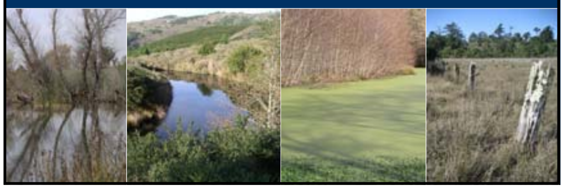
California Rapid Assessment Method for Wetlands (CRAM)

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

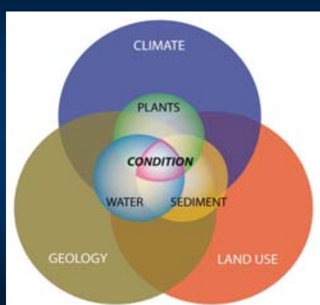
State of *landscape stressors* is assessed outside the buffer

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. CRAM 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 training purposes and to calibrate the metrics and indicators of condition.
- Can be used for tracking annual variability
- Reference network continually expanding

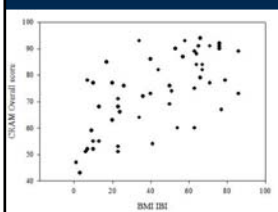
Development of CRAM

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

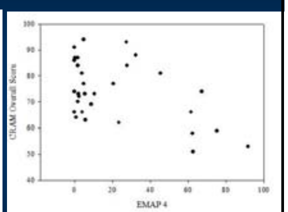
Development of CRAM

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 though 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 *e*CRAM

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

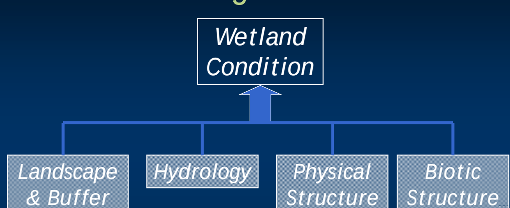
CRAM Design:
Office Assessment

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

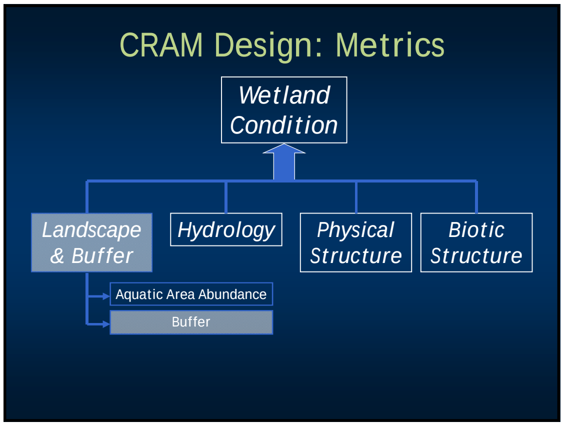
CRAM Design:
Field Assessment Procedure

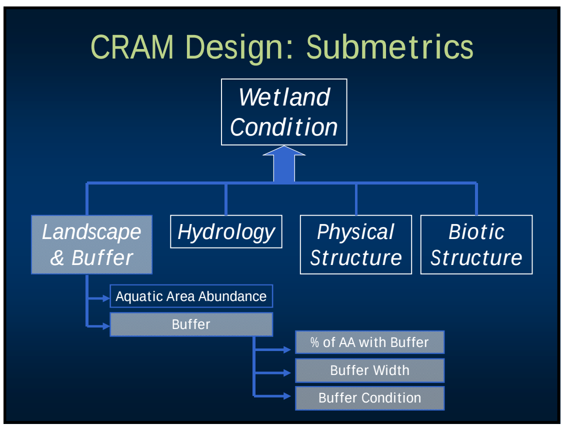
1. Bring aerial imagery and datasheets
2. Walk the field area and draw the AA boundary on the imagery
3. Walk through the entire AA making notes and recording important plant species
4. Fill out datasheets, conducting measurements, making observations, and sketching maps or diagrams as required
5. Walk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



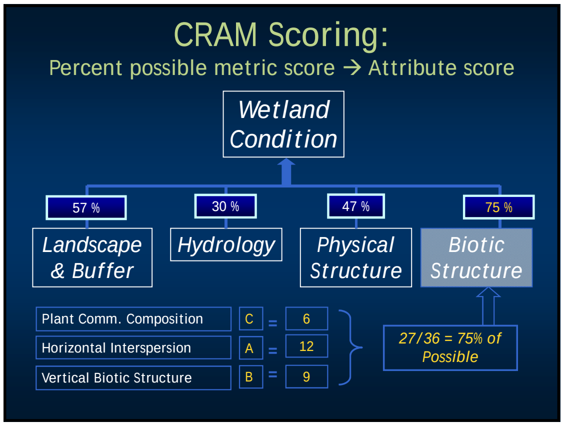


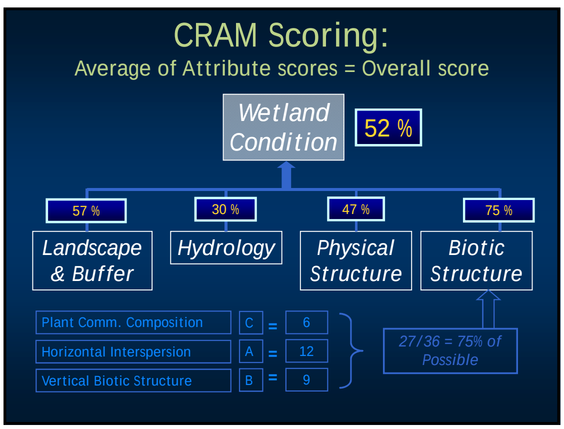
Submetric Scoring Example

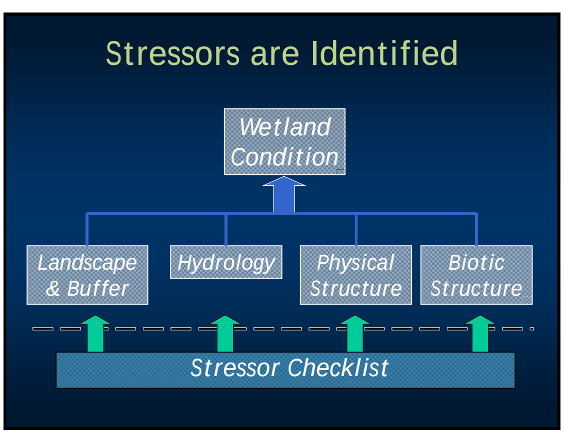
- Mutually exclusive alternative states
- Represent full range of possible condition

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
Wetland Condition
57 %
30 %
47 %
75 %
Landscape & Buffer
Hydrology
Physical Structure
Biotic Structure
Plant Comm. Composition
C
=
6
Horizontal Interspersion
A
=
12
Vertical Biotic Structure
B
=
9
27/36 = 75% of Possible


CRAM Scoring:
Average of Attribute scores = Overall score
Wetland Condition
52 %
57 %
30 %
47 %
75 %
Landscape & Buffer
Hydrology
Physical Structure
Biotic Structure
Plant Comm. Composition
C
=
6
Horizontal Interspersion
A
=
12
Vertical Biotic Structure
B
=
9
27/36 = 75% of Possible


Stressors are Identified
Wetland Condition
Landscape & Buffer
Hydrology
Physical Structure
Biotic Structure
Stressor Checklist

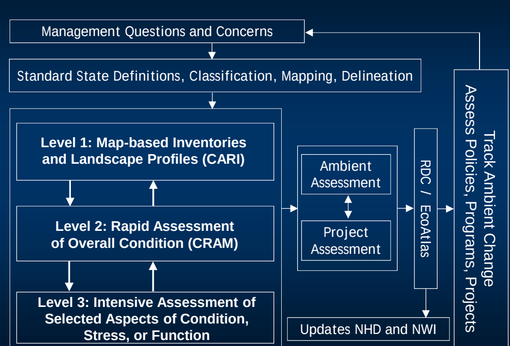
Uses of the Stressor Checklist

- 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.

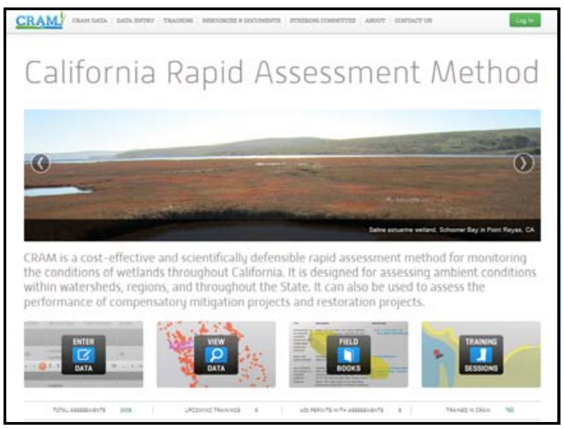
WRAMP Framework



WRAMP Implementation and Oversight

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

Senate Bill 1070
CA Water Quality Monitoring Council
CA Wetland Monitoring Workgroup (Fed-State)
- L1 Committee
- L2 Committee
- L3 Committee



Store, Retrieve, and Visualize Data and Results