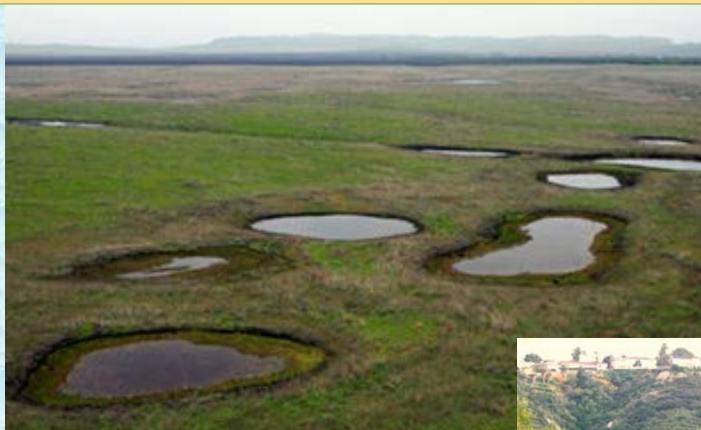
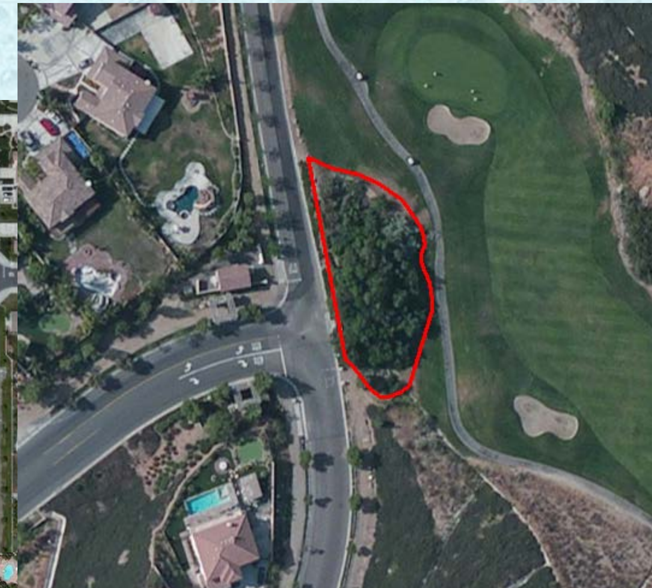
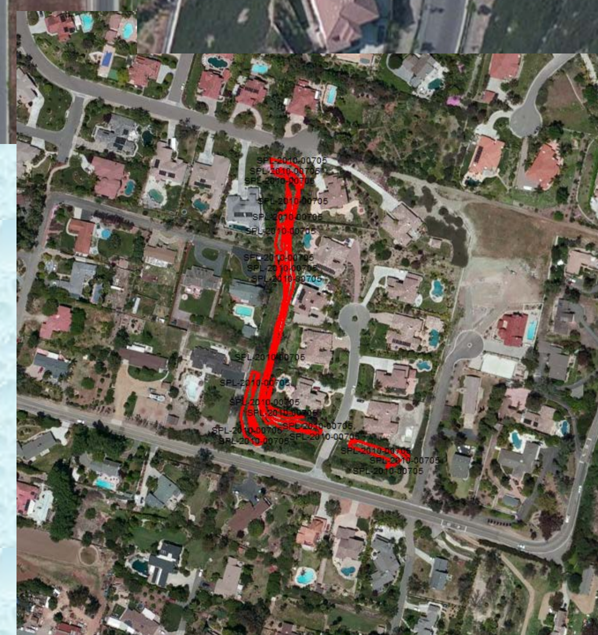
Improving Mitigation Success through Use of Performance Curves (Trajectories) and Tiered Performance Standards



Eric D. Stein
Southern California Coastal Water Research Project

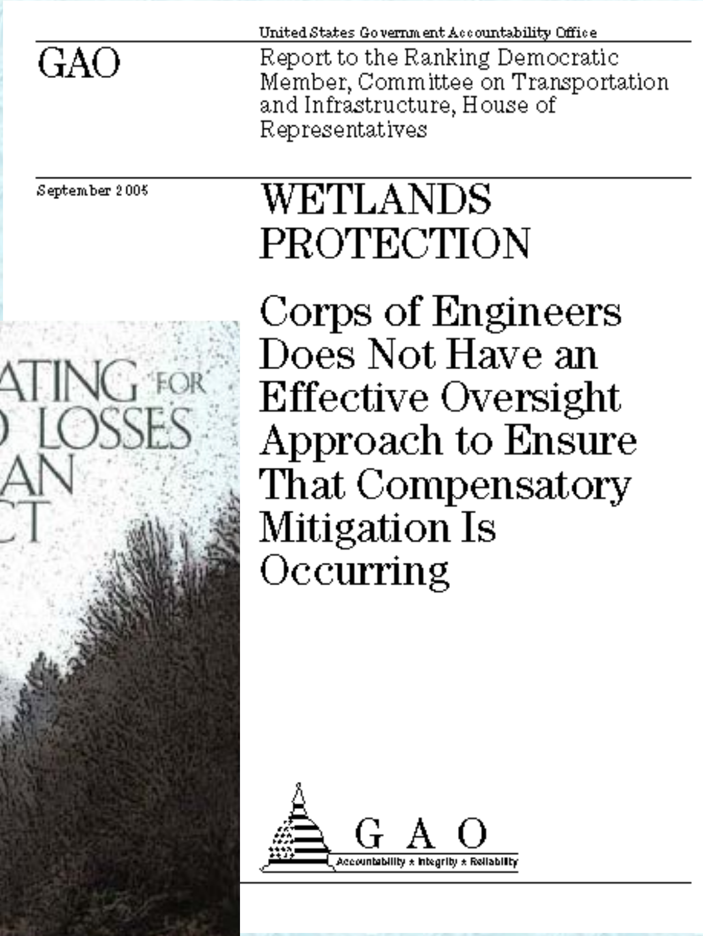
Past Practices





Reports of Mitigation Success

- 20,000 acres permitted annually
- 40,000 acres of mitigation required
- Well documented lack of success due to a variety of factors
  - Non-compliance
  - Non-performance


United States Government Accountability Office

GAO

Report to the Ranking Democratic Member, Committee on Transportation and Infrastructure, House of Representatives

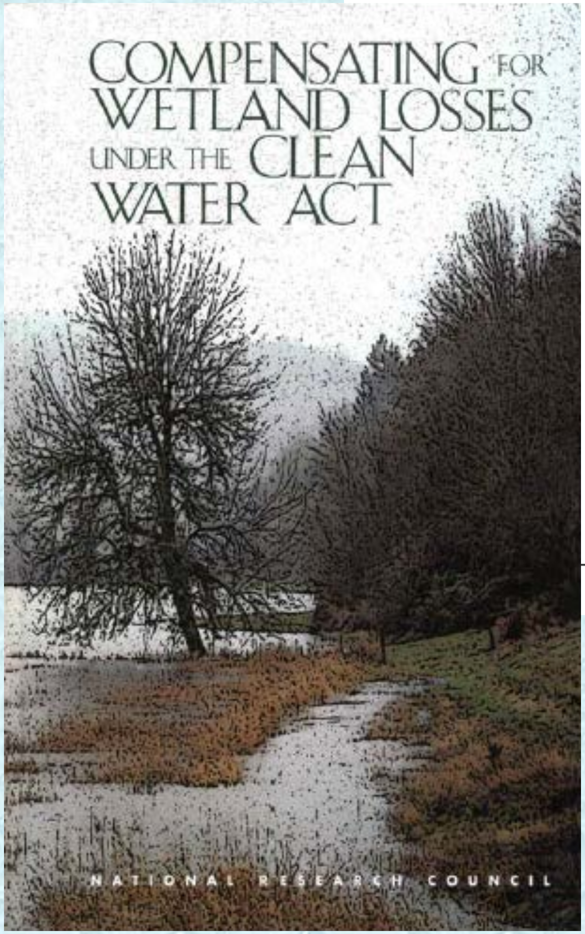
September 2005

WETLANDS PROTECTION

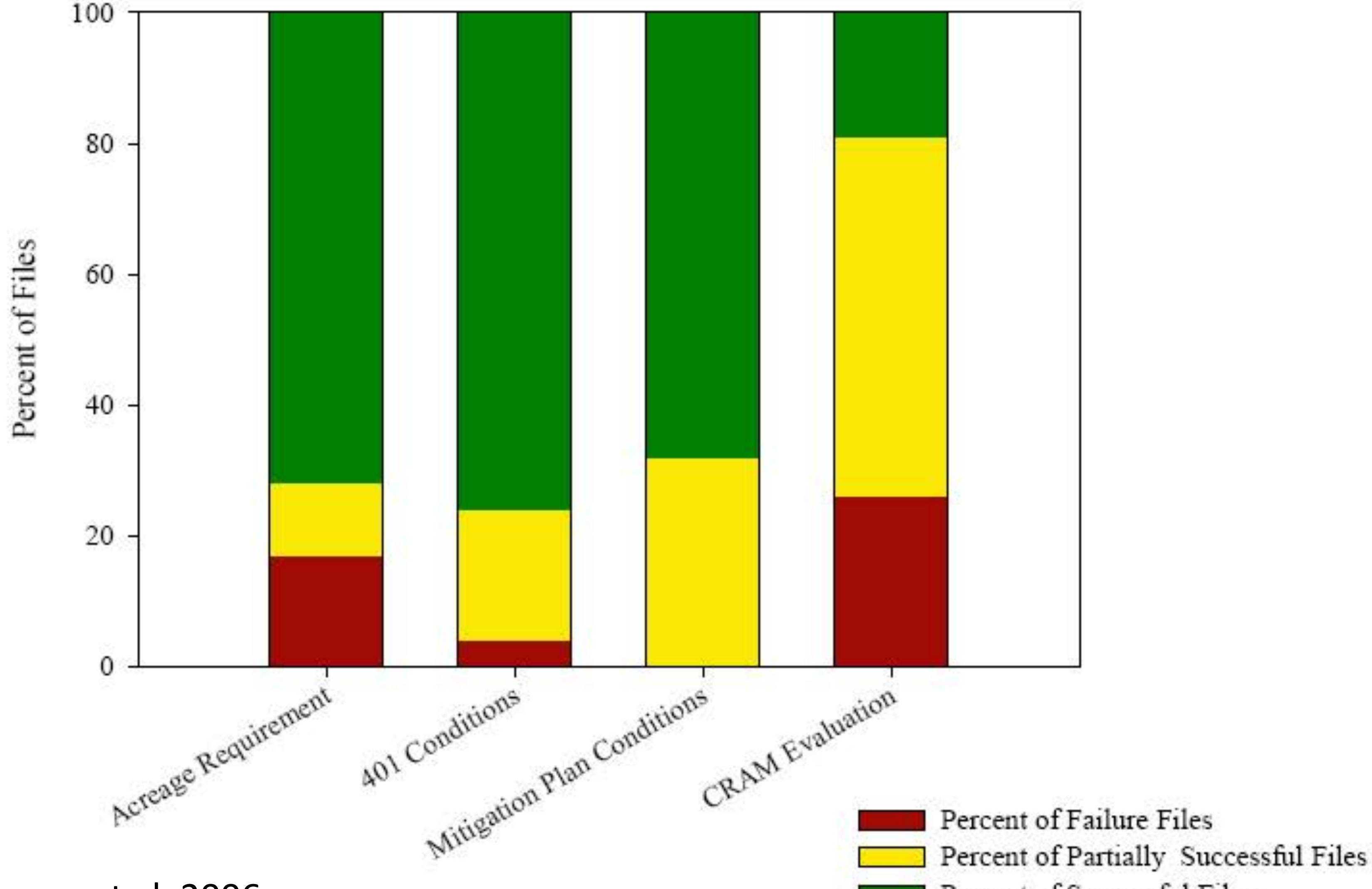
Corps of Engineers Does Not Have an Effective Oversight Approach to Ensure That Compensatory Mitigation Is Occurring

G A O

Accountability * Integrity * Reliability



What is Successful Mitigation??

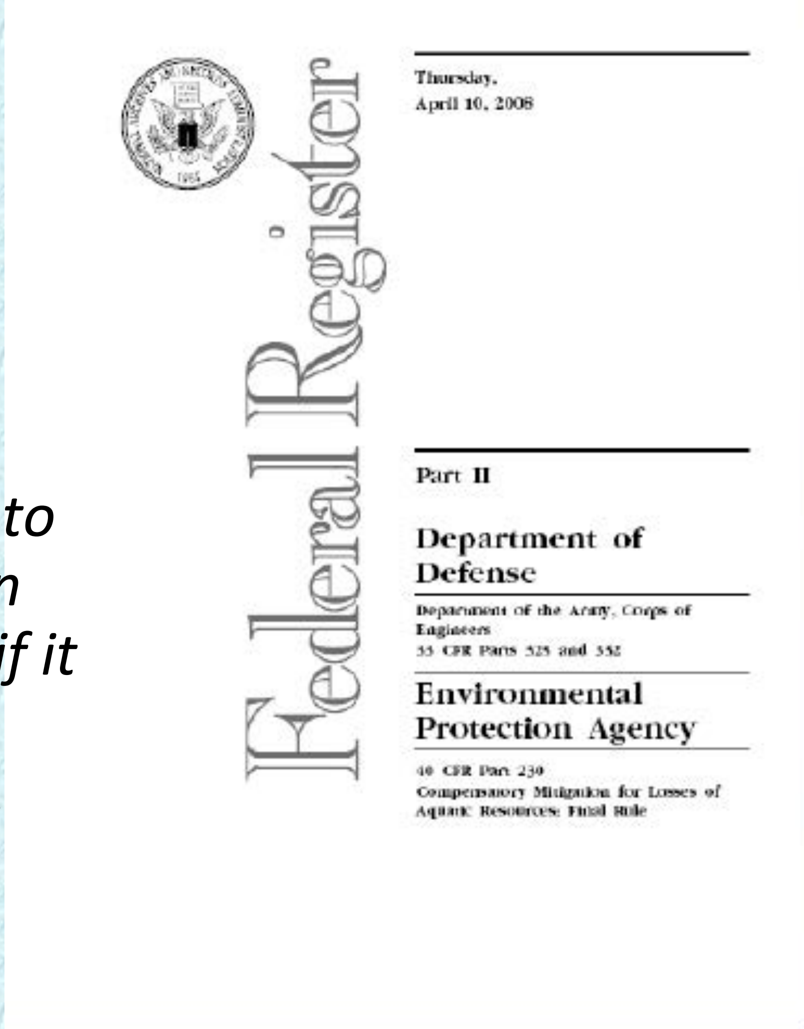


Ambrose et al. 2006

Corps-EPA Mitigation Rule

- Mitigation plans must contain performance standards to assess whether project is achieving its objectives

> *"Performance standards should relate to objectives of project so that project can be objectively evaluated to determine if it is developing into the desired resource type, providing the expected functions, and attaining any other applicable metrics (e.g. acres)."*


Federal Register

Thursday,
April 10, 2008

Part II

Department of Defense

Department of the Army, Corps of Engineers
33 CFR Parts 325 and 332

Environmental Protection Agency

40 CFR Part 230
Compensatory Mitigation for Losses of Aquatic Resources; Final Rule

It All Starts with Performance Standards

- Emphasize processes-based vs. structure-based standards
- Include the entire suite of hydrogeomorphic properties necessary to support wetlands
- **Phase in requirements over time (tiering)**
  - **Get the physical structure and hydrology right first**
  - **Restoration trajectories allow for adaptive management**
- Evaluate relative to reference conditions
- Require commitment to long-term management
  - Few wetlands are truly "self-sustaining"

Components of a “Good” Standard

- Clear and unambiguous
  - Somebody else will likely have to interpret what you meant
- Defensible
- Readily quantifiable with known levels of confidence
- Related to functional success
- Tied to established goals and objectives
- Can inform adaptive management actions and/or contingency actions

Example Performance Standard

- At the end of year 3, at least 80% of Area A shall have a benthic invertebrate index score within 10% of the median reference population score.
  - If this standard is not met, the site will be re-evaluated within 120 days of the original field assessment
  - If the standard is still not met, metric level analysis and/or causal assessment shall be conducted to identify likely reasons for failure

Considerations in Assessing Mitigation Performance

- "Successful" relative to what?
  - Frame of reference
  - Targets

- How to measure "success"?
  - Indicators

- When are you "successful"?
  - Timing for assessing performance

Setting Expectations

A standardized lexicon of terms used to define biological expectations (adapted from Stoddard *et al.* 2006):

Reference Condition (RC(BI)) ~ Because this term has been used for a wide range of meanings, Stoddard *et al.* (2006) argue that the term should be restricted to meaning "reference condition for biological integrity … in the absence of significant human disturbance or alteration"

Minimally Disturbed Condition (MDC) ~ stream condition in the absence of "significant" human disturbance. Assumes all streams have some anthropogenic stresses, but in most cases will approach true RC(BI)

Historical Condition (HC) ~ stream condition at a specific point in time (e.g., pre-Columbian, pre-industrial, pre-intensive agriculture, etc.)

Least Disturbed Condition (LDC) ~ the best physical, chemical and biological conditions currently available ("the best of what's left"). This definition is sufficiently flexible to establish biological expectations even in highly altered systems

Best Attainable Condition (BAC) ~ the expected ecological condition of least disturbed sites given use of best management practices for an extended period of time. This definition is helpful for communicating the potential for improving ecological condition above the currently best available conditions

Stoddard et al, 2006

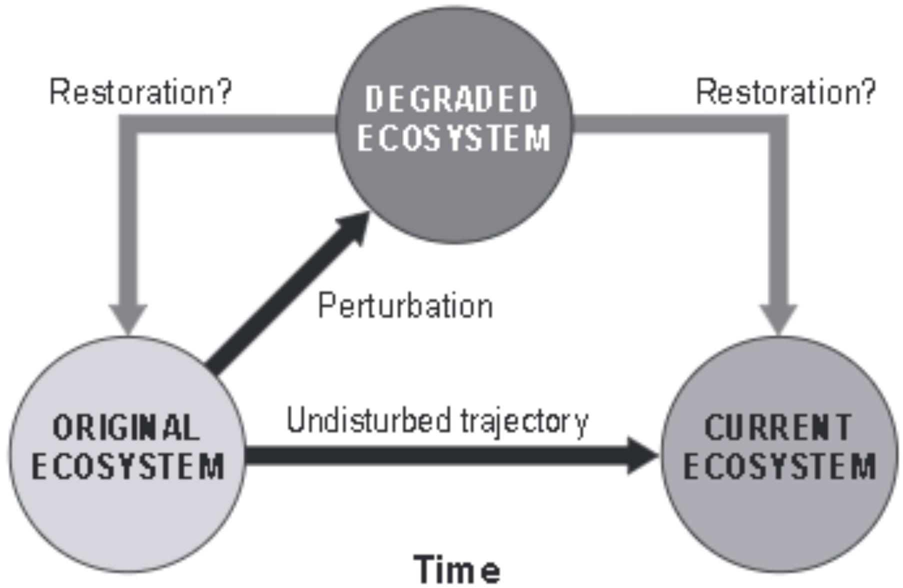
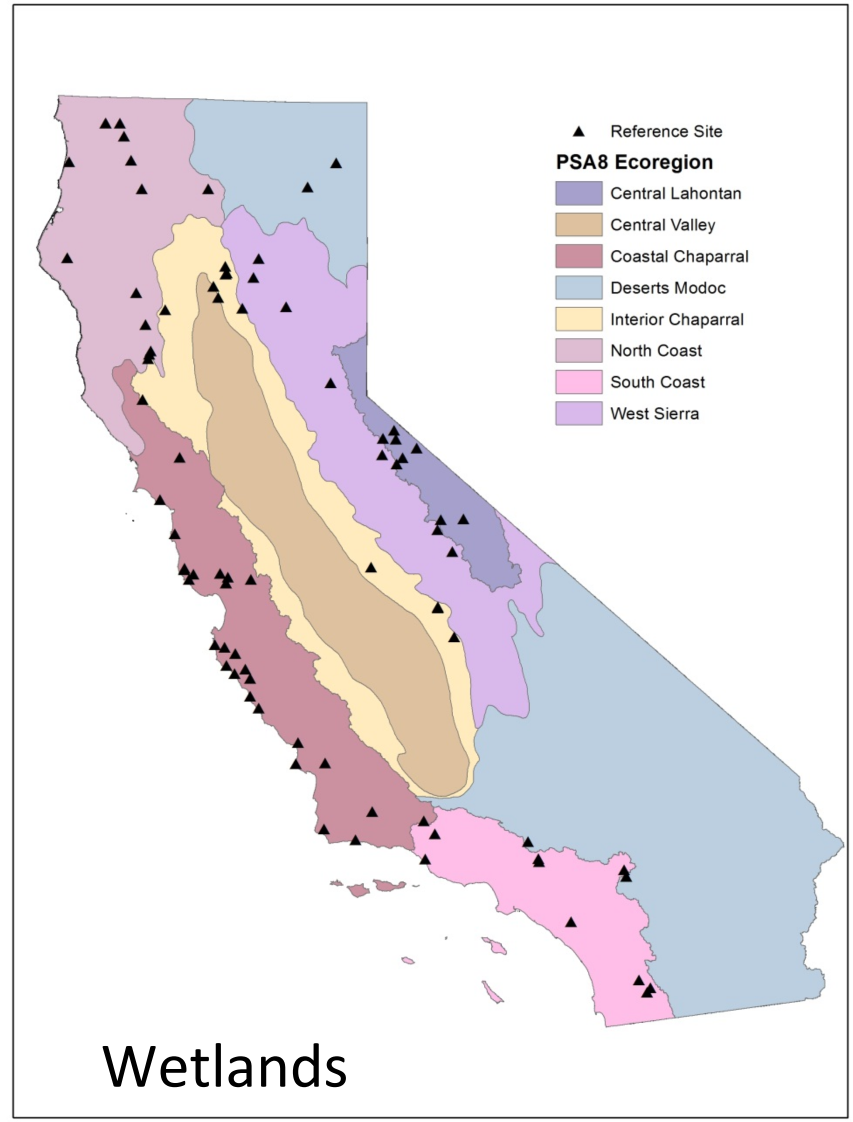


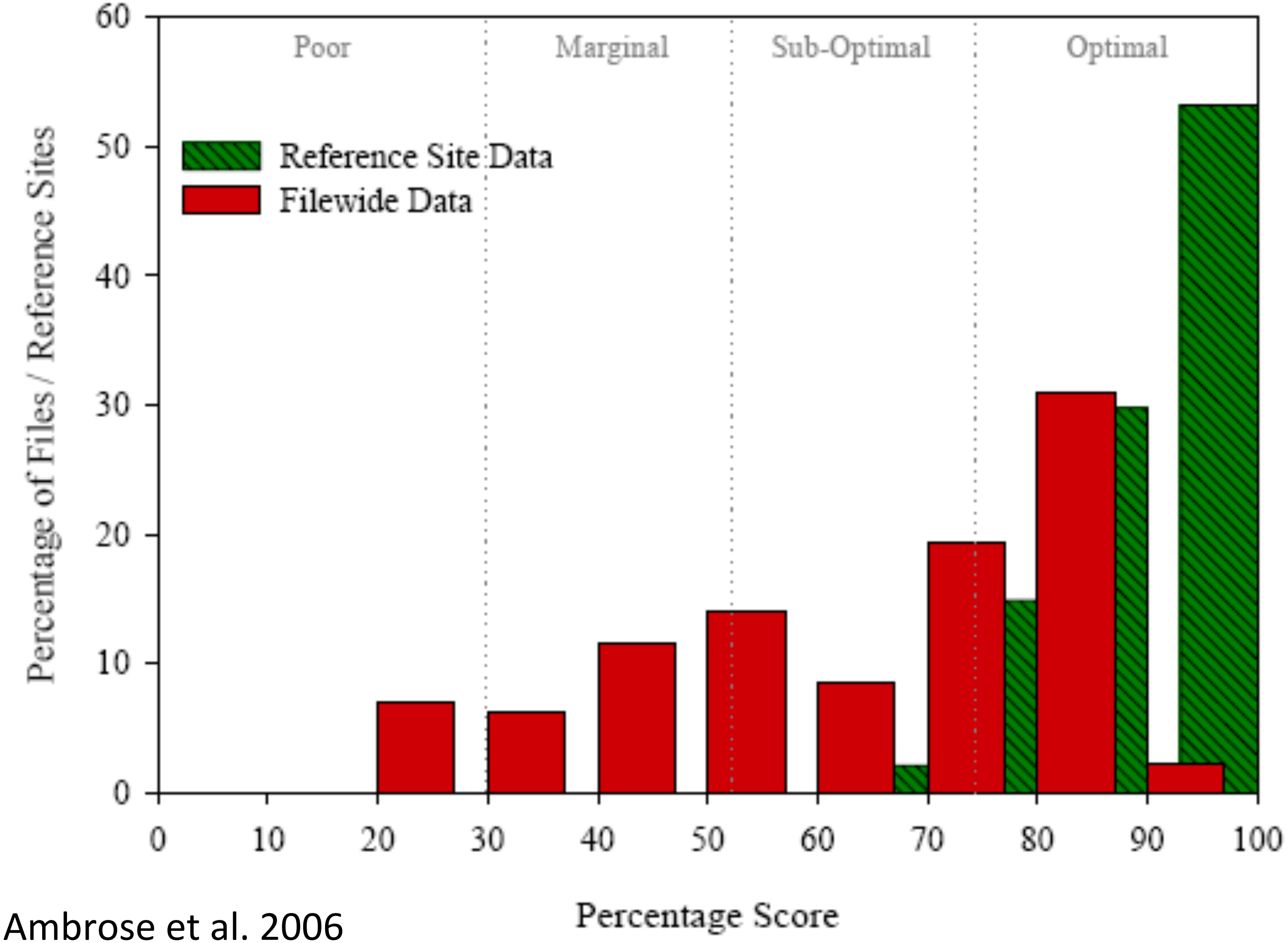
Fig. 1.5 Time changes an undisturbed ecosystem, making targets from the past hard to determine.

Harris and Van Diggelen 2006

California's Reference Network



Comparison to Reference



Ambrose et al. 2006

Comparison to Reference

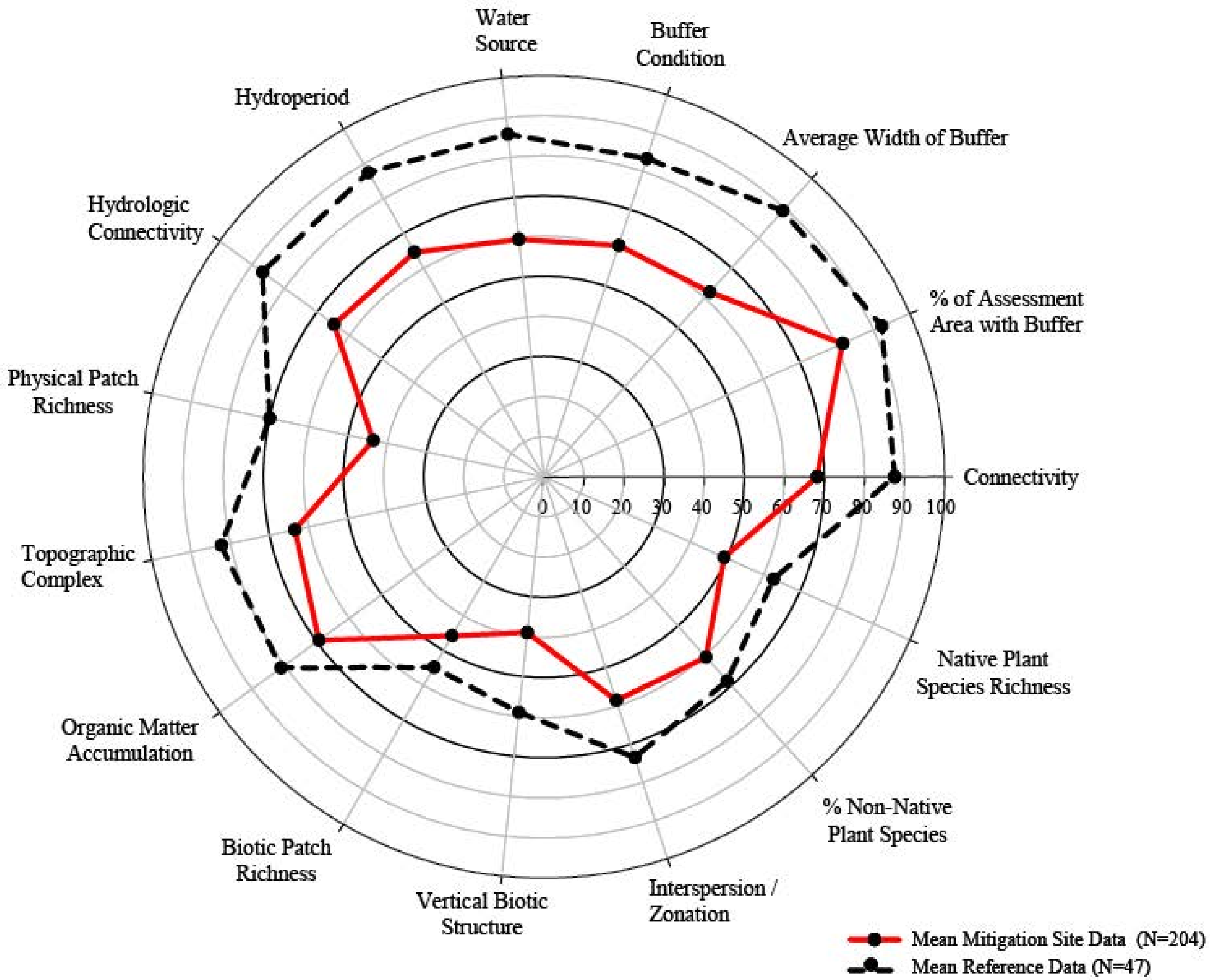


Figure 46. Mean percentage scores for each CRAM metric for mitigation sites (N=204) and reference sites (N=47).

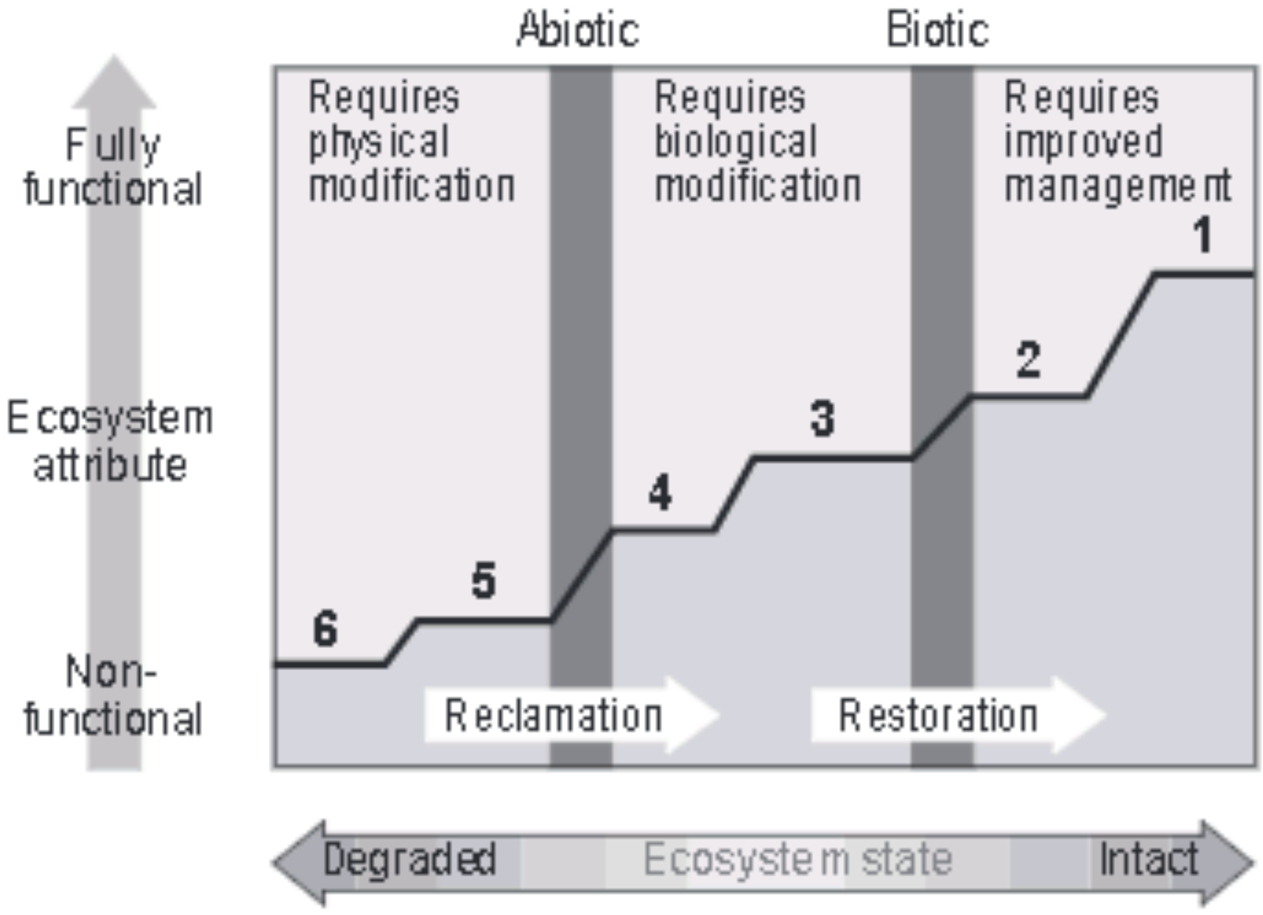
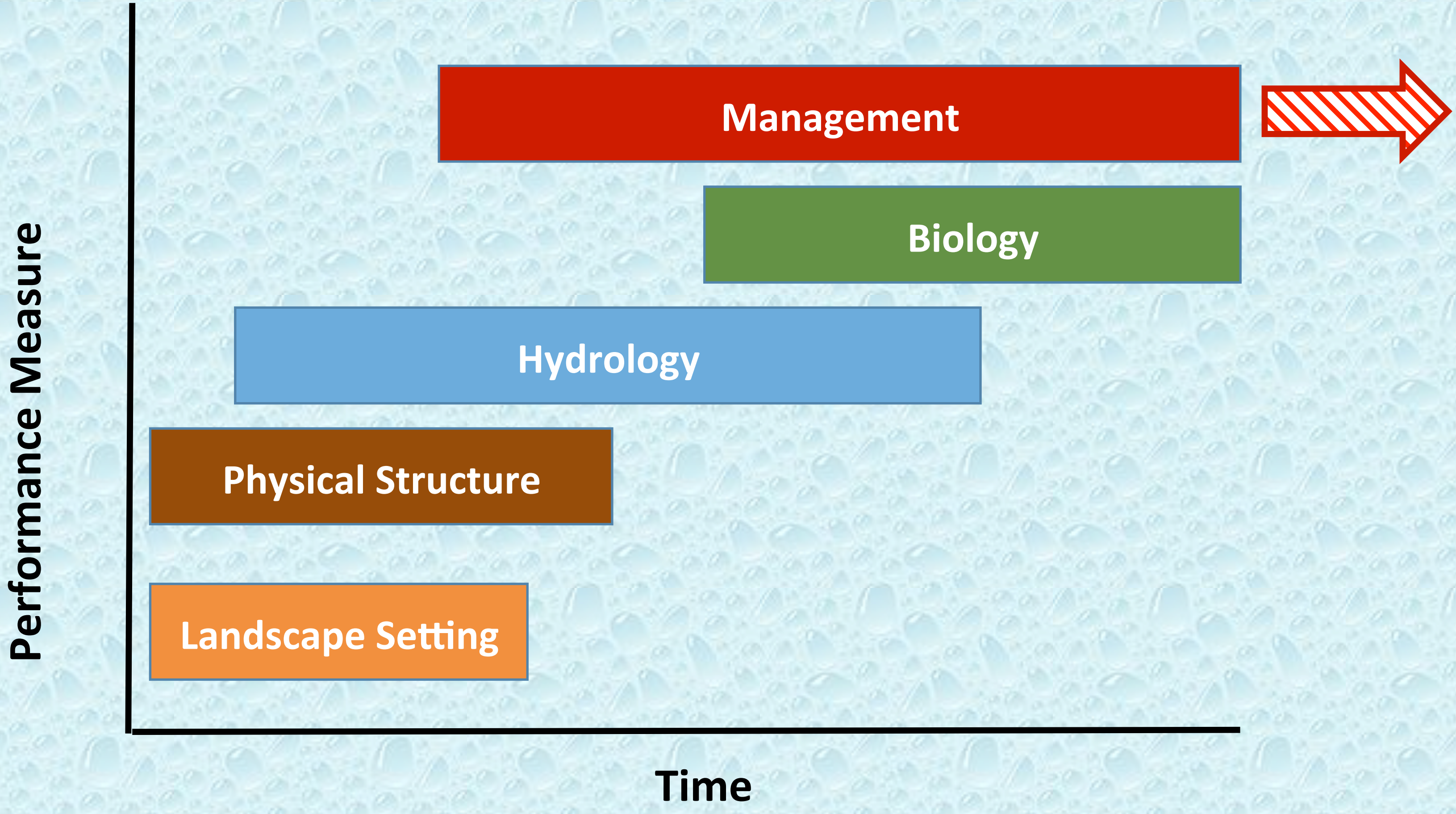


Fig. 1.4 Relationship between measured ecosystem attributes, biotic and abiotic barriers, and the processes of reclamation and restoration (modified from Hobbs & Harris 2001).

Harris and Van Diggelen 2006

Tiered Performance Standards

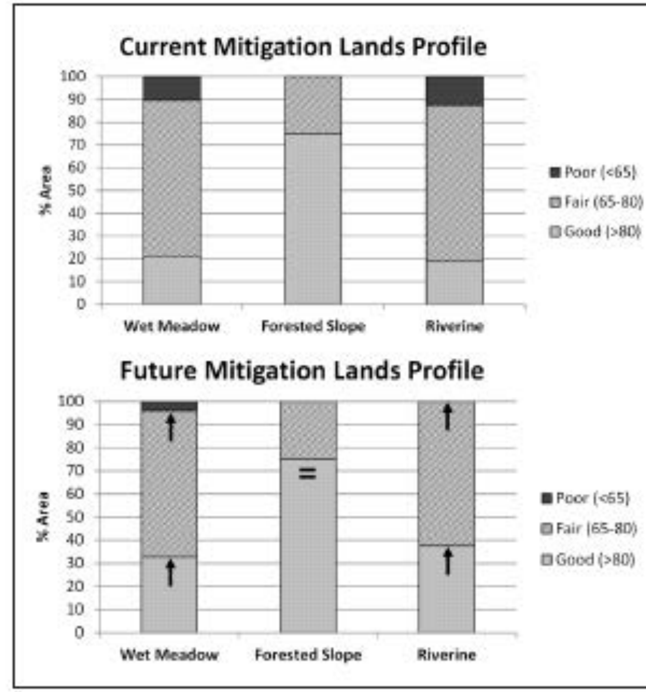


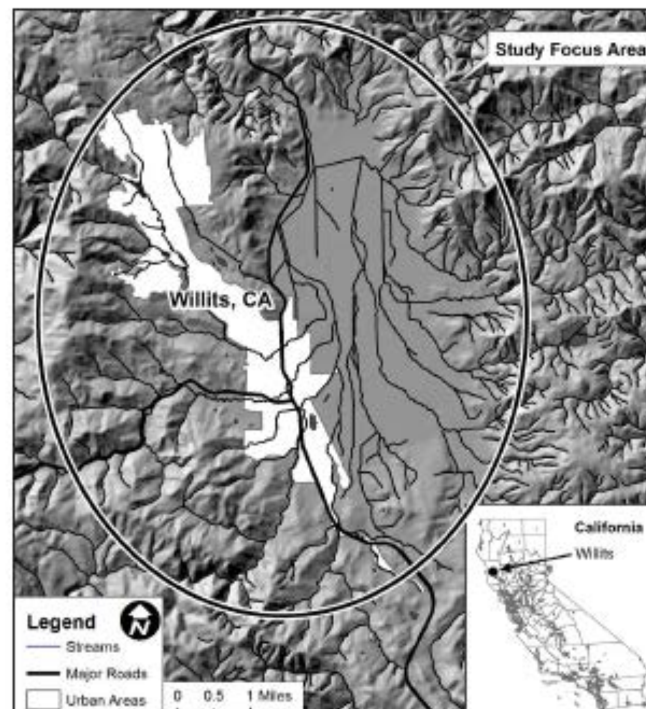
Landscape Setting

Development and Adoption of a Watershed Approach to Compensatory Mitigation: Experiences in Colorado and California

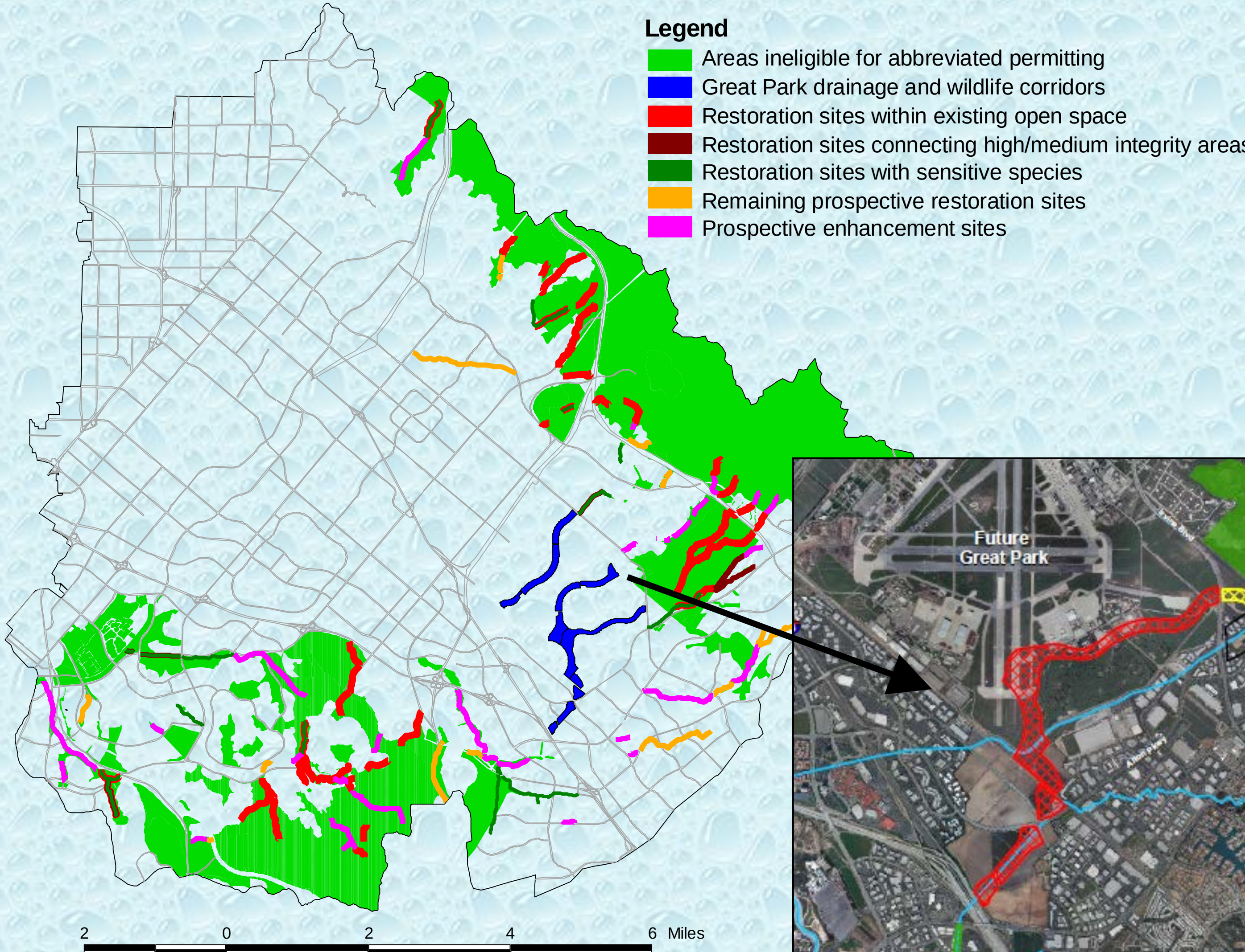
This article provides an update on the adoption of two watershed approach pilot projects into regul... programs. The authors discuss the use and implementation of watershed profiles, which incorporate ma... wetland data and rapid field assessment information, and lessons learned on information transfer.

By Richard Sumner, J. Bradley Johnson, and Bill Orme





Watershed Approach: San Diego Creek, California



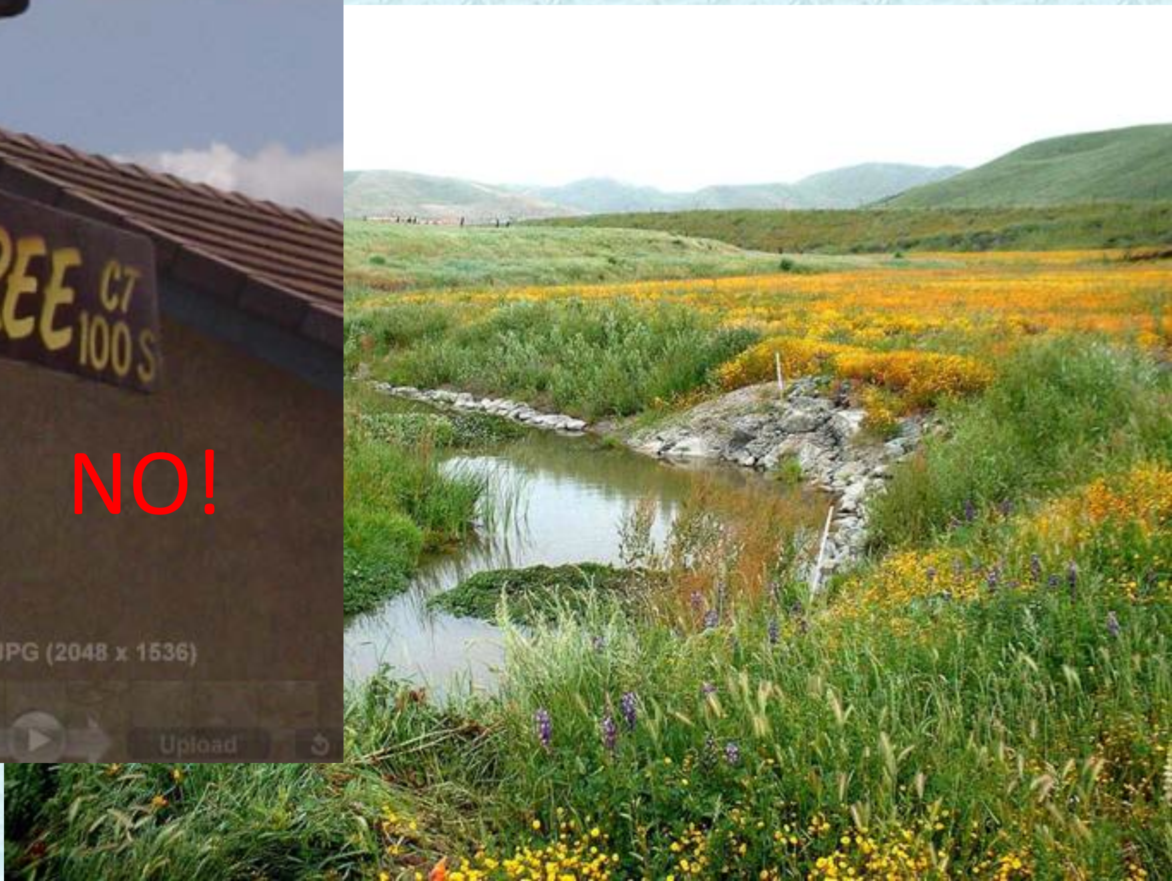
Physical Setting/Design

Long-term Hydrology

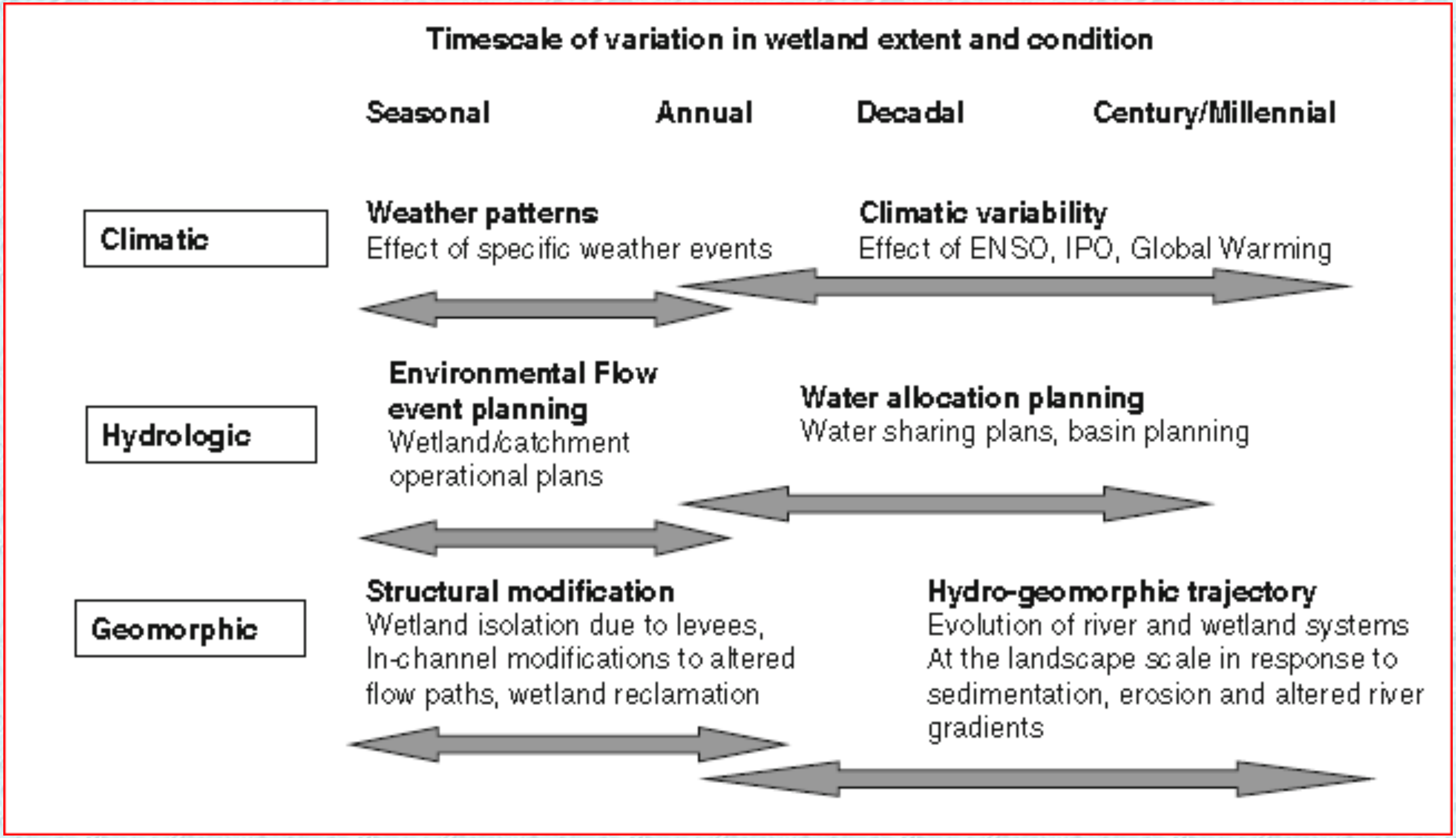
Finally. . . the Plants

YES!

NO!

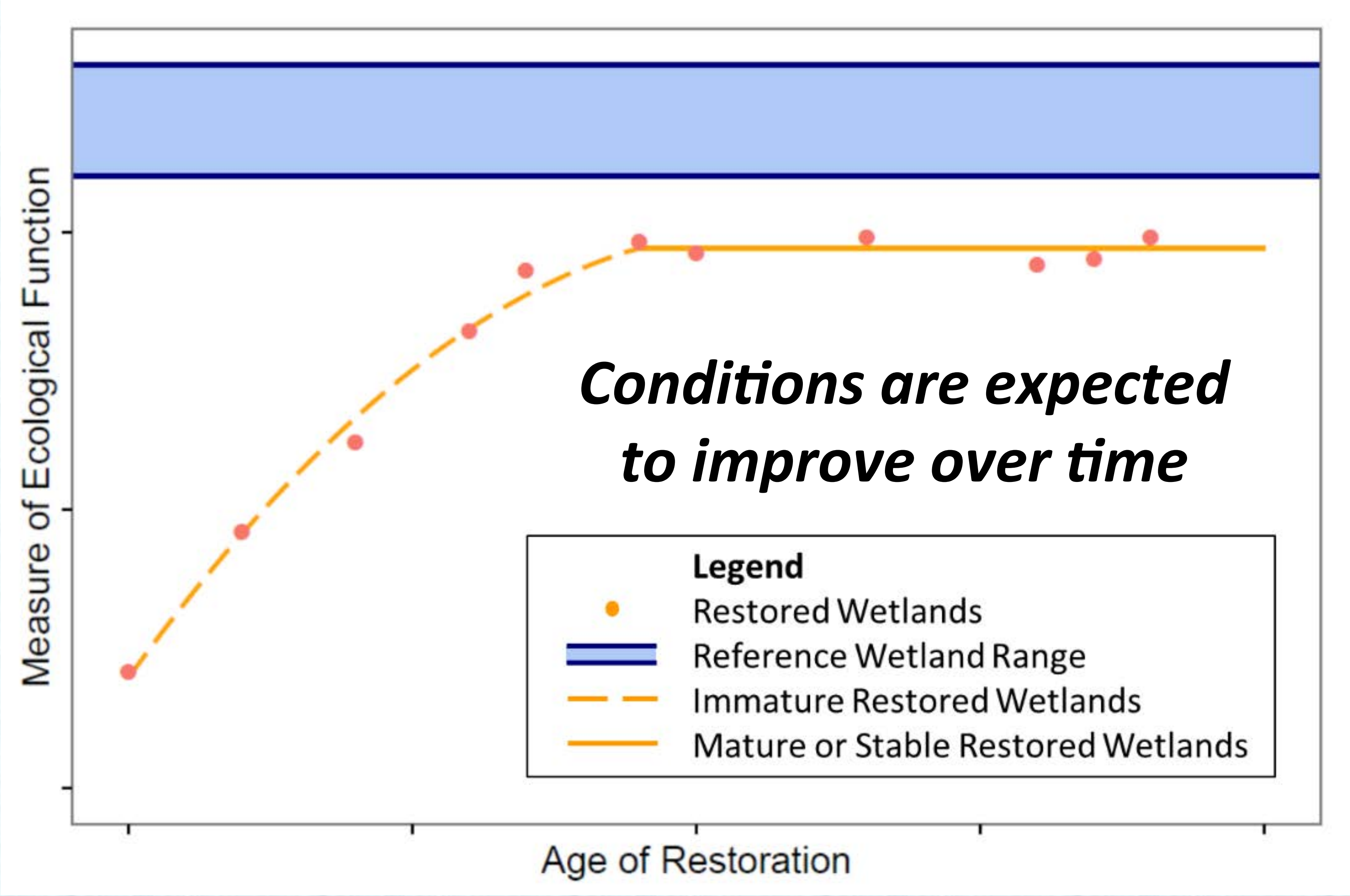


But… Recovery Takes Time

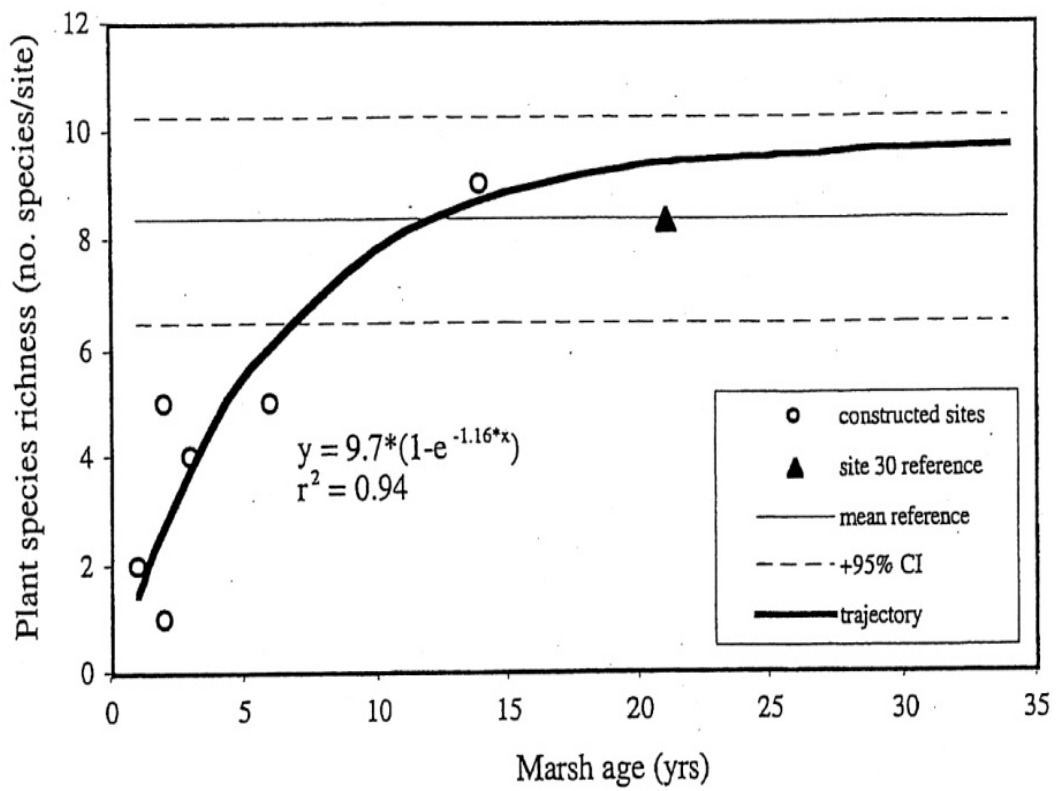


Saintilan & Imgraben 2012

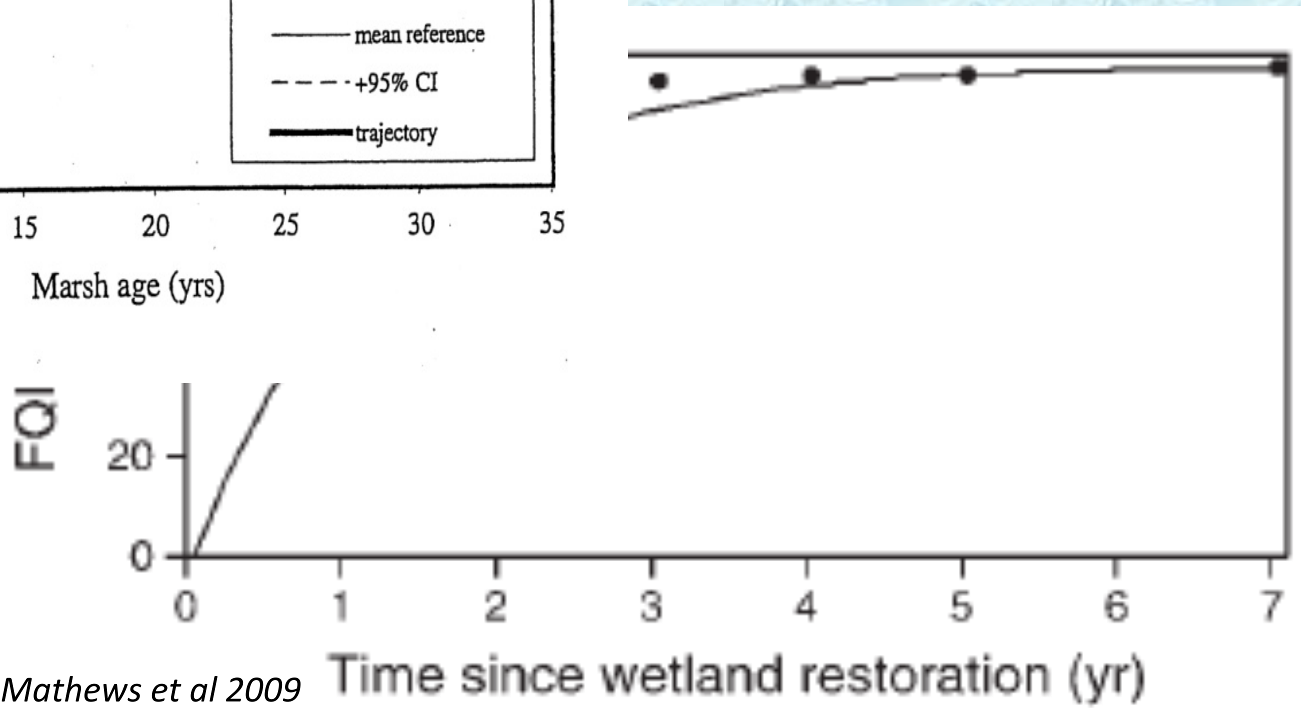
Hypothetical Performance Curve



Restoration Trajectories



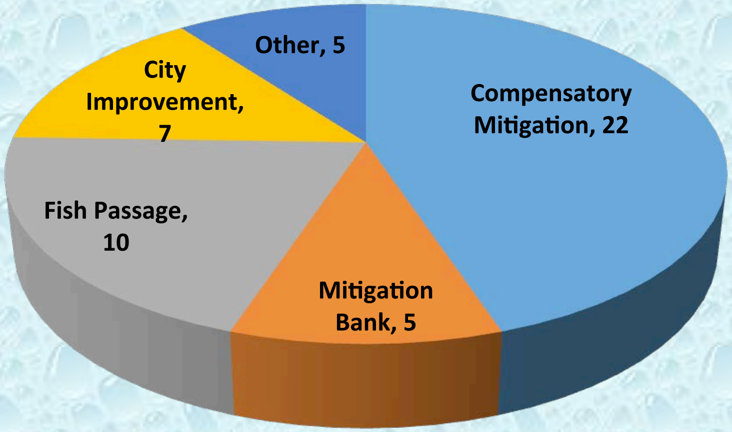
Morgan and Short 2002



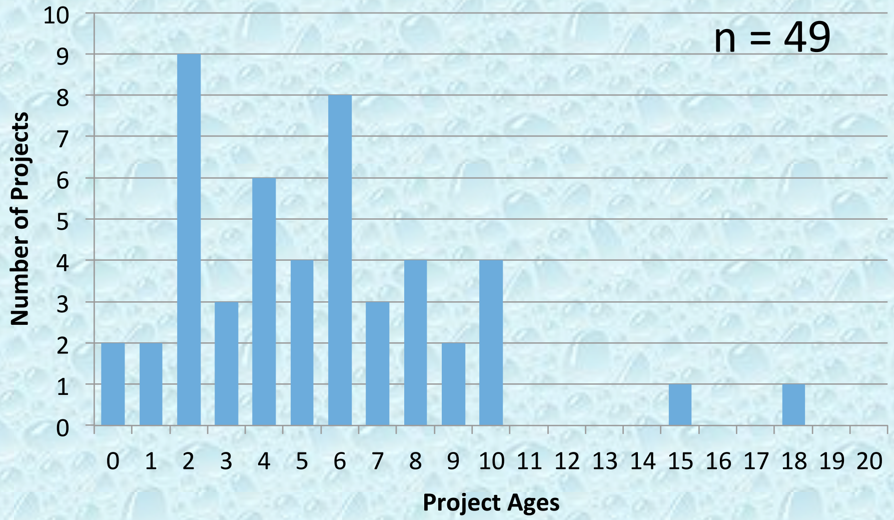
Mathews et al 2009

CA Performance Curve Development

- Collect CRAM data:
  - Restoration projects of various ages
  - Reference sites
  - Sites that have naturally evolved



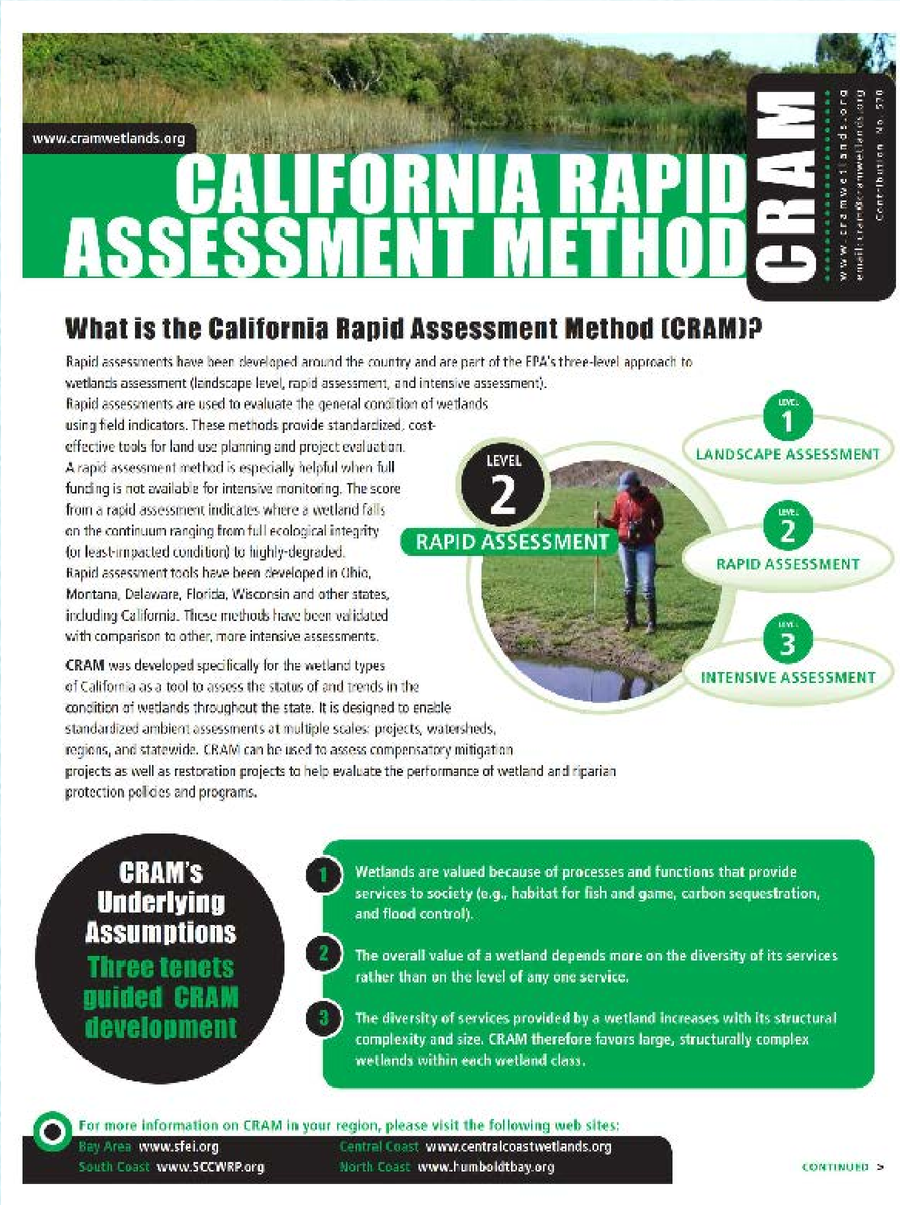
- Develop performance curves



- Test restoration project performance with data not used for curve development

California Rapid Assessment Method

- Standardized diagnostic assessment performed in 3-4 hours on a 100-200 meter stream reach
- Index scale: 25 – 100
- Four overarching attributes:
  1) Buffer and Landscape Context
  2) Hydrology
  3) Physical Structure
  4) Biotic Structure
- **www.cramwetlands.org**



www.cramwetlands.org

CALIFORNIA RAPID ASSESSMENT METHOD

CRAM

www.cramwetlands.org

email: cram@cramwetlands.org

Contribution No. 570

What is the California Rapid Assessment Method (CRAM)?

Rapid assessments have been developed around the country and are part of the EPA's three-level approach to wetlands assessment (landscape level, rapid assessment, and intensive assessment).

Rapid assessments are used to evaluate the general condition of wetlands using field indicators. These methods provide standardized, cost-effective tools for land use planning and project evaluation.

A rapid assessment method is especially helpful when full funding is not available for intensive monitoring. The score from a rapid assessment indicates where a wetland falls on the continuum ranging from full ecological integrity (or least-impacted condition) to highly-degraded.

Rapid assessment tools have been developed in Ohio, Montana, Delaware, Florida, Wisconsin and other states, including California. These methods have been validated with comparison to other, more intensive assessments.

CRAM was developed specifically for the wetland types of California as a tool to assess the status of and trends in the condition of wetlands throughout the state. It is designed to enable standardized ambient assessments at multiple scales: projects, watersheds, regions, and statewide. CRAM can be used to assess compensatory mitigation projects as well as restoration projects to help evaluate the performance of wetland and riparian protection policies and programs.

CRAM's Underlying Assumptions

Three tenets guided CRAM development

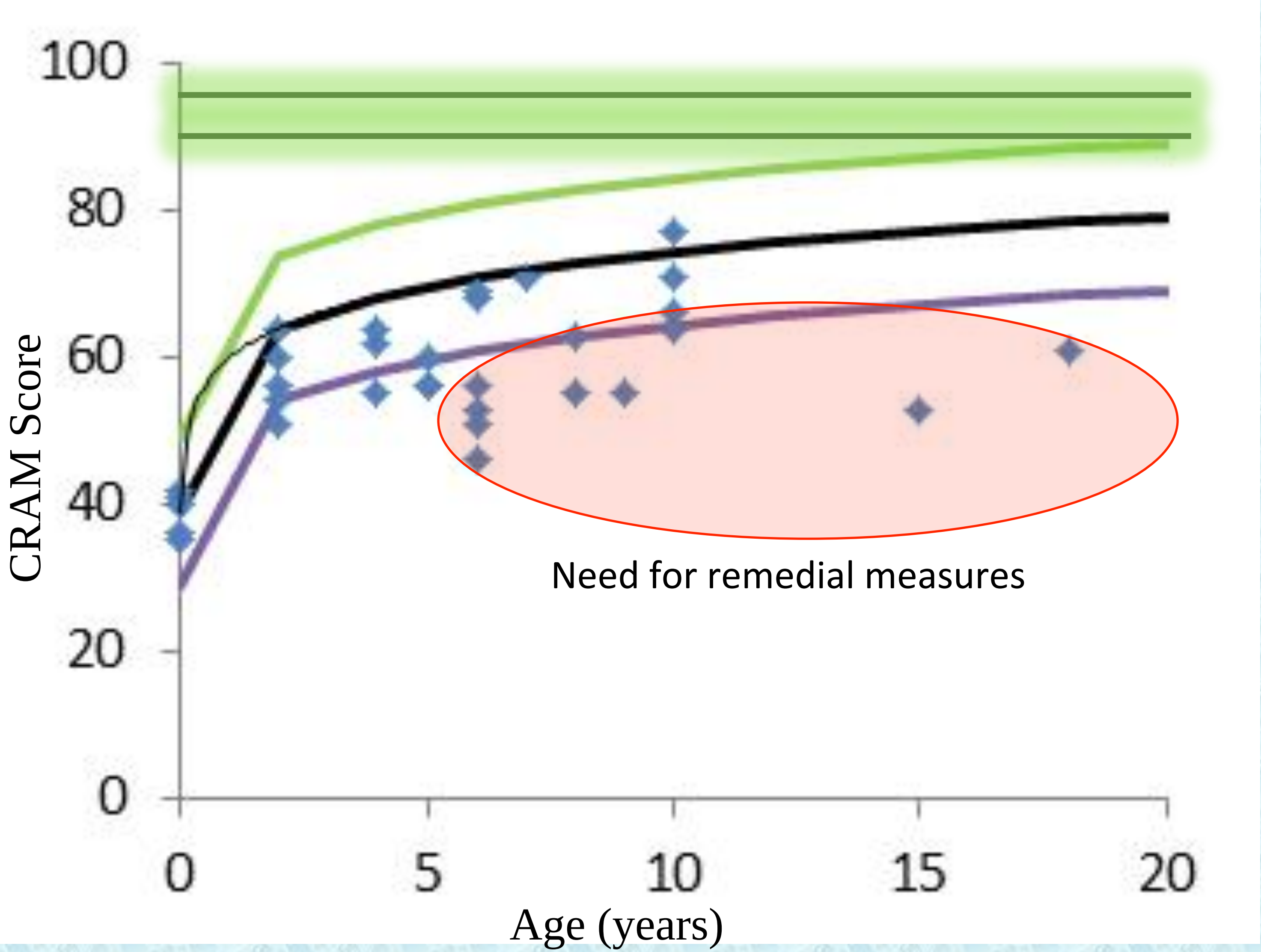
1. Wetlands are valued because of processes and functions that provide services to society (e.g., habitat for fish and game, carbon sequestration, and flood control).
2. The overall value of a wetland depends more on the diversity of its services rather than on the level of any one service.
3. The diversity of services provided by a wetland increases with its structural complexity and size. CRAM therefore favors large, structurally complex wetlands within each wetland class.

For more information on CRAM in your region, please visit the following web sites:

Bay Area www.sfei.org
Central Coast www.centralcoastwetlands.org
South Coast www.SCCWRP.org
North Coast www.humboldtbay.org

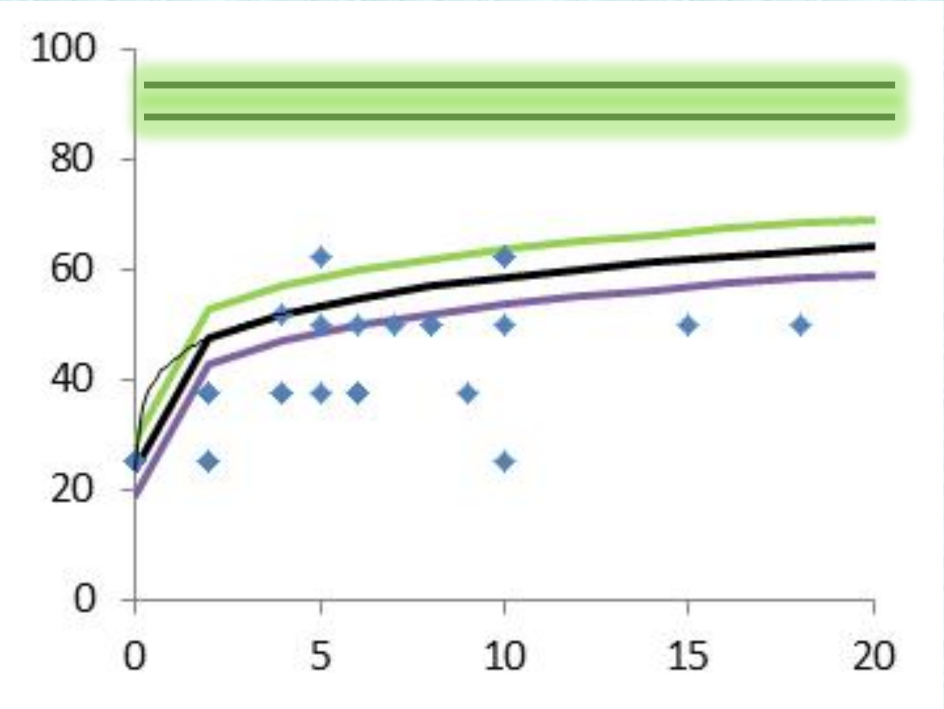
CONTINUED >

CA Performance Curves



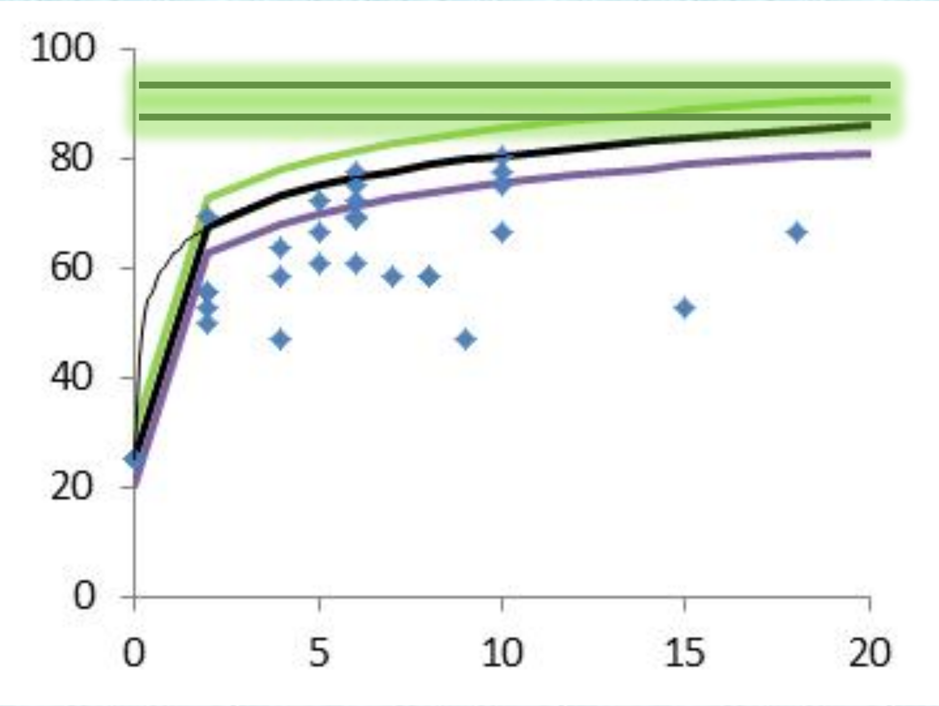
Performance Varies by Attribute

Physical Structure



- Slower recovery
- What are appropriate expectations?
- Need for design changes?

Biological Structure



- Active planting & vegetation management

Putting it All Together

Physical site design

Hydrology

Plant community

Long-term monitoring

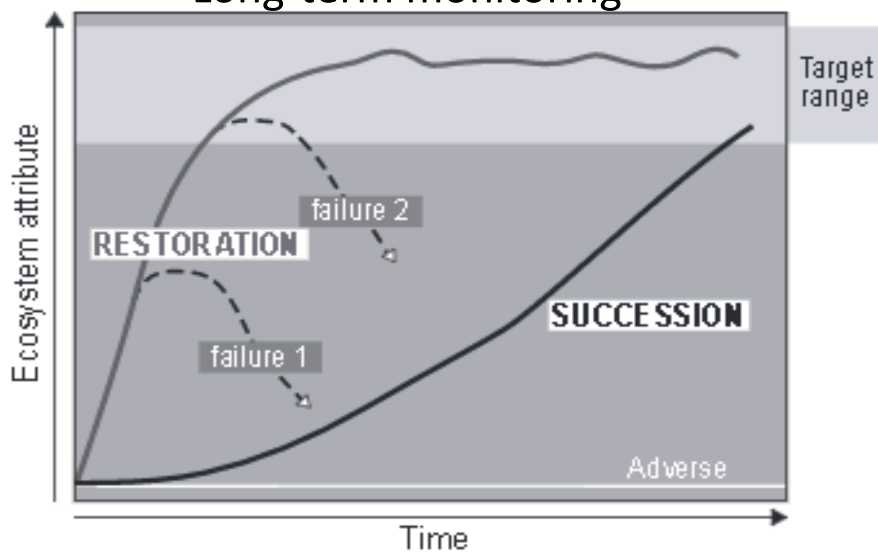
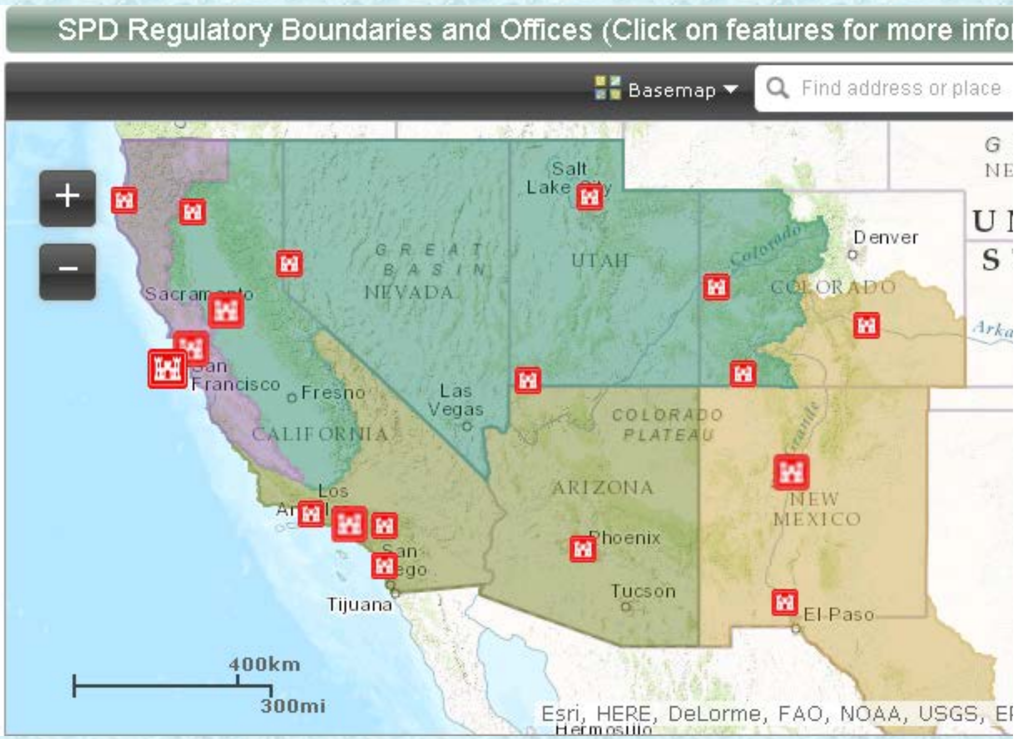
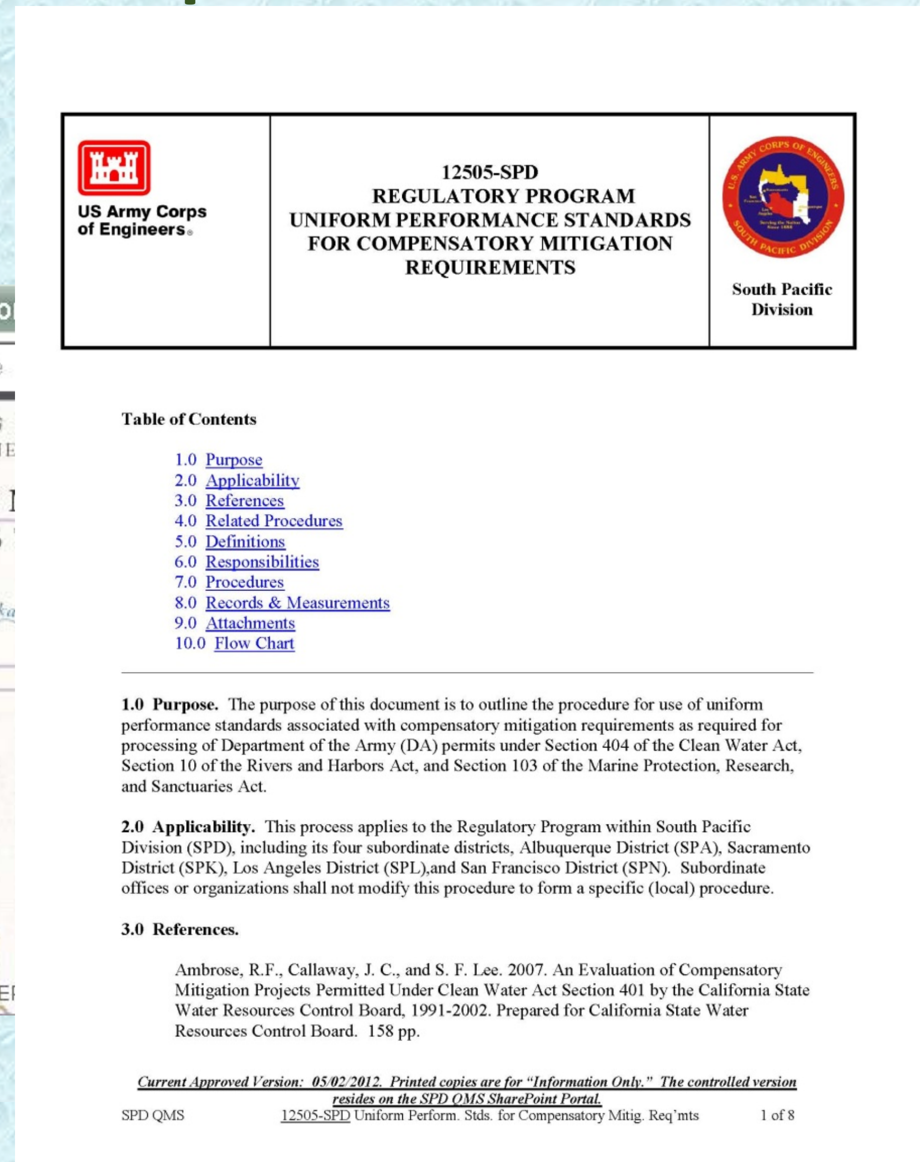


Fig. 1.7 Restoration success in relation to time: failures go undetected without appropriate monitoring.

Harris and Van Diggelen 2006

Uniform Performance Standards for Compensatory Mitigation Requirements





US Army Corps of Engineers.

12505-SPD
REGULATORY PROGRAM
UNIFORM PERFORMANCE STANDARDS FOR COMPENSATORY MITIGATION REQUIREMENTS

South Pacific Division

Table of Contents

1.0 Purpose
2.0 Applicability
3.0 References
4.0 Related Procedures
5.0 Definitions
6.0 Responsibilities
7.0 Procedures
8.0 Records & Measurements
9.0 Attachments
10.0 Flow Chart

1.0 Purpose. The purpose of this document is to outline the procedure for use of uniform performance standards associated with compensatory mitigation requirements as required for processing of Department of the Army (DA) permits under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act.

2.0 Applicability. This process applies to the Regulatory Program within South Pacific Division (SPD), including its four subordinate districts, Albuquerque District (SPA), Sacramento District (SPK), Los Angeles District (SPL),and San Francisco District (SPN). Subordinate offices or organizations shall not modify this procedure to form a specific (local) procedure.

3.0 References.

Ambrose, R.F., Callaway, J. C., and S. F. Lee. 2007. An Evaluation of Compensatory Mitigation Projects Permitted Under Clean Water Act Section 401 by the California State Water Resources Control Board, 1991-2002. Prepared for California State Water Resources Control Board. 158 pp.

Finalized May, 2012, covers 4 Corps Districts

Uniform Performance Standards Features

Types of Performance Standards

- Physical
- Hydrologic
- Faunal & Flora-Diversity
- Water quality (ecological vs. human health)

Features

- Ecologically-based performance standards
- Incorporation of reference sites
- Incorporation of functional/condition assessments
- Allows for tiered/incremental implementation of standards

Example Performance Standards

Category	Standard	Target	Timing
Physical - Riverine	cross-section has at least two benches or breaks in slope, including the riparian area, above the channel bottom, not including the thalweg	Relative to min of 2 reference sites	Year 1

Category	Standard	Target	Timing
Hydrologic - Tidal	Seasonally open inlet: The permittee shall ensure the tidal inlet opens at a frequency and duration to provide design-level site inundation and salinities.	Relative to regional reference sites of same estuarine type	Inlet dynamics would be present immediately and would be expected to persist; biological features would develop over time.

Category	Standard	Target	Timing
Flora – all wetland types	Species richness: The permittee shall ensure target native species richness values of tree, shrub, and herb strata are met by year 5.	>75% of reference	By year 5, after hydrology criteria

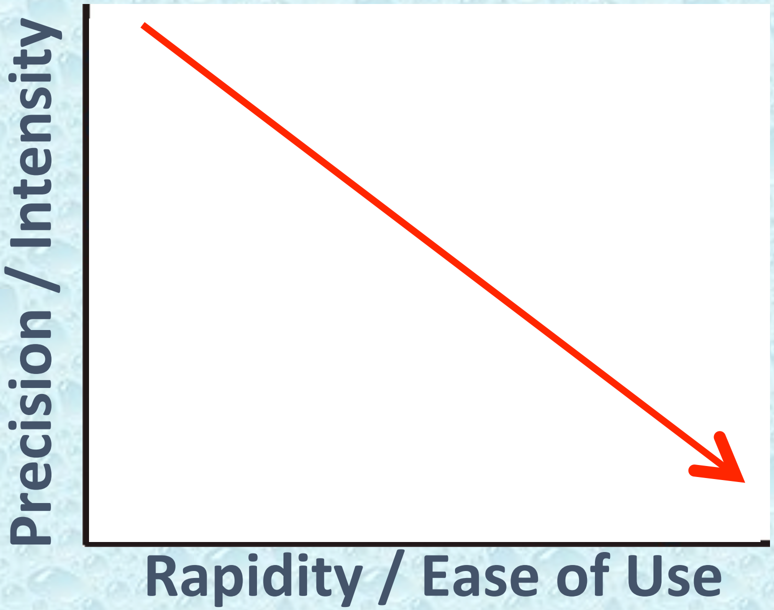
Closing Thoughts

- Choose the right tool to assess processes

- Keep it simple
  - repeatability

- Consider element of time

- ***Provide clear, enforceable and process-based standards***



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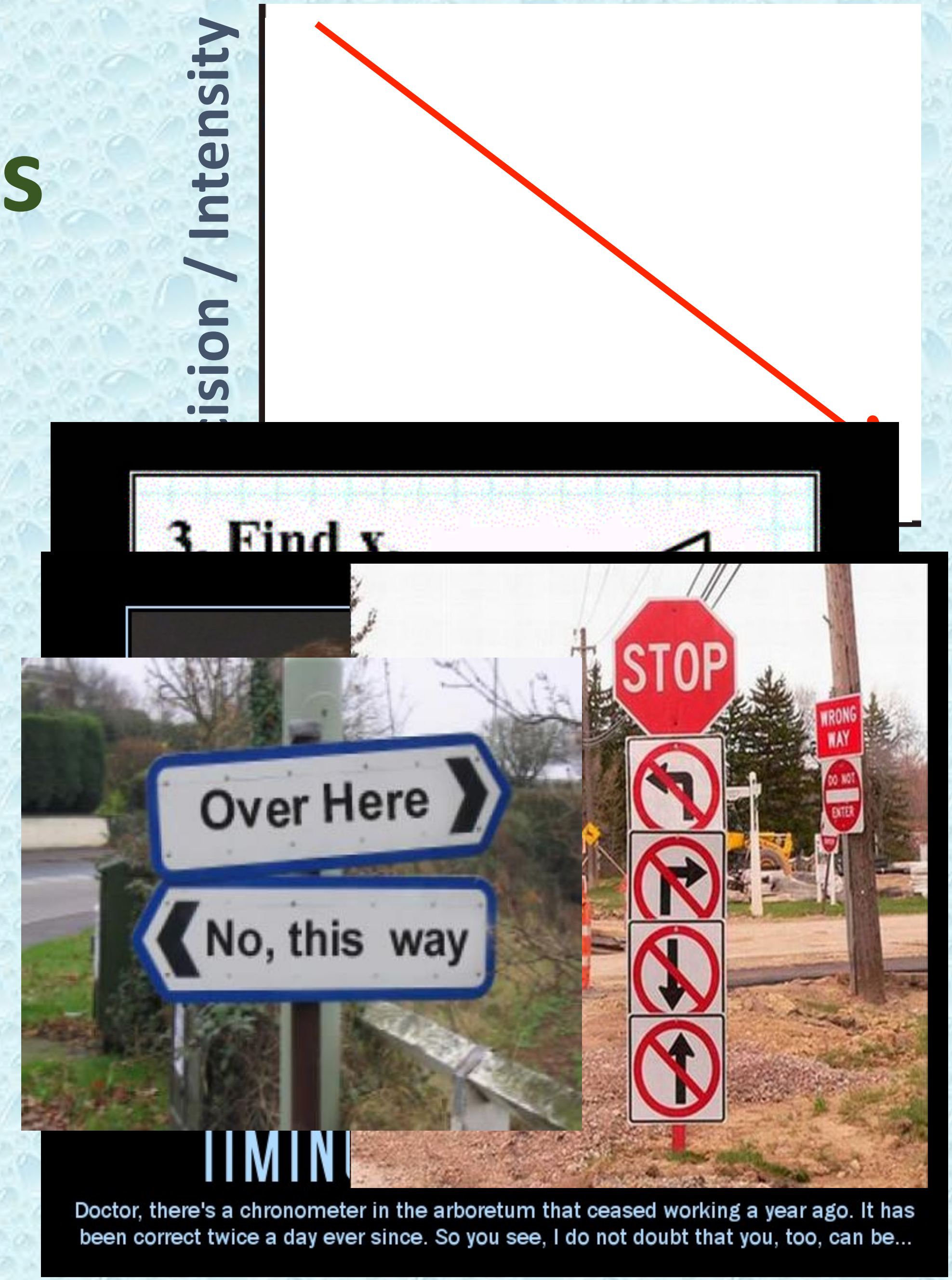


EVERYTHING IS
TERRIBLE!


EVERYTHING IS
AWESOME!

Thank You

Eric Stein
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