wetland condition* results from internal and external influences

*Buffer* exists between landscape stressors and the wetland

# Wetlands in the Physical Landscape



## Model of Forcing Functions

- Wetland condition responds to region-scale forcing functions (geology, climate, land use)
- Wetland condition responds to site-scale forcing functions (water, sediment, vegetation)
- CRAM is sensitive to results of all of these forcing functions



# Diversity of Services

The overall value of a wetland depends more on the diversity and levels of all of its services than the level of any one service.

The diversity and levels of services of a wetland increase with its structural complexity and size. CREAM therefore favors large, structurally complex examples of any wetland type.

# Reference Concepts

Internal reference standard:

*CRAM scores represent “percent of best achievable condition,” as defined by statewide ambient surveys and BPJ.*

- CRAM reference framework is *all wetlands in California in the same class.*
- For each wetland type, all scores can be compiled across regions and over time.
- Spatial and temporal differences can be quantified.

# Reference Concepts

- A reference site network is used for tracking annual variability, for training purposes, and to calibrate the metrics and indicators of condition.
- Reference network continually expanding



# Development of CRAM

1. Develop a strategic plan (USEPA)
  - Build State capacity
  - Issue guidance
  - Encourage implementation
2. Establish Statewide and Regional Teams
  - Build 1 method per wetland type for all regions
  - Involve user community
3. Develop conceptual models
  - Other RAMs
  - Wetland form and function
  - Assumptions and tenets of CRAM

# Development of CRAM

## 4. Verify method

- Calibrate to BPJ through field evaluations
- Field test across range of condition

## 5. Validate method

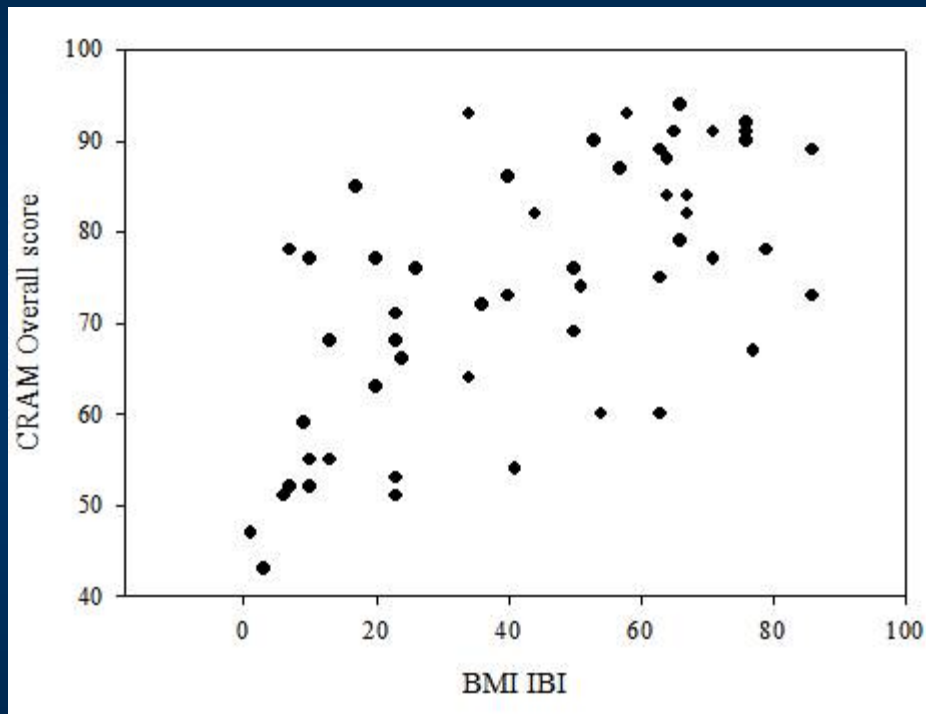
- Correlate scores to L3 data
- Test repeatability within and among teams

## 6. Implement

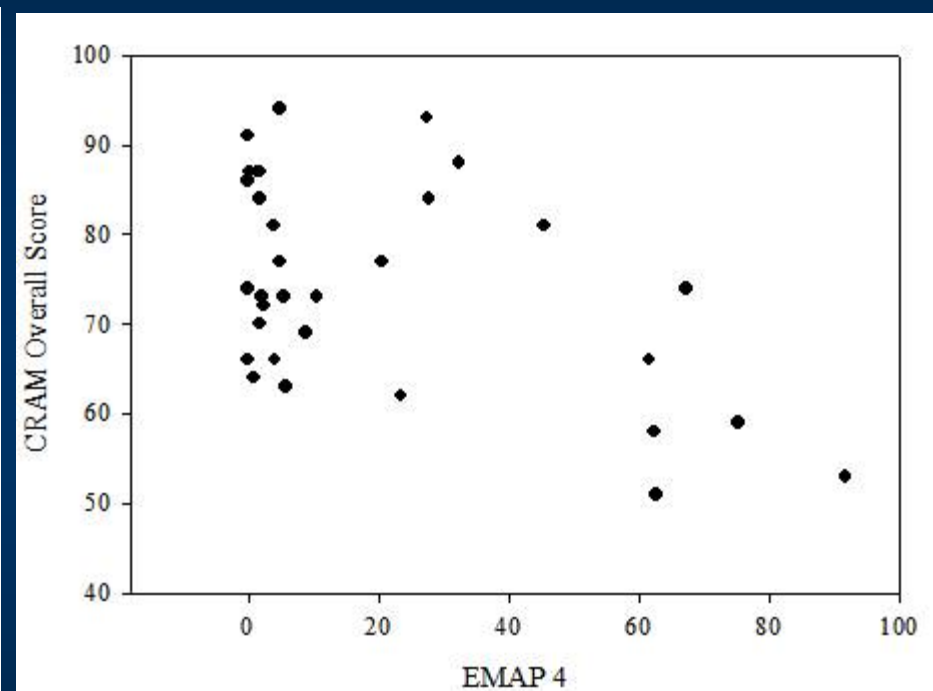
- Through existing State and federal programs
- Through new regional programs
- Process for regular review and revision



# Validation: CRAM Correlation to Level 3 Data



Riverine CRAM vs. BIBI



Estuarine CRAM  
vs. EMAP - Invasive spp

# Peer Review

- Rapid Assessment in California (Sutula et al. 2006)
- Mitigation project review (Ambrose et al. 2005, 2006)
- USACE ERDC Review (2008)
- CRAM Validation (Stein et al. 2009)
- State Water Board peer review (2009-12)
- SWAMP Endorsement (March 2013)

# CRAM Design

CRAM is structured to guide the user through a wetland in an orderly and thorough assessment of its overall condition.

- In the wetland, CRAM examines structure in three dimensions.
- CRAM moves into the wetland through the adjacent landscape and buffer.

# CRAM Design:

## Steps of a 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 (including completing the Stressor Checklist)
- Step 7: Complete CRAM QA/QC
- Step 8: Submit assessment results using eCRAM

# CRAM Design:

## Considerations for Identifying AAs

- Guidance in each Module
- Purpose of Assessment:
  - Project (multiple AAs according to sample design)
  - 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 take longer to assess
  - Larger AAs have higher or more variable scores



# CRAM Design: Office Assessment

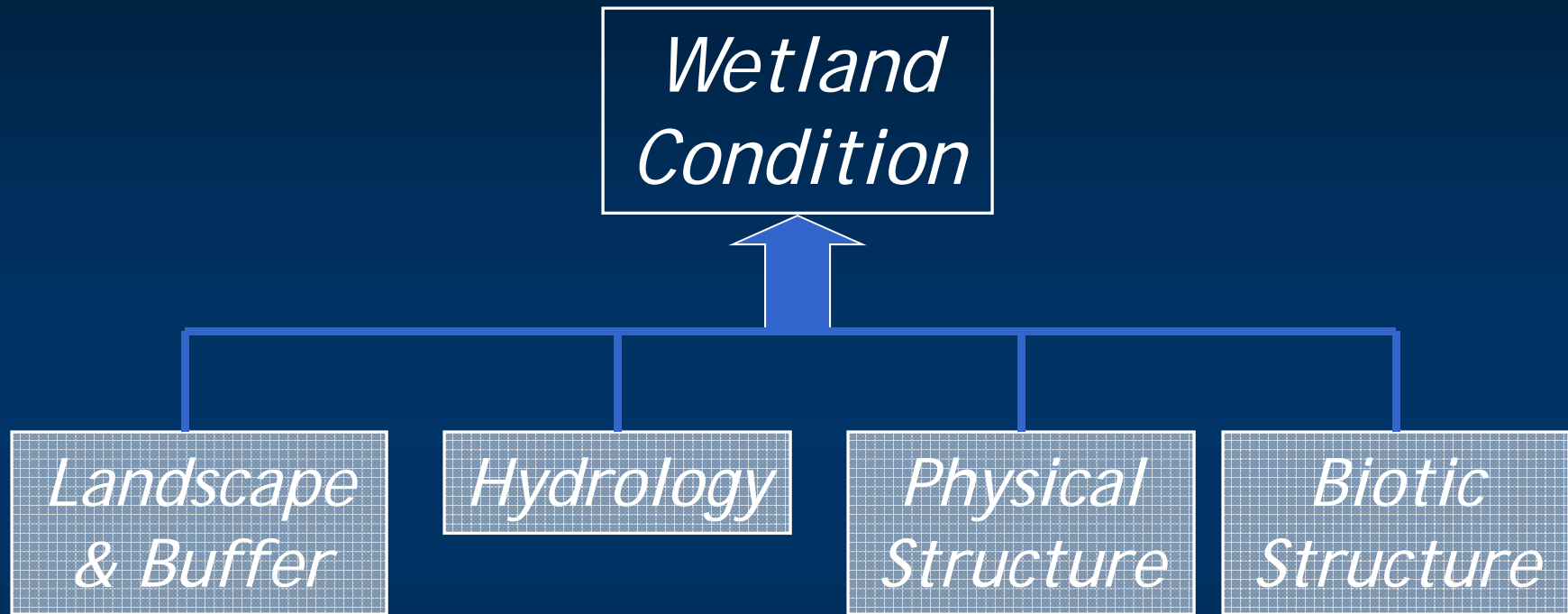
The scoring of some metrics benefit from checking additional background information or aerial photographic investigation completed in the office.

# CRAM Design:

## Field Assessment Procedure

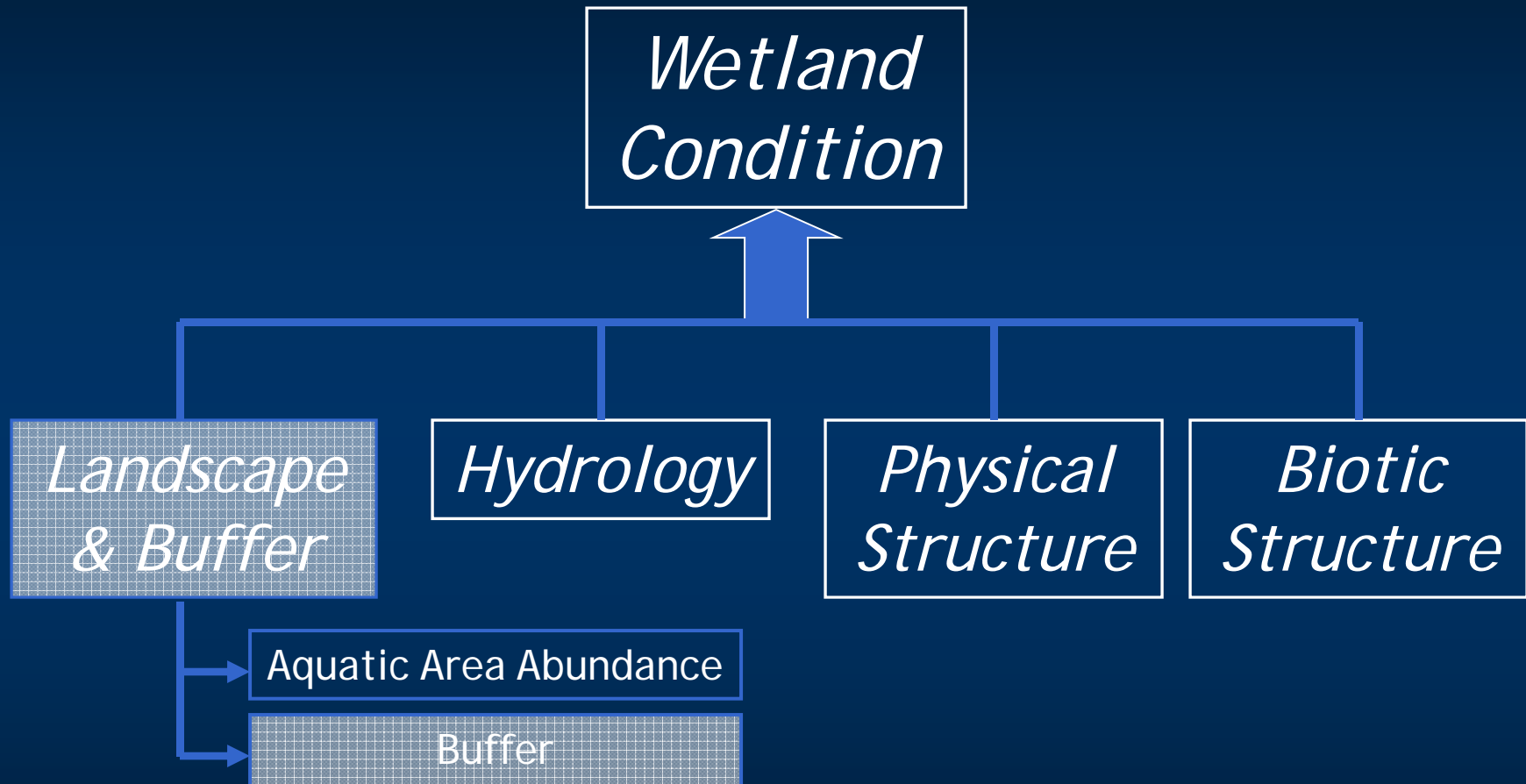
1. Bring aerial imagery and datasheets
2. Walk the field area and draw the AA boundary on the imagery
3. Walk through the entire AA making notes and recording important plant species
4. Fill out datasheets, conducting measurements, making observations, and sketching maps or diagrams as required
5. Walk again to clarify uncertainties
6. Finalize field scores

# CRAM Design: Attributes

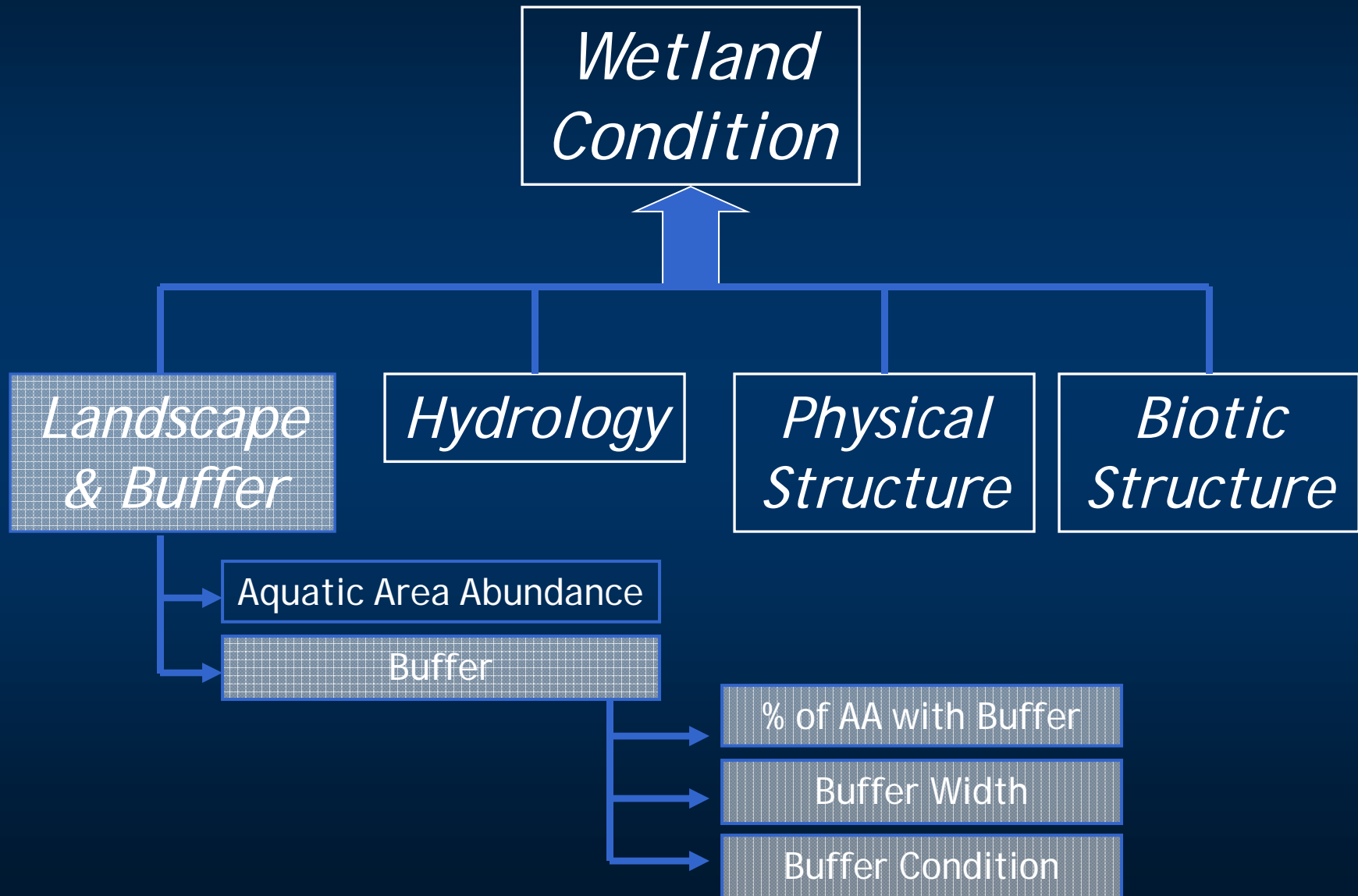


- For all wetland classes, CRAM recognizes 4 *attributes* of wetland condition (consistent across all modules).
- Each attribute is represented by 2-3 *metrics*, some of which have *submetrics* (some differences between modules).

# CRAM Design: Metrics



# CRAM Design: Submetrics





# Submetric Scoring Example

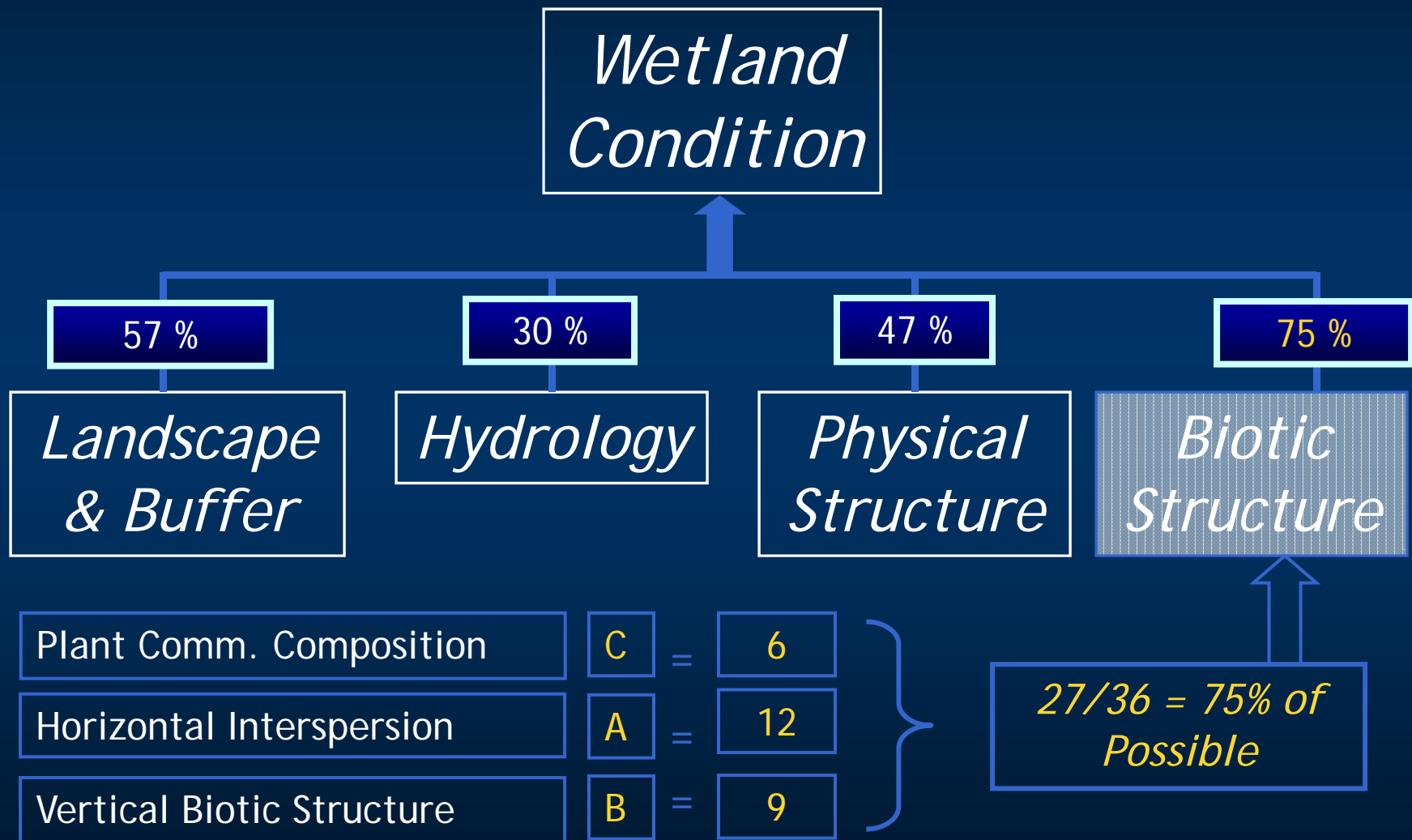
- Mutually exclusive alternative states
- Represent full range of possible condition

## Buffer Width

Alphabetic Score	Numeric Score	Alternative State
A	12	Average buffer width 190-250m
B	9	Average buffer width is 130-189m
C	6	Average buffer width is 65-129m
D	3	Average buffer width 0-64m

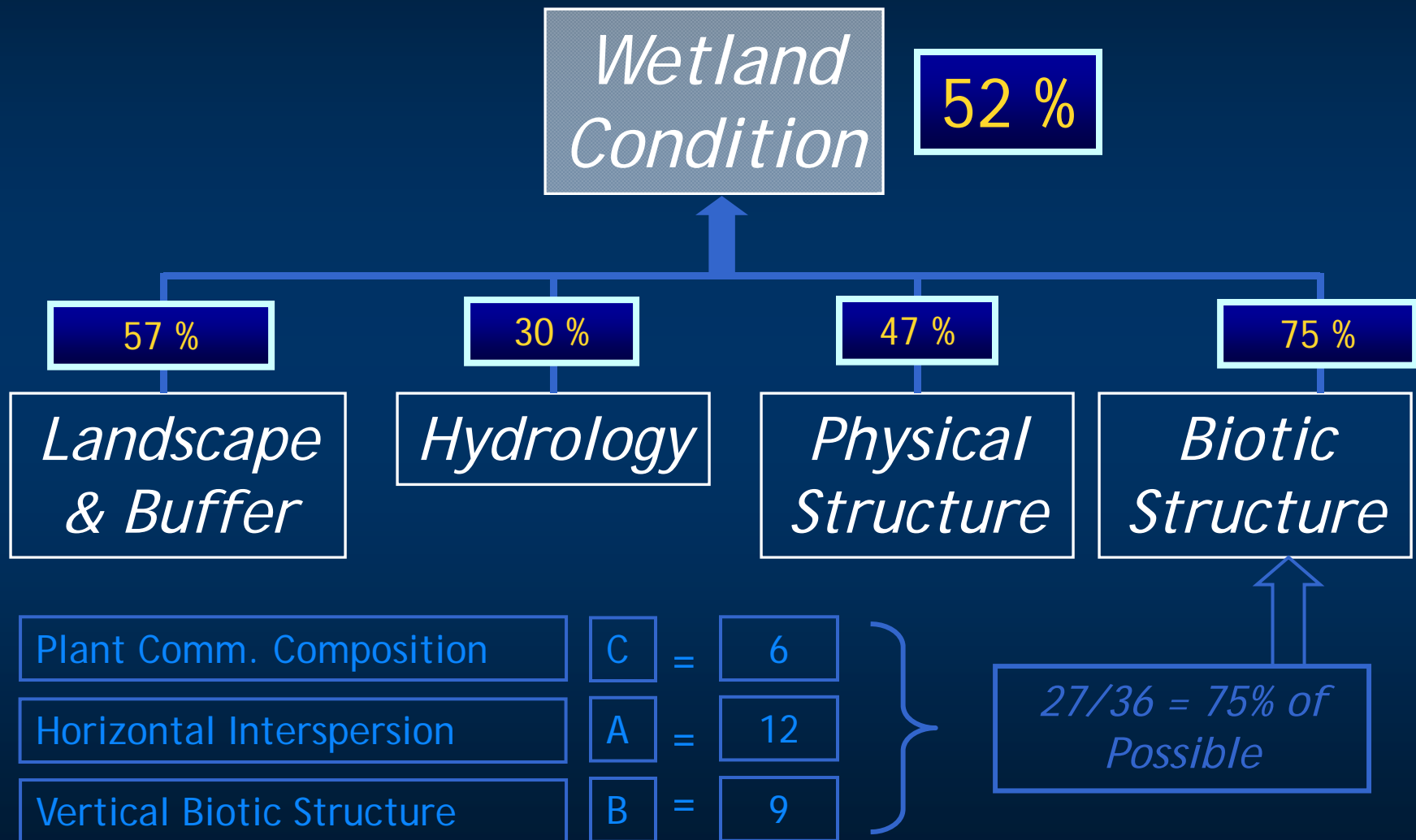
# CRAM Scoring:

Percent possible metric score → Attribute score

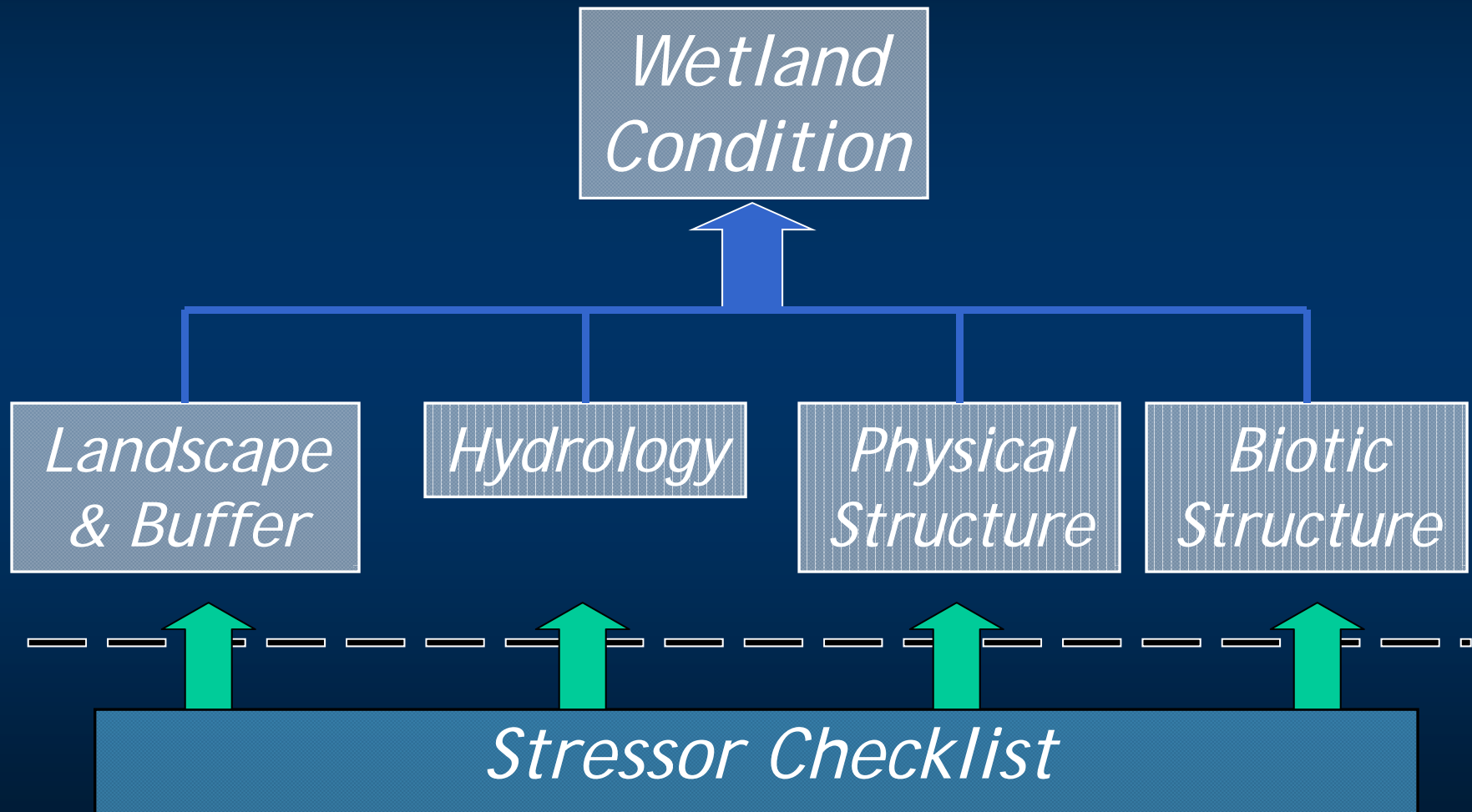


# CRAM Scoring:

Average of Attribute scores = Overall score



# Stressors are Identified



# Uses of the Stressor Checklist

- Identify possible causes for low CRAM scores
- Identify possible corrective actions
- Develop testable hypotheses relating scores to stressors

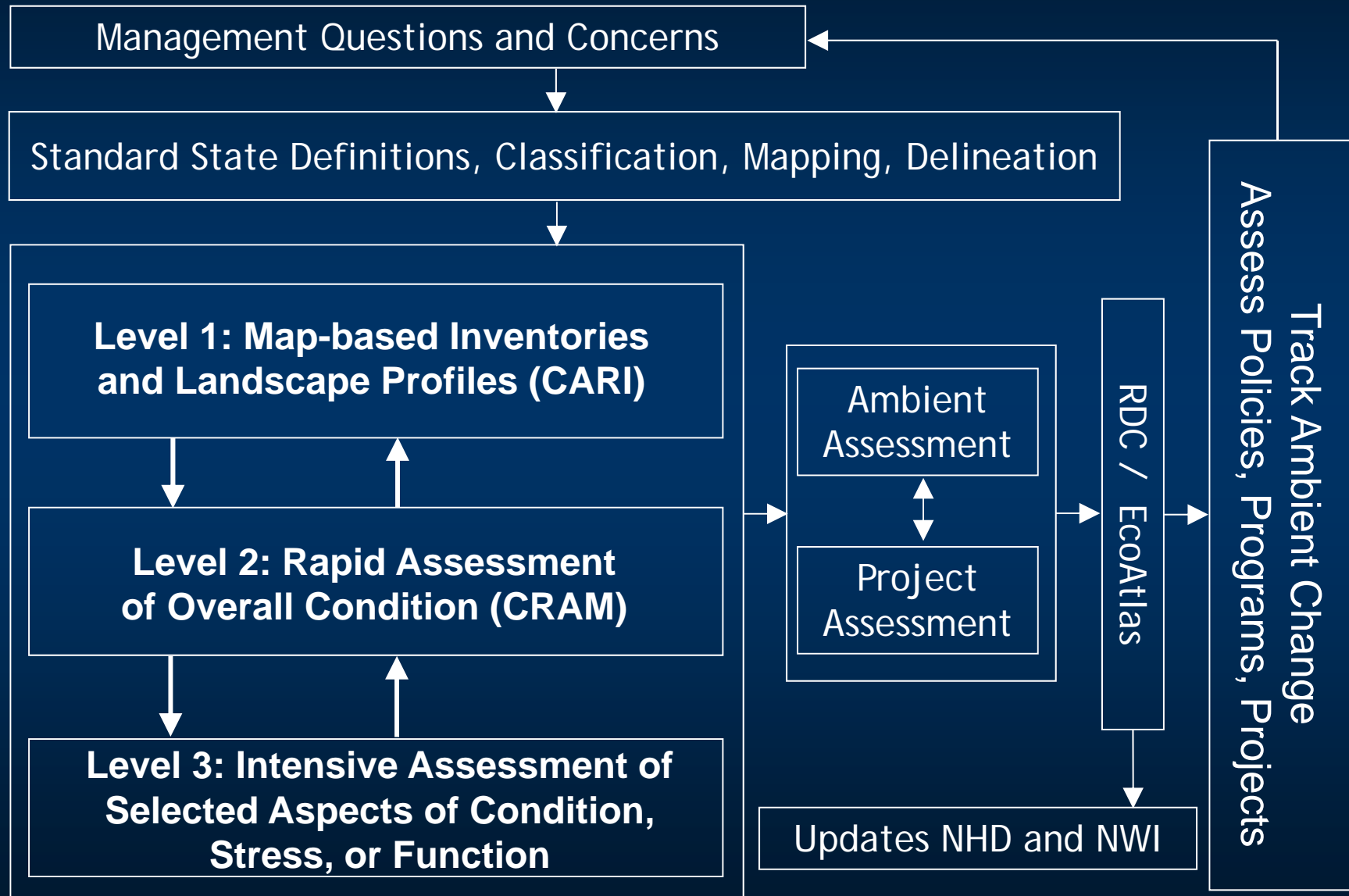




# References to CRAM in Existing Federal/State Wetland Policy Framework

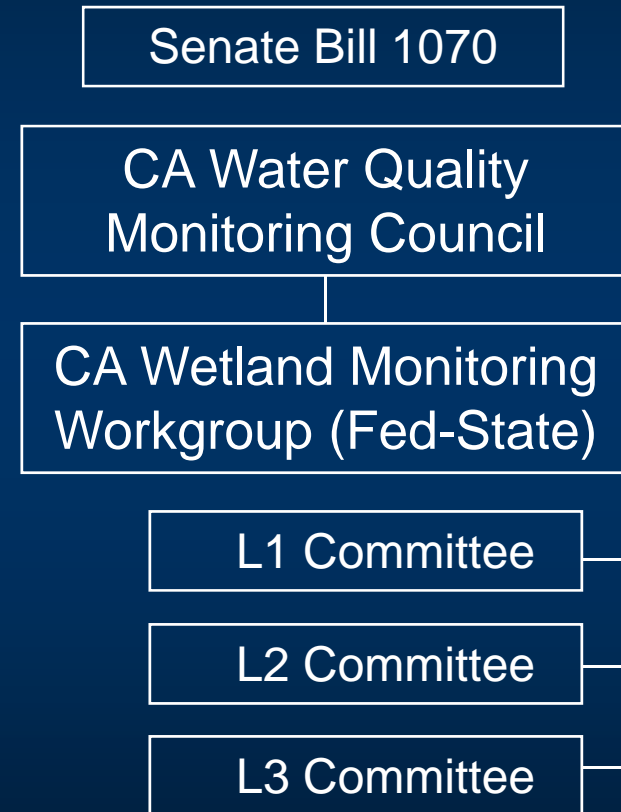
- CRAM is one procedure identified in USACE Guidance for specifying mitigation ratios for CWA Section 404 applications.
- CRAM is identified as a key element in the Draft Wetland Area Protection Policy of the SWRCB.
- CRAM is identified as a key element in the Wetland and Riparian Area Monitoring Program (WRAMP) of the California Wetland Monitoring Workgroup, part of the SB 1070 Water Quality Monitoring Council.

# WRAMP Framework



# WRAMP Implementation and Oversight

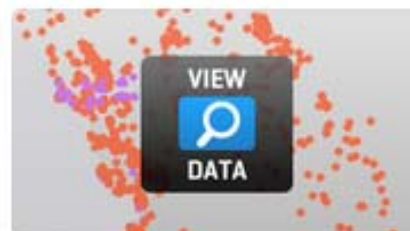
- The Level 2 Committee of the CWMW oversees the development and implementation of rapid assessment methodologies, including CRAM



# California Rapid Assessment Method



CRAM is a cost-effective and scientifically defensible rapid assessment method for monitoring the conditions of wetlands throughout California. It is designed for assessing ambient conditions within watersheds, regions, and throughout the State. It can also be used to assess the performance of compensatory mitigation projects and restoration projects.



TOTAL ASSESSMENTS 3306

UPCOMING TRAININGS 6

401 PERMITS WITH ASSESSMENTS 0

TRAINED IN CRAM 765



# Store, Retrieve, and Visualize Data and Results

