

Monitoring salmonid response to Barrier Removal in Northern California Coastal tributaries

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NOAA's Fish Passage Monitoring

- Initiated under NOAA's Open Rivers Program
- A way to address FAQ's from:
 - Scientists/Restoration Practitioners
 - NOAA Management
 - Office of Management and Budget (OMB)
 - Legislators
- Necessary to maintain or increase future barrier removal funding

NOAA's Monitoring Challenge

- Answer complex barrier removal questions
 - Are projects actually passing fish (structural)?
 - Are projects increasing fish populations (biological)?
 - Are there financial benefits from removing barriers?
 - Are there community benefits from removing barriers?
- Limited budget to conduct monitoring

How did we get here?

- NOAA's Fish Passage Restoration Strategy
 - Developed short and long term goals
 - Build sound projects
 - Open fish access to blocked habitat
 - Increase fish populations
 - Improve community safety
 - Reduce site maintenance costs
 - Described monitoring plan to determine if goals are met
 - Defines a plan for adaptive program management

How did we get here?

- Nationwide fish passage monitoring protocol development team
 - NOAA Biologists
 - Northwest Fisheries Science Center
- Balanced best available science with program funding limitations and species diversity
- Goal of “rolling up” programmatic monitoring results
- Individual case studies for outreach

Monitoring “Tiers”

– “Tier 1” monitoring

- Information collected on all passage projects Nationwide
- Limited effort and funds required
- Usually implemented by project proponent

– “Tier 2” monitoring

- Information collected on a subset of projects
- Opportunistic vs. random
- Intensive effort and funds required
- Usually implemented by monitoring specialist

“Tier 1” monitoring

- Done for all funded fish passage projects
- Data collected pre- and post project
- Data collected within grant period
- Are projects:
 - built as designed?
 - passing the target fish species?
 - increasing community safety?
 - reducing site maintenance costs?

“Tier 1” monitoring questions

- Is project built as designed?
 - Measure pre and post
 - Average channel width
 - Maximum jump height
 - Are post project conditions within target range (y/n)?
 - Does completed project meet local passage criteria (y/n)?
- Is the project passing target species?
 - Presence of target species upstream before and after barrier removal (y/n)?
 - Complicated by partial barriers

“Tier 1” monitoring questions

- Did the project increase community safety?
 - Did the project remove a safety hazard (y/n)?
 - Did the project remove an area from FEMA flood designation(y/n)?
- Did the project reduce site maintenance costs?
 - Estimated 5 year maintenance costs
 - Pre- and post project
 - Difference = estimated change in maintenance costs
- Results can be “rolled up” programmatically

CA “Tier 1” roll up as of June 2012

- 29 Fish Passage projects implemented in CA since monitoring program inception (2009)
- 27 within target jump height range
- 25 within target channel width range
- 24 with fish presence upstream after project
- (20 with fish presence upstream before project)
- 16 removed a community safety hazard
- \$65k net reduction in average annual maintenance costs (over 5 year period)

“Tier 2” monitoring

- Done for a subset of funded projects
- Opportunistic vs. randomly selected due to
 - Limited funding
 - Frequency of “partial barriers”
- “Tier 2” monitoring project selection criteria:
 - Total barrier with documented absence of fish presence upstream prior to project
 - OR partial barrier with ample abundance and distribution information above and below barrier

“Tier 2” monitoring questions

- Is there an increase in local fish abundance above the barrier after removal?
- Is there an increase in distribution of fish associated with the barrier removal?
 - Summer juvenile survey
 - 3 Winter spawner surveys
 - Fish numbers and distribution maps
 - NEW winter juvenile surveys
- Did the project result in a change in habitat above or below the project site?
 - Channel and habitat surveys

“Tier 2” monitoring

- Most monitoring done under contract with Ross Taylor and Associates
- Some sites monitored by California DFW
- Other sites monitored by project proponent or partners
- Monitoring data extracted from reports and entered into tracking spreadsheet

CA “Tier 2” monitoring sites

- 6 sites in Northern California currently being monitored at “Tier 2” level
- All 6 were documented total barriers to coho salmon (no fish using upstream habitat)
- 1 barrier was a dam, rest were road crossings
- 5 of 6 barriers have been removed to date
- All 5 barriers removed have documented fish presence upstream after the project*
- Projects implemented at different times so in different stages of monitoring

CA “Tier 2” monitoring sites

- Glenbrook Gulch dam removal (Mendocino)
- Frykman Gulch barrier removal (Mendocino)
- Ryan Creek barrier removal (Mendocino)
- Willow Creek barrier removal (Sonoma)
- Little Browns Creek barrier removal (Trinity)
- Quarry Creek barrier removal (Humboldt)

Glenbrook Gulch Dam Removal

- Tributary to Albion River
- Opened .66 miles
- Implemented in 2010
- 0 fish upstream prior to project
- Juvenile and adult coho in mainstem Albion but not in Glenbrook
- Steelhead in Glenbrook downstream of dam
- Lack of spawning sized gravel downstream of dam



Glenbrook Gulch Dam Removal



Glenbrook Gulch Dam Removal

- 2 steelhead immediately colonized LWD structure upstream just after project
- 1 year after project
 - 12 coho in Glenbrook
 - 3 steelhead upstream of dam site
 - Distribution extended 400'
- 2 years after project
 - 12 steelhead in Glenbrook
 - 3 steelhead upstream of dam site
- 0 spawners to date
- spawning habitat improved downstream due to trapped gravel redistribution

Frykman Gulch Barrier Removal

- Tributary to the Big River
- 0.6 miles of habitat opened
- Project implemented in 2010
- No spawners in watershed to date
- 1 year after project
 - 0 juvenile steelhead observed above barrier site
 - 4 fish observed immediately downstream
- 2 years after project
 - 5 juvenile coho upstream
 - numerous juvenile steelhead
- one more summer of post project monitoring

Ryan Creek Barrier Removal



Ryan Creek Barrier Removal



Ryan Creek Barrier Removal

- Tributary to Outlet Creek, Eel River
- 1000 ft. of habitat opened to next barrier
- Barrier removed in 2011 (3 upstream remaining)
- 440 coho relocated from construction area
- 0 coho or Chinook documented upstream
- 1 Chinook observed swimming through site immediately after project completion, redd found upstream
- Second winter monitoring occurring now. Chinook have been observed upstream of site to date
- Only 1 coho brood year remaining (returning 2013) so results forthcoming

Willow Creek Barrier Removal



Willow Creek Bridge



Willow Creek Barrier Removal

- Tributary to the Russian River
- 7 miles of habitat opened
- Project implemented in 2011
- Watershed monitored by UC cooperative Extension as part of Russian River Broodstock program monitoring
- Juvenile Broodstock coho released into watershed just after project

Willow Creek Barrier Removal

- 10 adult salmonids observed upstream of the barrier site during first winter (2011-2012)
 - 5 coho jacks with clipped adipose fins (Russian River Broodstock)
 - 5 wild male steelhead
 - 2 steelhead redds
- Tagged juvenile fish from broodstock program detected entering willow creek in 2012 non-natal rearing
- Spawners as of Jan 2013 (2nd winter after project)
 - 1 coho spawner
 - 1 steelhead spawner
- Ongoing monitoring

Willow Creek Habitat



Little Browns Creek Barrier Removal



Little Browns Creek Barrier Removal



Little Browns Creek Barrier Removal

- Tributary to West Weaver Creek, Trinity River
- 3 miles opened
- Project Implemented in 2007
- Monitored to present
- 0 coho found upstream of site to date, coho juveniles observed downstream
- Numerous steelhead found upstream, colonized upstream of project reach 2 years after project
- Poor flow/coho years during monitoring period

Quarry Creek Barrier Removal



Quarry Creek Barrier Removal

- Tributary to Mad River
- ~1 mile blocked
- Anticipated removal 2012
- Additional Habitat Restoration and fencing planned upstream
- Expected benefits to chinook, steelhead and coho
 - Increased spawning habitat
 - Increased rearing habitat
 - winter refuge from mainstem Mad River
- Monitoring plan
 - Winter spawner surveys
 - Summer Juvenile surveys
 - Winter juvenile surveys (go Pro camera)
 - Habitat typing (to document habitat changes from restoration)
- Initial pre-project survey in Jan 2013 found only steelhead juveniles upstream

In a larger context

- Initial results consistent with findings in other NW streams
 - Juveniles colonize immediately
 - Spawners tend to recolonize later
- Importance of tributaries for non-natal rearing
- Importance of suitable habitat upstream for recolonization

Considerations for choosing barrier removal monitoring sites

- Choose sites that:
 - are total barriers, or that have multi-year datasets on fish numbers upstream and downstream
 - are likely to have flow during drought years
 - fit into ongoing population monitoring programs
- Choose sites with high quality habitat upstream (or improve habitat as part of barrier removal project)
- Choose sites with documented fish use just downstream
- Utilize qualified professionals so that data are defensible, and can be shared

More Questions?

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