November IC-TRT meeting
August 2-4, 2004
NOAA
Portland, OR

TRT attendees: R. Carmichael, T. Cooney, F. Mutter, P. Hassemer, D. McCullough, C. Petrosky, H. Schaller, P. Spruell, M. McClure, P. Howell

Other attendees: C. Baldwin, D. Holzer, D. Matheson

Monday August 2

1. Updates
    a. RSRP – Meeting last week of Aug. - theme hatchery/ESA issues.
        i. Briefings for the RSRP on Northwest hatchery applications, issues
        ii. 1st day -- basic education - Could use a map showing the distribution of different hatchery types (ex production vs conservation)
    b. 2nd day – discussion of current issues & large scale experiments. Not too much detail needed (more conceptual w/ specific examples (Pete has been asked to give a summary on Idaho Supplementation Study)

    c. Need to come up with a list of people to send pop ID / viability report to for final (formal) review. Suggested list: Tribes (including CRITFC), government agencies,(state Fish & Wildlife, Ecology agencies, EPA, FS, Power Planning Council, indust/enviro/ag groups.
        i. Suggestions from TRT: Add mid-Columbia PUDs, BLM, BOR, BPA, core, consultants?? (Chapman, Klickitat)

    Formalize this list before Labor Day.

2. Catastrophe PVA project (RAMAS)
    a. See handout #1
    b. Objective: How many pops are needed to achieve ESU viability?
    c. Populations within an ESU assigned a size based on category from draft viability analysis (starting 'size' of 750, 1500, 2250 Initial model runs were done for the Snake River Spring/summer Chinook ESU in two sets:
        i. Randomly choose a number of pops from ½ to all pops
        ii. Incorporating draft TRT MPG criteria
    d. Methods (handout #1 p. 2)
        i. Compared high abundance & low productivity to low abundance & high productivity
        ii. In a particular scenario, each pop was assigned a common intrinsic productivity mean and variance.
        iii. A rate of catastrophe was added (0.6% (based on a study of catastrophic risk across many taxa)
            1. If a catastrophe occurred, capacity was permanently decreased by 25%.
            2. Assumed correlations in catastrophic risk among populations: within the MPG = highly correlated = .25, within the ecoregion = slightly correlated = .1

        iv.). Rates of dispersal between populations set by distance of separation, MPG.

e. Results (handout #1 p. 3)
    i. ESU risk sensitive to number of viable populations. Risk was high at ½ of historical populations (16 out of 32). Large reduction going from 20 to 24. Incorporating MPG 'rules' reduced risks given a particular number of viable populations.
    ii. Used a constant variance
        1. ?? consider randomly selecting from a family of variances (Howard)
    iii. QET: used 250 x 31 (# of pops in ESU)
        1. Initial runs, other populations were zeroed out. Future analyses should use an alternative viability level for other populations. Apply other QET scenarios

f. Next steps
    i. Define threshold
    ii. Rate of catastrophe
        1. Is the average (.6%) used appropriate for these populations/ESUs?
            a. **Can we pick out individual catastrophic risks? (Jennifer and Dale)**
            b. Differentiate between widespread versus individual events?
    iii. Define catastrophe
        1. “severely reduces” = >75% of breeding adults
        2. or eliminates an entire population
        3. RAMAS reduces capacity by 25% permanently—is this too severe?
    iv. Test parameters for sensitivity in the model
        1. try low production and high production scenarios
        2. **catastrophe rate – catastrophes and their effects (Phil, Dale, Casey)**
            a. 75% vs. 90% effect
            b. Rebounding population instead of permanent decrease in capacity
        3. **treatment of non-viable pops (Tom, Michelle)**
        4. **effect of autocorrelation (Tom, Charlie, Phil)**
        5. **dispersal rates (Fred)**
            a. higher vs. lower if w/in an MPG
            b. eliminate dispersal among different MPGs
        6. **defining the shape of the curve (Pete, Phil)**

3. Population size and complexity: Summary tables from draft Population Size Analysis (emailed for 7/14 discussions).

Stream Type Chinook	**Tributary Habitat Capacity/Complexity Categories**		
	Basic	**Intermediate**	**Large**
No. of Populations	20	10	5
Spawning KMs ***Median*** ***Range***	45 13 - 64	103 72 - 139	184 154 - 250
# per Population: HUC-5 watersheds ***Median*** ***Range***	1.5 1 - 4	5 2 - 12	5 4 - 10

Steelhead	**Tributary Habitat Capacity/Complexity Categories**		
	Basic	**Intermediate**	**Large**
No. of Populations	6	30	11
Spawning KMs ***Median*** ***Range***	 154 103 - 181	 443 250 - 662	 1013 735 - 1422
# per Population: HUC-5 watersheds ***Median*** ***Range***	 1 1 - 3	 5 2 - 9	 11 4 - 17

a. **Rearrange pop summary table and reorder pops in handout #3 (Tom)**
b. How does temperature affect placement of pops into size groups?
    i. # symbol indicates >10% habitat could be affected by high temps
    ii. Add in paragraph under methods about temperature (requires clarity—used current temp applied to historic)
    iii. 3 variables highly correlated to temp: July air temp, elevation, % forest cover (in a 500m buffer)
c. Abundance targets for populations
    i. 3 methods for discussion (handout #3, p. 3)
        1. base=750, intermediate=base x 2, large=intermediate x 2
        2. base=750; intermediate=750 x (median$_{intermediate}$ / median$_{base}$); large=750 x (median$_{large}$ / median$_{base}$)
        3. base=750; intermediate and large=750 x (km$_{spawning}$ / median$_{base}$)
    ii. how do we define "maintain?" Three possible approaches for discussion
        1. try for high level of all pops; no need for developing maintenance criteria
        2. 500 (for a pop) and a growth rate > 1 (pop not decreasing)
        3. median pop size for "others" > 500 with a growth rate > 1

*Abundance/productivity continued on August 3, point #4

Tuesday August 3

1. Update: Pop ID document. Working on summary of genetic information used in defining populations. Matrix format. Also developing matrix summarizing comparisons among potential population areas - degree of difference, types of information, etc. (handed out examples).
2. Historical distribution of pops in areas that currently contain no salmon—how did the ESU look historically? Intent is to analyze Upper Snake, Columbia drainages above Chief Joseph, Deschutes above Pelton/Round Butte. Generally characterize potential populations in these areas.
    a. Snake R. above Hells Canyon drainages. Used historical data and intrinsic potential analysis to guess where pops would have been. Used current pop distances and compared them to extirpated areas.
        i. Historic pop ID and MPG/ESU summaries (handout #5)

        ii. Upper Snake R. Chinook distance matrix (handout #6)
    b. Technique utilizes basin topography, elevation, and distances in known ESUs and compares them to historic areas to designate ESU boundaries and determine the number of pops w/in an ESU.
    c. Is this a valid modeling method?
        i. Use Karen Pratt's summaries of historical salmon/steelhead accounts as evidence.
        ii. Include an assessment of potential historical spring/summer chinook populations in the Clearwater River.
        iii. We need a more detailed analysis of precipitation
            1. monthly averages
            2. snowmelt dominated vs. rainfall dominated areas
        iv. problem: before Hell's Canyon dams, were the Hell's Canyon tributary Steelhead part of a population extending upstream?
            1. need a more historic view of certain current pops that were cut off from upstream pops
    d. Next steps in pop ID
        i. Create historical population boundaries (Casey, upper Columbia)
        ii. Consider the implications at the MPG and ESU levels
        iii. Release document 1-2 weeks after the September meeting
            1. Write up document before meeting and submit for comments

3. September TRT meeting logistics
    a. Objective: to arrive Tuesday night at "Three Rivers"
        i. Fly into Lewiston or Missoula - Three Rivers is 3+ hour drive from either.
    b. TRT Meetings Wednesday and Thursday at nearby Fenn Ranger Station.
    c. Wednesday evening—drive to Powell for tour (Fish Creek area, smolt traps, etc)
    d. Return to Lewiston late Thursday
        i. Need hotel info for Lewiston
    e. Friday morning field trip. (4 hours)
    f. Flights out of Lewiston to Boise and Seattle in early afternoon2 pm flight to Seattle
4. Diversity Index (see handout #9)
    a. Looked at five characteristics: Stream width , Elevation range associated with spawning, Stream order, Ecoregion, Hydrograph (snow/rain dominated)
    b. Problems
        i. Disproportionate ranges in values: ex. Elevation range is much greater (10-1000) compared to number of ecoregions (2-5).
                a. try dividing by a multiplier to normalize ranges, still get more heavily weighted characteristics (width and elevation)Pete- inconsistencies in comparative results (sum with and without ecoregion) depending on location - needs to be worked out
        ii. Hydrograph – calculated within pop boundaries - should include upper areas in the drainages.
        iii. Current vs. potential tables (handout #9): current includes low, med, and high, while potential includes only med and high → need to be normalized

iv. utilizing a range doesn't capture enough resolution (Howard) Example; A range in elevation yields a manifestation of high and low points, but doesn't account for the variety of peaks/valleys between endpoints. This could be a very important indicator of diversity. Consider using bins (frequency distribution) for elevation, stream order, and width
v. Fix snow-dominated variable (awards a high diversity score for the greatest snow cover—should be more responsive to relative distribution, amount of spawning habitat in rain vs snow dominated sections of population.)
vi. Should we be using rearing potential vs. spawning potential? (Phil)
    1. Key question: How does rearing habitat promote diversity??
        a. Its presence allows for outmigration
        b. Allows juvenile life history to develop
        c. Incorporating Tom's Valley Width based index would provide some link between diversity index and rearing conditions
    2. How do we identify currently utilized (occupied) rearing distribution? Problematic…
        a. Damon- we have what is defined as rearing habitat (in maps)
        b. Casey- need to find out if we know that fish were present in mapped rearing habitat
        c. No way of systematically sorting out areas that were not looked at from areas where fish are not present for current rearing. We can't exclude these areas as current rearing habitat.
vii. What about the Grande Ronde? Generally accepted as having high diversity potential, yet it gets a low diversity metric
    1. Incorporating Tom's valley width metric will raise the GR score

c. Next steps (Michelle)
    i. Important to account for rearing habitat
    ii. Identify which metrics are most predictive of diversity
        1. check these against genetic data
        2. use regressions/stats to improve weighting of metrics

5. Abundance and Productivity (revisited) – see handout #10
    a. Discussion Question: Should population specific abundance/productivity criteria be influenced by the size and complexity of tributary habitat historically available to a population? (Tom) handout #10 p. 3 - Alternatives
        i. No—use simple pop models to define minimum abundance/productivity levels
        ii. Hedge your bets—simple pop models, but require intrinsic potential / abundance levels associated with lower risk levels for a certain percentage of larger, more complex pops
        iii. Yes—adjust abundance goals in accordance with spawning/rearing habitat available to a pop. OR utilize a pop specific abundance, assign abundance by categories of size/complexity, use metapop models

b. Discussion results: Abundance/Productivity metrics should be responsive to population size/complexity. Need to decide on appropriate measure; be specific about assumptions in models, and use in context with our metrics; need to have some super viable pops, direct linkage to spatial structure & complexity rather that just total size. Fred U. pointed out that directly responding to pop complexity would be responsive to uncertainties in population definitions (especially for larger, aggregated populations).

c. Considerations for breaking pops into basic, intermediate, and large (see handout #11)

    i. % change (in number of spawning km between pops) and number of HUCs (more complexity with more HUCs)

        1. Consider using just one curve and setting thresholds for each level of complexity. Minimum size threshold of 500 for Basic grouping, incrementally higher thresholds for populations falling within medium and large groupings..

    ii. Start out using size-based groups. Later, use spatial criteria to round individual populations if needed.

        1. Double each group (intermediate, large)?

            a. Rational—natural breaks indicate an apparent relationship of doubling between group sizes

        2. Charlie pointed out range of historical productivities among pops in the basic size group. Consider moving break in groupings to a different place

            a. This may leave too few 1X pops

            b. Consider breaking up the smaller group based on some other index of complexity

        3. Consider calling for targeting some pops as "super viable" (Phil)

        4. Decision - use the draft size groupings. Tom will note in write-up that some pops within a grouping produced at a higher level during the period of record (1950's/60's) than others in same grouping (example Bear Valley vs Marsh Cr.)

d. Using S/S and SAR to determine population status (handout #11)

    i. Only certain combinations of smolt/spawner and SAR are capable of replacement

        1. 3 curves (handout #11) represent different smolt capacities (50k, 100k, and 250k)

        2. solid lines → threshold of 50 fish (4 years in a row) for 100 years

        3. sensitive to carrying capacity assumption, variance, but very sensitive to autocorrelation

        4. Questions

            a. What is the best estimate of SAR and smolt/spawner?

            b. Where is the currency measured??

                i. When comparing SARs between different systems, you must consider where mortality is accounted for

        5. Michelle—it is important for both curve models to be compatible—both curves should yield the same answer in terms of viability. **Tom will draft section describing linkages between the two models, comparisons, etc.**

6. Advantage of S/S SAR model
    a. Possibly easier to measure a short-term response and evaluate population status - could work in conjunction with adult based Viability Curves.

e. Does ½ historical population or at least 2 pops go far enough in meeting viability criteria? Do we need to add core/legacy population criteria? Table summarizing info for populations within MPGs handed out as background for future discussions.

6. Population specific spatial structure/diversity criteria
    a. Test runs of spatial structure/diversity table against example populations (Snake Fall Chinook, Wenatchee, a John Day steelhead population.
    b. Snake Fall Chinook: Discussed handout summarizing historical info, spawning potential distribution, factors. Applyied guidance in Spatial Structure/diversity criteria draft to Snake Fall Chinook. (see table below).
    c. Didn't get to Wenatchee or John Day. **Assignments: Results to be discussed at next TRT meeting (Sept). Pete/Charlie generate one or more examples of historical spatial structure for Idaho stocks, Phil for one or more John Day steelhead pops), Casey for Upper Columbia.**

	3-5 pops	**1 pop w/ foci**	**Current**
Patterns of gene flow	Restricted b/w pops. Some introgression in downstream pops from Columbia ESUs	Slight-mod gene flow b/w foci. Some introgression in downstream focus from Col. ESUs	None w/ upper regions. Past hatchery introgression into pops from outside the ESU. Large local hatchery influence
Natural variety of available habitats	Lower pop (Clearwater) has a different temp regime. Salmon falls/Marsing reach—unique ecoregion.		Lost upper ecoregion. Lost lowest ecoregion. Lost rearing habitat.
Number of aggregates	Lower Marsing/Salmon falls – many w/ gaps	3-5 "foci," each w/ sub-aggregates	Series of sub-aggregates
Distribution of aggregates	Lower branched (2) Marsing/Salmon falls – nearly linear	Nearly linear (1 branch – Clearwater)	Branch (2) Highly restricted
Natural processes	Alt. temp. regime in Clearwater. Likely linked to flow regime. Stable env. Conditions in Marsing.	Likely restriction of outmigration to pre-July due to temp.	Changes to temp. and flow regime.
Patterns of phenotypic expression	Outmigration from mainstem—early (predom. pattern). Likely later outmigration from Clearwater.	Spawn timing October-December	Shift in outmigration, timing, emergence, and spawn timing. Change in size.
Source areas	Lower-1(?) Marsing-1(?) Salmon Falls-1(?)	3-5 (?)	