

US EPA ARCHIVE DOCUMENT



California Coastal Wetlands Monitoring Venture

Joshua Collins & Cristina Grosso

San Francisco Estuary Institute

Martha Sutula & Eric Stein

Southern California Coastal Water Research Project

Ross Clark

California Coastal Commission



3-Level Approach

Level 1: Inventory Wetland Habitats and Projects; Develop Wetland Landscape Profiles

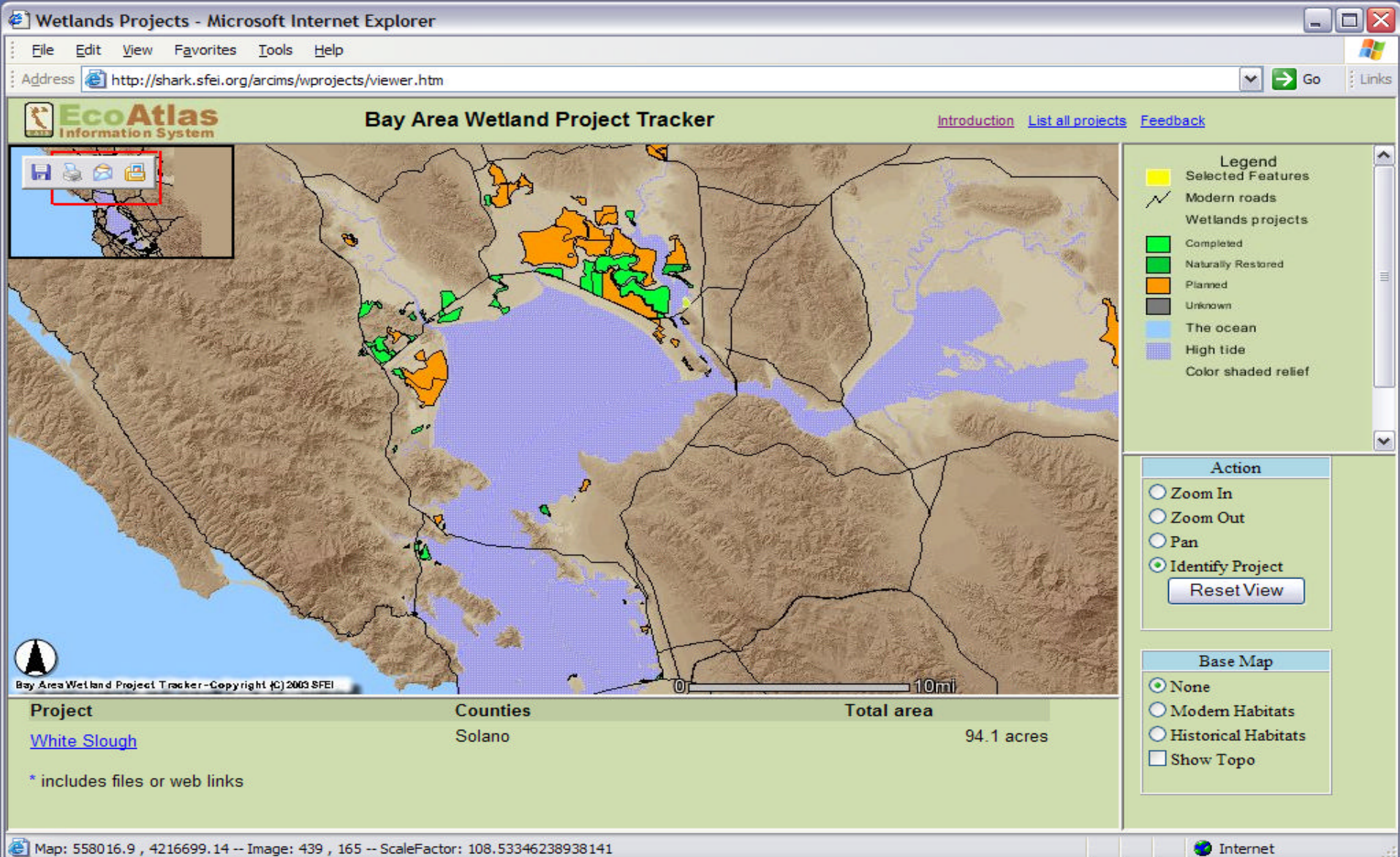
- Assess status and trends in wetland distribution and abundance, including projects.
- Develop sample frame for regional *probabilistic* ambient monitoring of condition by wetland type.



Level 1 Inventory

- California State Wetlands and Riparian Habitat Inventories follow NWI protocols with annotation for water source (HGM) and Landscape Position
- Input from local and regional agencies
- Data managed in Wetland Trackers of EcoAtlas www.wetlandtracker.org

Level 1 Inventory: Wetland Tracker




Level 1 Inventory: Wetland Tracker

Add Fileset, Web link, or Comment - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://dev.sfei.org/GISInfoCatalog/servlet/org.sfei.GISInfoCatalog.UserInterface?directive=newfileset&project_name=White+Slough Go Links

 **Bay Area Wetland Project Tracker** [Close Window](#)

White Slough

Add Files, Web Link, or Comments

Add one or more files to this project to make the information available to others in the wetland restoration community. The files can be of any type -- reports, photos, spreadsheets, or others.

Alternatively, submit a web link (URL) to information available elsewhere on the web, and the link will appear on the project information page.

Or, simply add a comment. Like web links, comments appear on the project information page.

To make a submission, you must have **cookies** enabled on your browser.

1. Give your submission a short, descriptive **title**; indicate the **type** of information you are submitting or providing a link to; and if desired, provide a detailed **description or comment**. This information will appear on the project information page.

Title
examples: "Aerial photo of Pond 16"; "Final project report"; "Link to mercury data"

Type ☐ Report ☐ Data ☐ Photo ☐ Map ☐ Comment ☐ Other

Description/
Comment

If you are submitting a link to a web page, enter the URL (address) here:

URL
example: <http://www.sfei.org/wetlands/mydata> (always start with "http://")

Done Internet



3-Level Approach

Level 3: Intensive Monitoring and Special Studies

- Develop predictive models of relations among states, functions, and stressors.
- Calibrate and validate Level 1 and Level 2.
- Develop standard protocols for intensive monitoring www.wrmp.org/cram.html



3-Level Approach

Focus on Level 2:

California Rapid Assessment Method

CRAM



Goals of the CRAM Program

Develop a method for assessing wetland condition that can be routinely used for evaluation and monitoring purposes

- relatively rapid
- scientifically defensible
- understandable to a broad range of expertise
- usable and consistent across wetland types
- applicable throughout California
- has a regional perspective



CRAM Scope

All wetlands of all types within coastal watersheds of California

Seven Major Wetland Types

lacustrine, estuarine, coastal lagoon, riverine, depressions, vernal pools, seeps and springs

At this time, “all” means every wetland that can be mapped using 1m² pixel resolution geo-rectified image plus ground-truthing.



Basic CREAM Assumptions

- Wetland condition can be assessed based on field indicators.
- Anthropogenic stressors contribute to wetland condition.
- Stressors can be managed to achieve conservation goals.

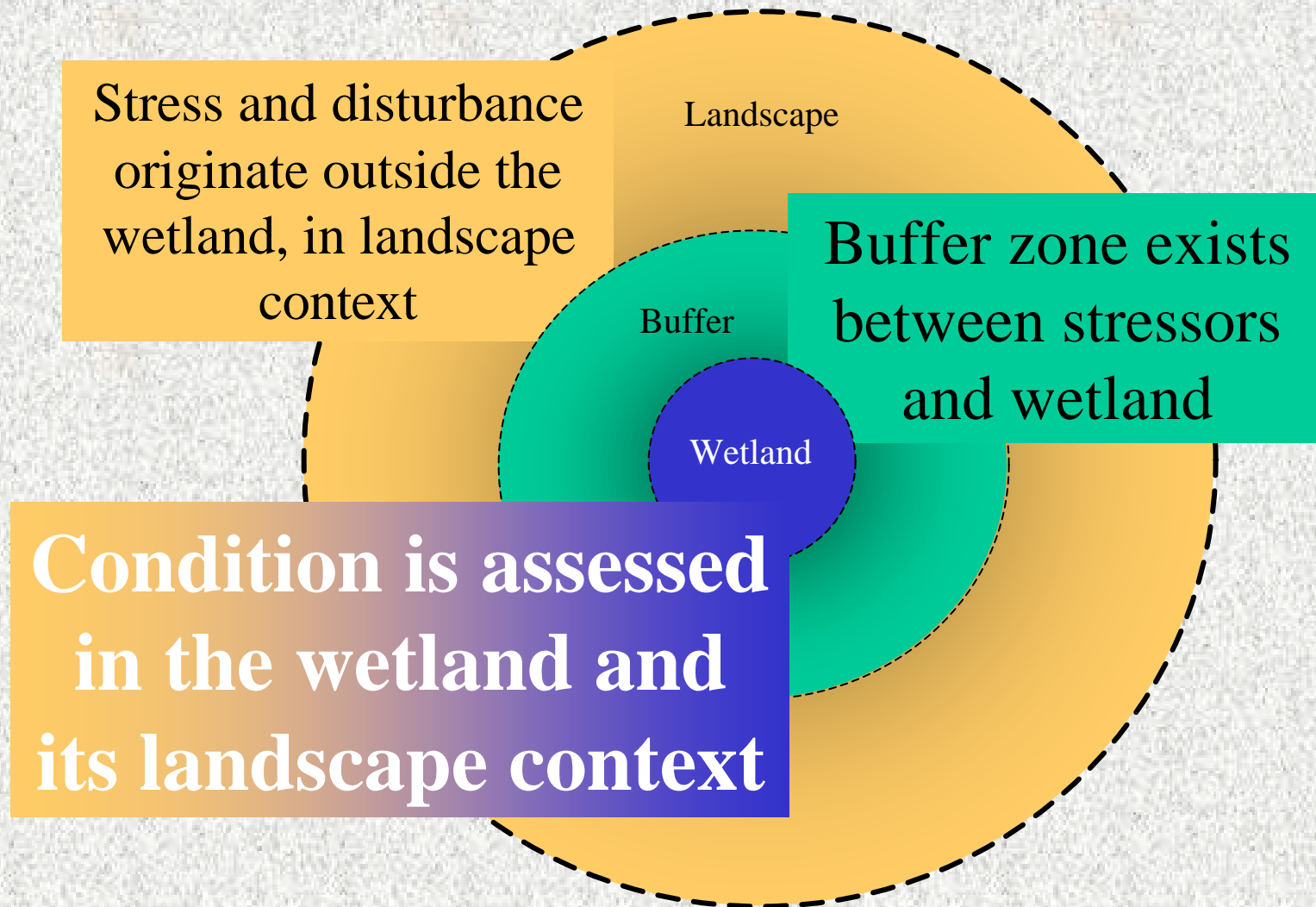


CRAM Potential Uses

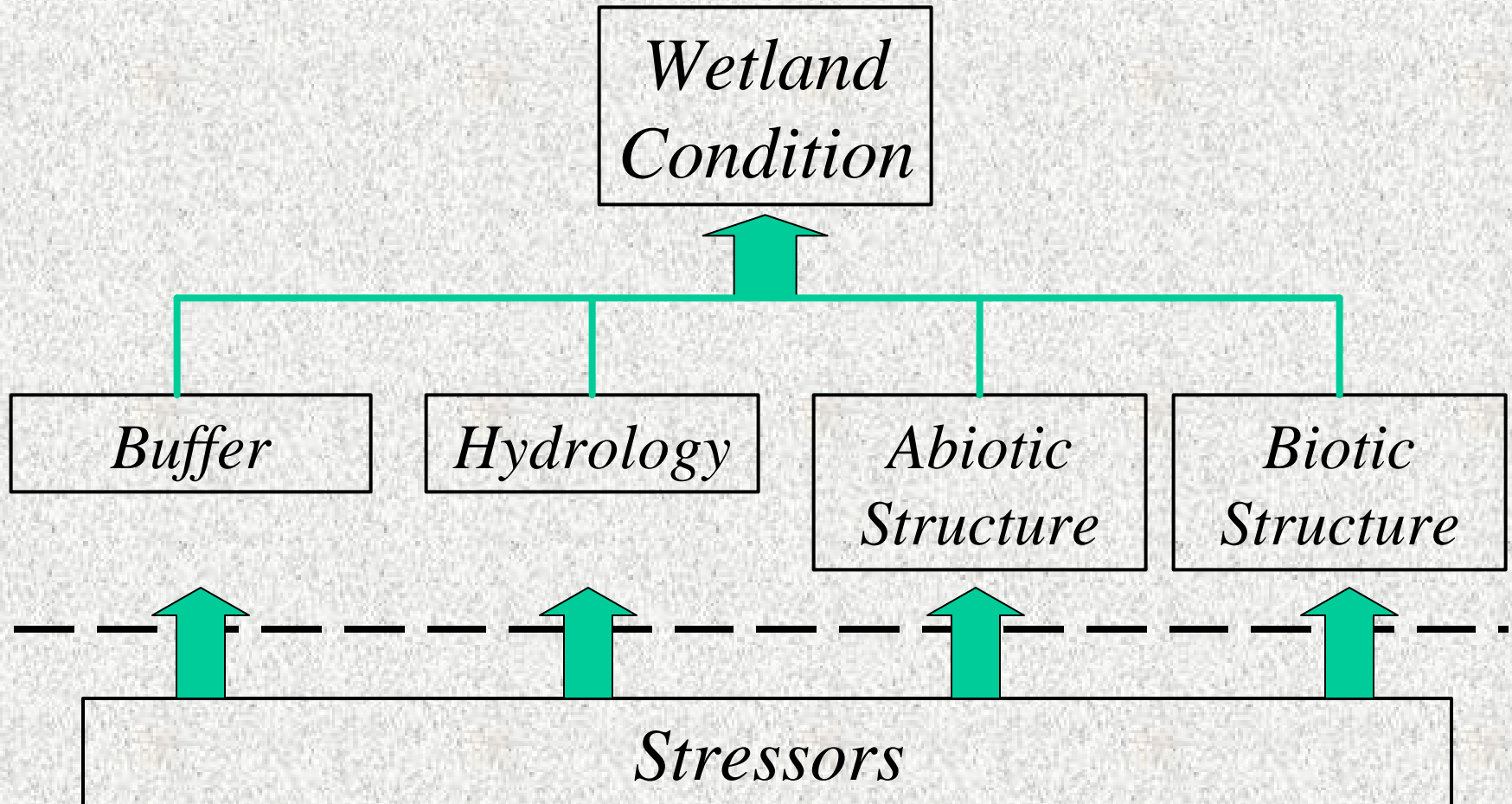
- Ambient monitoring
- Compliance monitoring
- Restoration performance assessment
- local and cumulative impact assessment
- Stressor analysis

Conceptual Model

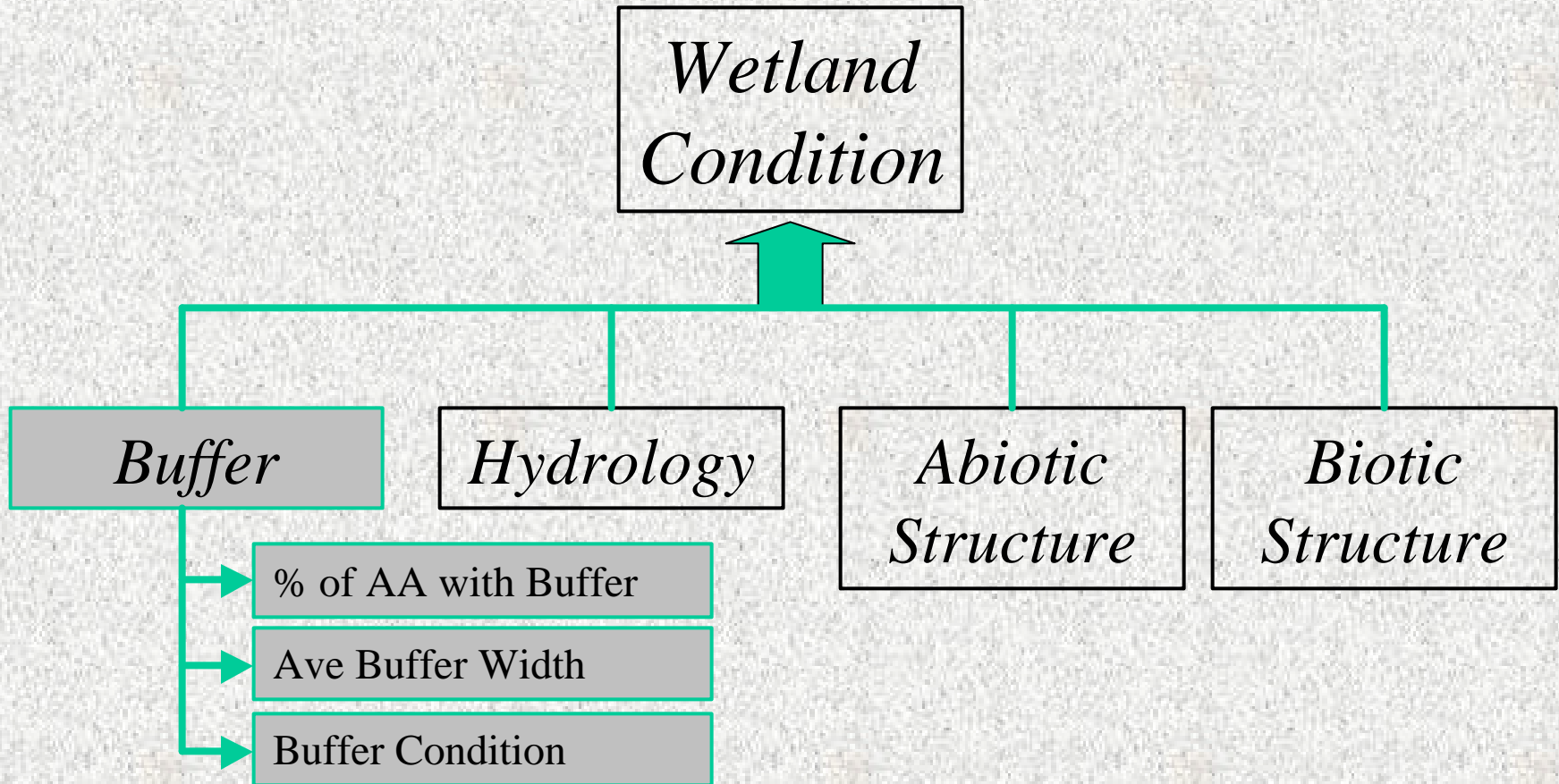
Spatial Template of Driving Forces



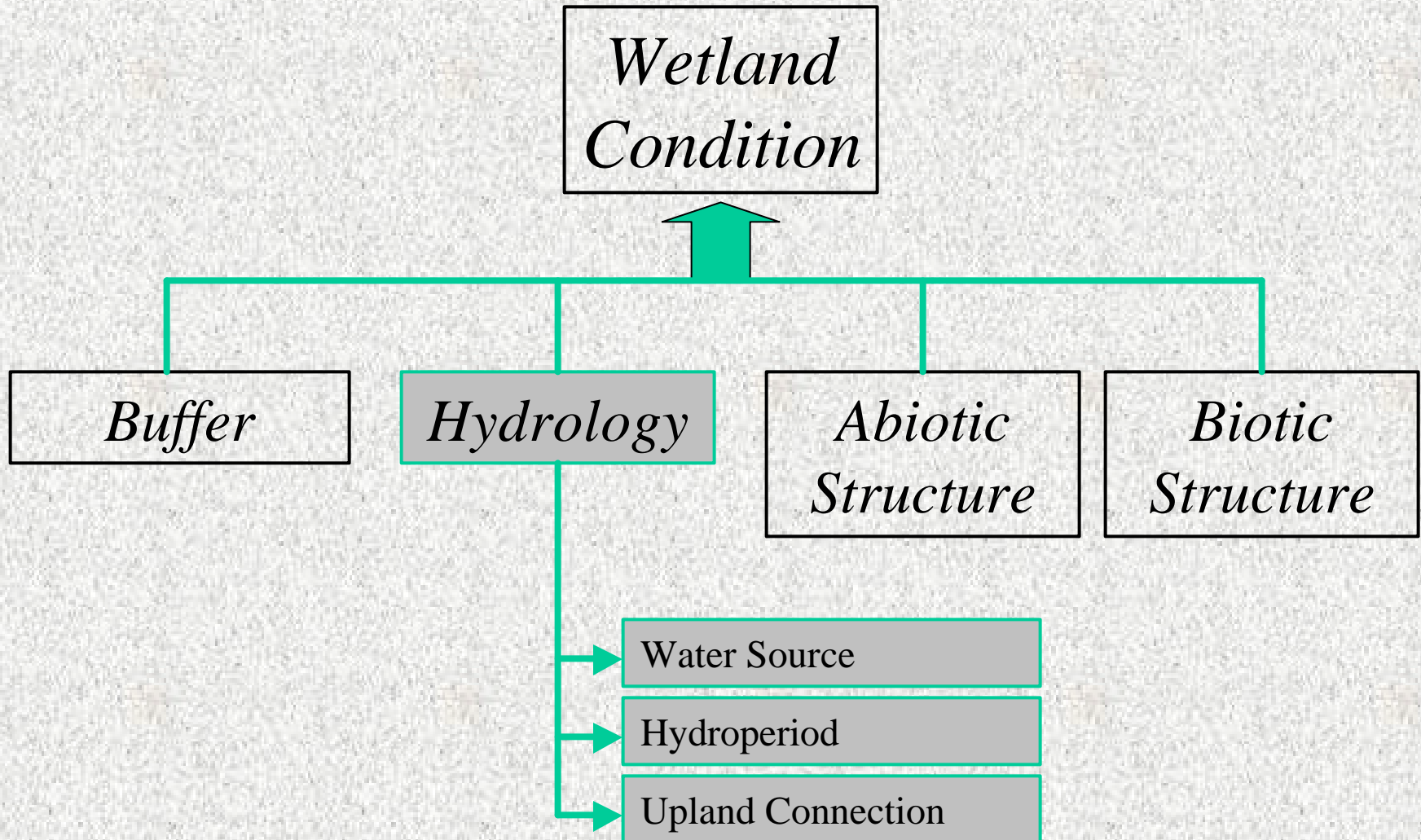
CRAM Conceptual Framework: Condition and Stressors



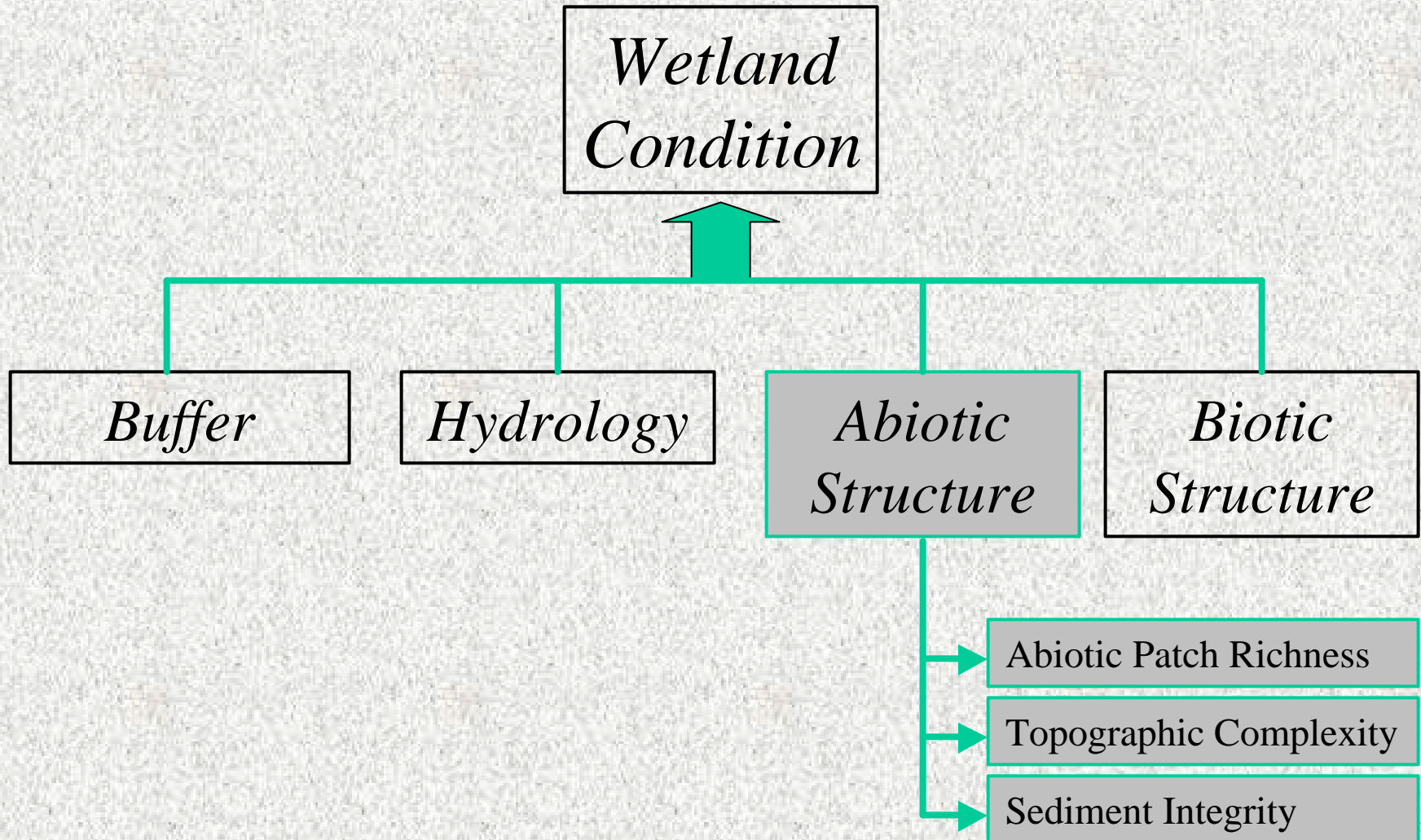
CRAM Conceptual Framework: Condition Attributes and Metrics



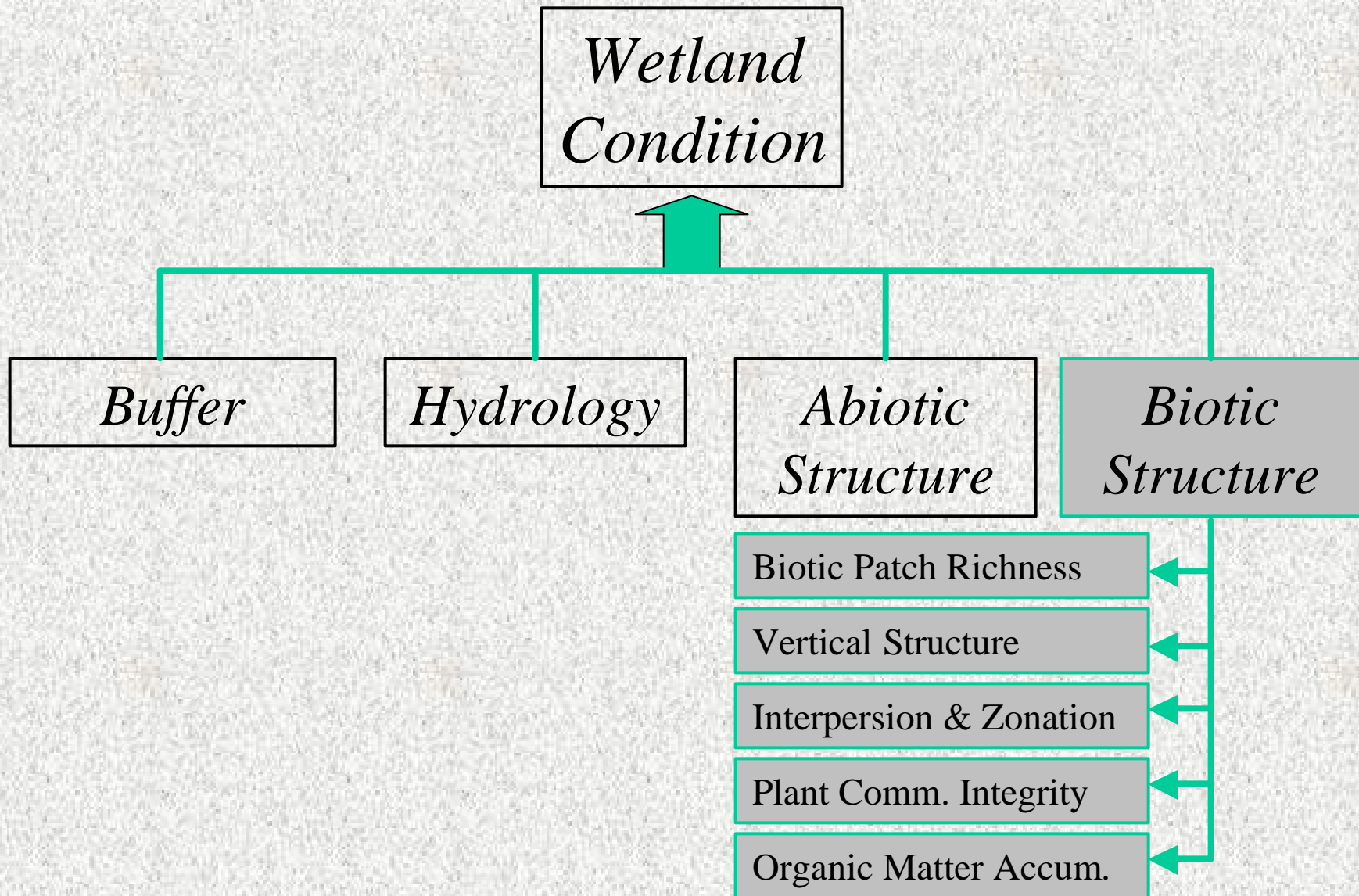
CRAM Conceptual Framework: Condition Attributes and Metrics



CRAM Conceptual Framework: Condition Attributes and Metrics



CRAM Conceptual Framework: Condition Attributes and Metrics





CRAM Development Teams

State Wide Core Team

- Coordinate process of CRAM development and implementation.
- Provide technical review.
- Integrate science and policy.

Regional Teams

- Provide regional perspective.
- Provide technical review.
- Help with verification, calibration, and validation.
- Help implement.

1 State-Wide Core Team

3 Regional Review Teams (South Ca, North Ca, Central Coast)



CRAM Development Teams

State Wide Core Team

- Project PIs
- State and Federal Regulatory and Resource Management Agencies
- State Colleges and Universities

Regional Teams

- Core Team
- Regional staff of State Agencies
- Regional Science NGOs
- Special Districts
- Private Consultants



CRAM Development

Development Steps

- **Initial development**
- **Field verification**
 - Assess the general ability of metrics to discern high vs. low condition wetland
- **Field calibration**
 - Develop scaling & scoring of metrics
- **Field validation**
 - Test the efficacy of the method to predict condition, fine-tune metrics
- **Education, outreach, & training**



Verification Questions

- Is CRAM rapid (2-3 hours)?
- Does CRAM produce a full range of scores?
- Do the metrics discern high vs. low stress wetlands?
- Are the metrics appropriate and comprehensive?
- Are all wetland classes adequately assessed?
- Should wetland types or metrics be regionally modified?
- Is CRAM repeatable?

Number of Sites Visited

Wetland Class	A Priori Classification of Wetland Sites			Total
	High Quality	Med. Quality	Low Quality	
Riverine	10	9	7	26
Depressional	8	12	13	33
Vernal Pools	(5)	(5)	(2)	(12)
Lacustrine	4	5	7	16
Lagoons	2	3	8	13
Estuarine	8	8	5	21
Seeps and Springs	5	3	1	9
Total	37	40	41	118

CRAM Data in Regional Wetland Trackers

California Rapid Assessment Method

File Edit View Insert Format Records Tools Window Help

Tahoma 8 B I U

CRAM : Database

Open Design New

Objects

- Tables
 - tblWetlandMetrics
 - tblWetlandInformation
 - tblWaterDescriptions
 - tblSupplementalAttributes
 - tblSupplementalInformation
 - tblStressorIndex
 - tblPostAssessment
 - tblPlantCommunitySummary
 - tblPlantCommunityRating
 - tblPlantCommunityLayerSummary
 - tblPlantCommunityLayers
 - tblPlantCommunityIntegrity
 - tblPlantCommunity
 - tblPatchBioticTypes
 - tblPatchBiotic
 - tblPatchAbioticTypes
 - tblPatchAbiotic
- Queries
- Forms
- Reports
- Pages
- Macros
- Modules

Groups

Favorites

Main Menu

California Rapid Assessment Method Data Management System

Enter / Edit Supplemental Information	Enter data from SUPPLEMENTAL INFORMATION DATA SHEETS
Enter / Edit Wetland Metrics	Enter data from CRAM METRICS DATA SHEET
Enter/Edit Crum Stressor Index	Enter data from CRAM STRESSOR INDEX DATA SHEETS
Enter/Edit Abiotic Patch Richness	Enter data from ABIOTIC PATCH RICHNESS DATA SHEET
Enter/Edit Biotic Patch Richness	Enter data from BIOTIC PATCH RICHNESS DATA SHEET
Enter/Edit Wetland Information	Enter data from Wetland Information Data Sheets
Enter/ Edit Plant Community Integrity	Enter data from PLANT COMMUNITY INTEGRITY DATA SHEETS
View Project Documents	View QAPlan, Field data sheets, etc.
Enter/Edit Metadata	Enter or Edit FGDC Metadata Records

Version 1.0

CRAM METRICS DATA SHEET (p1 of 1)

Site Name/No. San Joaquin Marsh Wetland Class Depressional Date (m/d/y) 01/23/2004

Investigators

InvestigatorName
entire Team

Landscape Context

Parameter	Office Score	Field Score	Comments
% of AA w/Buffer	A	A	100% buffer
Ave Buffer Width	A	A	
Buffer Condition		B	research/re

Record: 1 of 3

Hydrology

HydrologicalParameter	Office Score	Field Score	Comments
Hydroperiod		A	
Source of Water		C	
Upland connection			

Record: 1 of 3

Abiotic Structure

Structure	Field Score	Comments
Abiotic Patch Richness	D	
Topographic Complexity	C	
Sediment Integrity	B	

Record: 1 of 3

Biotic Structure

Structure	Field Score	Comments
Organic Matter Accum	A	
Biotic Patch Richness	C	
Vertical Structure	D	
Interspersion/Zonation	A	

Record: 1 of 5

Stressor Index

IndexType	Office Score	Field Score	Comments
Hydrology		24	
Abiotic Structure		17	
Biotic Structure		20	
Adjacent Land Use		31	

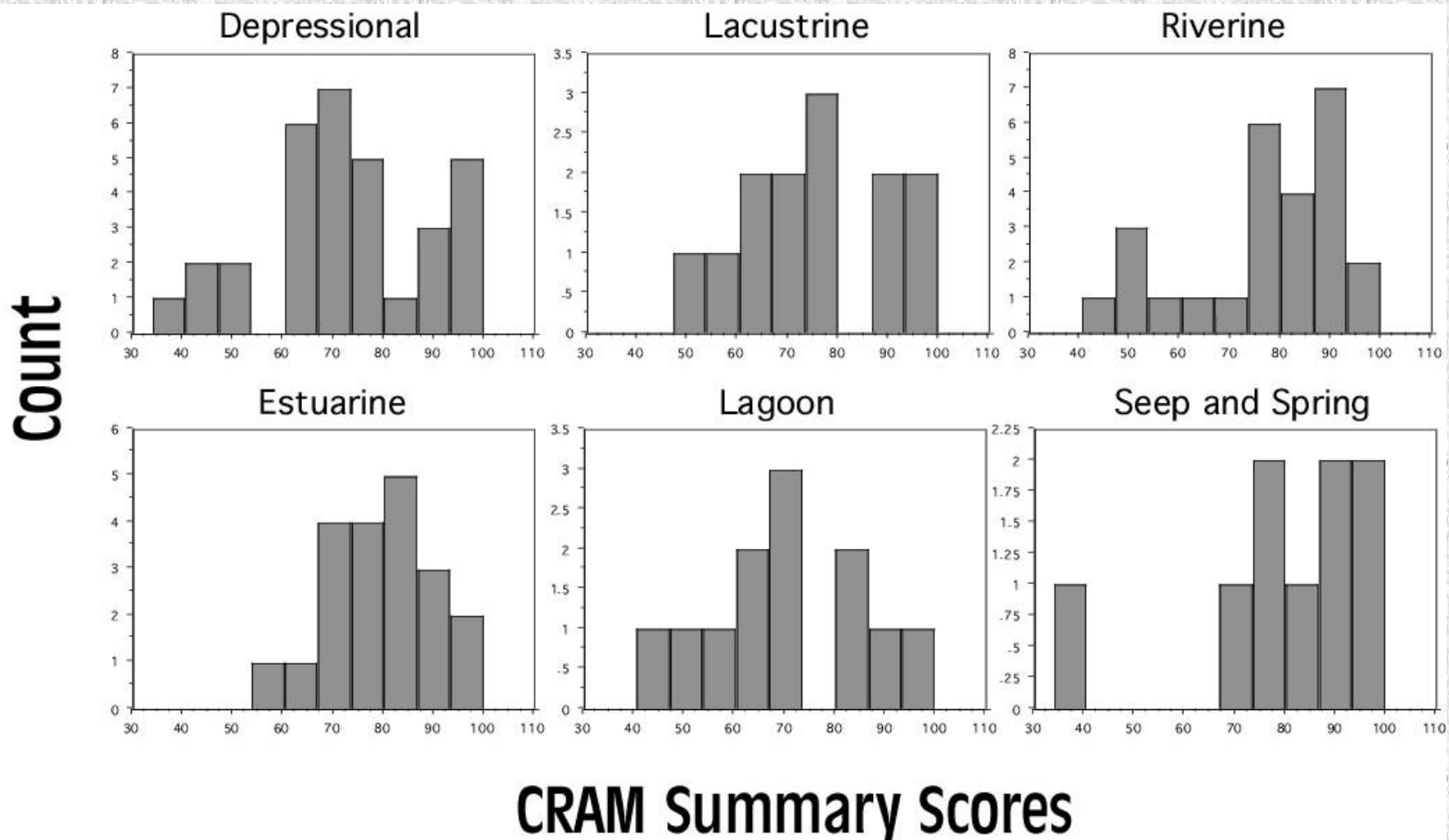
Record: 1 of 4

Photograph Numbers:

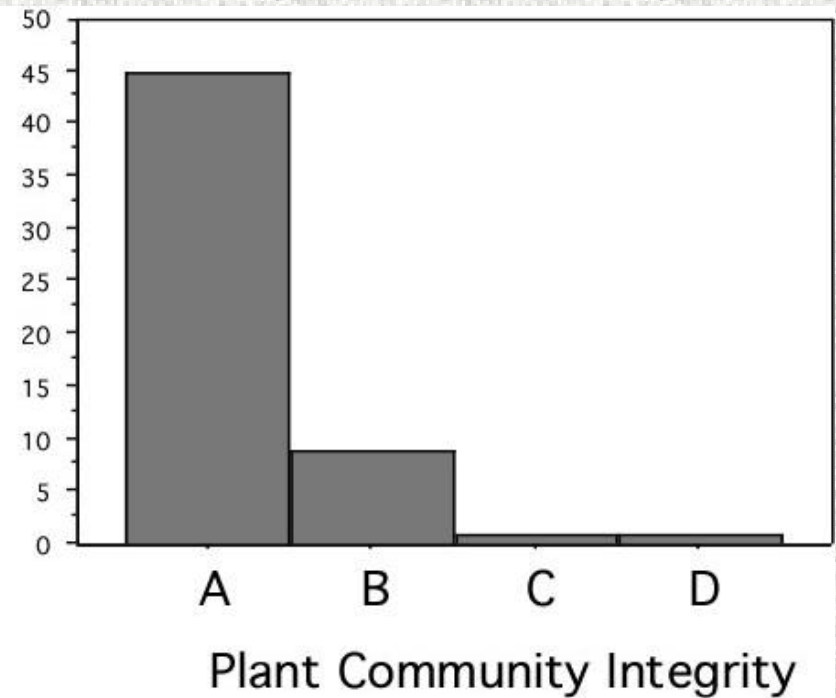
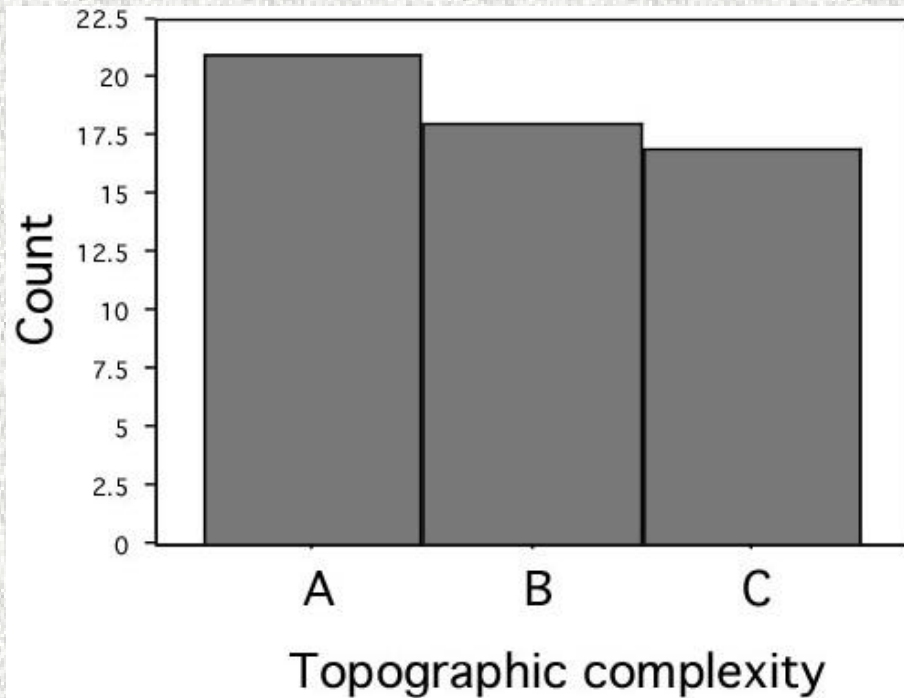
Is CRAM Rapid?



A Full Range of Scores?

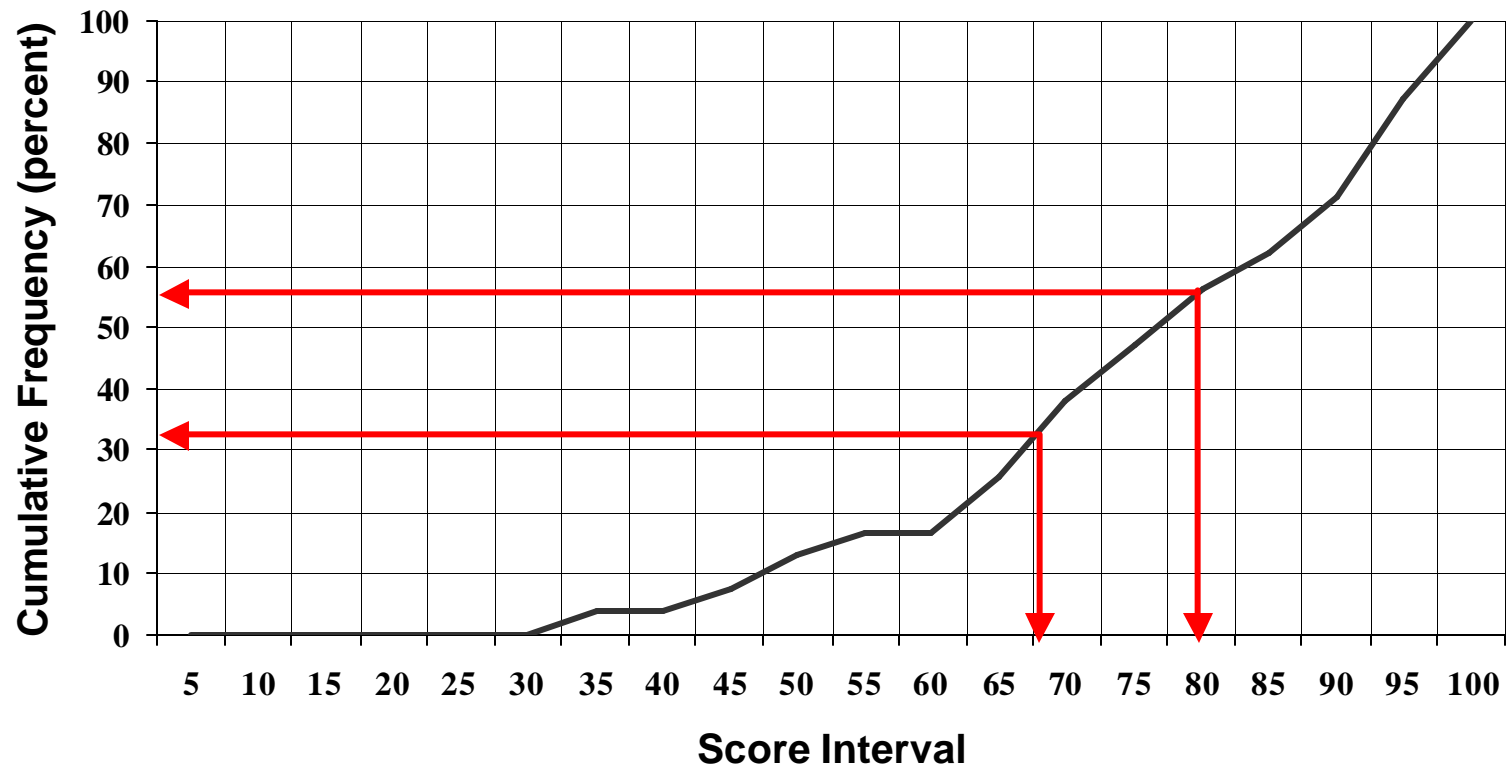


A Full Range of Variability?



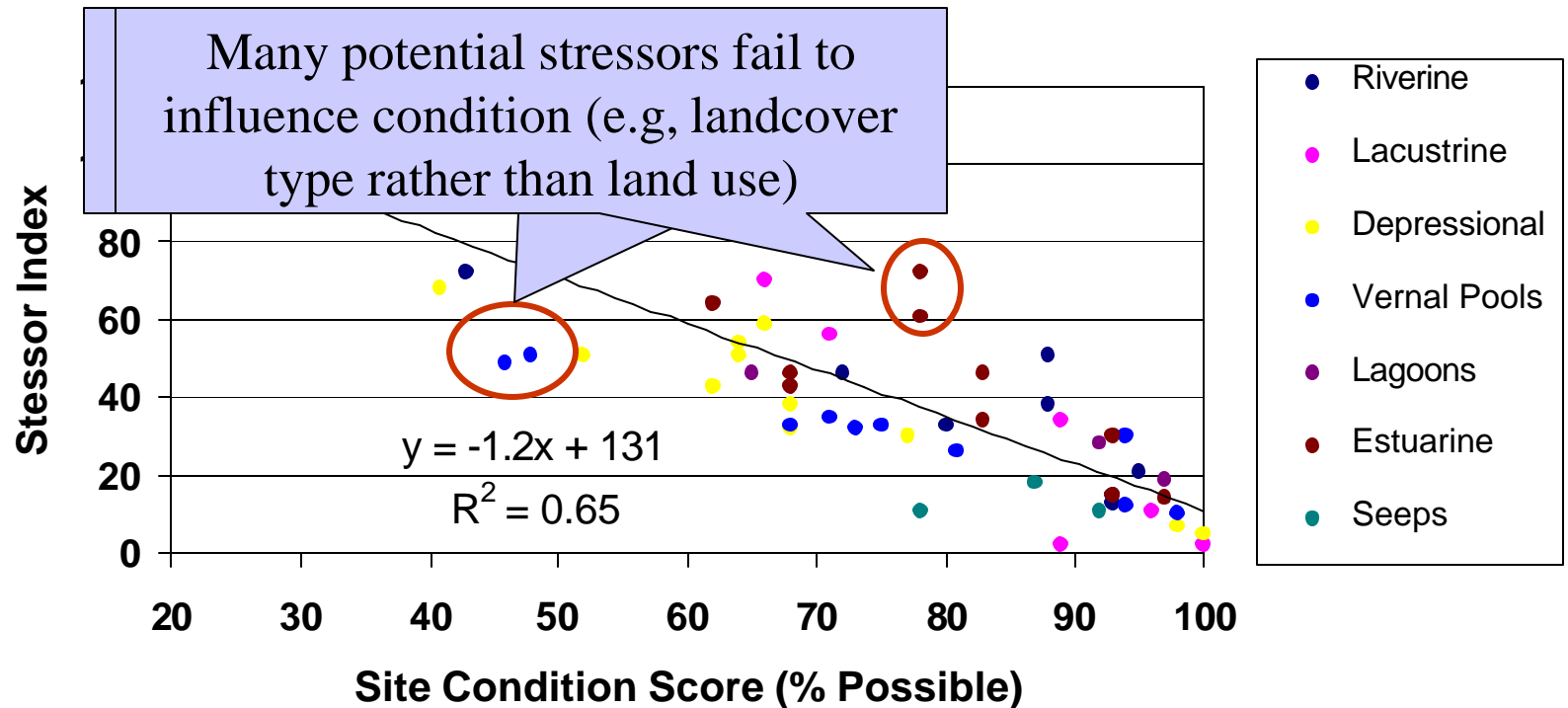
Discern High vs. Low Conditions?

Cumulative Distribution of Site Scores



Does Condition Relate to Stress?

Correlation between Site Condition And Stressor Index



All Wetlands Adequately Assessed?

Need additional work for:

- **Seeps and springs**
 - Differentiation from other wetland classes
 - Site-specific variability makes generalization difficult
- **Riverine wetlands**
 - High gradient versus low gradient

Performance of CRAM Metrics

Landscape Context		
% of AA w/ Buffer	Ave Buffer Width	Buffer Condition
		high gradient

Hydrology		
Source of Water	Hydroperiod	Upland connection
		high gradient

[illegible][illegible]



Additional Metrics Suggested

Possible additional metrics

- Wetland size
- Wetland form
- Connectedness
- Site as percent of total wetland area
- Linear contiguity (riverine wetlands)
- Adjacent land use as stressor



CRAM Verification Conclusions

- CRAM *is* rapid.
- CRAM *does produce* a full range of scores.
- CRAM *can discern* high vs. low condition wetlands.
- CRAM scores *do correlate* with stressor index.
- Wetland classes are adequately assessed for most metrics (refinement needed for depressions, seeps and springs, and riverine wetlands).
- Is the method repeatable (may depend on expertise)?



Facing the Future

- Defining Reference Condition
- Conducting Calibration and Scaling
- Revising the Stressor Index
- Implementation



Reference Condition

Absolute Reference

- ❑ Consistent for each wetland class and region.
- ❑ Defined by optimal alternative states for all metrics combined (narrative definition).
- ❑ Requires more inter-regional coordination.
- ❑ May set the bar too high for some regions and sites.

Relative Reference

- ❑ Specific to each region (CRAM results would not be comparable between regions).
- ❑ Requires identifying and collecting data at reference sites (best achievable conditions may not be evident).
- ❑ May set the bar too low for some regions and sites.

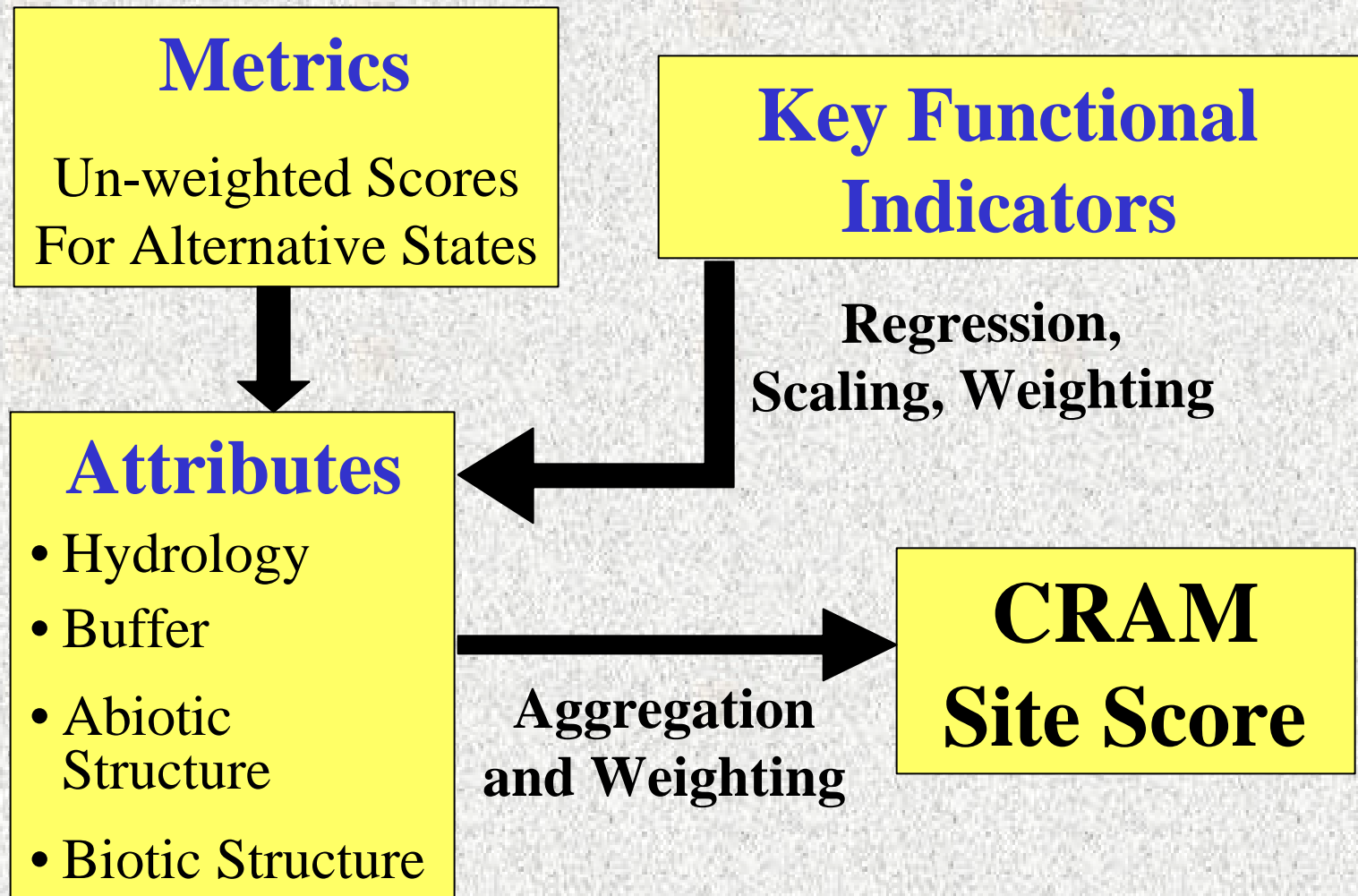


Calibration

Calibration is needed to assure that CRAM scores correlate with key wetland functions

- Initial calibration will depend on existing data for plants, animals, and habitat structure along stressor gradients within each region.
- Common data exist for the structure of plant, avian, and macro-invertebrate communities, density of selected species of special status, and edaphic conditions.

Calibration Process





Stressor Index

- Very sensitive to site-specific knowledge.
- Stressors need to be weighted case-by-case.
- Can be over-used (should yield hypotheses and not conclusions).

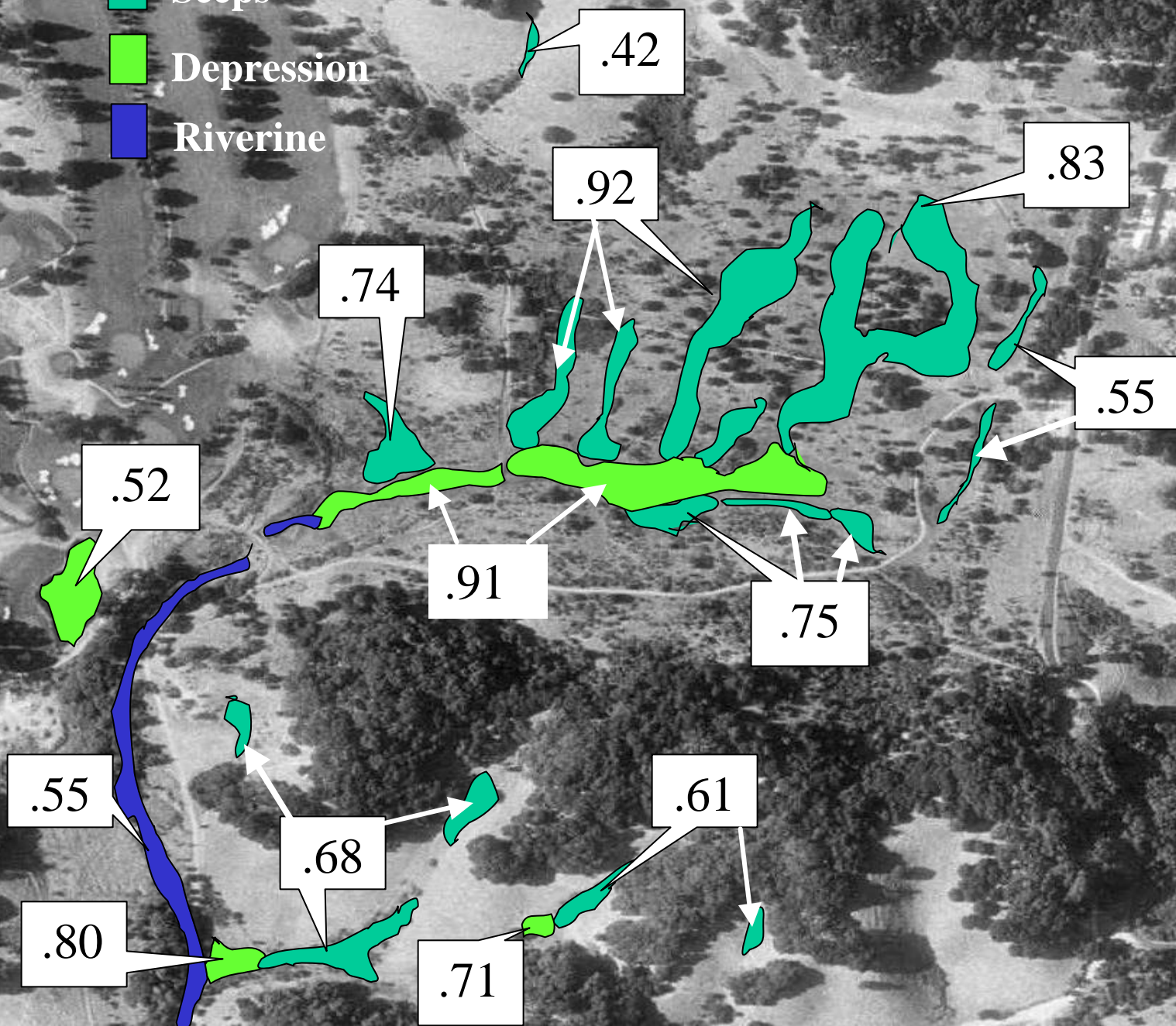


CRAM Implementation

Implementation Committee of the Core Team

- **Who should use CRAM?**
 - Level of expertise and training
 - Data management, interpretation, and reporting
- **How to integrate into existing programs**
 - CWA Sections 404 and 401 and State codes
 - Surface Water Ambient Monitoring Program (SWAMP)
 - NPDES
 - Watershed Management

- Seeps
- Depression
- Riverine



A photograph of a coastal wetland landscape. In the foreground, there are sandy dunes with sparse, low-lying green and yellow vegetation. A winding path or stream bed cuts through the dunes. In the middle ground, there are patches of green wetland vegetation interspersed with areas of brown, dry earth. A small, dark pool of water is visible on the right side. The background shows a vast, flat expanse of land under a hazy sky, with distant hills or mountains visible on the horizon.

California Coastal Wetlands Monitoring Venture

Thank You