Fish team meeting notes
Thursday, November 20, 2014, 1:00-4:00

Participants:

- Stacy Sherman
- Dave Contreras
- Alice Low
- Trishelle Morris
- Rosemary Hartman
- Pascale Goetler (CDWR)
- Shawn Acuña (MWD)
- Jason Hassrick (USBR)
- Larry Brown (USGS)
- Ramona Swenson (ESA)
- Gardner Jones (CDWR) (call-in)
- Jim Hobbs (UCD) (call-in)

Hypotheses:

The meeting started off with presentation of the hypotheses and metrics in their new table format. Stacy presented some changes to the original document. First of all, the first hypotheses are really landscape-level context, not things we are trying to prove/disprove in our monitoring. The hypotheses we originally had first in the previous meeting have been moved down. All the hypotheses have been put into a table along with the issues, premises, and conceptual model tiers they were designed to support. Some of the hypotheses have been broken down further by species (smelt and salmonids) and life history stages. We decided not to break the rest of the hypotheses down this way unless doing so would substantially change what we would measure on the site.

Issues discussed on the particular hypotheses and metrics

- Some of the metrics have been pulled from the SFEI "A Delta Transformed" report.
- Pascale: Do we care about area of habitat or diversity of habitat? Add habitat complexity to metrics. Pascale will forward methods for creating a complexity metric.
- Is there a threshold of habitat where you won't see an effect on fish populations until you get there? Answer: we will start by measuring changes the amount of available habitat that we *think* is good for our target species. We will also look for population responses, but considering the availability of suitable habitat even if fish populations have (especially) bad years is also important.
- Do we want to hypothesize that smelt spawning habitat has distinct physical properties? We can't say whether they increase or decrease until we know what it looks like. We decided to cut this part of it, and just hypothesize that smelt spawning habitat will increase, knowing that we cannot test this hypothesis until we have characterized what habitat smelt need to spawn.

- Diet contents easier than stable isotopes for marsh derived carbon.
- Should we combine premise 2.3 and 2.4? Yes. We have access and quality included in site-specific hypotheses, but on the landscape scale we would be measuring the same thing. Maybe come back to that if we need to.
- We don't really know what spawning and rearing habitat for delta smelt looks like, so first we need to figure out what it looks like, then assess whether it increases or decreases. This makes the hypothesis about changes in habitat capacity for smelts tricky.
- We call out Chinook Salmon, what about Steelhead? They are also in the BiOp… Steelhead are large and difficult to catch, and relatively sparse in comparison to Chinook. Theoretically things good for Chinook will benefit Steelhead.
- We should make sure to outline why we are doing just delta smelt, Longfin smelt, and Chinook Salmon.
- Access hypothesis: What are cues that bring fish into the wetland? Longfin seem to really be food driven. Some fish can smell zooplankton grazing rates? Pascale will look into this more.
- Fish use of wetland: We had cut adult smelt out of earlier draft, but we wanted to put them back in since Delta Smelt have used the Cache slough complex year round.
- We list residence time for Chinook, do we want to do it for smelt? Can we do it? After the methods discussion it sounds like determining residence time for individual fish is infeasible in a regular monitoring program.
- "Multiple size" rather than "multiple race" is a better characterization of diversity for Chinook Salmon life history strategies.
- Refuge habitat is mostly to guard against predators, not competitors. We also want to add turbidity to our list of metrics for refuge habitat.
- Artificial structures may cause bottlenecks that increase predation. Should we add something about this to the habitat hypothesis? We may or may not be removing artificial structures from our site, but we should definitely be aware of them.
- Birds can also affect vegetation by eating it before it gets established (something to deal with in the veg and/or food web discussion) (ex. Canada goose example in the Duwamish estuary).
- We probably won't do much with bird or otter diet, but we will decide more systematically during the next food web subteam meeting.
- Too much export of production might reduce suitability of habitat on-site, especially for salmon. Retention of detritus on the site is more important for salmon growth and food resources. This hypothesis may have to be reworded.
- How do we trace fish utilization of exported productivity? This may be infeasible.

Methods:

We began a discussion of what methods we want to use to measure these metrics, but after some discussion decided it would be most useful if participants did some research and sent the FRP team some recommended methods. Stacy, Dave, and Rosemary will compile these methods into a table which

we can fill in with pros and cons for each of the methods, especially in terms of which species and habitat type they will be most useful for.

In general, we will want to figure out how to prioritize sampling, while still encouraging project proponents to look for the functional relationships. Need to be pragmatic, but also emphasize that some things you need to measure no matter what and if you can't you might as well get out now. We also do not want to overwhelm individual project managers with too many recommendations. It is better to measure a few things well than a lot of things badly.

We should also consider timing and frequency. This will be largely driven by budget. How long will monitoring go on? It will depend on the site, but things will probably change fastest at the beginning (5 years out) slower later on, so can adjust frequency. Consider seasonal drivers, moons, hydrodynamic period, wet years and dry years to capture climatic variability. It may also be useful to advise on how best to distribute a limited number of sampling bouts over time. We also want to make sure we capture extreme events in our sampling plan – capture those to get range of variability and rapid change.

Most of the methods for physical habitat factors will be dealt with by the physical processes team. A few thoughts on physical methods:

- Substrate: estimate proportions of sand/mud/cobble, in benthic grabs or shovels. Check USFWS methods.
- How do we measure extent of each substrate type? We can do it in concert with benthic grabs, don't necessarily want to map every grain of sand. We can characterize shallows during beach seines.
- Hydrodynamic pattern: velocity, if you have decent bathymetry you can do hydrodynamic modeling
- How do we measure water depth? SONAR passes. Doesn't have to be super high resolution, divide the area into depth classes.

Some thoughts on fish monitoring methods:

- Larval fish – normal larval fish trawls, Shawn says light traps aren't that useful for smelt, they certainly wouldn't be useful for yolk larvae that don't swim yet
- Adult/juvenile fish – Lampara nets? Usually works in 6-10 ft, though depends on size of nets. Pop up nets allow multiple samples – much smaller than the ones we were thinking. Contact Brad Bridges about catching smelt. Access to the sites might control methods more than anything else.
- Preservation methods – some analysis (ex. Otoliths) can't be run when preserved with formalin and some things can't use Rose Bengal.
- We should go through pros and cons for each sampling method and what species, habitat, and price range each would work for.
- This is for on-site and immediately surrounding area, not duplicating IEP work.
- How do we do residence time? Using small tags for wild fish may be infeasible and hatchery fish aren't representative due to behavior differences. We could also put a DIDSON in the mouth of an area and might be able to identify fish coming in and out. Otoliths may show how long adults

spend in the estuary and we may be able to detectif that increased as restoration projects came on line, but not for a site-specific monitoring plan. Some sort of dye study? Works for Delta smelt or salmon, but very labor intensive. Can temperature mark otoliths? Tetracycline may be used as an otolith marker. This is all under category of "special studies" and we shouldn't recommend any of these as long-term monitoring programs.

- May have to find an abundant surrogate. How does silverside growth compare on or off site?