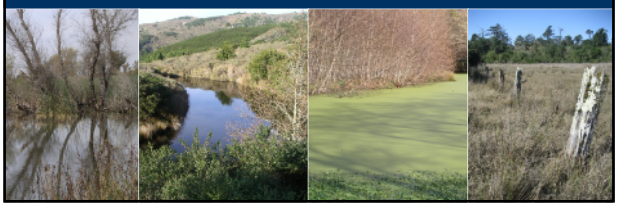
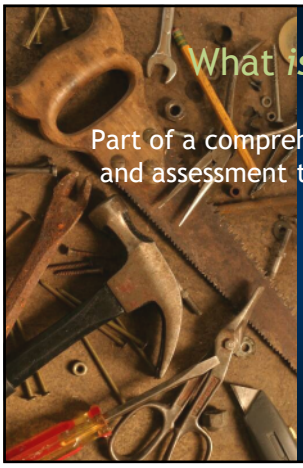
Introduction

California Rapid Assessment Method for Wetlands and Riparian Areas (CRAM)





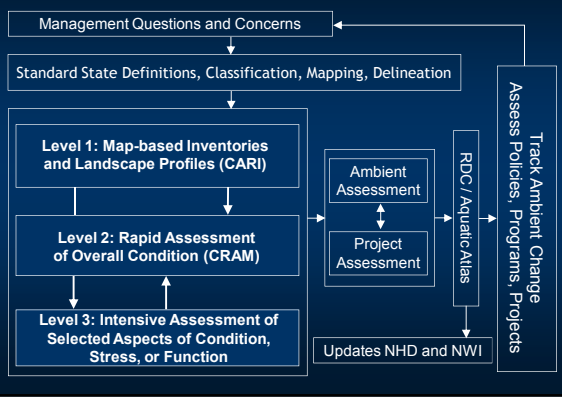
What *is* CRAM?

Part of a comprehensive monitoring and assessment toolkit for *WRAMP*

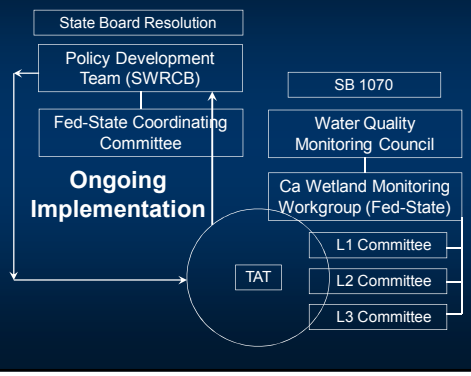
WRAMP

Wetland and Riparian Area Monitoring Program

WRAMP Framework



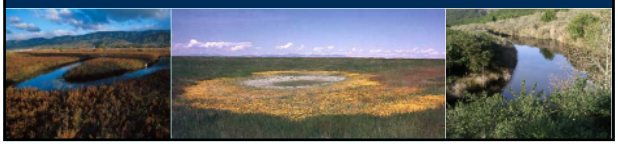
Coordinated WRAMP Development



Geographic Scope

All Wetlands in California

- Lakes and Lagoons
- Estuarine Wetlands
- Riverine Wetlands
- Seeps and Springs
- Depressional Wetlands
- Vernal Pools
- Playas
- Wet Meadows



What is CRAM?

- Expert “walk and talk” diagnostic tool for all wetlands in California
- Less than 3 hrs field time, team of 2-3
- Required expertise comparable to jurisdictional delineation
- It’s simple, but not easy

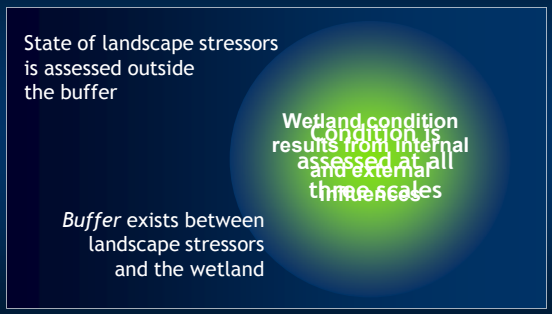
Key Assumptions of CRAM

Wetlands in the Management Landscape

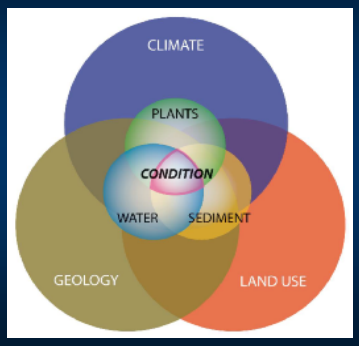
Pressure-State-Response Model (PSR)

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

Wetlands in the Physical Landscape



Wetlands in the Physical Landscape



Model of Forcing Functions

Why Wetlands Matter

Wetlands are valued because of processes and functions that provide services to society.

(e.g., primary and secondary production that supports waterfowl also supports hunting).

Why Some Wetlands Matter More

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 increases with its structural complexity and size. CRAM therefore favors large, structurally complex examples of any wetland type.

For each wetland class, larger, more complex wetlands tend to get higher scores.

Reference Concepts

Internal reference standard:

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

- 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 needed for tracking annual variability and to calibrate the metrics and indicators of condition.

Regional networks are being established

Development of CRAM

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

Development of CRAM

4. Verify method
   A. Calibrate to BPJ
   B. Field test across range of condition
5. Validate method
   A. Correlate scores to L3 data
   B. Test repeatability within and among teams
6. Implement
   A. Through existing State and federal programs
   B. Through new regional programs
   C. Process for regular review and revision

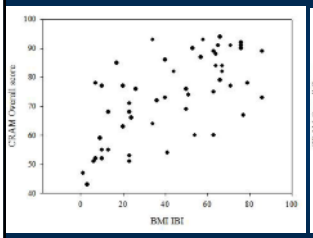
Development of CRAM

- Implementation
  - CRAM IT (eCRAM and Wetland Tracker)
  - Quality Assurance and Quality Control
  - Reference Network
  - Practitioner Training
  - Annual review process

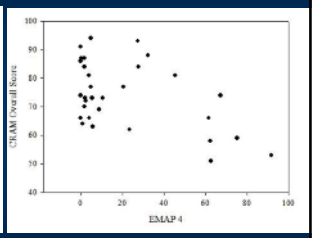
Validation: Repeatability Within and Among Teams

Precision Target 10%	Precision Achieved	
	Estuarine	Riverine
Same Team Different times	10%	6%
Different Teams Same time	8%	10%

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., Wetlands 29(2)
- State Water Board refereed review (2009)

CRAM Design

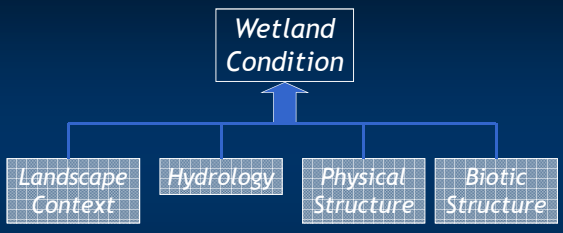
CRAM is structured to guide the user into and though a wetland in an orderly and thorough assessment of its overall condition.

- CRAM moves into the wetland through the adjacent landscape and buffer.
- In the wetland, CRAM examines structure in 3D.

Assessment Area (AA)

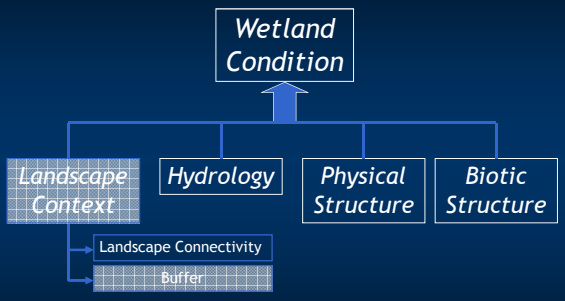
- An AA is the portion of a wetland that is the subject of a CRAM assessment.
- Rules exist for delineating an AA
- Critical step for creating results that are reproducible, and that relate to stressors or management actions
- AA represents only one type of wetland
- Optimization of hydro-geomorphic integrity and size guidelines

CRAM Design: Attributes

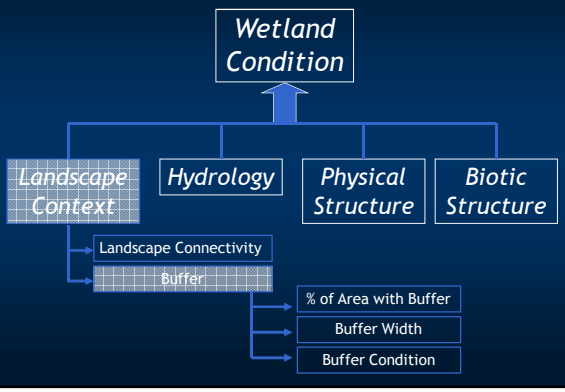


- CRAM recognizes four attributes of wetland condition
- Each attribute is represented by 2-3 metrics, some of which have sub-metrics.

CRAM Design: Metrics



CRAM Design: Sub-metrics

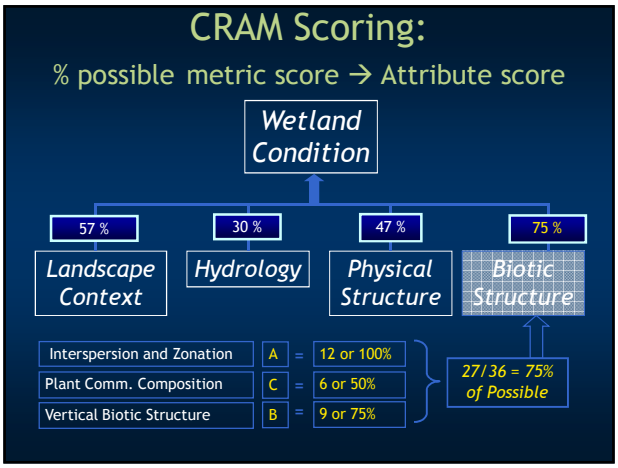


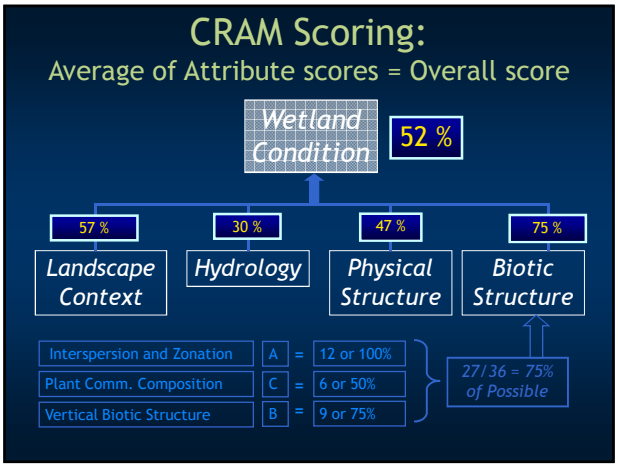
Sub-metric Scoring Example

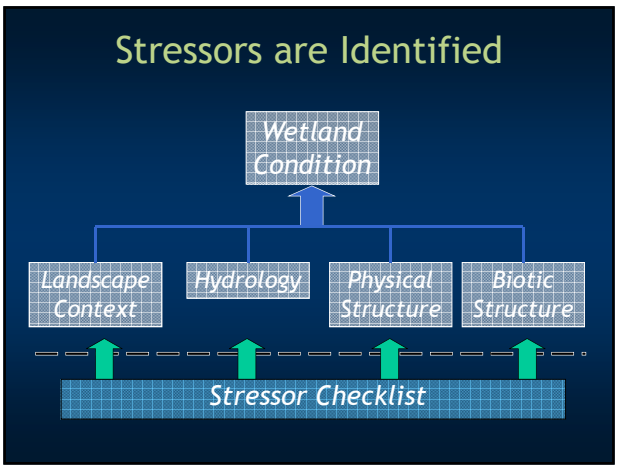
- Mutually exclusive alternative states
- Represent full range of possible condition

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

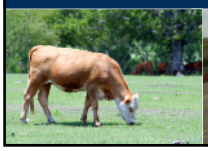
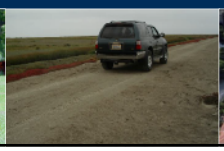
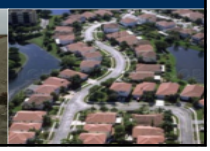

CRAM Scoring:
% possible metric score → Attribute score
Wetland Condition
57 %
30 %
47 %
75 %
Landscape Context
Hydrology
Physical Structure
Biotic Structure
Interspersion and Zonation
A
=
12 or 100%
Plant Comm. Composition
C
=
6 or 50%
Vertical Biotic Structure
B
=
9 or 75%
27/36 = 75% of Possible

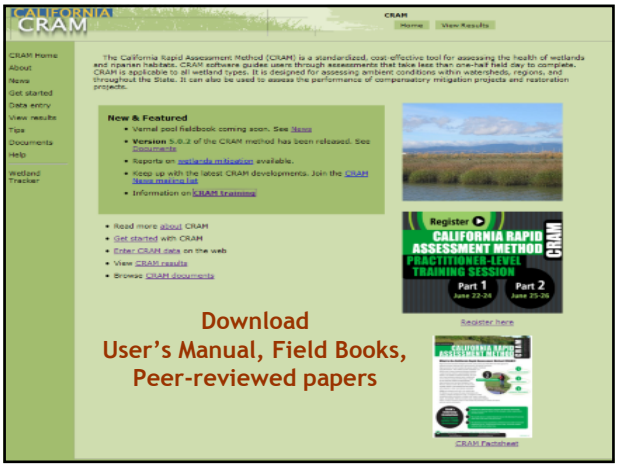

CRAM Scoring:
Average of Attribute scores = Overall score
Wetland Condition
52 %
57 %
30 %
47 %
75 %
Landscape Context
Hydrology
Physical Structure
Biotic Structure
Interspersion and Zonation
A
=
12 or 100%
Plant Comm. Composition
C
=
6 or 50%
Vertical Biotic Structure
B
=
9 or 75%
27/36 = 75% of Possible


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

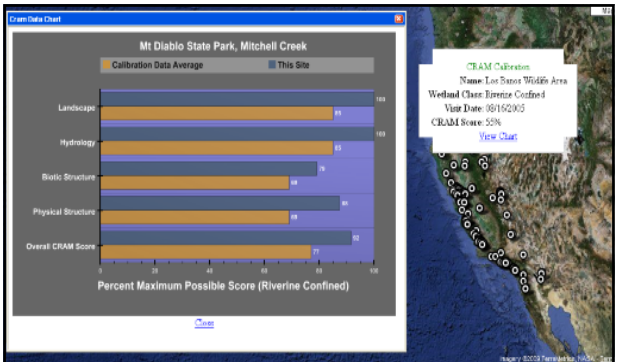
Uses of the Stressor Checklist

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



Download
User's Manual, Field Books, Peer-reviewed papers



CRAM scores are accessible through maps of CRAM Assessment Areas on cramwetlands.org and wetlandtracker.org


Thank you