Conceptual Approach and Technical Workplan for Freshwater Biological Objectives in California

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The Goal For Today

- **Reminder of workplan strategy from the kick-off meetings in March**
  - **Provide a little more detail**
- **Tell you what we know**
  - **What we don’t know**
- **Looking for feedback to enhance scope**
  - **Impressions for the Scientific Advisory Committee**

SWRCB's Bio-Objective Development Philosophy

- All waterbodies should have biological objectives
  - Start with perennial wadeable streams
- Desire multiple indicators
  - Start with benthic macroinvertebrates
- Biological objectives need numeric endpoints
  - Perhaps several
- Requires statewide consistency with regional flexibility

9-Step Development Process

- Reference condition
- Stressor response models
- Waterbody classification
- Stressor identification
- Information management

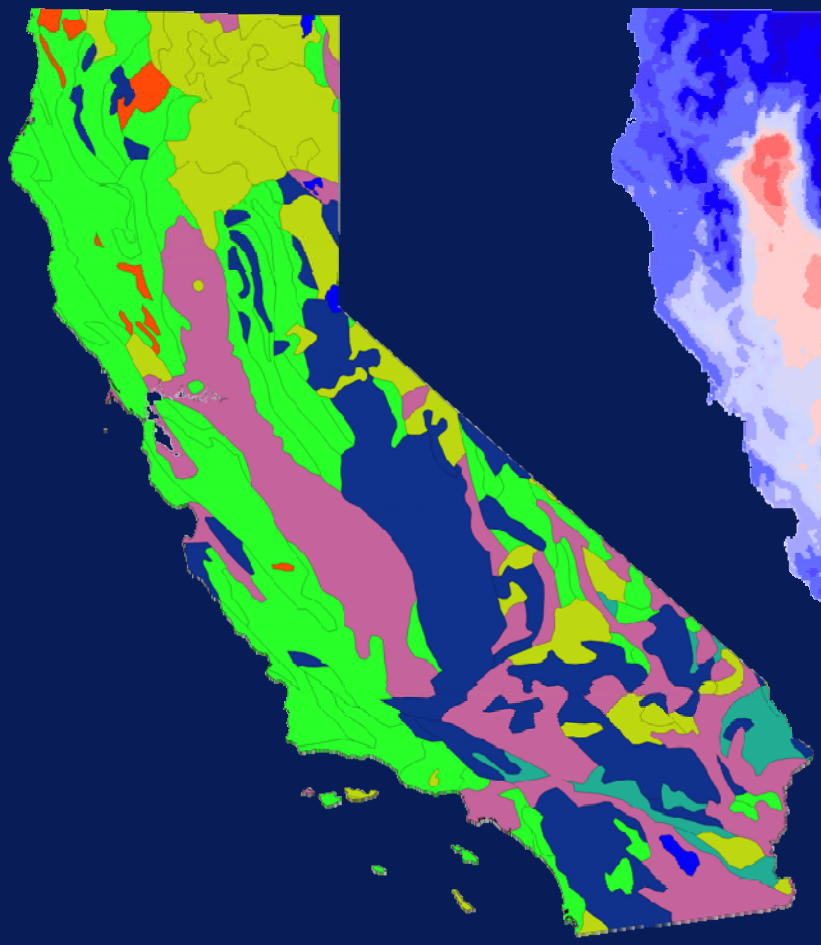
Technical Elements

- Implementation Plan Development
- Rulemaking
- Outreach
- Training and standardization

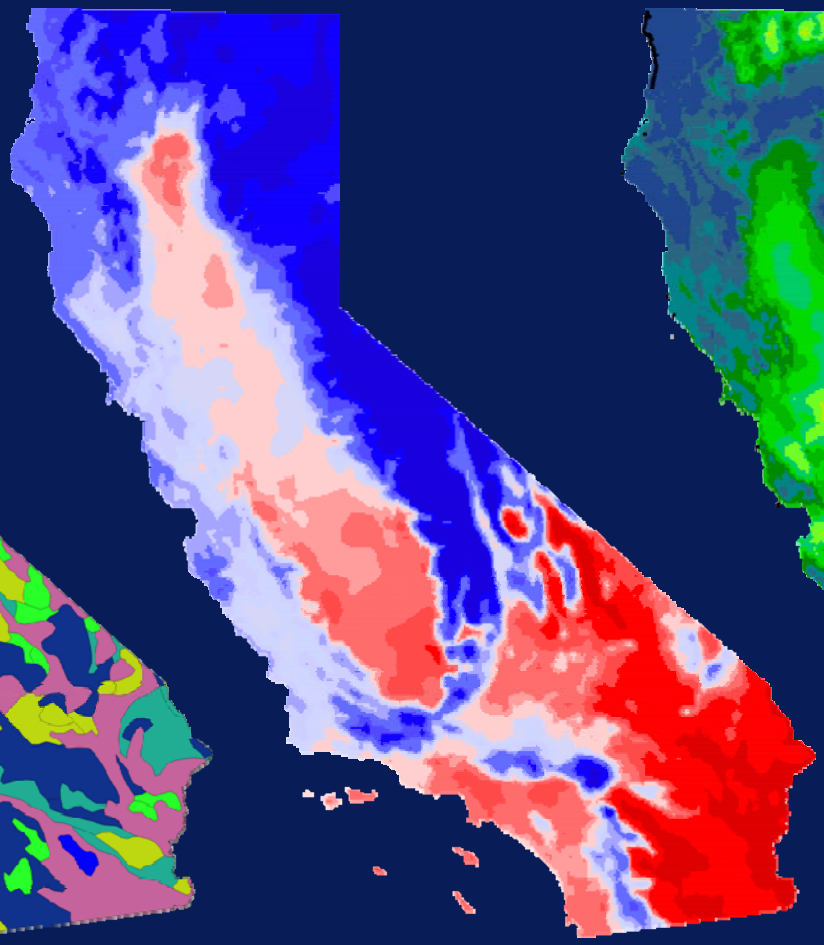
Reference Condition

- **Biology will naturally vary with physical factors**
  - **Rainfall, elevation, temperature, slope, etc.**
- **We don’t expect biology to look the same in different parts of the state**
- **Goal is to set biological expectations for unaffected sites**
  - **For each region**

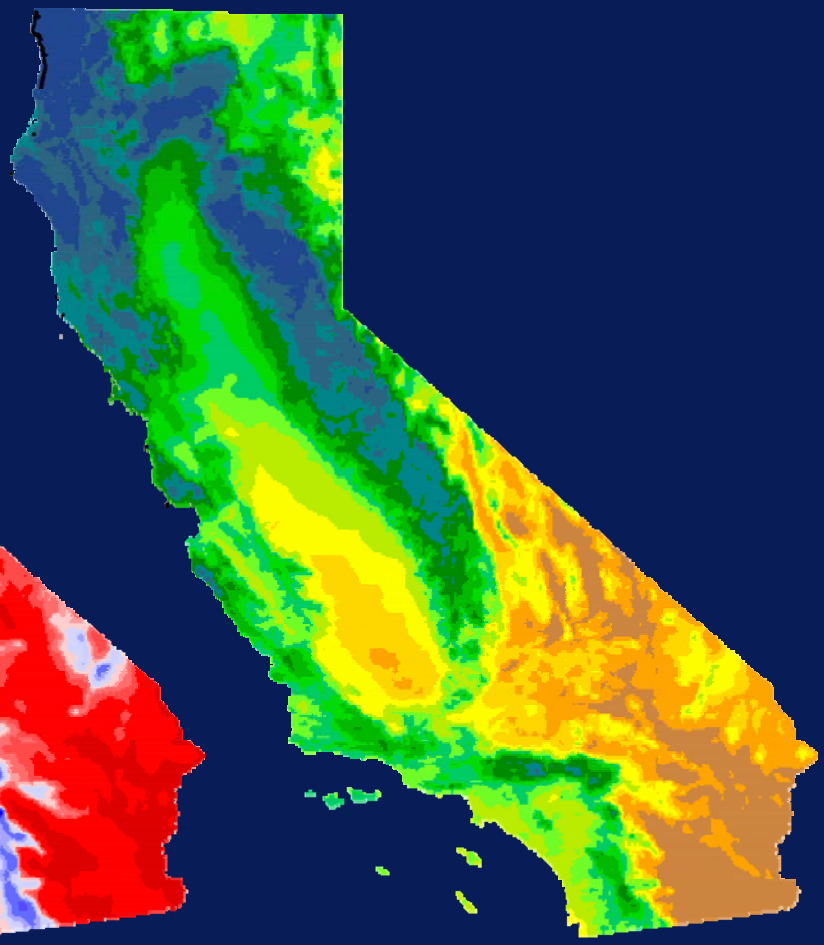
Geology



Temperature



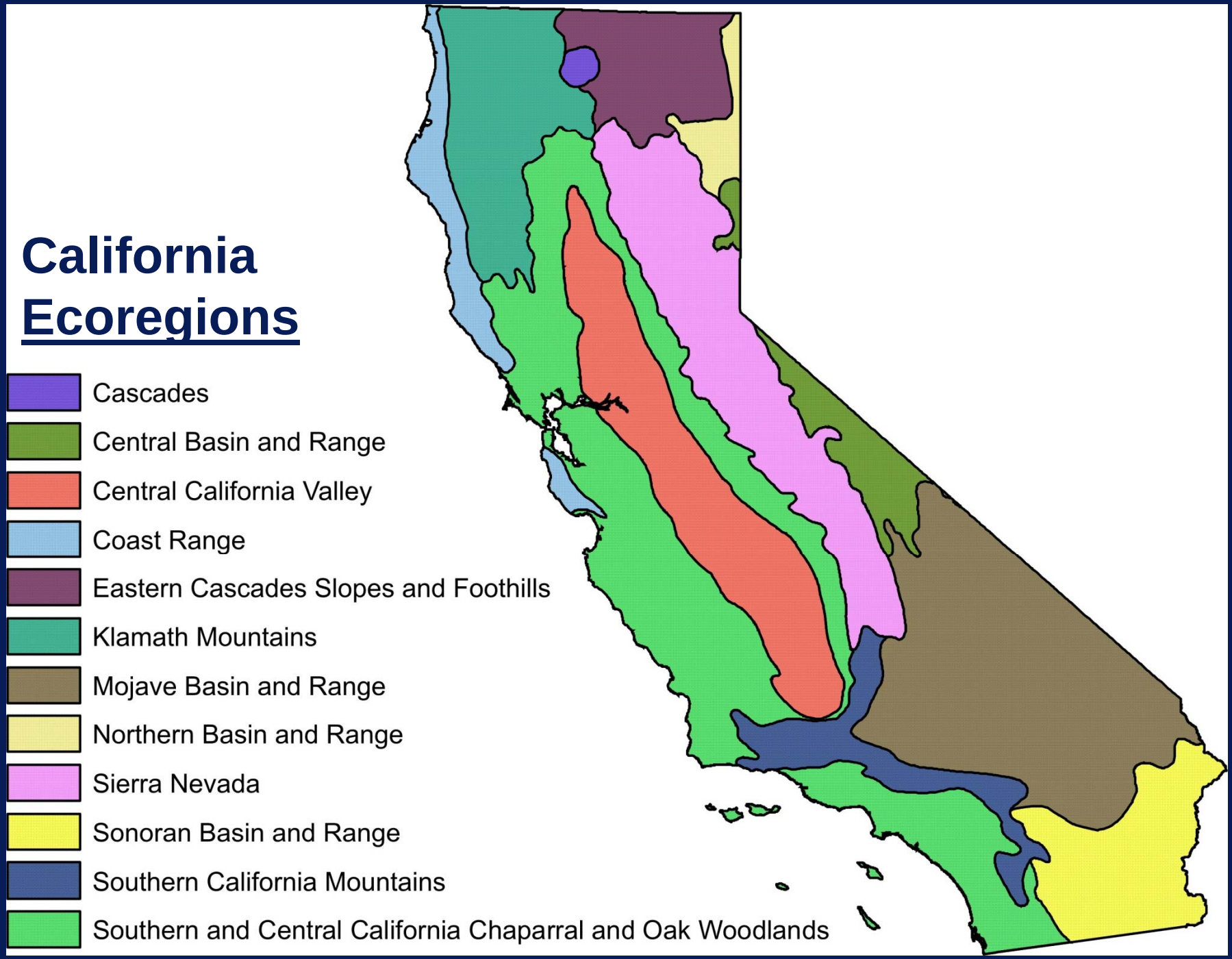
Precipitation



What Do We Know?

- State has multiple ecoregions
- There are multiple large-scale projects that can be used to help derive reference condition
- State has initiated a Reference Condition Management Plan

California Ecoregions

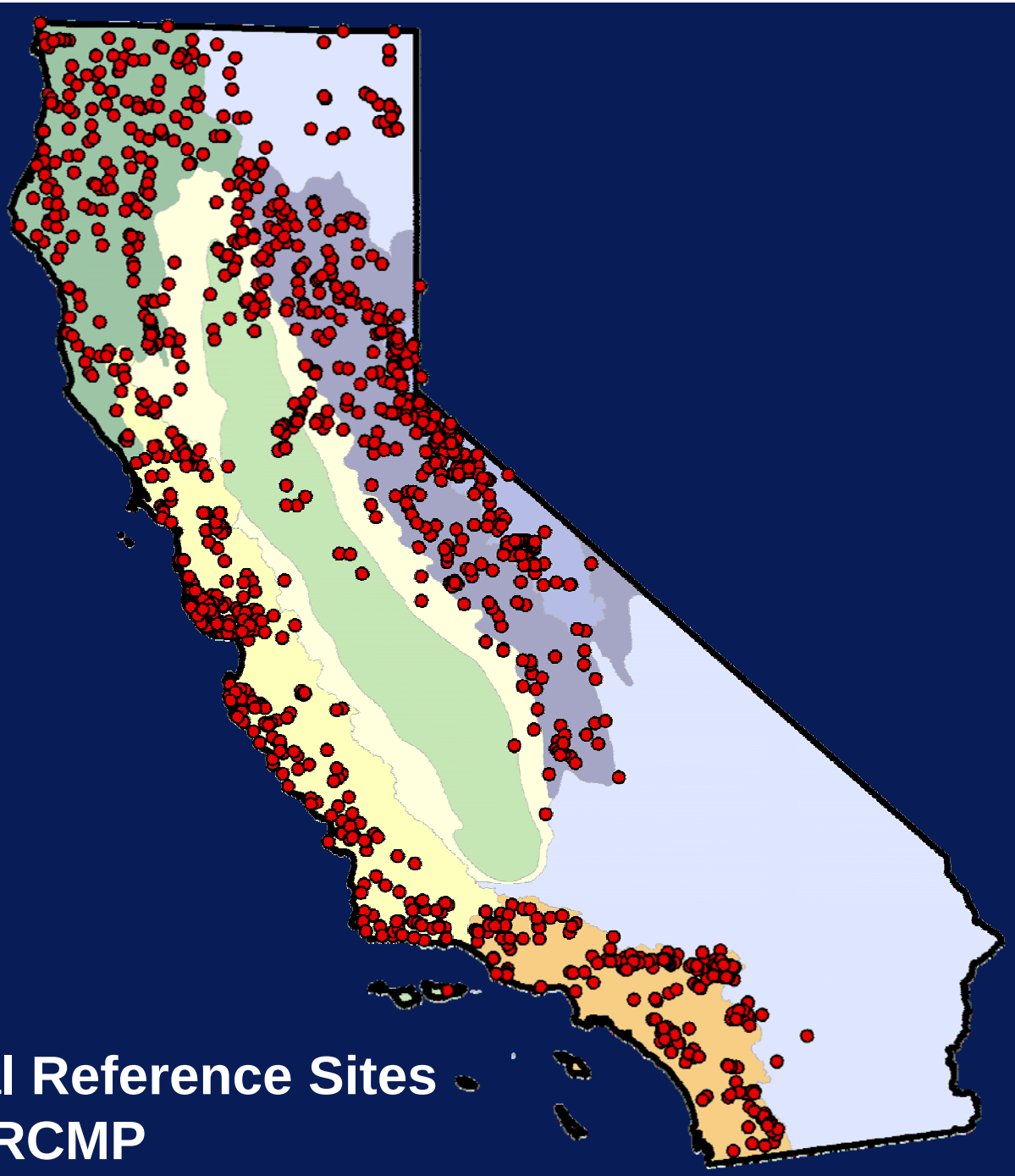


Large-Scale Programs Have Value

Program	Number of Sites	Geographic Distribution	Study Design	Indicators			
				BMI	PHab	Chemistry	Algae
EMAP	230	Statewide	Probabilistic	X	X	X	X
CMAP	200	Statewide	Probabilistic	X	X	X	X
PSA	200	Statewide	Probabilistic	X	X	X	X
USFS	200	Forest Lands	Targeted	X	X		
SMC	200	So Cal	Probabilistic	X	X	X	X
RWQCBs	>400	Many regions	Targeted and Probabilistic	X	X	X	

Reference Condition Management Plan

- State has invested over $2M into defining reference condition so far
  - Started with a 3-day workshop of national experts
- Defined an approach with multiple options
  - Statewide consistency with regional flexibility
- Started in 2008 by examining existing data
  - Collecting new data at existing sites this year



Map of Potential Reference Sites
For the State's RCMP

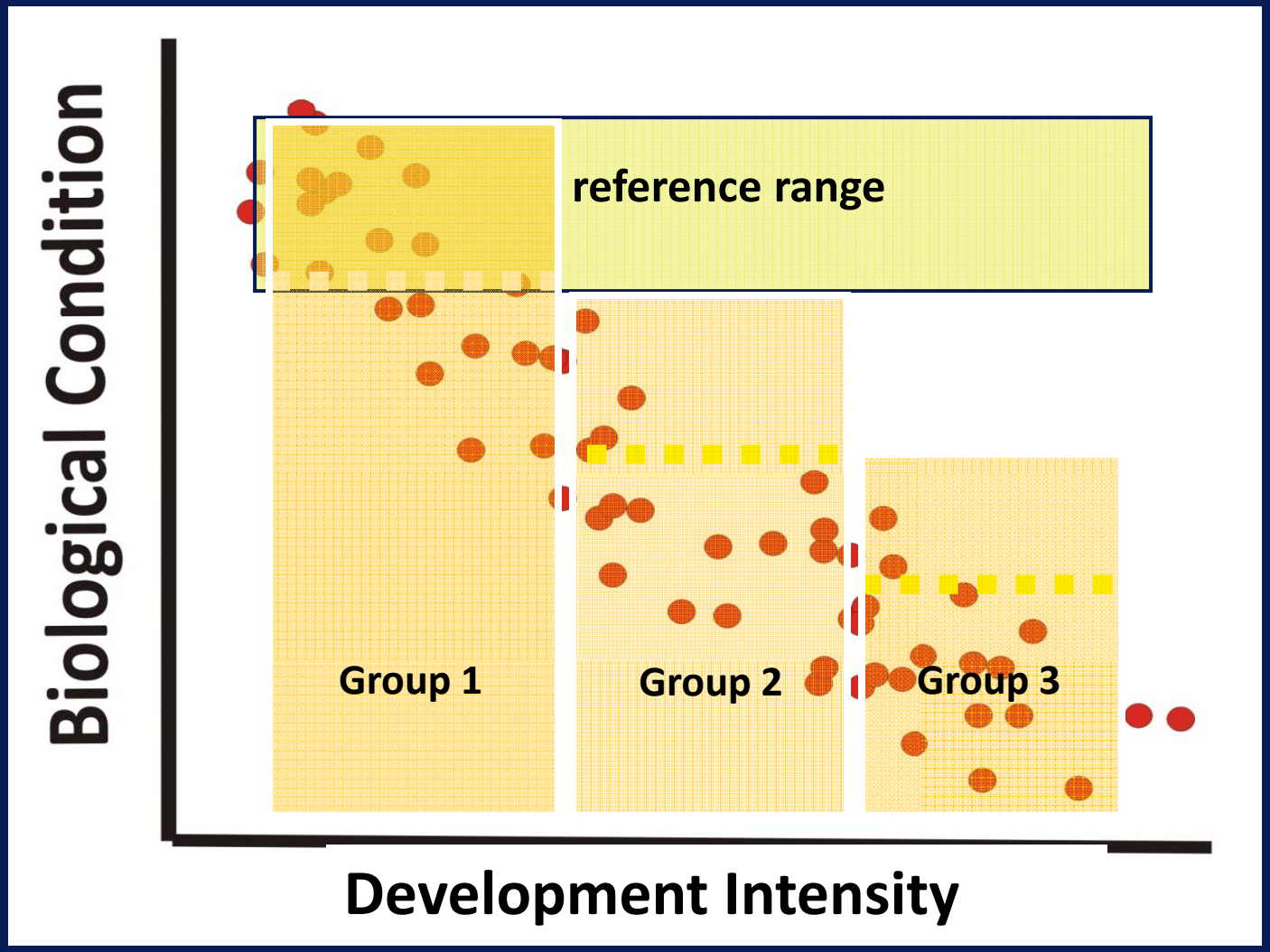
What Don’t We Know?

- How many biogeographic regions are there?
  - How many can we realistically accommodate?
- What are the important natural gradients within biogeographic regions?
- How do we account for biogeographic regions without many (any) reference sites?

Stressor Response Models

- Reference condition isn’t a fair standard for all sites
  - Unalterable anthropogenic stressors
- There are quantifiable changes in biological condition with increasing stressors
- Goal is to identify the most accurate model(s)

Stressor Response Models Can be Used for Establishing Tiered Biological Objectives



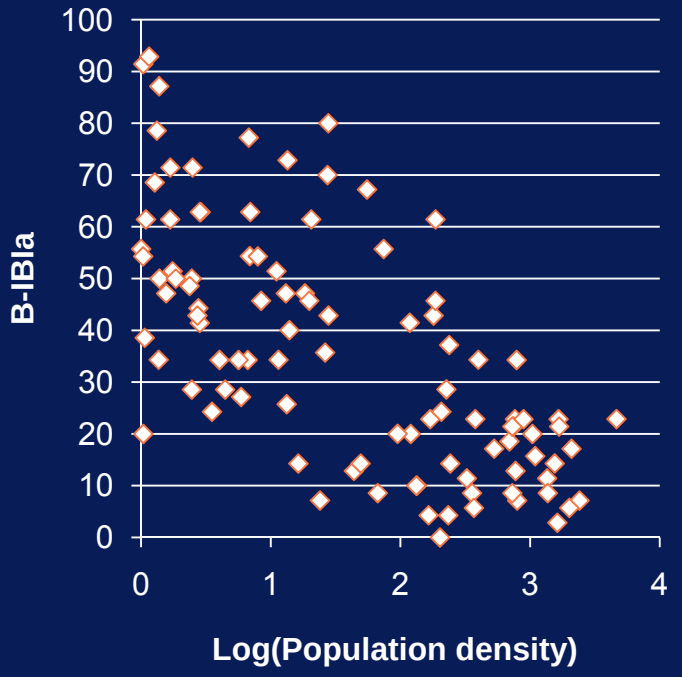
What Do We Know?

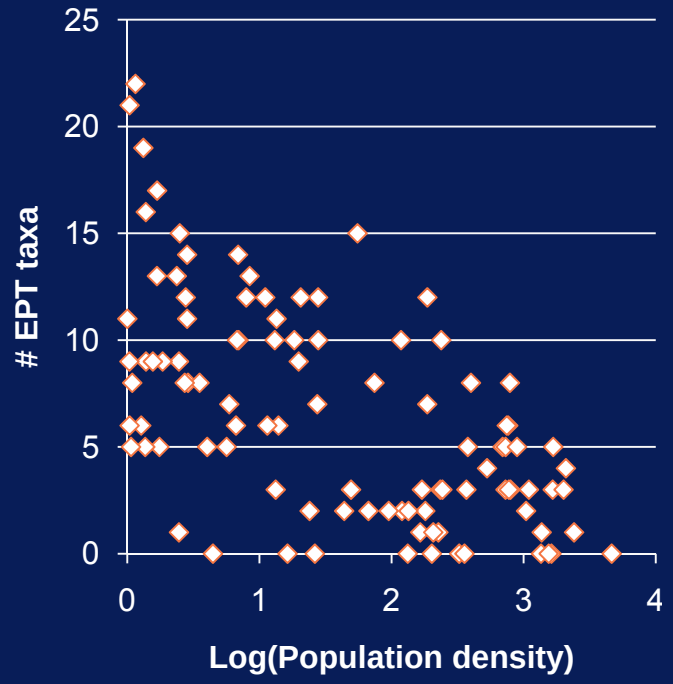
- **Stressor response models can be built**
  - **Several approaches can work**
- **Biological indices exist to assess response gradient**
  - **IBIs, O/E, individual metrics**
- **Existing data sets available to quantify stressor gradient**
  - **Landscape (GIS) and reach scales are likely important**

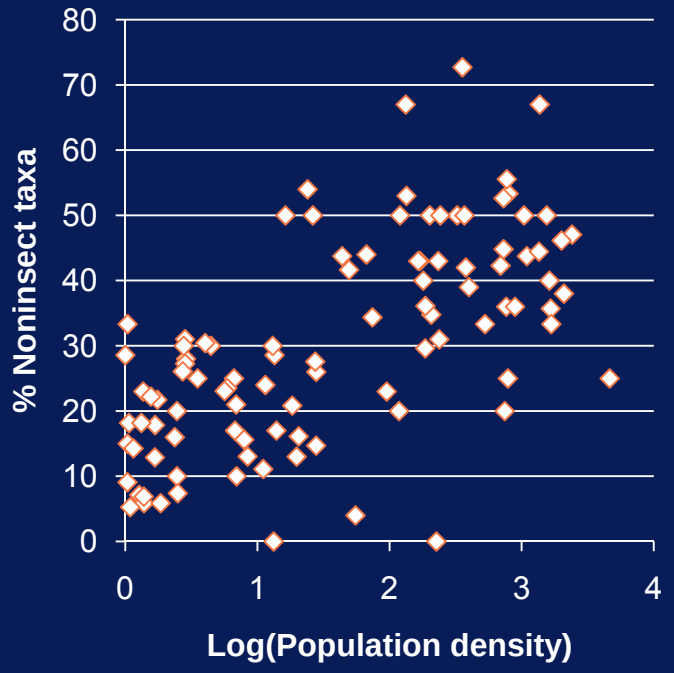
Types of GIS Data Sets Available For Use

Information Type	Data Sources	Notes	Coverage
Landuse/Landcover	National Landcover Dataset (NLCD), MRLC	1992, 2001 satellite imagery, allows for 9-yr landcover change assessments	Statewide
Impervious Surface	NLCD, Others	Quality varies regionally	NLCD statewide, others patchy
Road Density	USFS, TIGER		Statewide, but patchy
Timber Harvest	CDF, THPs		
Vegetative Change/ Vegetative Change Cause (LCMMP)	USFS/CDF		Not Statewide
Population Density	Census Blocks, CDF	Produced in conjunction with decadal population censuses; censuses can be combined to estimate population change	Statewide
Mining	USGS	Possibly outdated	Statewide
NPDES	EPA	Prone to inaccuracies	Statewide
303(d) listed streams	SWRCB	Every three years	Statewide
Water Diversions/ Extractions	USGS, NHD+	Possibly outdated	Statewide
Dams	CalWater	Doesn't include overflow info	Statewide
Stormwater Inputs	NHD+, Counties	Uneven coverages	Patchy
POTW	EPA	Prone to inaccuracies	Statewide
Landslide Datasets	CalTrans		Statewide

Example Stressor-Response Model from Southern California







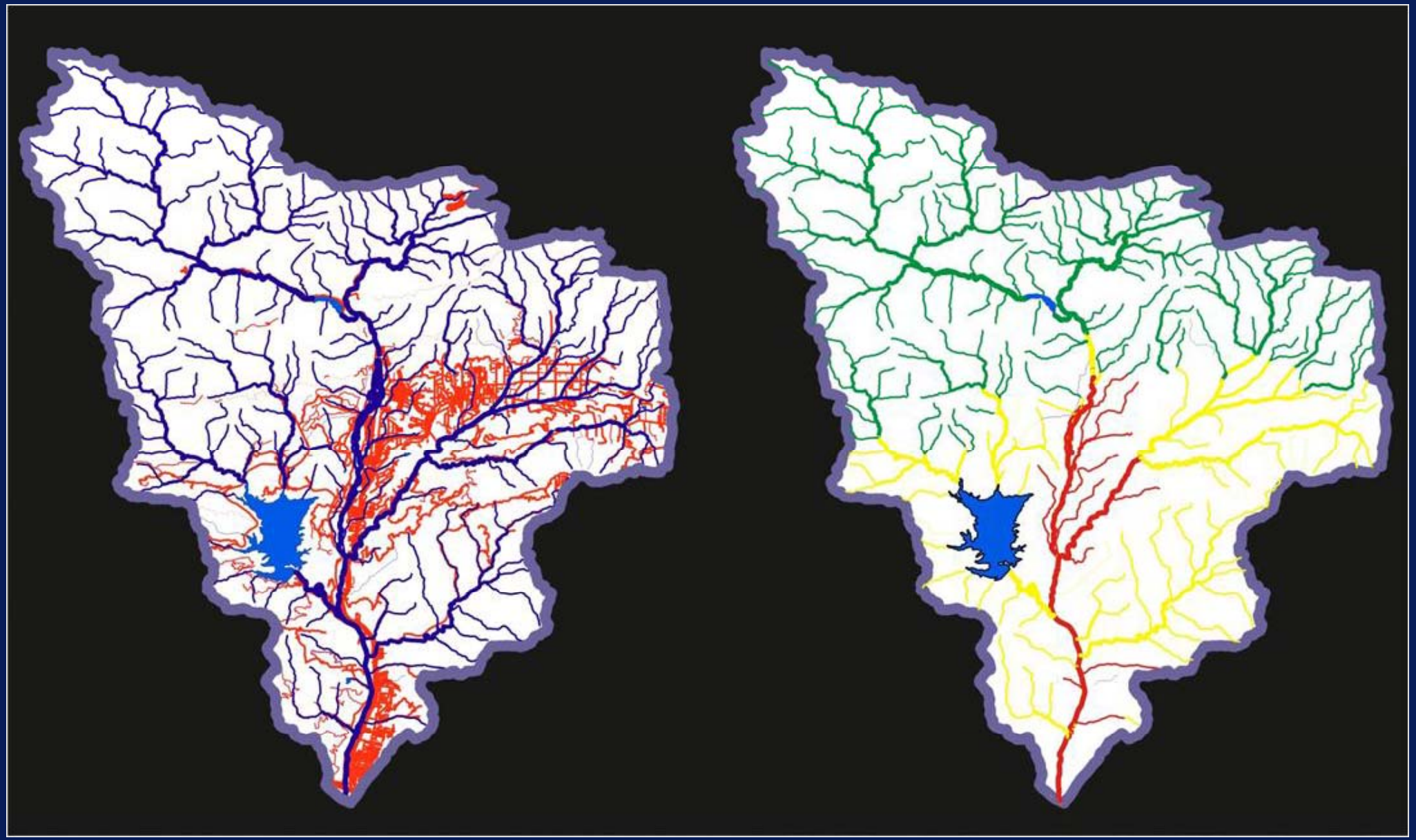
What Don’t We Know?

- **Which is the best modeling approach?**
- **Which biological assessment tool, or combination of tools, provides adequate response sensitivity?**
  - **How do we intercalibrate these tools across the state?**
- **Which stressor variables are the best predictor(s) of response?**
  - **At what scale?**

Waterbody Classification

- Goal is to translate the stressor response model into biological expectation
- Accomplished by extrapolating stressor gradients
- Will require both modeling and field verification

Example Waterbody Classification



What Do We Know?

- We have GIS layers of stream and stressors
  - Building blocks for classifying streams
- Will build on the stressor-response model task
  - Threshold development is not completely technical
- We won't be able to field verify every site
  - This is where it hits home for stakeholders

What Don’t We Know?

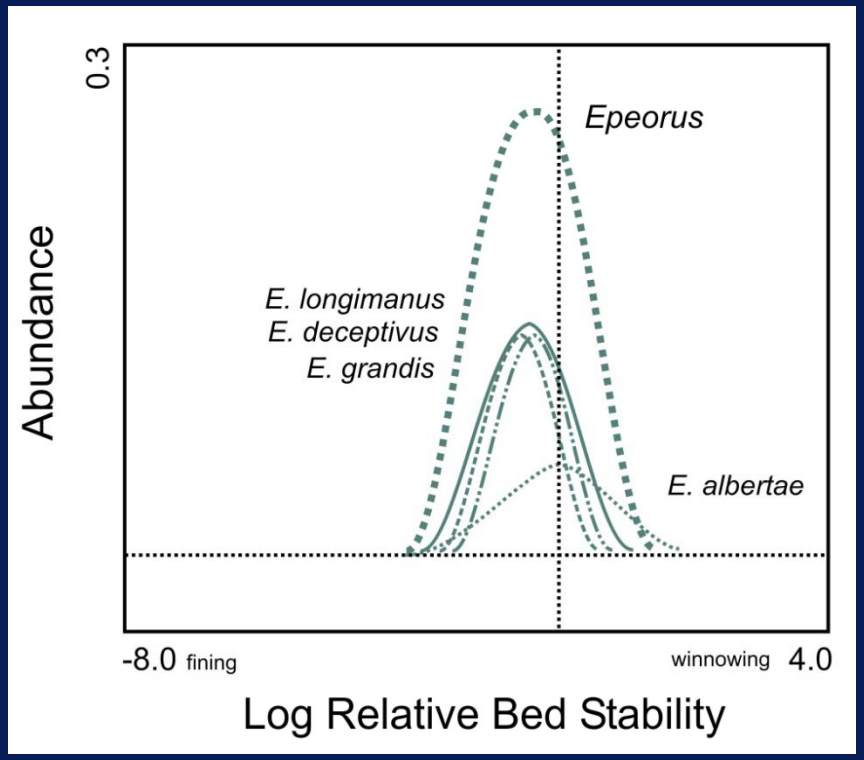
- How good the GIS coverages depict your stream reach
  - Model uncertainty versus GIS uncertainty
- If the model will work for every biogeographic region
  - This might result in missing portions of the State
- What resolution best ascribes classification
  - Reach buffer, upstream buffer, catchment, entire watershed

Stressor Identification

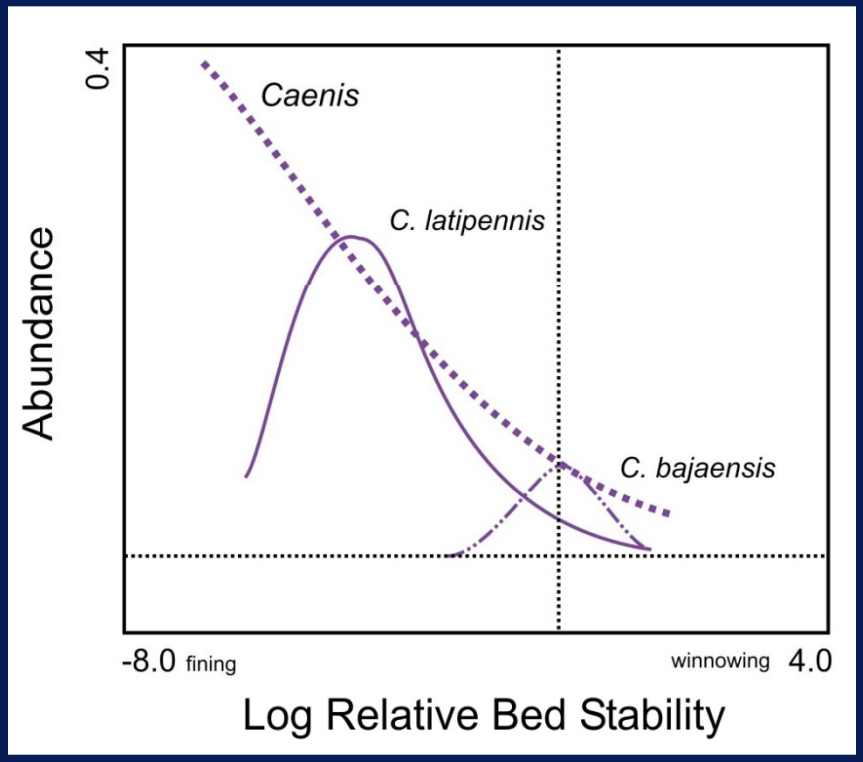
- Need to determine site-specific explanations when bio-objectives are not achieved
- Multiple approaches exist, but have not been vetted in California
  - correlative, relative risk, tolerance values, mechanistic, etc.
- Goal is to provide recommendations for future use

Sediment intolerant vs. sediment tolerant

Epeorus



Caenis



What Do We Know?

- Inherently site specific
  - Regional stressor response modeling can give insight
- US EPA has invested in this topic for nearly 10 years
  - www.epa.gov/CADDIS
- We are looking to conduct three test case studies as the basis for our recommendations
  - Different stressors
  - Different locations

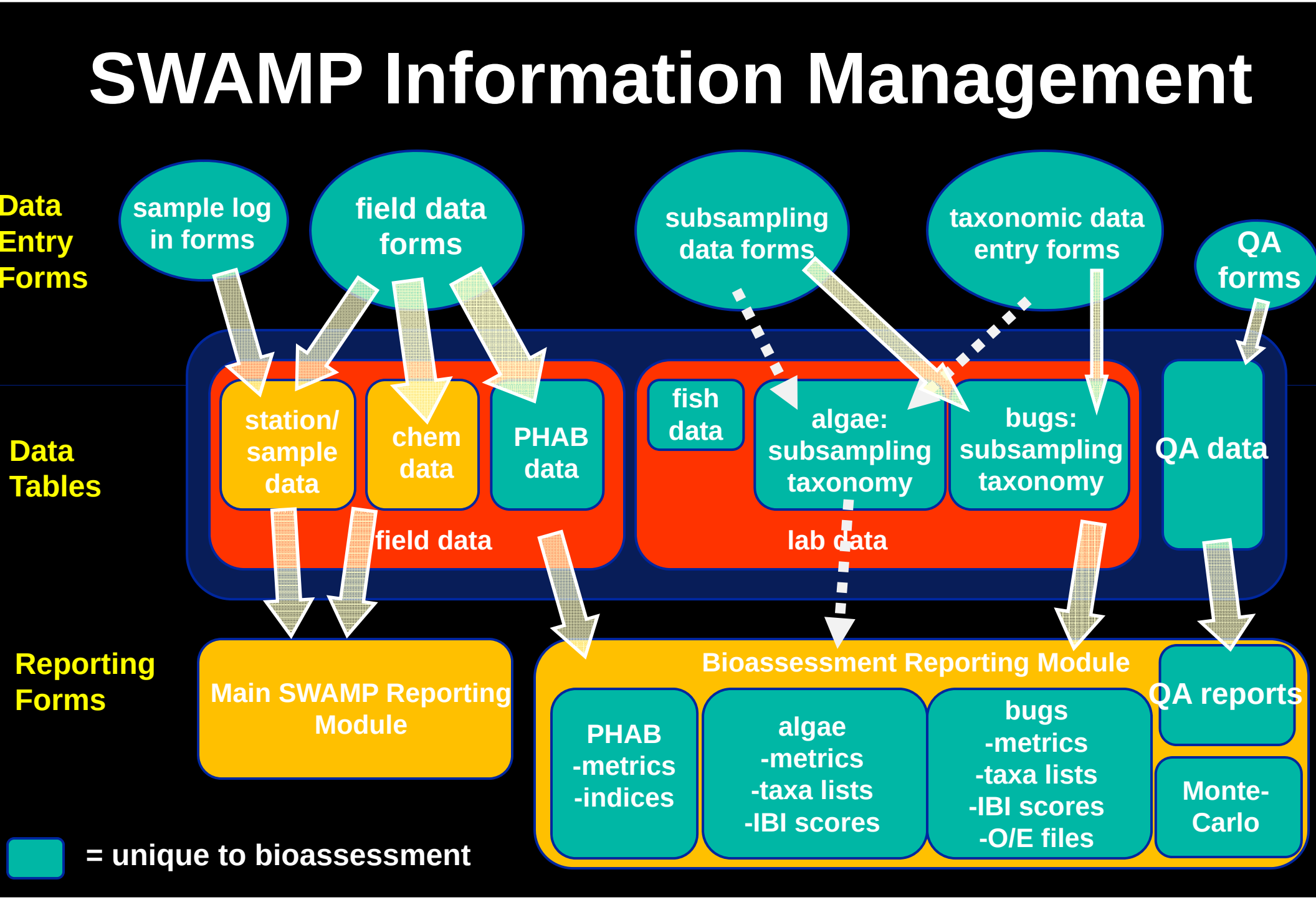
What Don’t We Know?

- Which approach will succeed/fail
- Where we will conduct the test case studies
- Which types of stressors for the test case studies

Information Management

- The State has invested over $2M into information management for ambient data thus far
  - Another $0.5M this year alone
- Developed a standardized data structure based on CA Environmental Data Exchange Network (CEDEN)
- Goal is to have a transparent and standardized way to submit, store, access, and analyze bioassessment data

SWAMP Information Management



What Do We Know?

- CEDEN to be launched in June
  - Chemistry and toxicity at the start
  - Biological and habitat data storage and functions will be developed in time for the bio-objective policy
- Regional Data Centers are being developed to assist with data transfer
  - Four statewide
- Need to turn data into information
  - Useable for both regulated and regulatory agencies

What Don’t We Know?

- **Largely non-technical hurdles to success**
  - **Equally as important as technical issues**
- **Linkage to electronic reporting requirements for permits**

Schedule

- The Science Team needs to produce all the Technical Support documents to SWRCB by Dec 2012
- Goal is to produce the best available technical information to support evaluation of bio-objective alternatives
- Provide for interaction and review by Science and Stakeholder Advisory Committees

Date	Task
Mar 2010	Form Stakeholder and Regulatory Committees
	• Workplan Review
Jun 2010	Form Scientific Advisory Committee
	• Technical Work Element Review and Approval
Mar 2011	RCMP, Method Standardization, IM
Sep 2011	Stressor Response models
Mar 2012	Waterbody Classification, Stressor identification pilots
Jun 2012	SAC Final Review on written Technical Reports
Sep 2012	Final draft Technical Documents to Stakeholder Committee
Dec 2012	Final Technical Documents to SWRCB

Role of the Scientific Advisory Committee

- **Provide independent technical review of policy development products**
  - **Includes the workplan and individual tasks**
- **Provide critical scientific insight based on extensive real world experience**
  - **Data gaps, alternative approaches, limits of interpretation**
  - **Potential management implications**
- **Like the SAC, their role is not approval**
  - **Goal is to not get sued over technical items**

Guidance From the SWRCB

- Keep relatively small to maintain effectiveness
  - Maybe 7 or 8 members
- Choose from outside California to avoid potential conflicts
  - I try to incorporate local expertise onto the project team
- Pick necessary disciplines for representation
  - Provide optional candidates for each

Seven Disciplines

- Stream biologist
- Ecological modeler
- Landscape ecologist
- Hydrologist
- Statistician
- Another state representative
- Federal representative

Stream Biologist

- Dave Allen
- Stan Gregory
- Dave Hart
- Eric Silldorf

Ecological Modeler

- Chuck Hawkins
- Richard Norris

Landscape Ecologist

- Alan Herlihy
- Bob Hughes
- Lucinda Johnson

Hydrologist

- Jonathon Kennen

- Chris Konrad

Statistician

- Tony Olsen

- John Van Sickle

Another State

- Susan Davies (ME)
- Lee Dunbar (CT)
- Rick Hafele (OR)
- Jeff Ostermiller (UT)
- Rob Plotnikoff (multiple)
- Ed Rankin (OH)

Federal

- **Mike Paul**
- **Lester Yuan**

Next Steps

- Contact each of the prioritized candidates
- Finalize confirmed list and distribute to Stakeholder Advisory Committee
- Schedule our first meeting to go over workplan
  - August or September