Potential Fish Habitat Subgroup of the TRRP Fish Work Group

PURPOSE: The purpose of the Potential Fish Habitat Subgroup is address the following priority issue to address:

> *Identify targets for how much habitat we need, and identify how much habitat we can potentially have based on geomorphic and hydrologic conditions* by answering the questions: *How much habitat do we need to meet program goals? What is the maximum habitat potential in the upper 40 miles?* (IAP Appendix P).

NEED: A critical question facing the Trinity River Restoration Program (TRRP) is: Can the restoration strategy employed by the TRRP, specifically channel rehabilitation, fluvial geomorphic flow management and coarse sediment augmentation provide sufficient habitat to increase fish production to support TRRP goals for spawning escapement and contribution to dependent fisheries?

Addressing this PITA will help support assessments **1H** and **2H***: Map and quantify the extent (area) of available fry/juvenile rearing habitat at rehab sites* and *Map and quantify the extent (area) of available fry/juvenile rearing habitat throughout the mainstem, respectively*, and assessment **13H**: *Determine potential habitat carrying capacity for anadromous fish species.*

A proposal was submitted for the FY2011 science work plan process for this effort that can be used as a starting point for this effort.

MEMBERSHIP: Charlie Chamberlain (FWS?), Damon Goodman (FWS?), George Kautsky (HVT), Aaron Martin (YT), Nina Hemphill (BOR), Sam Chilcote (FS), Physical WG rep, Riparian/Wildlife WG rep.

FY 2011 Trinity River Restoration Program Proposal Format

A. Project Title: Development of mainstem Trinity River habitat targets for anadromous salmonids.

B. Principal Investigator(s) and Affiliation: Charlie Chamberlain (USFWS), Tim Hayden (Yurok Tribe), Mike Berry (CDFG), Robert Franklin (Hoopa Valley), Nina Hemphill (TRRP-Weaverville)

C. Project Goal(s) and Objective(s): A critical question facing the Trinity River Restoration Program (TRRP) is: Can the restoration strategy employed by the TRRP, specifically channel rehabilitation, fluvial geomorphic flow management and coarse sediment augmentation provide sufficient habitat to increase fish production to support TRRP goals for spawning escapement and contribution to dependent fisheries?

> The goal of this project is to address the priority issue to address (PITA): *Identify targets for how much habitat we need, and identify how much habitat we can potentially have based on geomorphic and hydrologic conditions* by answering the questions: *How much habitat do we need to meet program goals? What is the maximum habitat potential in the upper 40 miles?* (IAP Appendix P).
> Addressing this PITA will help support assessments **1H** and **2H***: Map and quantify the extent (area) of available fry/juvenile rearing habitat at rehab sites* and *Map and quantify the extent (area) of available fry/juvenile rearing habitat throughout the mainstem, respectively,* and assessment **13H**: *Determine potential habitat carrying capacity for anadromous fish species.*
> .

D. Project Task(s) and Associated Methods:

> *Task 1.* Compile pertinent literature concerning methodologies to development habitat potential targets and information (habitat, geomorphology, channel morphology, etc.) pertinent to the Trinity River and other river systems that will be necessary to support this effort. Develop goals and objectives for a workshop, list of invited experts, and distribute pertinent literature prior to workshop.
> *Task 2.* Hold workshop – review information provided prior to the workshop, discuss different approaches to assessing potential habitat and
> *Task 3.* Produce white paper utilizing methodology developed at the work shop to produce habitat targets for the TRRP.

E. Data Evaluation and Deliverables: Information gathered during the literature search component of this project will be cataloged and a library of documents (converted to pdf files) will be provided to the TRRP. This project will rely on information that has already been produced by the TRRP and from effort on other river systems. Additionally, the effort being conducted by Beechie and Pess, "*Estimation of salmonid restoration potential in the Trinity River from North Fork Trinity River to Lewiston Dam"* funded by the USFWS-AFWO office should be completed by early fall of 2010 (See attachment 1 for scope of work). This effort should be evaluated and considered in the context of addressing this PITA prior to initiating this project. Following completion of the white paper, the document will be distributed for TRRP partner review and following that for external peer review.

F. Schedule:

Fall 2010 – initiate scoping of the project, begin to collect literature, and plan workshop;
Spring 2011 – hold workshop
Fall 2011 – produce white paper, circulate for review
December 2011 – finalize white paper and provide finalized document compilation to the TRRP.

G. Budget: Since this effort has not had the benefit of proper scoping through the Fish and Riparian Associates work group, a fixed level of funding is allocated to each participating agency for them to supply staff support (Table 1). The FWS and TRRP-Weaverville staff participating in this effort will not require additional funds since their salaries are covered as part of their contribution to the TRRP. An additional $15,000 was allocated provide funding to cover expenses (time if requested, transportation, lodging, per diem, etc.) of invited workshop experts. This is expected to be a one-year project.

H. Cooperators (if not included as principal investigators): TRRP partner agencies

Table 1. Budget for FY2011 proposal to development of mainstem Trinity River habitat targets for anadromous salmonids. Budget by agency for all tasks listed in Section D. Budget Category	USFWS	Yurok Tribe	Hoopa Valley Tribe	CA Fish and Game	TRRP-Weaverville	Workshop	Category Total
Salary	10,000	10,000	10,000	10,000	10,000		50,000
Benefits							
Lodging and Per Diem							
Transportation/Travel							
Equipment/Supplies							
Misc. Expenses							
Contracts[1]			15,000			15,000	
Subtotal (direct expenses)				65,000			
Indirect							
Subtotal Total (direct+indirect)				65,000			
In-kind(subtracted from above subtotal)		10,000		10,000			20,000
Grand Total (amount requested)				45,000			

Attachment 1.

Estimation of salmonid restoration potential in the Trinity River from North Fork Trinity River to Lewiston Dam

Tim Beechie, George Pess
Northwest Fisheries Science Center
Seattle, WA 98112

Objective

Estimate restoration potential of the Trinity River downstream of Lewiston dam to its confluence with the North Fork Trinity River. The primary purposes of estimating restoration potential are to (1) provide a quantitative hypothesis of restoration outcomes, and (2) provide a context for establishing accuracy and resolution criteria for data collection and monitoring programs.

Approach

We propose to evaluate restoration potential in the Trinity River based on simple analyses of habitat availability at present compared to expected habitat availability post-restoration, and translation of these estimates into estimates of potential fish population sizes at various life stages (e.g., Reeves et al. 1989, Beechie et al. 1994, Greene and Beechie 2004). Restoration actions in the Trinity River include short term flow increases of up to 11,000 cfs (maximum outlet works capacity of Lewiston Dam is 14,000), gravel augmentation, and mechanical manipulation of the legacy channel to accommodate reduced flood flows and sediment supply. These prescriptions impose certain constraints on restoration outcomes, which can be most simply accounted for using data from other montane, gravel-bed rivers as analogues and focusing on flow regime and sediment supply as the key driving variables (e.g., Pess et al. 2005, Beechie et al. 2006a). Accounting for these constraints allows pre- and post-restoration classification of channel patterns, which can be used to stratify type and availability of habitats by reach type. Existing habitat data can then be related to reach type to quantify habitat restoration potential by reach type, and to estimate total habitat availability for the study area. Finally, habitat constraints can be identified using simple limiting factors assessments (e.g., Reeves et al. 1989, Beechie et al. 2003), life-cycle models (e.g., Greene and Beechie 2004) or evaluation of individual life stages as potential populations constraints (Pess et al. 2003, Beechie et al. 2006b).

Tasks/products

1. Classification of reach types
    a. Determine potential channel types based on geomorphic setting and history of channel conditions
2. Identified areas of high restoration potential
    a. Map areas of valley floor the can be potentially restored for riparian forest establishment, LWD recruitment, and channel migration over decadal time scales and longer

b. Assess habitat fish production potential by reach type

3. Estimates of cumulative production capacity and restoration potential (NF Trinity to Lewiston dam)
   a. Evaluate restoration potential of project area (NF Trinity to Lewiston dam)
   b. Assess maximum potential steelhead production for the basin
   c. Interpret results in the context of production goals and design of restoration effectiveness monitoring programs

Assumptions

1. Habitat data sufficient to estimate current spawning and juvenile rearing capacities are available.
2. Recent digital aerial photography (2000 or later) is available for the entire study reach

Selected Citations

Beechie, T.J., C.M. Greene, L. Holsinger, and E. Beamer. 2006b. Incorporating parameter uncertainty into evaluations of spawning habitat limitations on Chinook salmon populations. Canadian Journal of Fisheries and Aquatic Sciences 63(6): 1242-1250.

Beechie, T.J., M. Liermann, M.M. Pollock, S. Baker, and J. Davies. 2006a. Channel pattern and river-floodplain dynamics in forested mountain river systems. Geomorphology 78(1-2): 124-141.

Beechie, T.J., G. Pess, E. Beamer, G. Lucchetti, and R.E. Bilby. 2003. Role of watershed assessments in recovery planning for endangered salmon. Pages 194-225 in D. Montgomery, S. Bolton, D. Booth, and L. Wall, editors, Restoration of Puget Sound Rivers, University of Washington Press, Seattle

Beechie, T. and S. Bolton. 1999. An approach to restoring salmonid habitat-forming processes in Pacific Northwest watersheds. Fisheries 24(4):6-15

Beechie, T., E. Beamer, and L. Wasserman. 1994. Estimating coho salmon rearing habitat and smolt production losses in a large river basin, and implications for restoration. North American Journal of Fisheries Management 14:797-811

Greene, C.M. and T.J. Beechie. 2004. Habitat-specific population dynamics of ocean-type chinook salmon (Onchorynchus tshawytscha) in Puget Sound. Canadian Journal of Fisheries and Aquatic Sciences 61:590-602.

Pess, G. R., T. J. Beechie, J. E. Williams, D. R. Whitall, J. I. Lange, J. R. Klochak. 2003. Chapter 8 - Watershed assessment techniques and the success of aquatic restoration activities. Pages 185-201 in Wissmar, R. C., P. A. Bisson. (Eds.) Strategies for Restoring River Ecosystems: Sources of Variability and Uncertainty in Natural and Managed Systems. American Fisheries Society, Bethesda, Maryland.

Pess, G., S. Morley, J. Hall, and R. Timm. Monitoring floodplain restoration. Pages 127-166 In P.Roni, editor. Methods for monitoring stream and watershed restoration. American Fisheries Society, Bethesda, Maryland.

Reeves, G.H. Everest and T. Nickelson. 1989. Identification of physical habitats limiting the production of coho salmon in western Oregon and Washington. USDA Forest Service Gen. Tech. Rep. PNW-GTR-245. 18p. USDA Forest Service, Pacific Northwest Research Station, Corvallis, Oregon.