



Developing Riparian Management Goals through Validation of Assessment Tools

EPA Region 9 Virtual Conference

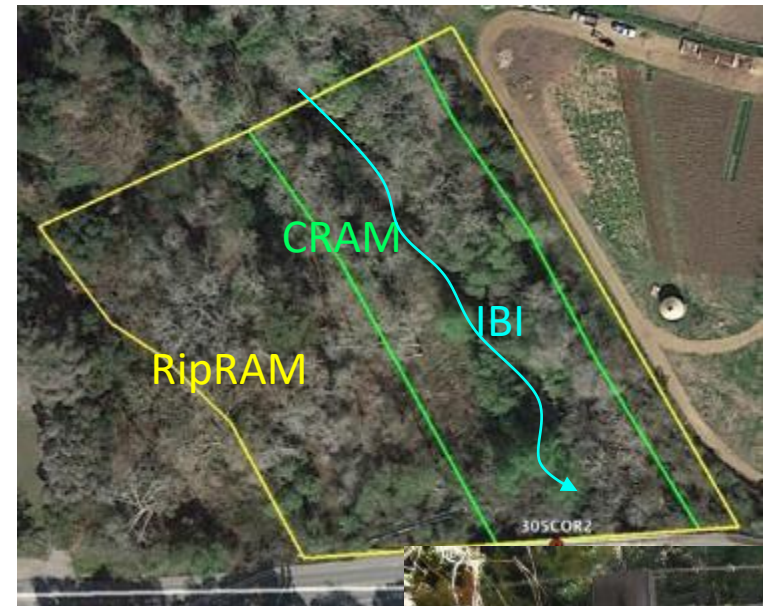
Nov. 17 – 19, 2020



Project Deliverables

- Establishment Riparian Technical Advisory Committee
- Validate Riparian Rapid Assessment Method (RipRAM) (n=40)
 - online data repository
- California State agency staff (and others) trained in RipRAM
- Watershed assessment framework integrating multiple data layers on “health” and “vulnerability” to produce assessment of management needs
- Map 4-6 priority watersheds showing quantifiable protection and management goals (including field verification) (RipRAM n=60)
- Upload riparian protection and management goals to [EcoAtlas.org](https://ecoatlas.org)

Riparian Rapid Assessment Method Validation n=40



Process to Develop a Riparian Condition Assessment Tool

1. Define levels of access (direct, bridge/road)
2. Evaluate available assessment tools
3. Select a set of appropriate assessment tools
4. Test efficacy of tools for different access
5. Develop new RAM based on tested metrics
6. Compare new RAM to CCAMP sites on Central Coast
7. **Validate RipRAM at sites around California
n=40**
8. ***Use tool to inform management decisions***



Riparian Functions Included in RipRAM Development

- Tree Shading (water cooling/microclimate control)
- Structural Shading in Stream
- Large Wood Input to Stream
- Leaf Litter Input to Stream
- Bank/Channel Stabilization
- Biodiversity and Vegetation Species Complexity
- Habitat/Riparian Wildlife Support
- Stream/Wildlife Corridors & Habitat Connectivity
- Human Benefits: Recreation
- Human Benefits: Water Quality (nutrient and sediment capture)
- Human Benefits: Flood Attenuation

J. Collins 2007



FINAL Riparian RAM Metrics

Metric 1: Total Riparian Cover

Metric 2: Vegetation Cover Structure

Metric 3: Vegetation Cover Quality

Metric 4: Age Diversity and Natural Regeneration

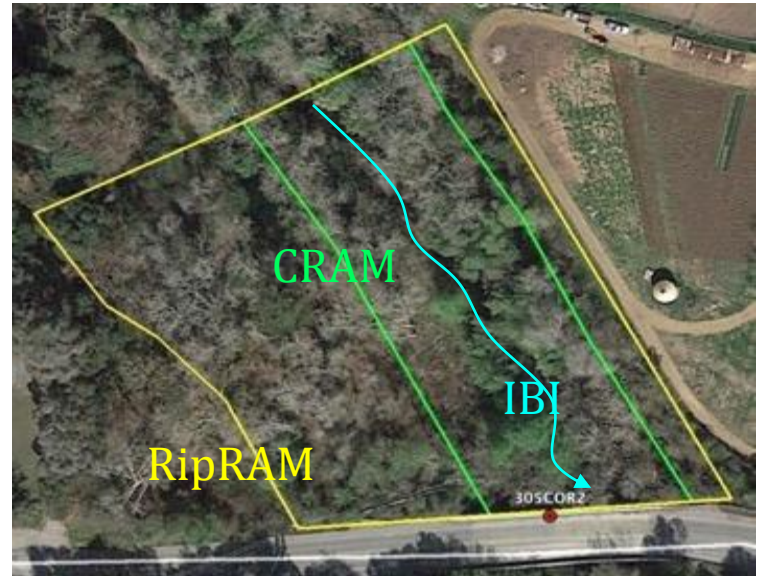
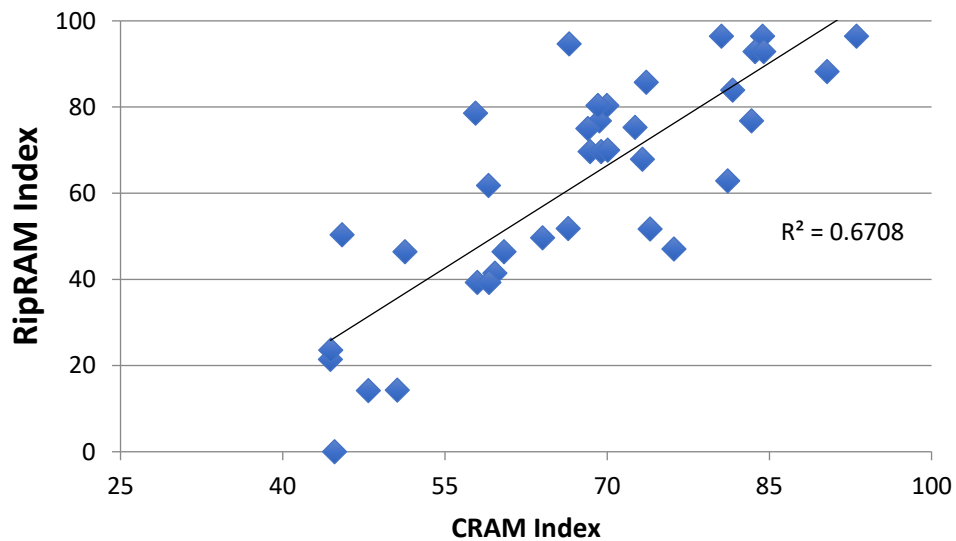
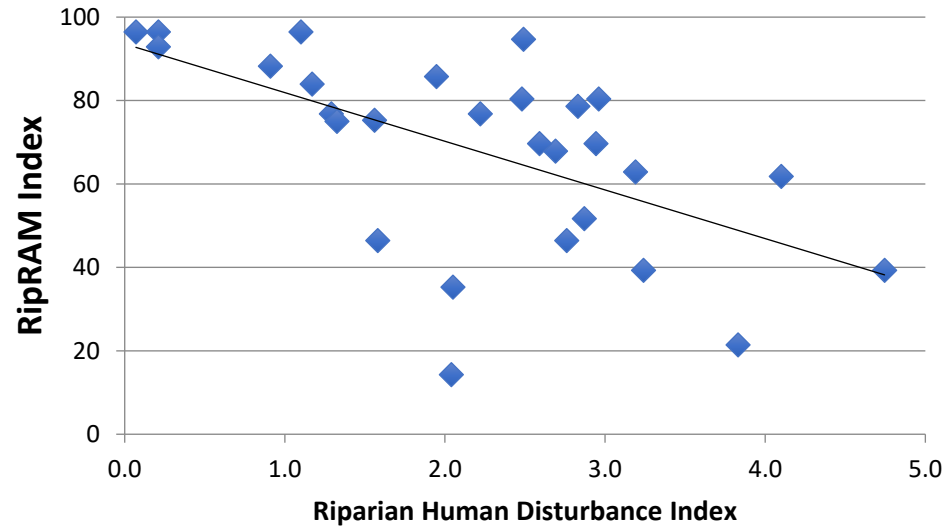
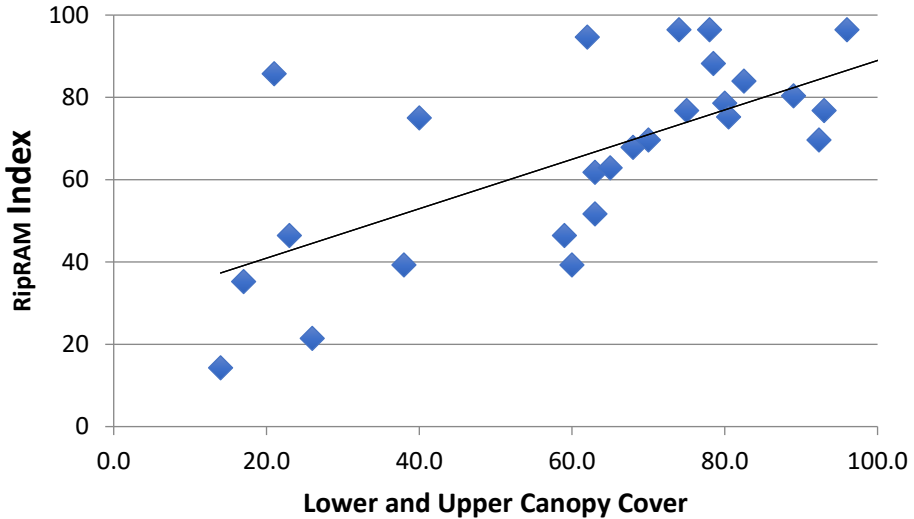
Metric 5: Riparian Vegetation Width

Metric 6: Riparian Substratum Condition and Vertical Connectivity

Metric 7: Macroinvertebrate Habitat Patch Richness

Metric 8: Anthropogenic Alterations to Channel Morphology

RipRAM Score Comparison to other measures



Level 3 data: Bugs, Algae, Water Quality, Birds

- Perennial Stream Assessment/Reference Condition Monitoring Program/
Stormwater Monitoring Coalition
 - California Stream Condition Index (CSCI) standardized measure of condition based on bugs and algae
 - PHAB data
- Monitoring Avian Productivity and Survivorship (MAPS)

Benefits

- Multiple trophic levels
- Site-specific
- Recent data from 2014-2017 available
- State Wide

The INSTITUTE for BIRD POPULATIONS

HOME ABOUT IBP PROGRAMS JOBS PUBLICATIONS GET INVOLVED

MAPS MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP

Vital Rates of North American Landbirds

Interactive Map of MAPS Stations

Starting a MAPS Station

MAPS Manual and MAPS Operator Resources

MAPSPROC - MAPS Data Management Software

Bird Bander Training

Ordnance Analysis of MAPS Data

Standardized 4- and 5-letter Bird Species Codes

MAPS AND CLIMATE CHANGE

Understanding the effects of a long-term, geographically vast process like climate change requires datasets that are likewise broad in time and geographic scale. The MAPS database— with over 30 years of data— offers just this quality of data to scientists working to understand the effects of climate change on birds.

What is the MAPS Program?

The MAPS program is a continent-wide collaborative effort among public agencies, non-governmental groups, and individuals to assist the conservation of birds and their habitats through bird banding. Most avian monitoring programs count or estimate numbers of birds to track changes in population. Estimates of population trends are useful but limited in their capacity to reveal underlying causes of observed trends in population sizes.

MAPS bird banders collect data that can be used to estimate key demographic parameters— also known as vital rates— like productivity, recruitment, and survival of individual bird species. This information helps scientists understand which life stages may be most important in limiting population growth or causing declines.

Since 1999, more than 1,300 MAPS stations spread across nearly every state and Canadian province have collected more than 2.5 million bird capture records.

Why is MAPS important?

Examining vital rates can enhance the effectiveness of conservation efforts so that limited conservation dollars can be directed to the times and places in the annual cycle where they are most needed.

MAPS data provide insights into important questions such as:

- What factors drive avian population declines?
- Where are problems most acute, on the breeding or non-breeding grounds?
- What stressors influence avian behavior most in the wild?

Tool Development Next Steps – 2020-2022

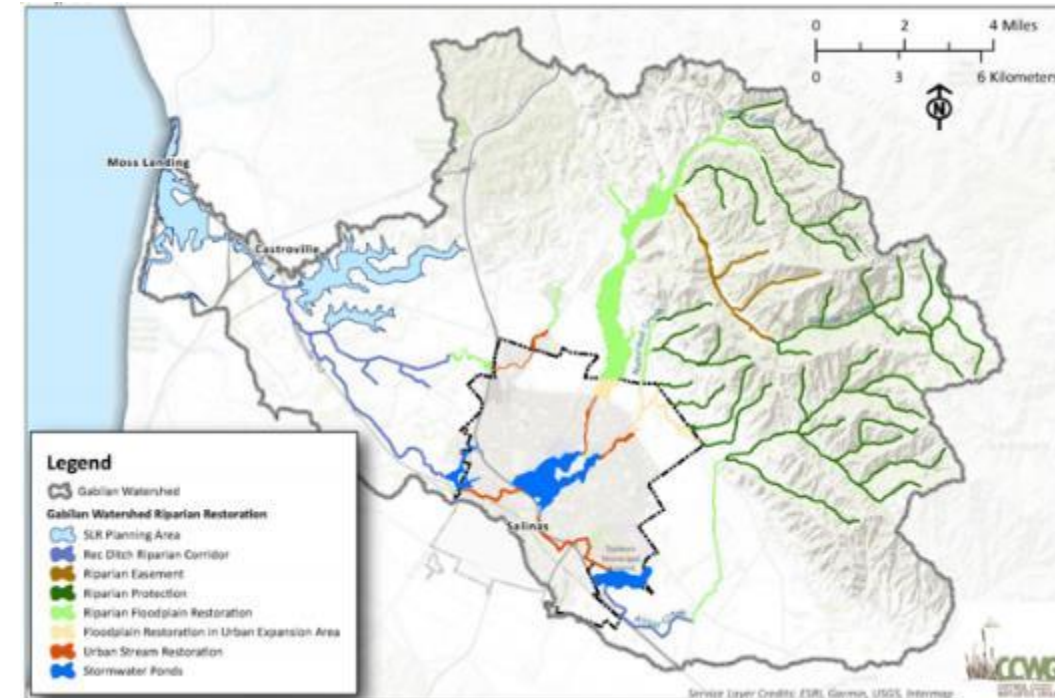
- Complete fieldwork this fall and next spring
- Assemble L3 data
- Complete validation analysis (L2~L3)
- Finalize the RipRAM field book
- SFEI to build an online data repository (EcoAtlas.org)
- Develop training program



Watershed Scale Riparian Management Prioritization Tool



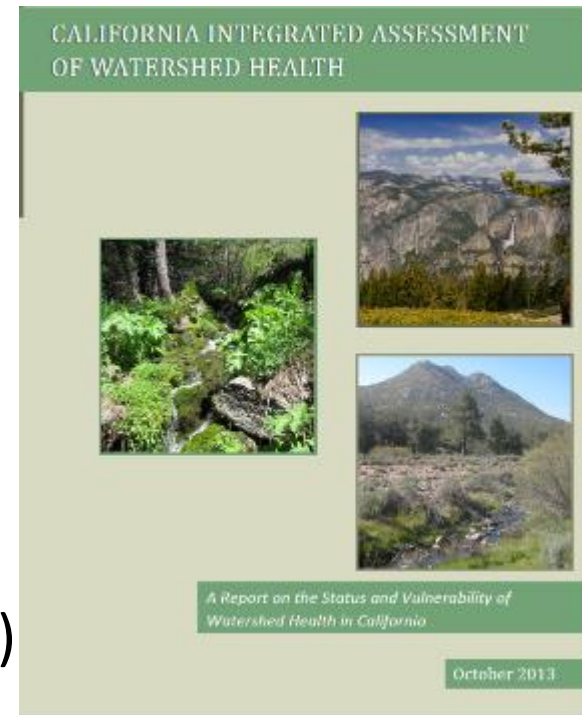
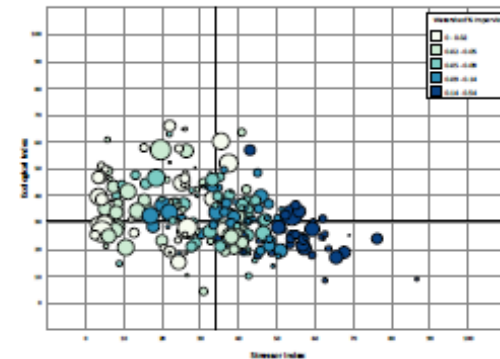
Develop and demonstrate a tool to prioritize restoration and management actions within individual watersheds



Review of Other Watershed Prioritization Methods

- Most methods reviewed provided useful elements that informed our development of the Watershed Prioritization Tool
 - Indicators (CA HWI)
 - Structure of assessment tools (DSL)
 - General approach (RPS)
- None provided all desired elements
 - Correct scale (stream reach)
 - Balanced set of indicators (condition, stress, vulnerability, etc.)
 - Fully compatible with data sets and indices available in CA

RECOVERY POTENTIAL SCREENING (RPS)

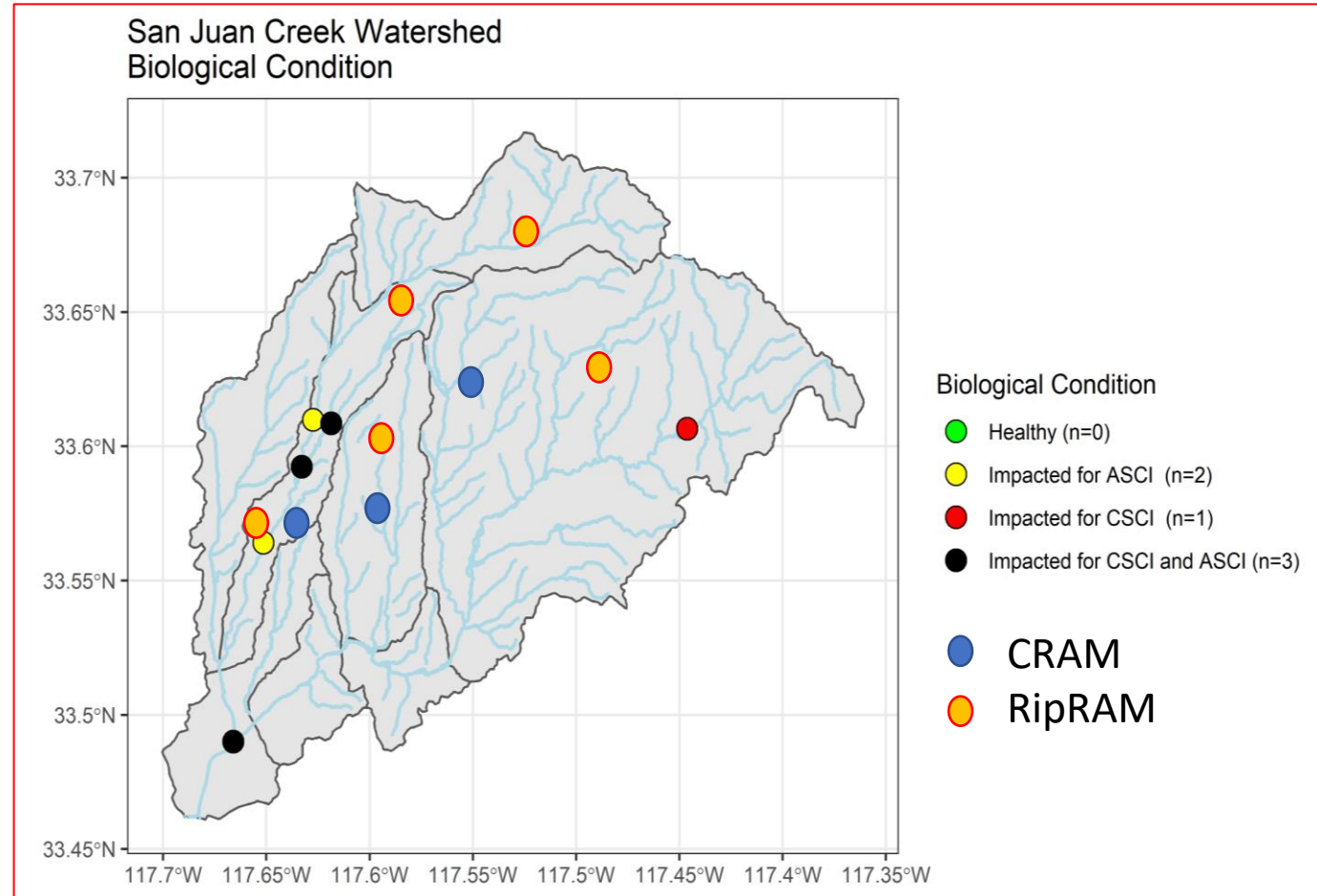


Watershed Prioritization Process

- 1. Rate overall condition of reaches using Stream Quality Index approach(H,M,L)**
 - RANDOM FOREST APPROACH using existing data inputs CSCI, ASCI, CRAM & RipRAM
- 2. Map stressors for each reach to prioritize management actions**
 - Use StreamCat datasets
- 3. Rank sites based on severity of stressors & map opportunities**
- 4. Prioritize sites based on combination of stressor, condition & opportunities**
- 5. Consider social equity implications of management prioritization**

Overall Condition Assessment

- Use Biological Condition components of SQI
 - H , M_{CSCI} , M_{ASCI} , L
- Integrate Habitat Condition
 - CRAM & RipRAM
- **Extrapolate condition scores across stream network**
 - Random Forest Model
 - Using StreamCAT Data (600 variables)



Stressor Evaluation

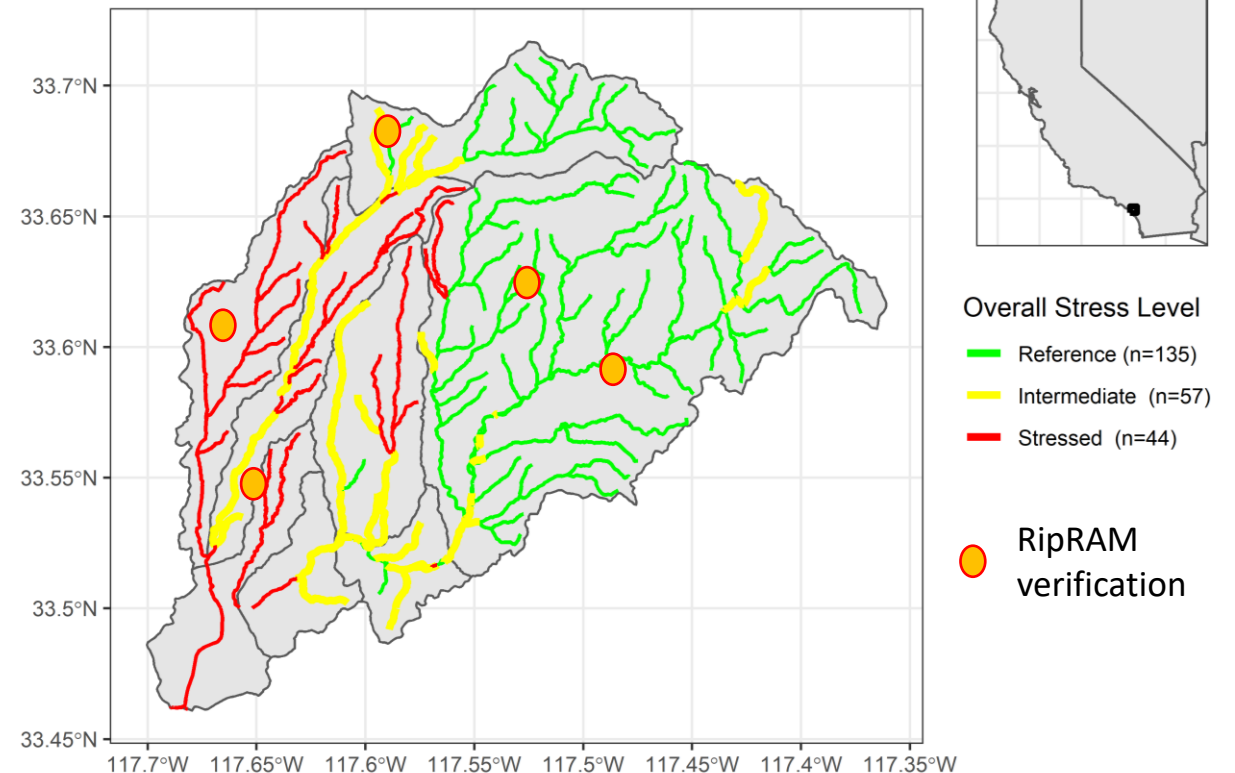
- Build off of the EPA Index of Watershed Integrity (IWI)
- Utilize the StreamCAT Disturbance Variables for an IWI approach
- Verify model outputs with field habitat condition assessments (CRAM/RipRAM n=5)

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Sci Total Environ. 2019 February 15; 651(Pt 2): 2615–2630. doi:10.1016/j.scitotenv.2018.10.112.

Revising the index of watershed integrity national maps

Zachary C. Johnson^{a,*†}, Scott G. Leibowitz^b, and Ryan A. Hill^a

San Juan Creek Watershed Most sensitive stress category



Relating Stressors to Management Actions & Ranking Severity of Stress

- High quality sites get evaluated for preservation or management
- Lower quality sites get evaluated for restoration and management
- Rate the severity of stress specific to each management action
 - Number of stressors vs. Severity of stressors

Protection

Riparian zone protection

Buffer protection/easement

Catchment preservation (sed. Supply)

Restoration

Physical rehabilitation of stream channel/floodplain

Revegetation of riparian zone/invasive control

Revegetation of buffer

Upland catchment revegetation

Management

Runoff or flow management

Sediment management

Water quality management

General Approach


POTENTIAL ACTIONS	CONDITION (SQI)		VULNERABILITY/STRESS								OPPORTUNITY				
			WATER CHEM	PHAB METRICS	CRAM METRICS	LU OR LU CHANGE	FIRE RISK	RAINFALL		DAMS AND DISCHARGES	EXISTING PROTECTION	PROXIMITY TO		EXISTING MGMT PLANS	
	CHANGE (GCM)	GRAZING OR AG USE						PROTECTED AREAS	CRITICAL LINKAGE			FLOODPLAIN ACCESS			
Protection															
1 Riparian zone protection	X	X		X	X	X		X				X		X	X
2 Buffer protection/easement	X	X	X			X		X	X			X		X	X
3 Catchment preservation (sed. Supply)	X	X	X	X	X	X	X		X	X		X	X		X
Restoration															
4 Physical rehabilitation of stream channel/floodplain	X	X		X	X	X			X	X			X	X	X
5 Revegetation of riparian zone/invasive control	X	X			X	X			X			X	X	X	X
6 Revegetation of buffer	X	X	X		X	X	X		X			X		X	X
7 Upland catchment revegetation	X	X				X			X			X	X		X
Management															
8 Runoff or flow management	X	X	X	X	X	X		X		X			X	X	X
9 Sediment management	X	X		X	X	X	X	X	X	X		X		X	X
10 Water quality management	X	X	X			X			X	X			X	X	X



Identify management actions



Assess condition based on available indices



Assess vulnerability/stress using readily available data



Prioritize actions based on local opportunities

Prioritize Actions Based on Opportunities

- Select preferred management action based on condition + stress evaluation
- Map opportunities
 - Weight based on existing, in-progress, or planned
- Iteratively assess management relative to opportunities
- Locations are prioritized based on opportunities
- Account for spatial relationships
 - Prioritize based on spatial prevalence or aggregation
 - Account for critical breakpoints, barriers, or opportunities
- Develop an algorithm to account for all these issues
 - Test sensitivity and discriminatory power → refine

Thank you



- Ross Clark
- Email: rclark@mlml.calstate.edu
- Website: www.centralcoastwetlands.org

