

SRFB Project Effectiveness Monitoring Program Final Results and Recommendations



Phil Roni^{1,2}, Chris Clark¹, Michelle Krall¹, and Kai Ross¹

¹Watershed Sciences Lab, Cramer Fish Sciences

²School of Aquatic and Fisheries Sciences, University of Washington



PE Management Questions

1. Are restoration treatments having the intended effects regarding local habitats and their use by salmon;
2. Are some treatments types more effective than others at achieving specific results; and
3. Can project monitoring results be used to improve the design of future projects?

Three Project Types

MC-2 Instream



MC-4 Livestock



MC-5/6 Floodplain



Basic Study Design for all 3 Categories

- Multiple Before-After Control-Impact Design
- 1 year before, years 1, 3, 5, and 10 after restoration (impact)
- Protocols developed by SRFB (Crawford et al. 2011), which were based on EMAP Program
- Columbia Habitat Monitoring Program (CHaMP) at some sites from 2012+



MC-4 Livestock Exclusion

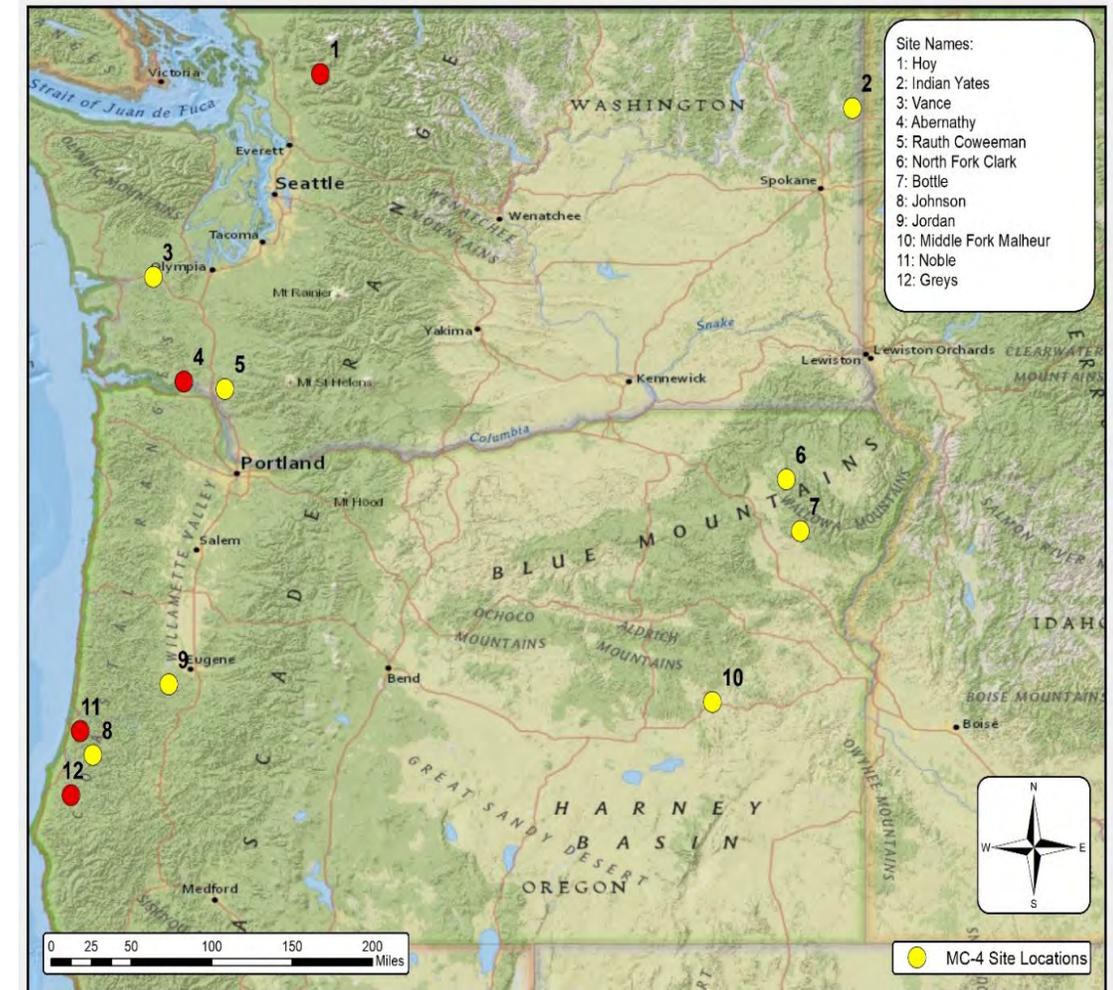
(SRFB & OWEB)

- 12 Projects Beginning in 2004-2006
 - Collected year 10 in 2017*
- SRFB Protocols
 - Riparian structure along transects
 - Canopy cover/shade (spherical densiometer)
 - Bank erosion
 - Pool tail fines
- Analysis
 - **T-test**, regression, BACI mixed effects*



MC-4 Livestock - Results

Metric	Years Compared	P-value
Bank Erosion (%)	0↔1	0.02*
	0↔3	0.04*
	0↔5	0.03*
	0↔10	0.01*
Riparian Vegetation Structure (%)	0↔1	0.81
	0↔3	0.28
	0↔5	0.82
	0↔10	0.04*
Bank Canopy Cover	0↔1	0.81
	0↔3	0.45
	0↔5	0.03*
	0↔10	0.50



MC-4 Livestock - Results

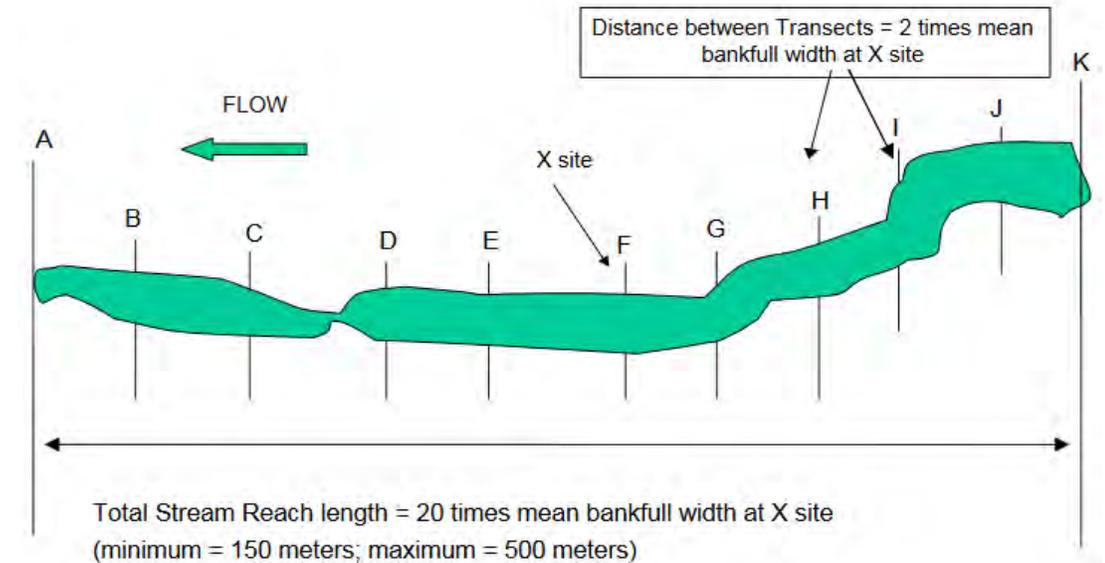
Exclusion Assessment	Year 1	Year 3	Year 5	Year 10
# of sites with fencing not Intact and/or not functioning as intended	0	1	4	4
# of sites with signs of Livestock in impact	1	3	4	4

- Many impact reaches (livestock exclusion) had evidence of livestock
- In year 10, 5 control (livestock not excluded) reaches had no evidence of livestock



MC-2 Instream - Methods

- 23 Projects
 - 6 removed from analysis
- SRFB Protocols
 - Fish = snorkel surveys
 - Habitat modified EMAP
 - Habitat CHaMP 2012/13
- Analysis
 - **T-test**, regression, BACI mixed effects*



MC-2 Instream - Results

Metric	P –Value from T-test	
	Year 10 (n)	Last year sampled (n)
Vertical pool profile area (m ²)	0.28 (6)	0.13 (17)
Mean residual profile depth (cm)	0.28 (6)	0.10 (17)
Log ₁₀ LWD volume (m ³)	0.003 (6)	0.002 (17)
Chinook density (fish/m ²)	0.56 (4)	0.50 (9)
Coho density (fish/m ²)	0.41 (5)	0.50 (8)
Steelhead density (fish/m ²)	0.16 (6)	0.08 (17)

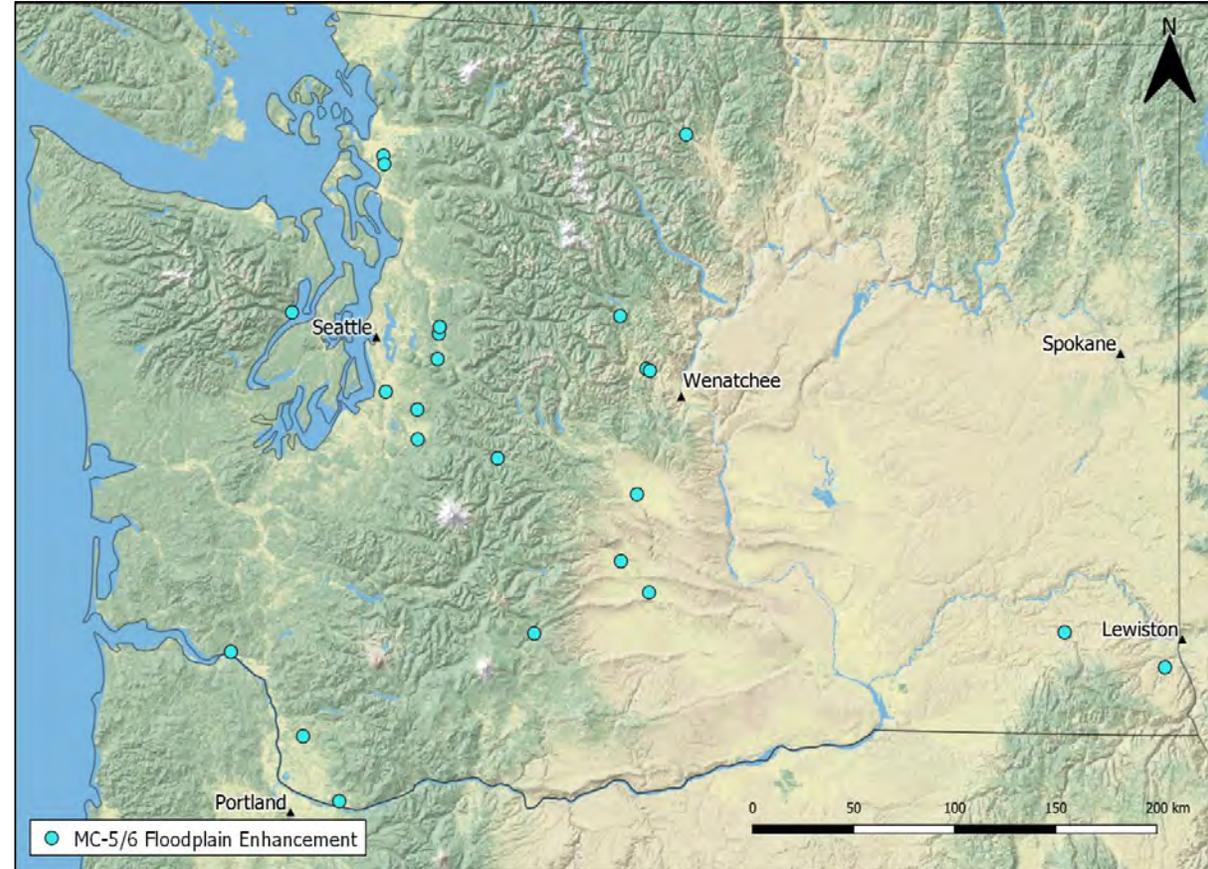


MC-2 Instream – Interpretation of Results

- Most studies have found positive increase in pool area, complexity, and salmonid abundance.
- Lack of results likely for a number of reasons
 - Low number of sites monitoring for 10 years
 - Poorly matched treatments and controls
 - EMAP metrics that don't directly measure pool metrics
 - Lack of geographic stratification
- Future monitoring of instream projects requires
 - stratifying by ecoregions
 - seasonal fish sampling (summer and winter),
 - more rigorous selection of controls,
 - improved habitat survey methods

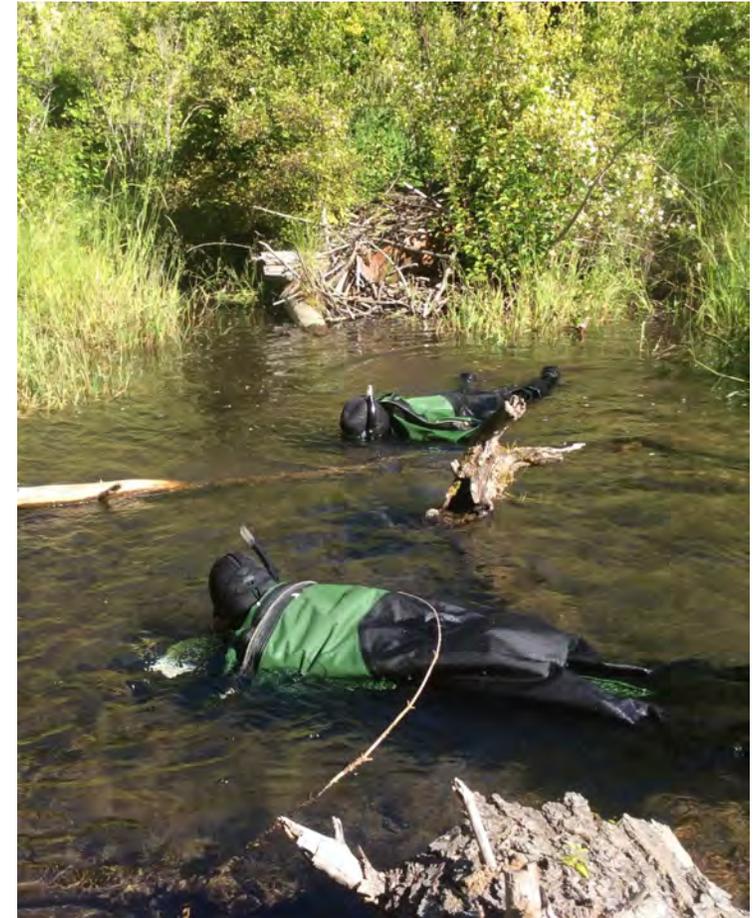


MC-5/6 Floodplain?



MC- 5/6 – Floodplain Discontinued in 2017

- 10 of 23 sites had to be dropped
- Some modest results, but little faith in results
- Future monitoring of floodplain projects needs
 - stratifying by ecoregions
 - new and appropriate floodplain protocols
 - seasonal fish sampling (summer and winter)
 - more rigorous selection of controls and treatments
 - to cover multiple rest. techniques
 - to survey entire floodplain
 - monitor large wood



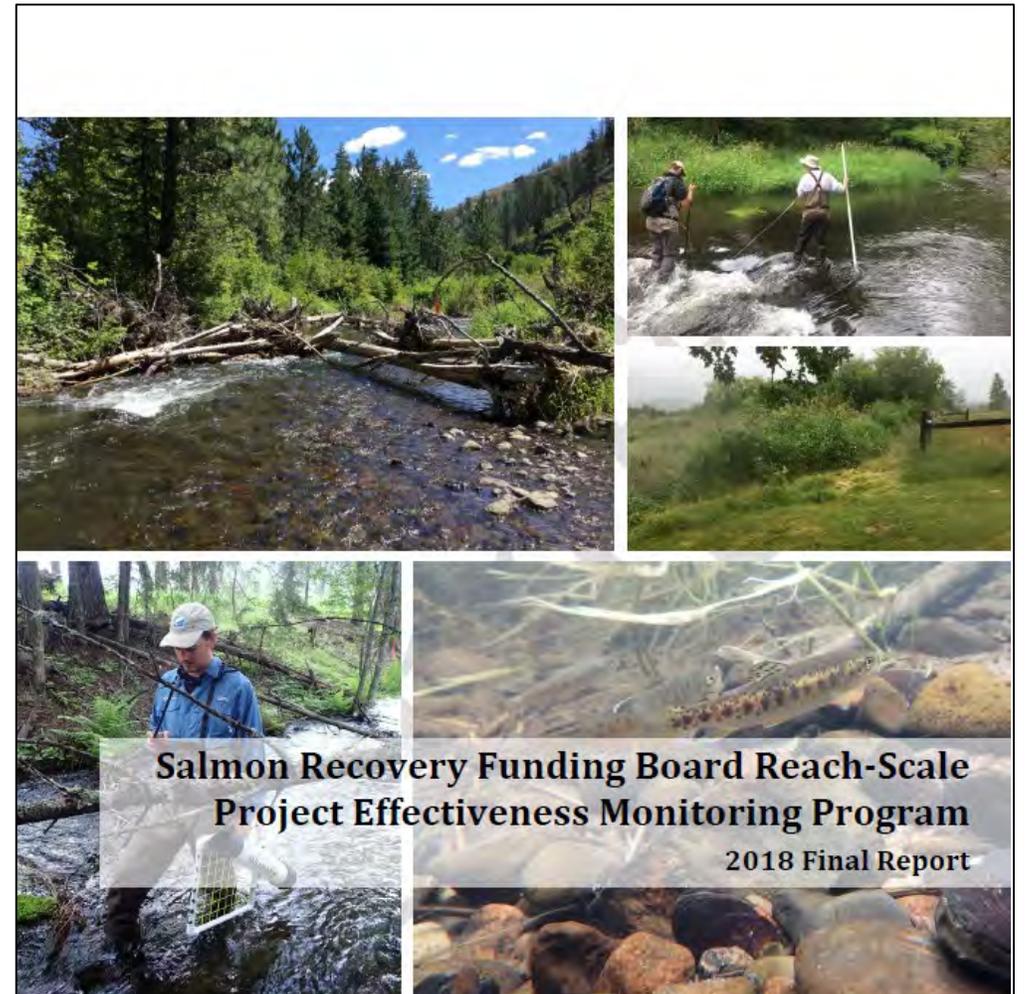
PE Management Questions

1. Are restoration treatments having the intended effects regarding local habitats and their use by salmon;
 - Limited positive response for most treatments
2. Are some treatments types more effective than others at achieving specific results; and
 - Can't really tell due to implementation challenges
3. Can project monitoring results be used to improve the design of future projects?
 - For livestock exclusion yes, others limited info

Overall Summary – SRFB PE Monitoring

- The lack of stronger responses should not be seen as evidence that fish or habitat responses to some techniques cannot be measured
- Other studies in other regions have detected response for many of the action types examined under PE
- SRFB PE had widespread implementation and procedural issues
- Results emphasize the importance of proper design and implementation of large program like PE
- Several recommendations to improve future success

Questions?



**Salmon Recovery Funding Board Reach-Scale
Project Effectiveness Monitoring Program
2018 Final Report**



Extra Slides for Questions

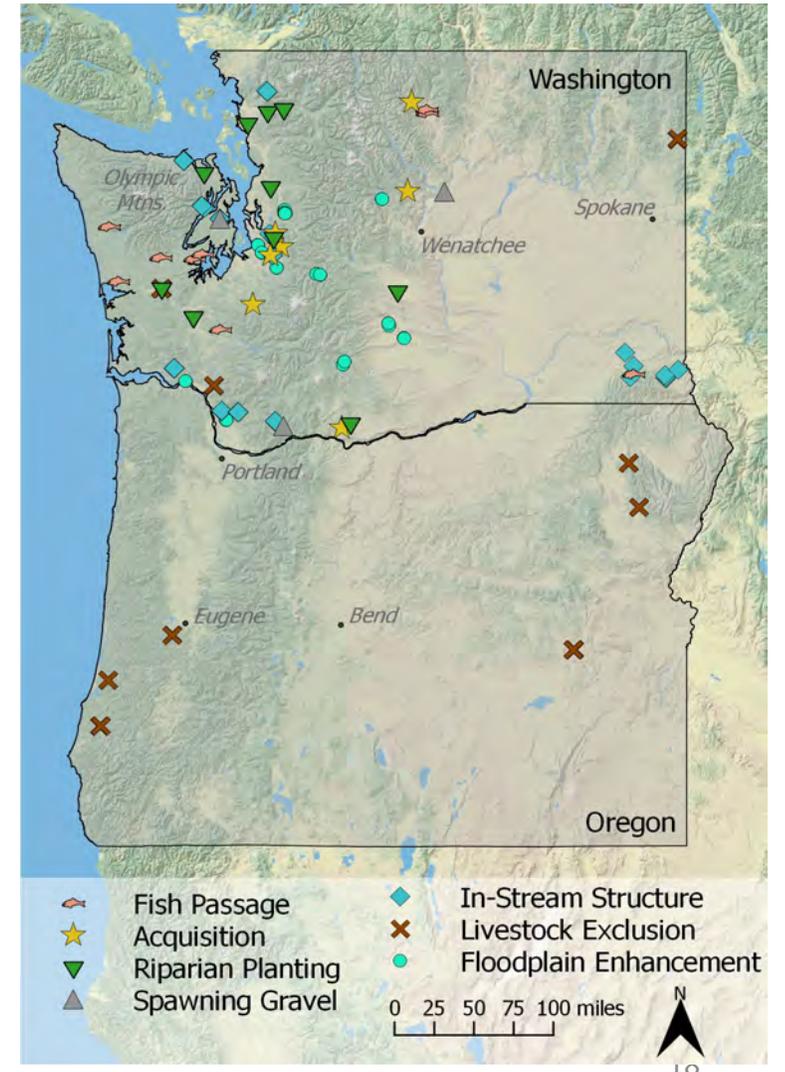
Challenges of PE Program 2004 to 2018

- Run into challenges seen with other larger monitoring programs
 - Site selection
 - Protocols
 - Data collection
 - Restoration
 - Data management
 - Data analysis and reporting
- SRFB PE had widespread implementation and procedural issues



SRFB Project Effectiveness (PE) History

- Standardized PE monitoring program in 2004
- 2004 to 2016- Tetra Tech
 - site selection, data collection, analysis, & reporting
- Originally 10 categories but only 3 as of 2016
- CFS was contracted in 2016 to:
 - Complete data collection for remaining 3 categories
 - Analyze all data for 3 categories (2004 to 2018)
 - Provide final results and interpretation of findings
 - Provide recommendations for future PE monitoring



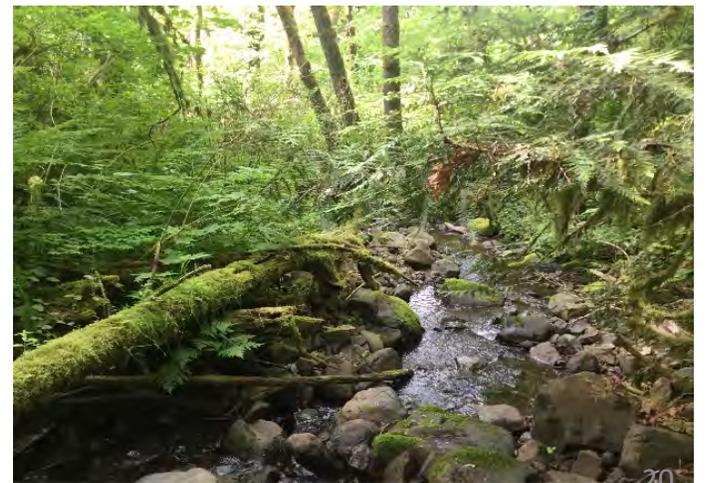
MC-5/6 – Implementation Issues

- MC-5 did not collect fish
- MC-6 did not collect channel constraints.
- CHaMP initiated in 2012 at new and old sites
- CHaMP used to calculate EMAP metrics
- Floodprone width and channel constraints not available for all years/sites
- Several sites with treatment/control issues
- Some site locations varied among years



MC-4 Livestock – Interpretation of Results

- Results for riparian structure and bank erosion consistent with literature
- Future effectiveness monitoring
 - More rigorous selection of control and treatments
 - Stratify by ecoregion
 - More rigorous/quantitative monitoring protocols
 - Limited info exist on aquatic biota, however, ...
- Focus on compliance/implementation



SRFB Project Effectiveness History

- Standardized PE monitoring program in 2004
- Originally included 10 monitoring categories
 - MC-1 Fish passage - completed (2009)
 - **MC-2 Instream habitat - 2018**
 - MC-3 Riparian planting – discontinued (2015)
 - **MC-4 Livestock exclusion - 2018**
 - **MC-5/6 Floodplain – 2018**
 - MC-7 Spawning gravel –discontinued (2009)
 - MC-8 Diversion screening – completed (2009)
 - MC-9 Estuary - never implemented
 - MC-10 habitat protection – discontinued (2015)



MC-5/6 Floodplain - Methods

- 23 Projects Beginning
 - 10 removed from analysis due to problems
- SRFB Protocols
 - Fish = snorkel surveys (some sites)
 - Habitat modified EMAP
 - Habitat CHaMP some sites/years 2013
 - Riparian structure
 - Floodprone width
 - Average channel capacity
- Analysis
 - **T-test**, regression, BACI mixed effects*

