Smolt Estimation and Analytics Workshop

November 6-7, 2019 · Walla Walla, Washington

Walla Walla Community College · William A Grant Water and Environment Center, Building #12

Agenda and Notes

Our goals are to share information, compare and discuss statistical practices, and recommend further collaboration to develop interoperable data outputs and common analytical tools for smolt data.

Contents

Action Items:

- Presentations, notes documents will be posted on PNAMP.org on the workshop event page
- Jim Ruzycki - ODFW will make the model Jeremy presented available
- Two guidance or rules documents were suggested/requested:
  - Ryan Kinzer: rule set guidance "When models work and what to look for"
  - Lytle Denny: It is good to have a group put together guidance: for metrics, analytical procedures.
- Planning group will hold post-workshop meeting in late November to plan next steps to continue conversation

Day 1 - Wednesday, November 6, 2019

Remote Participants: Braden Lott (Biomark) , Marika Dobos (IDFG), Trent McDonald (West Inc.), Nathanial Fuchs (WDFW), Ian Tattum (ODFW), Charlotte Scofield (Stillaguamish Tribe), Andrew Berger (Puyallup tribe-nsn), Andrea Pearl (Colville Tribes)

12:30 pm	Welcome	*Sheryn Olson, USGS/PNAMP*
12:40 pm	**Plenary Talks**	
	50 Uses for Your Smolt Data: Overview of Smolt Data Uses	*Dan Rawding, Washington Department of Fish and Wildlife*
	A Brief Review of Smolt Trapping in the Pacific Northwest: A brief history and current status of trapping with respect to goals, equipment, data analysis	*Tim Copeland, Idaho Dept of Fish and Game*
	Smolt Abundance Study Designs and Assumptions: Overview of common study designs and assumptions needed for an unbiased estimate of abundance	*Jim Ruzycki, Oregon Dept of Fish and Wildlife*

Plenary NOTES

- How do you deal with detection efficiency?
  - Dan R. - In what regard? Survival.
  - Dan R. - Generally, people use the CJS model, and generally Bonneville is 97-99% in detecting adults

1:25 pm	***Session 1:*** **Nuts and Bolts of Smolt Trapping** Data collection, protocols and methods as they relate to use of the data for analysis. A synthesis of the results of a region-wide survey.	*Jim Ruzycki, ODFW and Ryan Kinzer, Nez Perce Tribe*
1:55 pm	Questions and Discussion	*Jim Ruzycki, ODFW, moderator*

Notes

Location for a PowerPoint with survey results

- Dan R. - WDFW does not need P4, neither do those on the Oregon Coast Q32 of questionnaire
- Braden Lott (QCI/Biomark) didn't use P4 either for the lower Lemhi RST We tried and it vastly underestimated

- Marika Dobos (IDFG) - The potlatch IMW project does
- Braden Lott - To be clearer, we compared emigration estimates from the lower Lemhi RST with the newest PIT array that read well out of the water and the PIT array vastly underestimated juveniles emigrating past that location.
- Braden Lott - We used a time release device as well
- Marika Dobos - It would be interesting to hear if agencies are more consistent with methods and definitions. IDFG has standardized rotary screw traps and methods so we can comprise and analyze the data in a state-wide report. Do other agencies do that?
- George Pess- the survey results are online and there for discussion
- Dan - Why do people use different methods for efficiency trials?
    - Fish that are not big enough to PIT tag, different techniques
    - If we don't get enough Chinook, we use a different mark
- Dan R. - We have used other methods in the past; Smolt book there is the back-calculation method, get a ratio of tagged and untagged, wondering if there are techniques
    - Sometimes estimates are based on one trap and two trap designs
    - Listed vs. non-listed species
- Eric - I'm curious about Q28, (How is PIT tagging allocated across the migration period?)
    - In the past, when we are tag limited, we would tag only 300 /day
    - Tim Copeland - Spring time we tag everything you can, when flows start, trapping is more about balancing out the rest of the tags you have left for the rest of the season - May be every 5th fish.
    - Ryan Kinzer - A lot of times you are optimistic, it's extremely difficult to try to match the run
- Still Q28: For those who stratify, I'm interested in how?
    - Dan R. - Fall migrants vs. Spring migrants
    - Ryan K. - a common strata is time
    - We look at trap position in the S. Fork, try to keep it efficient throughout the day, can look at recaptures that way.
    - Kale B (WDFW) -Lower Columbia use Batch Markings - largely most sites are based on how tags are put out, recently we've been incorporating covariates like major trap moves. Need to make sure we are changing those mark rotations
    - Braden Lott - We stratified by flow, time, and overall trap efficiency by species for PIT tagging allocation. That was typically spread out over life stage periods such as parr/presmolt/and smolt. We typically used Fin Clips in addition to PIT tags to avoid tag loss.
- Q18 (If you do estimate trap efficiency, what marks/tags are used?)
    - "Other" was a combination of tags for us
- Interested in Missed trapping periods, has anyone sub-sampled to get an idea of how many fish are moving during those periods? Curious if anyone has done that.
    - Craig Contor - We've trapped through high flow and you get a bimodal pattern typically follows the hydrograph
    - Use Bayesian approaches
    - For short periods of time we will use spline models, and then past data Bayesian approach for long periods.

Q19: trap efficiency. (If you do estimate trap efficiency, how often do efficiency trials occur?)

- {We use} different models for different efficiencies (high water vs. normal thalweg). Stratify.
    - Dan - any interpolation method results in that your model is wrong, if you don't fish then you don't know. Try to keep missed days to a minimum.
    - Braden Lott (Biomark) - We found that when the flow rapidly increases, we'll get a slight delay in fish emigration, but it follows the spike in flow. We also have experienced that even though flows remain high, overall fish emigration will (not always) go down. Agrees with Dan Rawding. This makes it difficult to accurately represent the peak and length of the curve trying to extrapolate during those longer periods of downtime because it's not always consistent. I think it's better to come up with innovative ways to keep trapping over trying to come up with innovative ways to extrapolate the data.
- Andrew Berger (Puyallup Tribe) - curious if anyone has discovered a different batch stain, besides Bismarck Brown...Malachite green USED to be used...VIE injection and pneumatic are messy time consuming, hard to mark significant numbers of fish quickly.

2:45 pm ***Session 2:*** **Estimation and Analytics** *Ryan Kinzer, NPT, moderator*

Each speaker will address their typical approaches, challenges, innovations. Then speakers will present results and interpretation from the same data set of spring-summer Chinook smolts trapped on the Imnaha River.

3:05 pm Idaho Department of Fish and Game *Bruce Barnett and Tim Copeland*

Notes

- Do you still stratify to recapture goals?
  - A minimum 7 goals - publication Kirk Steinhorse 2004
- Did he break up the period when the 7' cone was installed?

3:25 pm The Confederated Tribes of the Colville Reservation *John Rohrback*

Notes

- Skeptical whether you're IDing recaptures correctly, why?
  - Sometimes during nocturnal trapping, we have 100s of fish and we use Bismarck brown that may be tough to ID
  - Want to see how long that dye is lasting, also test to see if workers can ID in a difficult environment (dark)
- Efficiency is low, how much have you played around with where you release the fish?
  - We've played around a fair amount, we drop fish about 6.5 river miles upstream. Less than a km resulted in inflated efficiency and there wasn't a chance for equal mixing
  - Are you concerned about tag or mark loss releasing them so far upstream?
    - We believe more loss is due to predation, but we assume zero
- How long do you acclimate before releasing?
  - take them from acclimation pond to release site, our acclimation ponds receive river flow.
- Could you speak to why your 5' trap catches more?
  - The 8 footer is stationary in the thalweg, but once flow increases it moves a bit, still check multiple times every day
  - 5' is the same kind of trap as the 8', not sure why it does better

3:45 pm Nez Perce Tribe *Lora Tennant*

Notes

- One suggestion, combine strata and see what it does
  - I have done that some and of course it's very variable from year-to-year
  - Maybe I don't need to be as much of a splitter and more of a lumper

4:05 pm Confederated Tribes of the Umatilla Indian Reservation *Carrie Crump*

Notes

- How do you break the months in half?
  - You can break it anyway you want, but I like 2 week periods, the smaller periods you have the better
- You can use DARR to estimate individual days, it allows you to pool data the same way an eyeball test would
- Braden Lott (remote) - DARR seems really neat in that it looks at strata down to a single day and creates the periods for you. This would remove user bias from creating periods somewhat subjectively.

4:25 pm Oregon Department of Fish and Wildlife *Jeremy Henderson*

Notes

- Are you choosing the number of dots?
  - The model does that
- I was curious if you played around because there are some models prone to overfitting

4:45 pm Washington Department of Fish and Wildlife *Dan Rawding*

Notes

- Dan Rawding - 95% recapture in day 1, 4% in day 2
  - Braden Lott - Typically, we found that to be the same situation with our data in the Lemhi in that most Chinook are recaptured in the first two days. Steelhead was spread out a little bit further.

4:55 pm Wrap-up and Introduce Day 2 Sessions, Adjourn

Day 2 - Thursday, November 7, 2019

Remote Participants: Marika Dobos, Aaron Brooks (Jamestown Tribe), Braden Lott, Brian Miller (Colville Tribes), C. Scofield, David Grundy (WDFW), Devin West, Fuchs, McCormick, T. R. Jones, Josh Poole (IDFG), Marilyn B, Marisa Litz, Scott Putnam (IDFG), S. Feeken, Snake River, Tattamia, Trent McDonald, Sheri Sears, Tom Iverson, Tracy Hillman, Warre BJW, Matt Falcy, Kings JDK, Andrea, , Al, Ben, Sippet JS, K. Gulbranson, J. Gillie, Jason Schaffler, Favrotsc, Jason Schaffler, Amy Seiders (NWIFC), S. Folks, Matthew Sturza, Eli Felts, YKFP - Nelson Springs, Nadine Craft, Mike Lance (ODFW)

8:35 am ***Session 2:*** **Estimation and Analytics,** continued — *Ryan Kinzer, Nez Perce Tribe, Moderator*

8:40 am Yakama Nation Fisheries — *Tim Ressegiue*

Notes

- Do you see a size difference that you think are outmigrants vs. residents?
  - There isn't a difference in detectability of smaller steelhead vs. larger
  - They seem to migrate downstream and grow over winter
- Is there a survival difference between the two traps?
  - The lower trap has been so unsuccessful at collecting steelhead, would have gotten rid of the lower trap if it wasn't so good at catching juvenile lamprey

9:00 am Northwest Fisheries Science Center / NOAA Fisheries — *Martin Liermann*

Notes

- How would you test for overdispersion?
  - When you have more efficiency trials, you should have more confidence in what's going on
- No fall sampling?
  - Sometimes the trap goes into September, but generally it comes out in August
    - October is our biggest month

9:20 am Insights into Smolt Abundance Study Designs and Estimation from Census and Simulations — *Dan Rawding, WDFW*

Notes

- You haven't spoken specifically to model selection, what are your thoughts
  - Yesterday I looked at model selection, with weekly data sets - the covariate model was a better model. I tend to do model selection, but I don't let that drive everything. There are plenty of problems within sample selection.
- Did you look at no flow No hierarchical vs. hierarchical?
  - Did not get to that
- Braden Lott -20 days seems like a while. Do they account for randomness past that, or exclude days leading up to when the trap might be pulled where they cannot operate the trap?
- Braden Lott -Not trying to operate to capture marks moving past could inflate their estimate.

9:40 am Discussion with Panel of Presenters — *Dan Rawding, WDFW, moderator and presenters*

Notes

- Wanted to point out that a lot of people are using batch mark for efficiency
- Dan R - I think it helped in the analysis,
- You all handling that data, what were the stumbling blocks?
  - Seemed pretty typical.
- Any other covariates you weren't used to dealing with?
  - Dan R Most fish migration occurs at night, I don't care if miss during daylight except for high water days. I used sample fraction to expand what I thought the catch for the day was. Fishing at night I wouldn't expand Bigger traps, dirtier rivers - much migration during day.
  - Lora T - our catch in Imnaha, is almost all caught at night. Handful during day.
  - Ryan K Did others expand for hours fished?
    - Crowd agrees they also sometimes do this
  - What does everyone do? - expand from missing days or ignore daytimes?
    - Tattamia - Good discussion of diel timing. matching diel timing of efficiency trials to natural migration timing is crucial and merits continued evaluation and discussion.
    - Bruce - remove tagged upstream- most at night I remove them and put in recaps

        - Braden Lott - We find that we have very little to no movement during the day and most all our movement was at night. We've had to make assumptions at times that all fish moved at night.
        - Dan R - knowing that timing helps -- are you willing to let it go if catastrophe, if you miss a handful of fish during the day, why fish.
        - Lora-pull trap if things might go bad, not worth the risk of losing trap
        - Braden Lott - During periods with heavy leaf litter or debris coming down, we've pulled the trap during the middle of the day. And assumed that during those times, fish were not moving.
    - Tim - it's a safety issue - at night, high water - can be big water.
        - Ryan also cold water in spring
    - Lytle - be helpful to talk more about what went wrong. We don't always know what our gear is - what really happened - all our setups are different.
        - Dan R - I've lost first freshet - high water suspends wood - can be as small as 12" diam, 3 ft. long - can be a small thing in the cone, to sink a trap
        - Bruce - our traps sunk by little debris
        - Lora - a tumbleweed sunk our trap. Helps us to look at USGS gauges
        - Carrie - we used to have a USGS gauge-gone now, so we pay close attention to weather - when we know there's snow above, warm temps
        - Bruce - the rookies have no idea about the risks
        - Lora-the experienced people-rely on them helps.
        - John R - swift water rescue training is helpful for people
        - Carrie - we have breakaway cables to pull our trap over
        - Braden Lott - Anyone ever sacrifice overall trapping efficiencies and trap off the side of the thalweg in order to miss most of the debris coming down?
            - Braden Lott -we've also gone to the extent of roping some of the bigger downed tree's upstream that are loose so that they kick to the side when flows come up.
            - Braden Lott -Unfortunately for us, those periods of crazy flows and debris tend to be periods where we encounter a lot of fish emigrating.
        - Scofield -On the Stillaguamish (western WA), we have a CFS threshold where we pull the trap if it goes above. We often fish the downside of the hydrograph when most of the larger debris has passed. We really watch the stream flows. We also have a breakaway cable.
            - Andrea (Remote) - We have done that many times. We have different configurations based on the flow conditions which often forces us to trap on the margin of the thalweg. Unfortunately, during high flows, we have to suspend when there is lots of debris and we miss a lot of fish as well.
        - Scofield (Remote Discussion) - Do you run efficiency trials when you fish on the margin of the thalweg?
            - Andrea - Yes
            - Braden Lott - We Do
            - Tattamia - Yes, every day
            - Marika Dobos - daily
                - Although my mainstem trap has very low efficiency and often cannot be estimated
                - Scofield - Our mainstem trap has very low efficiency as well
        - A. Berger (Remote Discussion) - anyone have a batch stain besides Bismarck?
            - Andrea -I don't know of any other stain besides Bismarck but it would be nice to try another product
            - A. Berger - there are options, elastomer, calcein...but none are "easy"
            - Scofield - Re: batch stains, we once tried neutral red (similar powder form), but we never got the buffering right and it basically lightly eroded the fins of the fish. But with more time and effort maybe someone could figure it out?
    - Lytle-we have a lot of uncertainty at tails of our dataset.
    - Upper Columbia data - distinct seasonal data. We use pit tag larger fish to characterize genetics.
    - Q - Ryan K -- multiple approaches from Dan, does anybody take that approach-ever switch to a different approach?
        - Bruce - same approach, stratify differently

- Martin - I calculate a lot of different efficiencies (hierarch vs. not) I use common sense. If I see a trend in efficiency, I don't use a hierarchical model. Using a Pearson, if I get something dramatically different - I start asking Qs.
- Ryan, should we take that approach? - exploratory data analysis w/different covariates then go from there?
- Dan R - I did that b/c I didn't know anything about the Imnaha
- Kale B-I Don't spend any time on traps so I do a lot of data viz to get an idea - I run lots of different models, Unless ----> lots of data. But problems when lost freshets. Comes down to assumptions of your model and what happened in the field. Issues at the peak - don't know - need to ground truth. #1 we want unbiased est. Sometimes have to sacrifice precision for accuracy.
- Bruce - we're talking about changing methodologies - important to stay consistent year to year.
- Kale - well field methods are consistent - W/PIT tags you can stratify any way you want. to me catch & efficiency should be correlated. If you have a lot of recaps, DARR is great, but if not - DARR excessively lumps
- Ryan-leads to negative bias
- Carrie - there is an algorithm in DARR - will only lump to an extent
- Craig - Steve selected DARR b/c he thought it was the better method, no there wasn't an eval of multi methods

10:30 am **Session 2: Estimation and Analytics: Guest Speakers** *Tim Copeland, IDFG, Moderator*

10:40 am Bayesian Approach for mark recapture operation for rotary screw traps:

An introduction to juvenile survival methods incorporating screw traps — *Jim Peterson, USGS Oregon Cooperative Fish and Wildlife Research Unit and Adam Duarte, Oregon State University*

Notes

- Do you have a sense for who is using the model you developed?
  - Central Valley salmon
- How do you deal with gaps in the data?
  - Base model you can deal with gaps, the integrated model deals with gaps just fine
- One of the parameters was egg to fry survival, it seems like survival was pretty dependent on those, did you make the priors tight enough?
  - The priors were already established by Central Valley

11:10 am Generalized Additive Models, b-splines, bootstrapping, and covariates: A flexible regression approach to estimate salmonid outmigration and confidence limits. — *Trent McDonald, Western EcoSystems Technology, Inc.*

Notes

- Tim C - you were inputting catch into your model, is that a difference in terminology or a difference in how you construct your model
  - I suspect it's a difference in terminology, Jeremy did something similar, but I think called it something different
  - Jeremy - Jeremy is nodding his head

11:40 am Estimation of Survival Probability and Habitat Capacity of Presmolt/Smolt and its Importance in the Life Cycle Model — *Shubha Pandit, Yakama Nation*

Notes

- The CJS works if you plug in your groups by life stages/ discrete periods
  - Yes, it works as a discrete group. I realize that sample size is not really the issue. Better to put more effort on detection probability
- The baseline is 20-21%
- Kale - habitat capacity is tough to wrap your head around
  - If you are able to increase the food availability

12:10 pm Discussion

Notes

- Tim Copeland - wondering how sensitive some of these models are with the need to combine data, when you have sparse data
  - The real issue is how do we pull data together. you do have data from many years

12:40 pm **Lunch**

1:40 pm ***Session 3:*** **Data Management and Connections to Coordinated Assessments Juvenile Out-migrants: Data Management and Data Exchange Standard Overview** — *Russell Scranton, Bonneville Power Administration and Brian Maschhoff, Exelearn*

2:00 pm Data Management from Collection to Reporting — *Colette Coiner, The Confederated Tribes of the Umatilla Indian Reservation*

Notes

- Colette- Paper and pencil does not fail/need batteries/ good back up plan
  - Braden Lott (Remote)- Paper and pencil has a degree of transcription error.
  - Marika Dobos (Remote)- We've had tablets get dropped in the river or just die and data for that stint could not be retrieved. Having both is helpful for reducing error
  - Marika Dobos -All PIT tags are stored in the HPR readers as backup to P4 when needed too
  - Braden Lott - Agreed that both is helpful for reducing error. We implement data ranges that run validation tools while users input data that will flag inputs if they are outside of the normal. Having that initial validation tool is very useful.
  - Marika Dobos - We have queries set up in P4 that does a lot of data checks as they are being entered too which is helpful for crews working on their own. They prompt warnings depending on how you set up the queries.

2:20 pm Small Fry to Big Data: Progress and lessons from WDFW's juvenile data collection, management, and reporting. — *Danny Warren, Washington Department of Fish and Wildlife*

Notes

- Banach - T. McDonald was talking about the system we made. #3 give them something they can use… that's the carrot
- You mentioned you do pre and post gatherings
  - That is just in the region right now, there is no central body enforcing things
  - Within the region are you collaborating with anyone with similar data?
    - We are, there are a few from Puget Sound we are in contact with, but more collaboration needs to be done

2:40 pm Idaho Anadromous Emigrant Data Management — *Bruce Barnett, Evan Brown, Tim Copeland, Idaho Department of Fish and Game*

Notes

- Braden Lott (Remote) - P4 is pretty great for trapping but still clunky for doing remote mark/recapture surveys from discrete or continuous fish monitoring if you're looking at summer parr rearing within a sub-basin.

3:00 pm Discussion: Data Management and Communications — *Russell Scranton, BPA, moderator*

Notes

- Ryan K - all your systems are fairly mature; how long have you all been working on your systems? I'm trying to figure out how much time and energy that needs to go into this?
  - Bruce - you need access to everybody, a central location, and be able to handle your non-tagged fish
  - Ryan K- Nez Perce is just getting started. I'm sort of wondering about the full lifecycle of your data… where is the funding?
  - Danny Warren- Our main juvie database was built from the $ from a grant, our final product was probably a little hurried, built in less than a year. The issue isn't building it, it is knowing what to build. Meeting the needs of the techs in the field all the way up to the analysts sitting at their desk.
- Dan R. - could you talk a bit about how you integrated PIT tag data even though our dbase was not designed with PIT tag data in mind?
  - Danny W - Yes - to change 1 fish would have taken too long - was designed to be a stopgap. It didn't detect pit tag data. but ½ our state was pit tag centric. Needed that
- Russ - being able to access and share information is of great importance, making your
  - Colette - when creating a data set think about how you structure it, if you don't structure it properly you will not

be able to get the data out. Creating the front end is easy, creating a solid base in the background is really important. Creating something interrelated has been very useful
    - Braden - It seems that there are good database storage tools being built out there but there's a lack of data collection software for generating the inputs for these databases. Where it's good for traps, lacks in function for collecting other entities of a fish's life cycle. Spawning ground surveys, remote juvenile fish surveys, e-fishing, etc. Are folks looking to standardize collection tools that can accommodate a standardized database?
    - Danny (WDFW)
    - Josh - we use BigFin scientific, it has some limitations
- Peter - how do you handle when users want to change data or correct data?
    - Danny - we report our tagging data a little slower, so the data is pretty well scrubbed. Having a delayed upload is helpful. PITagis has ways to resubmit things.
    - Peter - I know of the ability to resubmit, but then you need to update your centralized database
    - Danny - we try to get our system right first, but ideally an API would allow you to not have to upload it manually twice. The computers would talk to each other and update automatically.
    - Ryan K. - There is an automatic process that
    - Danny- good data entry forms need to be at least as fast as paper

3:45 pm ***Session 4*: Wrap-up, Discussion and Next Steps** *Jen Bayer, PNAMP/USGS, moderator*

Introduction part 1: Workshop Summary

Part 2: Questions and Concepts Beyond this Workshop and Discussion with panel of moderators

Notes

- Did anyone hear something new that might make them change how they do estimates?
    - Mike Banach - has anyone compared their two side by side PIT arrays? Seems like your introducing error
    - Ryan K In a situation like that, treat the traps as independent, treat them as two observations(state space approach) with an unknown truth
    - Skagit - trap efficiencies are different for species and life stage. Steelhead avoid the scoop or are caught at a lower rate than the 8 ft screw trap - we have to be careful analyzing
    - Peter - I've run screw traps side-by-side, what I did is treat it as one trap, but I'd also stratify the estimate as trap A and Trap B, I would only do it in the fall or early spring when I wasn't worried about sinking the trap. Primarily done for survival estimates
    - Dan R We run 2 traps on big rivers to avoid data sparsity-in theory it doubles your sample size if operating the same way
        - Braden Lott - I agree with Dan. Is running two traps any different than running two hand netters when someone is e-fishing? I think most folks don't separate those estimates.
        - Marika Dobos - That's a tough one, I have run two screw traps in tandem on the Lochsa and tried to do independent trapping efficiencies but the traps as a unit move and trap in different sections of the river depending on flow and debris, so I've just treated them as a single trapping unit
    - A consideration with two traps acting as one is to rig them so they can't spread apart
    - Kale - in lower Col - there are a couple sites where we'll run a tandem - in general we treat them as one catch - actually are not independent. Trap efficiency changes if one goes down - account for it in the analysis
        - Ryan - could logically think that they aren't going to be independent
- Russell - Lot more analytics than smolt est. SARS RpS - think about other estimates later. Innovation to help? What are the other issues?
- Don - Calcein Really hard to use when working w/lots of fish.
- Dan R - we will have hundreds/thousands - we went through all options for marking - Bismarck brown was the best BUT - we tested. Mixed marked vs. non-marked and had people id - made corrections based on results. Assign observer efficiency rates to individual people?
    - Staff had a good id rate. Also, concentration of B-brown - we made sure concentration was high enough to last throughout migration - no PIT tags. 99% of the fish came out the 1st night.
- Ryan K Q- is it a useful model?
    - Devin (Lummi) - policy? or science? We have to come up w/what works for policy & mgt, less time for science. What are others thinking and how are they handling that.
    - Kale - how does it affect your day-to-day operations?

- Devin - ultimately it comes down to how you run things and how you analyze the data. Know your people and know their limitations. I'm doing a lot less assumption testing/modeling though I came from an academic background
- Brian M - hurricane plots - you show the inferences to policy people, it gets loose (sharpies). BUT having the scientific info helps you put bounds on what the data is. You do get too caught up in the CIs. But still having a lot more models lets you consider the unknowns
- Alan Chapman - How is the trap data being used? Are all these models and elaborations getting policy people involved?
- Jim R - is there a best choice - they're not relevantly different from a manager's perspective. Important for us to share the methods so we can find a way - how to share our routines etc. like GitHub. so, everyone can converge on what the right methods are for a given data set.
  - Dan Rawding - what if we ended up with very diverse estimates, where would we be? When would you not publish an estimate? Example - 6 weeks of no data - didn't publish got both support and beat up
  - Russ - still comes down to you all are choosing one at the end of the day. You've taken the time to run all the other simulations, you can choose to release those as trial estimates, but essentially it is the one that is really useful. Just say why you chose that one
- Ryan - agree w/Dan. A steelhead weir blew out - person said I could still publish an estimate - Ryan said - Should you? It falls on us to decide.
- Jim - the decision process needs to go through the person closest to the data and the supervisors who know the long term trajectory of the data
- Tim C - There's an appropriate quote: Publish and be damned. Russ is right - got to be transparent. Must say why you are not publishing - but still must come up w/justification.
- Mari W - Values aren't valid when not supported by the data, have to accept that there will be holes in the data. From our level, we need to trust that you're going to use your best judgement.

- Jim R. - There are times when we hold the data back
  - Tim C. - Mari, that's an important observation. We have to do our own due diligence - if I say it's the best info then my supervisor's trust me. Comes to training, the QA/QC and thinking that the analysis is appropriate. When I saw the results of the Imnaha it filled my heart with joy! In that case, model selection not necessary. I'd like to see cases in which model selection does make a difference.
- Jen - is there a way to get at when it is okay to not have to test which model is best?
  - Tim - That was My q to the group earlier
  - Mike Banach - Suggestion: Do same exercise with a much messier dataset.
  - John - Need data with a lot of uncertainty in many areas
  - Kale - One dangerous takeaway is that regardless of your analysis you get the same answers. Using simulations, you can get a better result. There are times when models aren't appropriate. Important thing for this group - many people may have access to a sophisticated biometrician, but others don't. I do think we should take advantage of newer techniques that have been developed in the last 100 years. - e.g. the Bayesian state space models are really finicky, and some people may go back to a simpler maximum likelihood technique.
- Is that sharing resources/code? Is that training webinars?
  - Dan R - one of the reasons we came up with similar estimates with different models we met the Peterson estimation requirements. Hierarchical is good to do - it's partial pooling, and mostly it did work. Then Murdoch said that's never going to work. For me it was good to do those simulations -- we can code really complex models when our data is not meeting the assumptions. What assumptions are our models making?
  - Jim R - the model Jeremy presented, they will make it available
  - Ryan - sharing code is great, but at some point, these models get too complex for us to run. Unless you have the skill set, there is risk of not understanding what the model produces.
  - Kale - what's good enough?
  - Ryan - some sort of rule set guidance "when models work and what to look for" We had 2 ways to go w/our common dataset -- we could get similar answers, or we could get really different answers.
  - Dan - that dataset illustrated that when you look at smolt caps. that's where it diverges (zeros are bad, esp by themselves in a strata) That daily estimate didn't work - didn't converge. I believe trap efficiencies are changing on a daily basis, but I can't go there. And the covariate models - daily or weekly didn't matter. It's really important to think about those issues.

- One follow-up - how do we standardize definitions - PNAMP, CA, StreamNet are the forums for us to continue the dialogue
- Mari - encourage folks to engage with a lot of different folks - NOAA is looking at CA for the status review. Juvie stuff is behind NOSA data and the NOSA work is solid in CA. Trustworthy data - i.e. if you have a null value b/c you don't have data, don't put anything in.
- Lytle D - We had a problem getting everyone coordinated - from that folks developed a standardized set of evaluations. It is good to have a group put together guidance: metrics, analytical procedures. It would be nice if there was a document that pulled all this together.
- Jim - we would need a volunteer subgroup to put that together.

4:30 pm Adjourn

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			F2F =	**68**
			web =	**50**
			Total =	**118**
				~33 entities