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.

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Item</th>
<th>Bates Number</th>
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<tbody>
<tr>
<td>1</td>
<td>Staff PowerPoint Presentation</td>
<td>11-5</td>
</tr>
<tr>
<td>2</td>
<td>Presentation by Sarah Pearce, CRAM</td>
<td>11-11</td>
</tr>
<tr>
<td>3</td>
<td>Presentation by Cristina Grosso, EcoAtlas</td>
<td>11-31</td>
</tr>
<tr>
<td>4</td>
<td>Presentation by Shin-Roei Lee, EcoAtlas (will be sent under separate cover)</td>
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ENCLOSURE 1
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

California EcoAtlas provides access to information for effective aquatic resource management. This map and table can be used to create a comprehensive picture of aquatic resources in the watershed, integrating land use, soil type, and other relevant data to inform planning decisions. The EcoAtlas provides an interactive platform for exploring aquatic resources, including information on species, habitats, and conservation efforts. The map can be navigated by zooming in and out, and the table provides a detailed view of the data for specific locations.

EcoAtlas

Where are the aquatic resources and how are they doing?

- Projective Restoration project maps, plans, current information, and a library of project files.
- Browse Counties: Maps of aquatic resource extent and special instream of interest.
- Counties: Assessment and monitoring data including relevant water quality and California Rapid Assessment Method (CRAM) data.

Statewide

Locations: Water Body Regions

- Klamath/North Coast
- Bay/Delta
- Central Coast
- Modoc
- South Coast
- Sierra
- Sacramento Valley
- Mojave
- San Joaquin Valley
- Colorado Desert
2003 CA Legislature: No Net Loss Wetland Policy not working

2008 CA Wetland Monitoring Workgroup (CWMW)

2008 WRAP Development Team

2006 Ca SB 1070 Calls for Water Quality Monitoring Council (WQMC)

2008 CA State Water Board Resolution 2008-0026 calls for Wetland and Riparian Area Protection Policy (WRAPP)

2003 USEPA calls for 1-2-3 Framework

1-2-3 Data Framework

Level 1: Map-based Inventories and Watershed Profiles

Level 2: Rapid Assessment of Overall Condition of Aquatic Resource

Level 3: Intensive Assessment of Selected Aspects of Condition, Stress, or Function

Wetland and Riparian Area Monitoring Program (WRAMP)

L1 Committee (CDFW) (Linked to NWI and NHD)

L2 Committee (SWRCB)

CRAM Development and User Guidance

L3 Committee as needed

Regional Data Centers (linked to CEDEN)

Level 1: Map-based Inventories and Watershed Profiles

Level 2: Rapid Assessment of Overall Condition of Aquatic Resource

Level 3: Intensive Assessment of Selected Aspects of Condition, Stress, or Function

1-2-3 Data Framework

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Regional Data Centers (linked to CEDEN)

California Wetlands

*What is the extent of our wetlands?*

*Where do wetlands occur?*

*What are the major wetland types?*

*What is the value of wetlands?*

*What is the status of our wetlands?*

*What are our wetlands used for?*

*What are restoration actions?*

*What are our wetlands protected under?*

*What are regulatory wetlands?*

*What are coastal wetlands?*

Coastal wetlands are disappearing at an alarming rate. Degradation is due to causes such as urbanization, pollution, and habitat loss. Human activities include reclamation of land, manipulation of water levels, and introduction of exotic species. Habitat loss threatens not only the health and survival of coastal wetlands, but also the overall ecosystem.
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.

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**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.

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**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.
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

<table>
<thead>
<tr>
<th>Alphabetic Score</th>
<th>Numeric Score</th>
<th>Alternative State</th>
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<tbody>
<tr>
<td>A</td>
<td>12</td>
<td>Average buffer width 190-250m</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>Average buffer width is 130-189m</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>Average buffer width is 65-129m</td>
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<tr>
<td>D</td>
<td>3</td>
<td>Average buffer width 0-64m</td>
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### CRAM Scoring:

Percent possible metric score = Attribute score

<table>
<thead>
<tr>
<th>Metric</th>
<th>Score</th>
<th>Percent</th>
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<tr>
<td>Plant Comm. Composition</td>
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<tr>
<td>Horizontal Interspersion</td>
<td>A</td>
<td>12</td>
</tr>
<tr>
<td>Vertical Biotic Structure</td>
<td>B</td>
<td>9</td>
</tr>
</tbody>
</table>

\[ \frac{27}{36} = 75\% \text{ of Possible} \]
CRAM Scoring:
Average of Attribute scores = Overall score

Wetland Condition: 52%

Landscape & Buffer: 57%
Hydrology: 30%
Physical Structure: 47%
Biotic Structure: 75%

CRAM Scoring:
Average of Attribute scores = Overall score

Vertical Biotic Structure
Horizontal Interspersion
Plant Comm. Composition

A = 12
B = 9
C = 6

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

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

<table>
<thead>
<tr>
<th>Landscape - Buffer</th>
<th>Hydrology</th>
<th>Physical Structure</th>
<th>Biotic Structure</th>
<th>Index Score</th>
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<tr>
<td>50</td>
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<table>
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<tr>
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<td>72</td>
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<td>100</td>
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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.
Store, Retrieve, and Visualize Data and Results

Peer Review

- Rapid Assessment in California (Sutula et al. 2006)
- Mitigation project review (Ambrose et al. 2005, 2006)
- 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).
California coast sampled in four regions

Perennially tidal saline estuaries targeted

150 sites probabilistically selected (GRTS)

CRAM used to assess condition

Ambient Assessment Example:
Estuarine Wetland 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

<table>
<thead>
<tr>
<th>Percent Total Stream Length</th>
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<tbody>
<tr>
<td>Overall CRAM AA Score</td>
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</table>

Upper Truckee River | Statewide Riverine

- Median 73
- Median 83
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

- 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

Proposed Project to fill 165 acres
Permitted Project

- Avoidance of high quality primary streams
- Minimization of direct and indirect impacts through reduction of roads, redesign of crossings, and suncatcher layout
- Reduced fill, somewhat reduced energy generating capacity

Long Term Monitoring Example: Merced River Plan

- In 2014 the National Park Service released *The Merced Wild and Scenic River Final Comprehensive Management Plan*, which is the guiding document to protect and enhance river values and manage use in the river corridor for the next 20 years.
- Identifies management objectives, use capacities, and prescribes long-term monitoring to ensure objectives are met.
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.

81 total AAs assessed
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

- 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

- 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
Watershed-based Decision Support Tools

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

Planning Tool: Tahoe Aquatic Resource Inventory (TARI)

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

![Map of Tahoe area with ecosystem types: Lake, Depressional Wetland, Stream, Wet Meadow, Upper Truckee River]
Tracking Tool :: EcoAtlas Project Tracker

Purpose
Track project information on a common statewide map

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

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 :: EcoAtlas Information System

- EcoAtlas aggregates data and information from many sources to inform environmental regulatory and management decisions
- Project Tracker and Landscape Profile Tool reside in EcoAtlas
- EcoAtlas is the information delivery system for public CRAM assessments

Visualization Tool :: CRAM Tool

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

![CRAM Assessment Chart](image)

Ambient UTR CRAM Survey Results
Upper Truckee River Streams cf Statewide

Visualize Tool :: Landscape Profile Tool

**Purpose**

Aggregate different data sources for area of interest

![Landscape Profile](image)
Visualization Tool :: Landscape Profile Tool

Features

- Summarize information for user-defined watersheds
- Generate custom maps and graphs
- Download PDF summary report

Thank You

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