

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION**

**MEETING OF JULY 8-9, 2015
SOUTH LAKE TAHOE, CA**

- ITEM:** 11
- SUBJECT:** **WETLAND ASSESSMENT AND MAPPING TOOLS –
PRESENTATIONS ON THE CALIFORNIA RAPID ASSESSMENT
METHOD AND ECOATLAS**
- CHRONOLOGY:** The Water Board has been provided some information regarding this topic through Executive Officer Reports.
- ISSUES:** Wetland assessment and inventories (via standardized mapping protocols) are vital tools in ensuring no net loss of wetlands and in prioritizing and effectively monitoring wetland restoration and enhancement projects.
- DISCUSSION:** The objective of this informational item is to present to the Water Board wetland mapping and assessment tools that have been developed to further the protection and enhancement of wetlands. These tools, which have been developed by the San Francisco Estuary Institute (SFEI) in cooperation with the State Water Resources Control Board, U.S. Environmental Protection Agency, and the California Water Quality Monitoring Council, are now routinely being used by some of the Water Boards, particularly those with along the coast.
- The assessment tool, California Rapid Assessment Methodology (CRAM), was first introduced in the Lake Tahoe Basin in 2010 when the Lahontan Water Board was co-recipient of an U.S. Environmental Protection Agency wetland grant. The primary objectives of the grant were to (a) introduce the standardized mapping tools and protocols to the Lake Tahoe Basin by mapping two sub-watersheds, (b) introduce CRAM by holding two seasons of training followed by assessing 60 locations in the two sub-watersheds, thereby testing CRAM's riverine module in a high sierra setting, and (c) develop a wet meadow module for CRAM. The first presentation by Sarah Pearce (SFEI) will provide the Lahontan Water Board a broader understanding of what CRAM is and how it can be used as a cost-effective, reproducible, and scientifically-validated method for rapid assessments of wetlands and other waters.
- A second U.S. Environmental Protection Agency wetland grant, awarded last year to the Lahontan Water Board, Tahoe Regional

Planning Agency, and SFEI, is in progress and is designed to introduce the wetland visualization tool, EcoAtlas, to potential users of this tool. This will be accomplished through several workshops that will be scheduled for the current calendar year. Future potential uses of EcoAtlas include: (a) linking wetland project impacts to mitigation areas, (b) improvement in tracking and coordinating restoration and monitoring activities, and (c) supporting regional or programmatic reporting needs. The second presentation by Cristina Grosso (SFEI) will discuss EcoAtlas, its potential uses in the Lake Tahoe Basin and elsewhere in the region, and current uses within the state.

Finally, Shin-Roei Lee, Assistant Executive Officer at Region 1, will discuss the benefits and utility of EcoAtlas (and its predecessor, Wetland Tracker) as a regulatory tool for Clean Water Act section 401 Water Quality Certification (401 Certification) compliance and the state's no net loss wetland policy. Starting about ten years ago, Shin-Roei was instrumental in requiring most 401 Certification applicants at Region 2 to download their project information and map it into Wetland Tracker. The result has been a critical mass of project information on the map, which then helps to inform managers regarding watershed-scale cumulative impacts and associated mitigation.

RECOMMENDATION:

No action is required. This is an informational item only.

Enclosure	Item	Bates Number
1	Staff PowerPoint Presentation	11-5
2	Presentation by Sarah Pearce, CRAM	11-11
3	Presentation by Cristina Grosso, EcoAtlas	11-31
4	Presentation by Shin-Roei Lee, EcoAtlas (will be sent under separate cover)	

ENCLOSURE 1

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Wetland Assessment and Mapping

Tobi Tyler, WRCE
Lahontan Regional Water Quality Control Board
July 9, 2015

Tools in Our Toolbox for Protecting and Restoring Wetlands

- California Rapid Assessment Method (CRAM) for condition assessment
- EcoAtlas for the map of wetlands and other aquatic resources

2011 and 2012 CRAM Trainings



Where are the aquatic resources and how are they doing?

EcoAtlas

California EcoAtlas provides access to information for effective wetland management. The maps and tools can be used to create a complete picture of aquatic resources in the landscape by integrating stream and wetland maps, restoration information, and monitoring results with land use, transportation, and other information important to the state's wetlands.

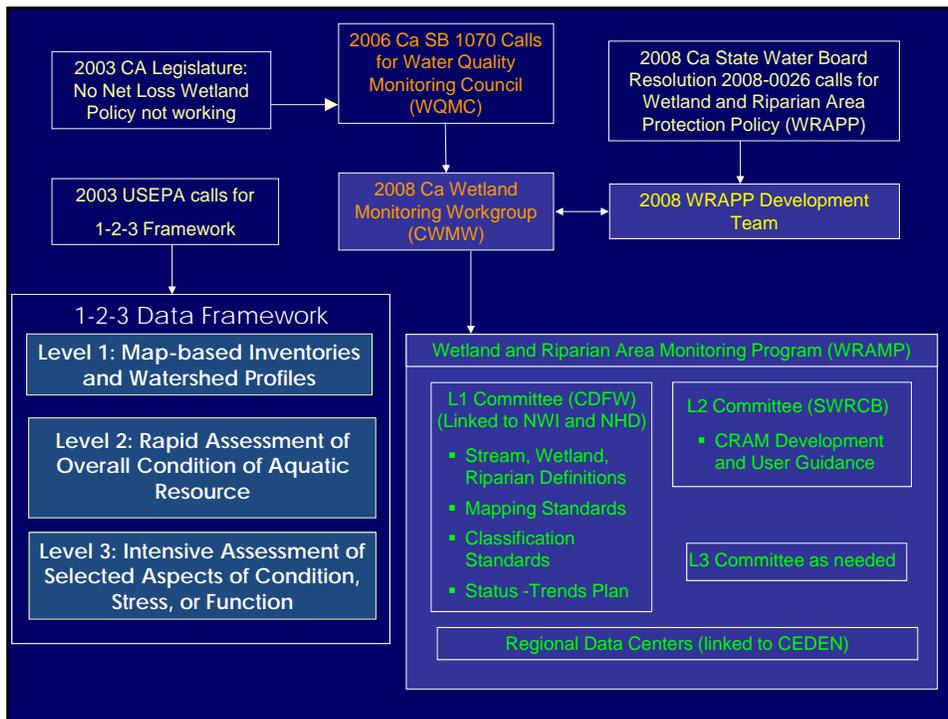
- Projects:** Restoration project maps, plans, contact information, and a library of project files.
- Resource Extent:** Maps of aquatic resource extent and special habitats of interest.
- Conditions:** Assessment and monitoring data including relevant water quality and California Rapid Assessment Method (CRAM) data.

Statewide

Map Projects Summaries

Ecoregions Water Board Regions

- Klamath/North Coast
- Bay/Delta
- Central Coast
- Modoc
- South Coast
- Sierra
- Sacramento Valley
- Mojave
- San Joaquin Valley
- Colorado Desert



File Edit View Favorites Tools Help
 Division of Water Quality Meeting Room Booking S... Bioflow CalATERS Equipment Reservations Printers Suggested Sites Page Safety Tools

State of California
 ENVIRONMENTAL PROTECTION AGENCY
 NATURAL RESOURCES AGENCY
 CALIFORNIA WATER QUALITY MONITORING COUNCIL

Home Safe to Drink Safe to Swim Safe to Eat Fish Ecosystem Health Stressors & Processes Contact Us

City of Governor
 Edmund G. Brown Jr.
 View his Website

WETLANDS

- Stressors
- Laws, Regulations & Standards
- Regulatory Activities
- Enforcement Actions
- Research
- Monitoring Programs, Data Sources & Reports

California Wetlands

Lake / pond, wet meadow
 Hybrid sagebrush grows on the edge of the pond in this wet meadow.

Click on an image above for more information

7/9

Wetlands have both aquatic and terrestrial characteristics. Wetlands form along the shallow margins of lakes, estuaries, and rivers, and in areas with high groundwater or shallow surface water, such as springs, wet meadows, ponds, and freshwater and tidal marshes. They often go through wet and dry cycles, and therefore support a unique array of life specially adapted to these conditions. Wetlands provide important habitat for birds, fish, and other wildlife. They support local food webs, contribute to flood protection, groundwater recharge, shoreline protection, and water filtration, all important ecosystem services.

California has lost more than 90% of its historical wetlands and today, many remaining wetlands are threatened. Wetlands continue to be drained for agriculture, filled for development, or disturbed by modifications to the watershed such as dams or water diversions. Climate change poses a significant threat, as many wetlands today are dependent on artificial water delivery systems or high groundwater levels, and may be impacted by changing climatic conditions. Further, wetlands along the coast face flooding from potential sea level rise.

Because of their value and vulnerability, wetlands are protected by a series of special laws and permitting requirements. The informational links on this page contain more information about the health and distribution of California's wetlands.

Informational Links

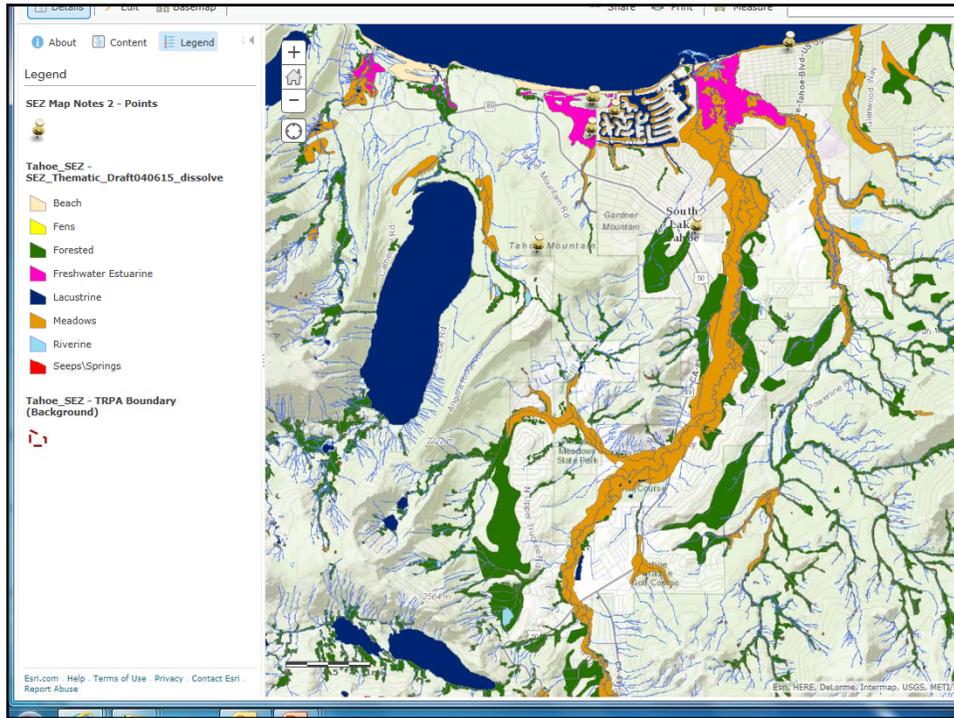
QUESTIONS ANSWERED

What is the extent of our wetlands?
 Where did our numbers come from?
 → Where are they?
 → How much have we lost?
 → What types are there?
 → How do we classify them?
 → What services do they provide?
 → What is the status of mapping?

How healthy are our wetlands?
 → How do we know how they're doing?
 → How do we assess wetland health?
 → What studies have documented wetland condition?

How are our wetlands protected?
 → What regulations protect them?
 → Where are wetlands being restored near me?

Coastal wetlands are disappearing at an alarming rate, despite their importance to ocean and coastal health, humans and the economy. We talk with Megan Cooper, Project Analyst at the State Coastal Conservancy, about how coastal restoration provides benefits to the environment and the economy. Restored



ENCLOSURE 2

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California Rapid Assessment Method for Wetlands

Applications and Real Life Examples

Sarah Pearce, San Francisco Estuary Institute
sarahp@sfei.org



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 in the field, maximum, to assess a representative wetland area. That’s 3 hours from the car to final results.

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.

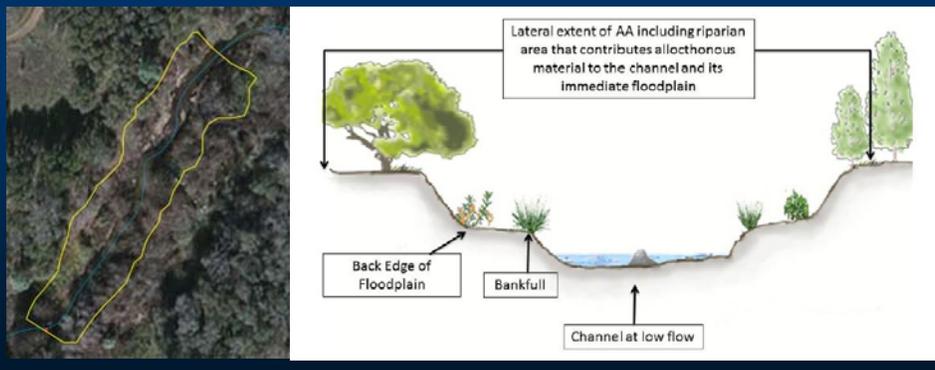
Geographic Scope of CRAM All Wetlands in California

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

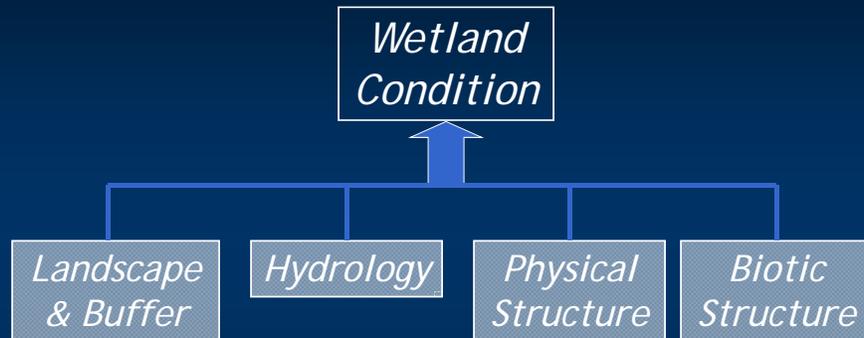


CRAM Design: the Assessment Area

- The Assessment Area (AA) is the portion of the wetland that is assessed using CRAM.

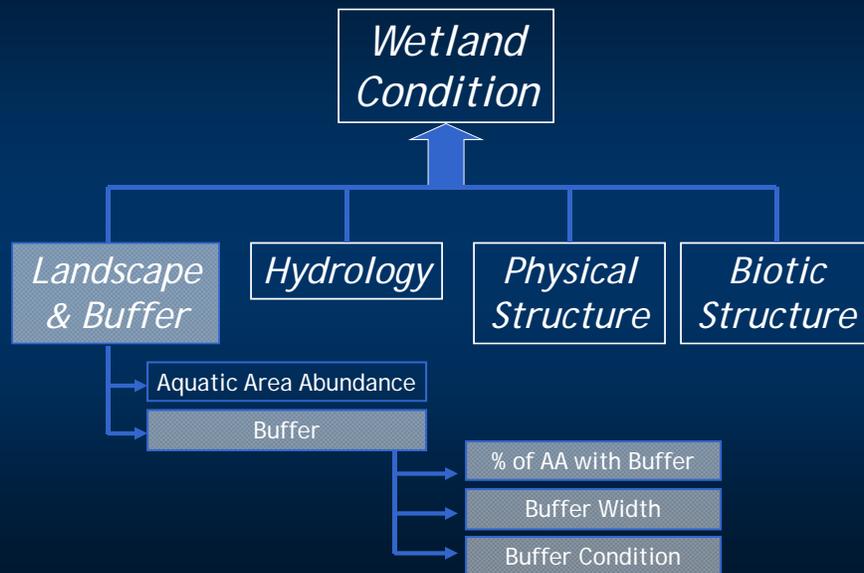


CRAM Design: Attributes



- 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: Submetrics



Submetric Scoring Example

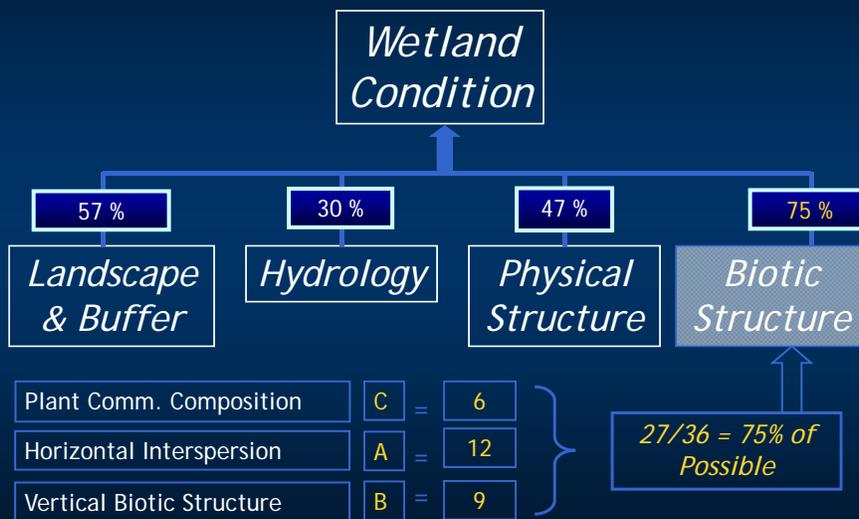
- Mutually exclusive alternative states
- Represent full range of possible condition

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

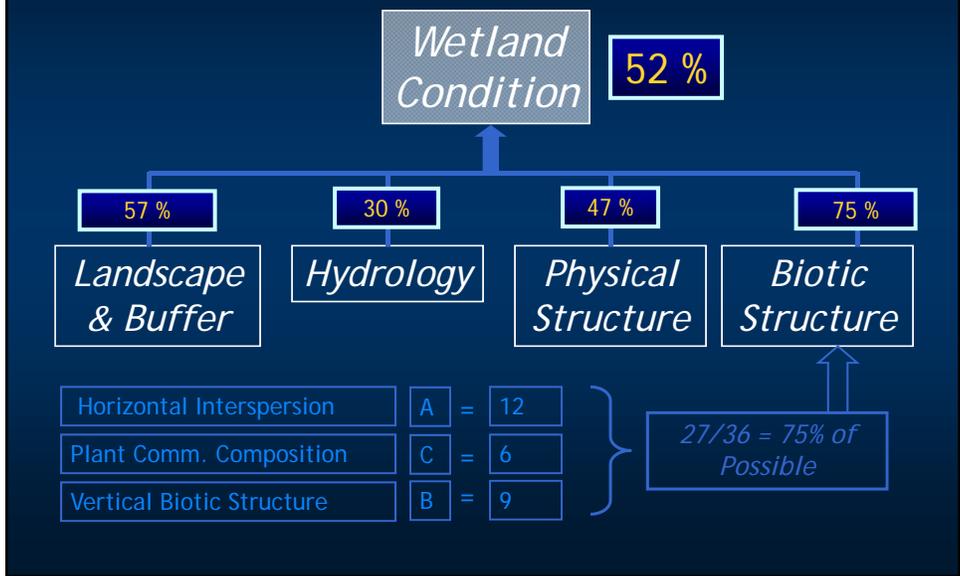
CRAM Scoring:

Percent possible metric score = Attribute score

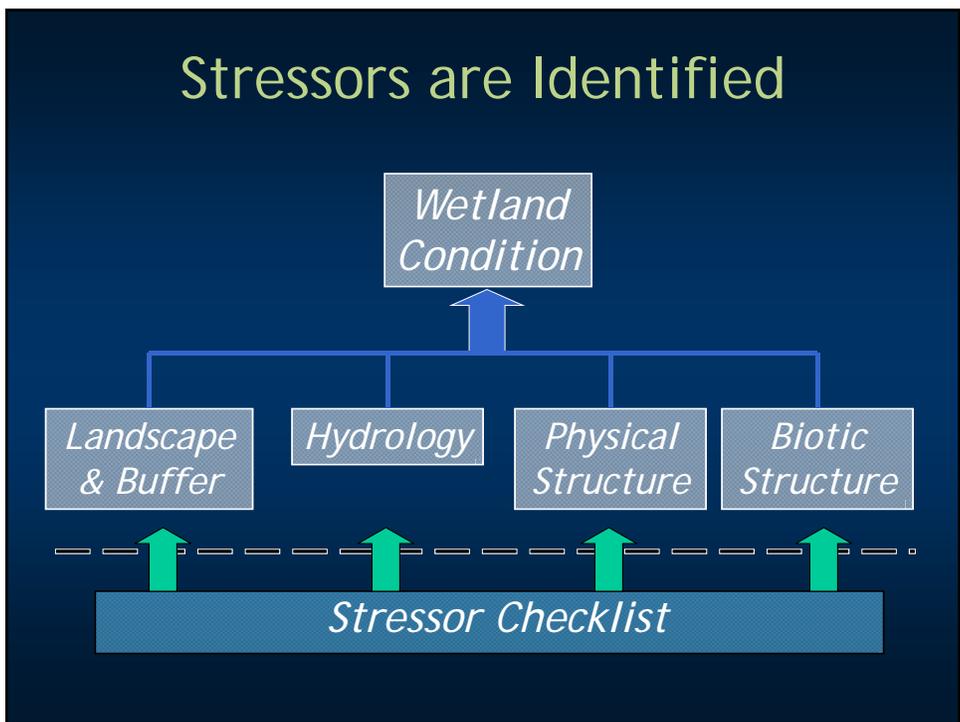


CRAM Scoring:

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



Index Score Represents Overall Wetland Condition

- The CRAM Index Score combines indicators of all Attributes to represent overall condition, which is related to functional capacity or wetland "health."
- CRAM Index Scores are analogous to:
 - Apgar Scores (newborn infant health)
 - Dow Jones Industrial Average (DOW)
 - Gross National Product (GNP)
 - Grade Point Average (GPA)

Index Scores Alone Can Be Misleading

- Identical Index or Overall Scores can be derived from different arrays of Attribute Scores
 - Must refer to Attribute Scores (and sometimes to Metric Scores) to interpret Index Scores

Landscape - Buffer	Hydrology	Physical Structure	Biotic Structure	Index Score
50	65	42	68	56
64	48	37	76	56

Index	Landscape/ Buffer	Hydrology	Physical Structure	Biotic Structure
70	58	58	66	89



Index	Landscape/ Buffer	Hydrology	Physical Structure	Biotic Structure
72	83	100	50	53



CRAM DATA | DATA ENTRY | TRAINING | RESOURCES & DOCUMENTS | STEERING COMMITTEE | ABOUT | CONTACT US

Log In

California Rapid Assessment Method

Saline estuarine wetland, Schooner Bay in Point Reyes, CA

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

The screenshot displays the CRAM website interface. On the left, a map shows a specific location marked with a red arrow and labeled 'Ash Creek 948'. A search window titled 'At this location' is open, showing the following details:

- Search: Ash Creek 948
- Wetland Type: riverine non-confined
- AA Category: study
- Visit Date: 2011-08
- CRAM Version: 5.0.1
- Index Score: 67

Below the search window, there are buttons for 'Attribute & Metric' and 'Nearest reference'. In the center, a 'Summary Assessment Report' is displayed, featuring a map of the assessment area and a table of basic information:

Basic Information	
wCRAM ID	3376
Assessment	Lower Mark West Creek
Area Name	
Project Name	Laguna 2013
Assessment	R0225
Area ID	
Project ID	
Wetland Type	riverine non-confined
CRAM Version	5.1
Visit Date	2013-11-01
AA Category	ambiant

On the right, a larger map of California shows numerous orange dots representing assessment locations. The website URL 'cramwetlands.org' is visible in the bottom right corner.

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)

How is CRAM Being Used?

- **Ambient** Assessments- statewide and watershed scale
- **Project** Assessments
 - Baseline Conditions
 - Impact Assessment and Alternative Comparison
 - Restoration/Mitigation Planning and Permitting
 - Long-term Monitoring

Ambient Assessment

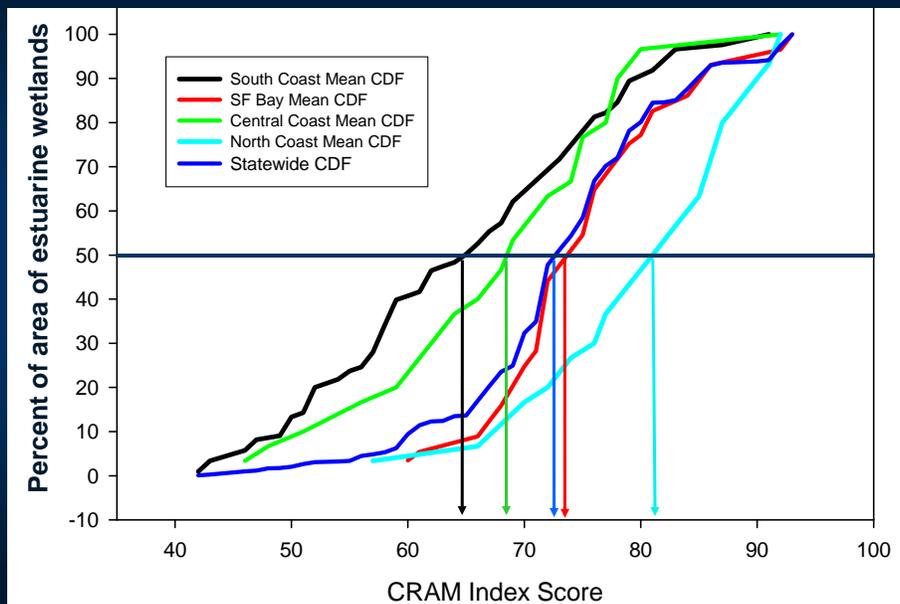
- A probabilistic survey conducted for wetlands in a specific wetland class.
- Requires a “complete” map of all wetlands and a sampling methodology that relates each sampled point to a wetland area for which the point represents the wetland condition (e.g., GRTS).

Ambient Assessment Example: Estuarine Wetland Condition

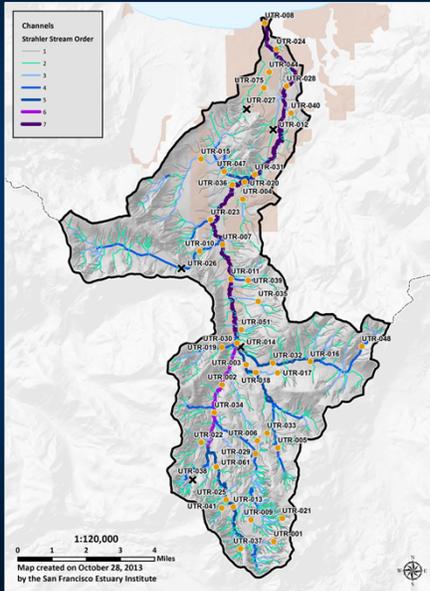


- California coast sampled in four regions
- Perennially tidal saline estuaries targeted
- 150 sites probabilistically selected (GRTS)
- CRAM used to assess condition

Cumulative Distributions of CRAM Scores

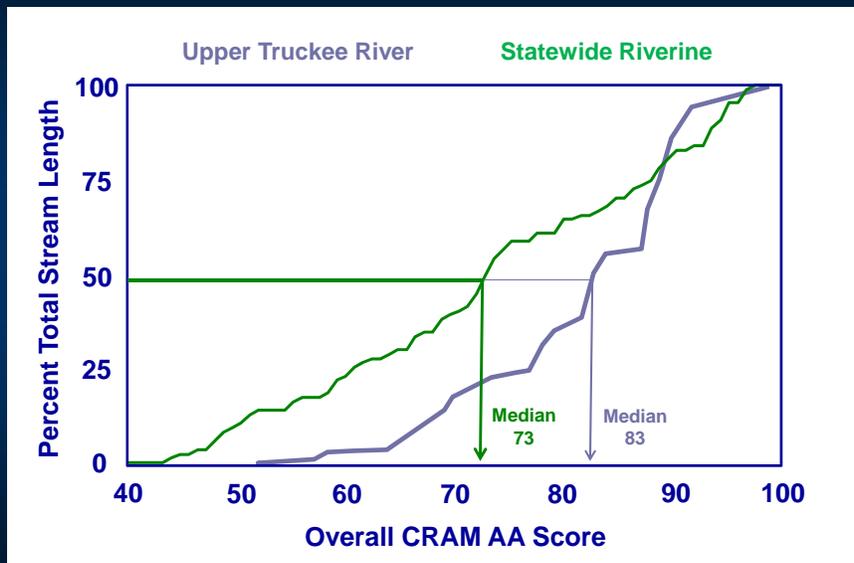


Ambient Assessment Example: Upper Truckee River Survey



- Stratified by stream order and by urban vs. non-urban
- 40 sample sites selected using GRTS
- CRAM assessments completed summer 2011 by SFEI staff and local trained practitioners

Comparison to Statewide Condition



Project Assessment

- A structured assessment of wetland condition used to support an application for an approval or permit, an environmental review, an alternatives analysis, a mitigation proposal, or any similar use or action.
- An assessment conducted for monitoring such projects.
- May be conducted by project applicants or by reviewing agencies.

Project-Related Uses of CRAM

- Sampling the full range of wetland condition at an impact site, which can assist with impact identification, avoidance, and minimization.
- Identifying mitigation requirements.
- Identifying reference conditions and reference sites for the project and mitigation sites.
- Characterizing existing condition in aquatic resources proposed for enhancement or rehabilitation.
- Assessing performance of compensatory mitigation projects.

Baseline Condition Example: Prospect Island Restoration



- DWR and CDFW restoration project, to return tidal action
- Stratified depressional wetlands
- CRAM used to assess current and post-restoration condition
- Baseline condition determined by 18 assessments (6 days of fieldwork), for significant cost savings

Impact Assessment and Alternative Comparison Example: Imperial Valley Solar Project



881 acres of Waters of the U.S.



Proposed Project to fill 165 acres

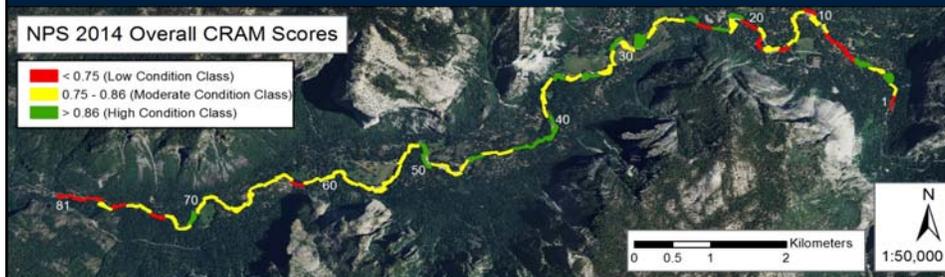
- 84 CRAM AAs
- Data Used in 404(b)(1)
- Evaluate Baseline Stream Condition
- Analyze Direct and Indirect Impacts of 6 Alternatives
- Redesign Alternatives to Avoid and Minimize
- Identify Mitigation Need

CRAM is prescribed as an indicator to monitor the status of the Riverine and Riparian habitat.



- Objective: comprehensive rapid assessment of river habitat conditions (every 3-5 years), to detect potential visitor use impacts at the incipient stage.
- Thresholds determined based on CRAM scores (2010 and 2014 surveys), where progressively more intensive management actions are taken, if conditions breach trigger points, management standards, or progressive degradation.

CRAM is prescribed as an indicator to monitor the status of the Riverine and Riparian habitat.



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One tool in the toolbox

- CRAM scores can assist in watershed-level decision making. Can compare scores through time and space.
- CRAM can characterize patterns among aquatic resources in a project, landscape, watershed or statewide setting.
- CRAM can enhance project or watershed characterization, impact assessment, mitigation planning, and monitoring.
- New applications of CRAM continue to evolve each year.



ENCLOSURE 3

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EcoAtlas

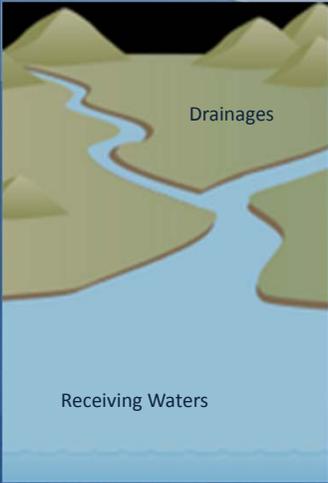
Visualize Abundance, Diversity, and Condition of Wetlands, Streams, and Riparian Areas in the Watershed Context

Cristina Grosso, SFEI-ASC

Lahontan RWCQB Board Meeting
July 9, 2015



Emerging Toolset



	<ul style="list-style-type: none"> Flood Control 2.0 Framework Stream & Riparian Definitions Riparian Buffer Decision Tool (RipZET) Sediment Budget Estimator LID Optimizer Restoration Performance Models Transition Zone & Head of Tide Definitions Shoreline Change Detector Bay & Delta Regional Monitoring Programs Nutrient Visualization 	<ul style="list-style-type: none"> Ecological Resilience Framework Compliance & Effectiveness Monitoring Framework Historical Ecology Flood Infrastructure Mapping CA Aquatic Resource Inventory Contaminant Load Models CA Rapid Assessments Tools Project Tracker Contaminant Data Display (CD3) Landscape Profile Tool Regional Data Center EcoAtlas My Water Quality Portals
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Watershed-based Decision Support Tools

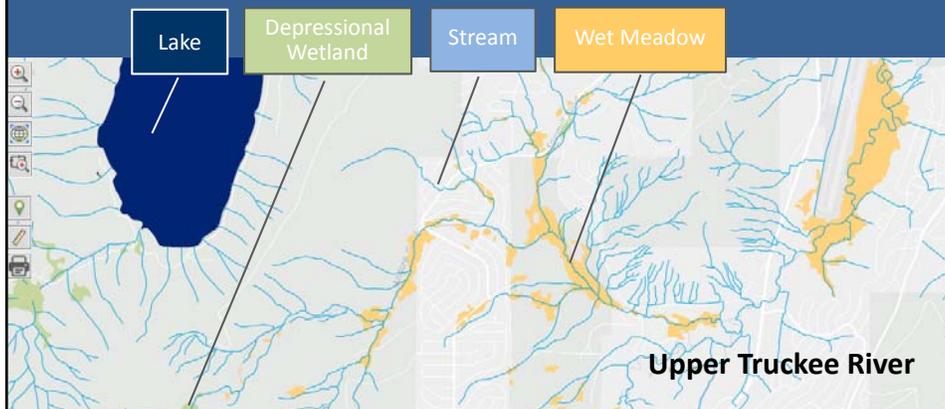
- **Planning** :: Resource Inventory (CARI, TARI)
- **Tracking** :: EcoAtlas Project Tracker, Online 401
- **Visualization** :: EcoAtlas, Landscape Profile Tool

SFEI AQUATIC SCIENCE CENTER

Planning Tool :: Tahoe Aquatic Resource Inventory (TARI)

Purpose

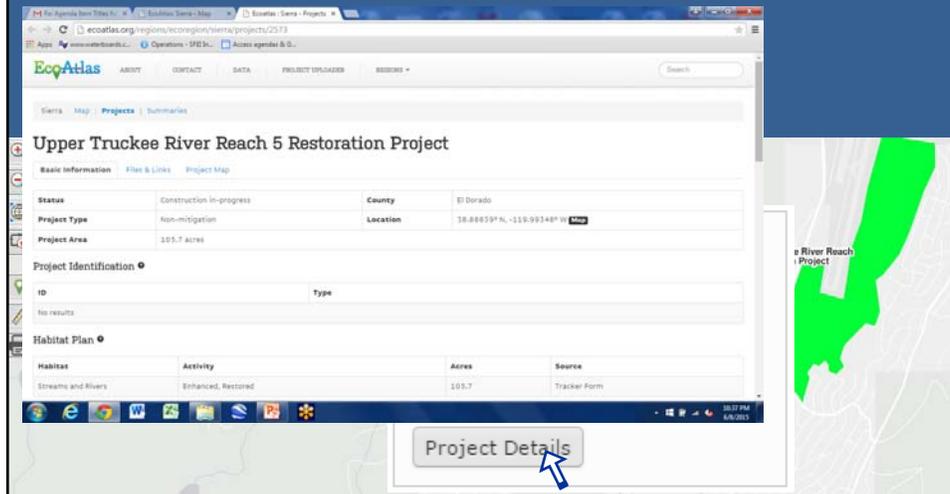
Serves as common base map to coordinate watershed health across Federal, State, and Local agencies



Tracking Tool :: EcoAtlas Project Tracker

Purpose

Track project information on a common statewide map



The screenshot displays the EcoAtlas Project Tracker interface. The main heading is "Upper Truckee River Reach 5 Restoration Project". Below this, there are several sections:

- Basic Information:**

Status	Construction in-progress	County	El Dorado
Project Type	Non-mitigation	Location	38.88839° N, -119.99348° W
Project Area	105.7 ACRES		
- Project Identification:**

ID	Type
No results	
- Habitat Plan:**

Habitat	Activity	Acres	Source
Streams and Rivers	Enhanced, Restored	105.7	Tracker Form

A "Project Details" button is visible at the bottom of the information panel, with a blue arrow pointing to it. To the right, a map shows the project area highlighted in green.

Tracking Tool :: EcoAtlas Project Tracker

Features

- View maps of projects provided through 401/WDR permits
- View maps of proposed surface waters within projects (CARI)
- Share data and information through project maps
- Perform spatial queries to search maps and lists of projects



Tracking Tool :: Online 401 Application

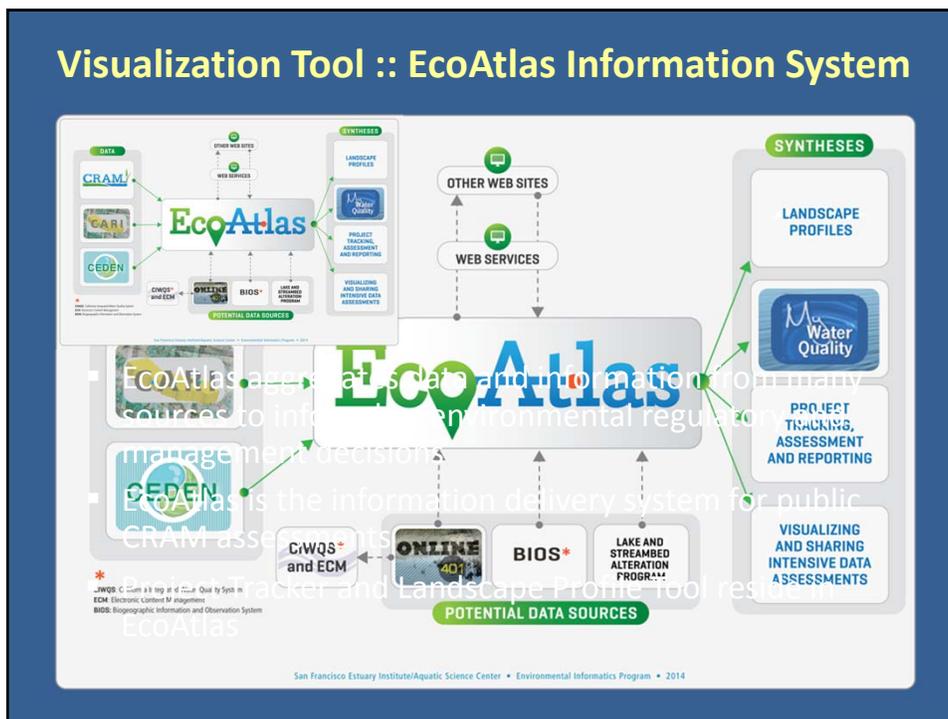
Purpose

Track permit negotiation process and deliver an approved certification

Tracking Tool :: Online 401 Application

Features

- Standard web-based data entry forms
- Interactive mapping tool
- File repository
- Project management and tracking tools
- Shared environment for applicant and line staff



Visualization Tool :: CRAM Tool

Purpose

Visualize and download wetland condition data for ambient and project surveys, and reference sites

Statewide | Map | Projects | Summaries

Layers | Legends | Basemap | Overlays | Tools

CRAM Info on this data

Transparency

- CRAM Assessment Sites
- CRAM State Reference Network Sites
- CRAM Self-Training Sites

Wetland Condition (CRAM)

CRAM AA Locator

Limit above list to AAs currently visible in map window

Filter AAs by:

Wetland Type

AA Category

Filter by Index Score: 25 - 100

Filter by Assessment Year: 2000 - 2015

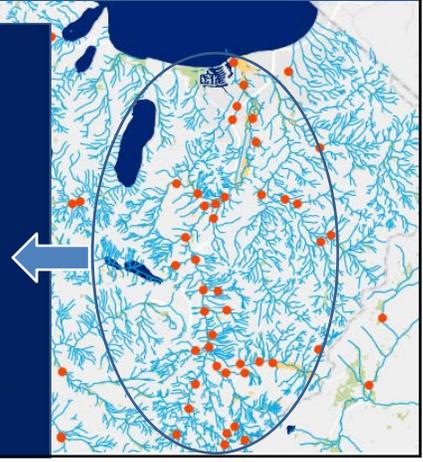
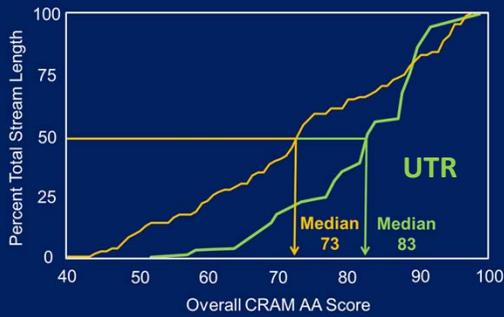
Download All Public CRAM Data

Visualization Tool :: CRAM Tool

Features

- Query CRAM assessment data
- Access details on index, attribute and metric scores
- Download data as tabular or spatial file (shapefile or KML)

Ambient UTR CRAM Survey Results
Upper Truckee River Streams of Statewide



Visualization Tool :: Landscape Profile Tool

Purpose

Aggregate different data sources for area of interest

Landscape Profile

User Defined Region

Total Profile Area: 32,322.2 acres or 50.5 miles² Print Report

- + Abundance and Diversity of Existing Aquatic Resources based on California Aquatic Resource Inventory (CARI)
- Historical Aquatic Resources
- Estuarine and Marine: No historical estuarine or marine resources found
- Palustrine: No historical palustrine wetlands or terrestrial features found
- + Ecological Restoration based on Wetland Projects within Profile - Total Records: (4)
- + Aquatic Resource Condition based on California Rapid Assessment Method for Wetlands (CRAM) within Profile - Total Records: (44)
- + Human Population based on 2010 Census

