Trinity River Restoration Program (TRRP)

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TECHNICAL MEMORANDUM

TO: TMC

FROM: INTERDISCIPLINARY TEAM VIA ERIC PETERSON, SCIENCE COORDINATOR

CC: MIKE DIXON, EXECUTIVE DIRECTOR

JAMES LEE, IMPLEMENTATION BRANCH CHIEF

SUBJECT: SCIENCE PROGRAM PROPOSALS FOR FISCAL YEAR 2026

DATE: JUNE 13, 2025

ATTACHMENT:

The TRRP Science Plan (Pickard et al. 2023), approved by the TMC in March 2023, sets forward a process for Program scientists to develop proposals for targeted studies in addition to our standard long term monitoring efforts. The process requires a full year to develop the proposals across Program Workgroups and the Interdisciplinary Team (IDT), all with guidance from the Scientific Advisory Board (SAB) at multiple points in the process.

The IDT implemented the process for the first time in preparation for the Fiscal Year (FY) 2025 budget. During that first experience with the process, the IDT found it to be effective overall, but requiring a few additional steps. These were implemented toward these FY2026 proposals. The full process now involves:

1. Workgroups are asked to inform IDT of any major questions
2. IDT, in consultation with SAB, confirms Key Uncertainties in light of major questions to determine focus for the upcoming funding cycle (the summer a full year ahead of the intended FY)
3. Workgroups develop specific Research Questions as briefs targeting 2 pages length. These are reviewed by the SAB and revised accordingly.
4. The Program office develops a and releases a Request for Proposals (RFP) toward those Research Questions (during winter before the intended FY)
5. Individuals or teams develop draft proposals
6. Workgroups evaluate draft proposals and make recommendations for revision; SAB also makes recommendations for revisions
7. Individuals or teams revise proposals accordingly
8. SAB provides final ranking of proposals with guidance on worthiness for TMC
9. IDT assembles proposals and SAB guidance (the “portfolio” referred to by the Science Plan)
10. IDT (via Science Coordinator) presents the proposals to the TMC
11. TMC makes funding decision

Toward FY 2026, the IDT identified 3 Research Questions that were included in the RFP:

1. Monitoring the effects of tributary sedimentation events on salmonid redds in the mainstem Trinity River

2. Development of a foodscape model for incorporation into the Stream Salmonid Simulator

3. Can rehabilitation site design provide adequate thermal diversity for Northwestern Pond Turtle (*Actinemys marmorata*) growth?

However, the IDT did not receive a proposal for the first of these. Thus, only two proposals are forwarded to the TMC for consideration. These are posted separately to the TMC meeting materials.

Linking fish foraging with population dynamics: incorporating variable consumption into the Stream Salmonid Simulator

Authors: M. Dodrill (USGS), R. Perry (USGS), K. Lindke (CDFW), C. Laskodi (YTFP), S. Naman (NMFS), and N. Som (USGS).

Funding request: $336,266 (to USGS)

Thermal assessment of turtle growth and habitats at rehabilitation sites

Authors: J. Alvarez (HVT), D. Ashton (ARS), B. Nissen (USFWS)

Funding request: $126,614 (to HVT and ARS)

Following completion of the proposals, the SAB was asked to rank proposals and provide guidance for the TMC on worthiness of the proposals. The SAB was not asked to consider cost, as that is the responsibility of the TMC.

The SAB felt that both proposals are worthy contributions to the science of the Trinity River. They ranked the fish foraging/consumption project as the higher priority than the thermal heterogeneity/turtle project because it more directly informs the goal of the Program. The SAB evaluation is attached to this memorandum; please note that in the typical style of scientific peer review, there are questions and concerns raised by the SAB. If funded, the IDT will communicate these comments to proposal authors and request adjustments where reasonable. Again, the SAB states that both are worthy contributions for Trinity River science.

Therefore, the IDT requests that the TMC fund the two proposals outlined above. The full proposals are posted separately to the TMC meeting materials.

Respectfully,

IDT as represented by
Eric Peterson
TRRP Science Coordinator

Attachment: SAB Evaluation and Ranking

Science Advisory Board (SAB)
Trinity River Restoration Program

Eric Peterson
Science Coordinator
Trinity River Restoration Program

RE: Final FY26 Science Proposals

May 31, 2025

Eric,

As requested, the SAB has provided their evaluation and ranking of the Final FY26 Science Proposals. Specifically, you asked the SAB for input on whether each of the projects are worth funding to achieve needs of the Trinity River Restoration Program (TRRP) and a comparative ranking of the two proposals.

The SAB agreed both proposals were well written and appreciate the authors' feedback to previous comments submitted by the SAB in April. Both proposals address key uncertainties in the TRRP's Science Plan (i.e., nutrient flux, temperature regime and fish production) and are well grounded in Program objectives. The SAB does have lingering concerns regarding each of the proposals that should be carefully considered if either project moves forward. Specifically, the study design of Alvarez et al. using multiple methods to collect temperature data in rehabilitation and mainstem sites may not produce defensible results; and, assumptions needed by Dodrill et al. to develop a drift foraging module in the S3 model may overshadow its predictive capacity. These concerns are elaborated further in specific comments provided by individual SAB members below.

Overall, the SAB agrees each project can provide important learnings to the Trinity River and are worthy of funding, but with consideration to the noted concerns. The SAB does, however, rank the Dodrill et al. (drift foraging) proposal somewhat higher as it addresses the primary purpose of the TRRP–fish production.

Sincerely,
Andrew Paul, on behalf of the SAB

Dodrill et al., "Linking fish foraging with population dynamics: Incorporating variable consumption into the Stream Salmonid Simulator"

Specific comments by K. Fausch:

1. The proponent responded to all the comments of reviewers, primarily by acknowledging the large number of assumptions and uncertainties.
2. In their response to SAB comments, the proponents acknowledge a large number of assumptions that will need to be made in this analysis. Given this, if the model doesn't match the observed growth well, then various parameters will likely be "tweaked" to adjust the model so that it does fit. Given the large number of assumptions made, how likely is it that such model tuning will reveal answers about which assumptions are incorrect? Could various combinations of such tweaks result in the same output? The investigators admit that it is beyond the scope of their proposal to begin validating the various mechanisms driving invertebrate drift (in the water column and on the surface) with flow, and fish foraging on this drift, so there will be opportunity for an independent evaluation of such assumptions.

Specific comments by D. Tonina:

1. Direct alignment with Topic 2: The proposal directly addresses the need to incorporate spatial and temporal variability in food availability into the S3 model.
2. Relevance to TRRP key uncertainties: it specifically targets two major uncertainties: nutrient flux and fish production. This makes the proposal relevant for adaptive management decisions.
3. Adaptive management support: Improves S3's realism, allowing better-informed management actions tied to actual ecological responses.
4. Methodology: The approach integrates hydrodynamic modeling, drift-foraging theory, and bioenergetics modeling. It also proposes to estimate growth from otolith microstructure—leveraging prior datasets, which improves both efficiency and feasibility.

Specific comments by A. Paul:

1. Appreciate the thorough and thoughtful responses to the SAB's previous input on the proposal, especially comments/concerns raised by Dr. Hayes.
2. I see this proposal as two connected projects: a) modelling exercise to update the S3 model to incorporate spatio-temporal varying drift foraging to predict factors influencing Chinook growth; and, b) using daily otolith growth increments from Chinook to biologically validate S3 model predictions on growth. The S3 modelling approach to daily growth variation requires a number of assumptions that will be difficult to test but the otolith growth increments may be the tool to test overall model predictions…namely did juvenile growth increase because of increased consumption.
3. Both components are important, however both are also significant research undertakings with uncertain outcomes. The project team needs to ensure each receive adequate attention.

Attachment: SAB Evaluation and Ranking

Specific comments by J. Buffington:

The authors of both proposals have done a nice job responding to reviewer comments and revising the proposals accordingly. The proposals are each relevant to the Science Plan and are well grounded in Program objectives and the RFP.

I have ranked the consumption proposal (Dodrill et al.) highest because it addresses the primary currency and *raison d'être* of the Program (fish production). Although it is a modelling exercise handicapped by limited information about macroinvertebrate drift in the restoration reach, it provides a means for assessing whether variable consumption (as opposed to a constant value) is an important factor to include in the Program's S3 modelling. The approach is further handicapped by focusing on a single aspect of fish production, making it uncertain whether other factors are equally or more important, but that issue is being addressed in part by Cramer's limiting factor analysis, which helps to dispel this concern.

Specific comments by J. Hayes:

The consumption proposal methodology is well designed for success, including comparison of 1) variable consumption estimates with fixed consumption estimates, 2) predicted consumption and consumption estimated from observed growth rates (determined from otolith daily growth increments), and 3) observed size and predicted size of smolts (the latter based on modelled consumption).

The study will provide a good functional modelling platform upon which to guide and build further research evaluating hypotheses related to altered flows and ecological responses.

Weaknesses, challenges, limitations and assumptions are well covered and include responses to SAB review comments.

Alvarez et al., "Thermal Assessment of Turtle Growth and Habitats at Rehabilitation Sites"

Specific comments by K. Fausch:

1. Substantial modifications were made to this proposal, apparently in response to SAB comments. Despite this, several aspects still seem somewhat haphazard.
2. A key outcome described is the range of temperatures available at habitat restoration sites where turtles are sampled. Temperatures will be measured
    a. Using 4 thermographs placed at each site (1 in the mainstem), suspended 10 cm below the surface
    b. At locations where turtles are observed, and two random locations nearby (one in the main channel, the other in the rehabilitation site)
    c. At a "variety of depths" (apparently only in the rehabilitation site locations) to "get a sense" of thermal stratification in calm waters favored by turtles
    d. At locations that are noticeably warmer or colder
3. This sampling design seems rather haphazard. If the goal is to understand the full range of temperatures at rehabilitation sites would it be better to develop a protocol for searching for the warmest temperatures that could withstand scientific review? There must be some literature on optimal search strategies.
4. Alternately, if the goal is to measure the relative availability of temperatures available to turtles, then a more standard sort of transect sampling seems called for.
5. I am trying to imagine what kind of plots will be made, and statistical analyses will be conducted, to compare temperatures where turtles were found vs. the variety of temperatures described above. This might help the investigators plan sampling.
6. It is unclear how many sites will be evaluated, although I understand this depends on finding sufficient numbers of turtles for analysis of their growth. The relationship between turtle growth and some metric of temperature seems straightforward, if sufficient numbers of sites with turtles are found to fit such a relationship (e.g., N=6 or greater?).

Specific comments by D. Tonina:

1. Direct alignment with Topic 3: This proposal directly addresses whether channel rehabilitation sites offer the thermal diversity needed to support juvenile growth of the northwestern pond turtle.
2. Clear relevance to the Riparian and Aquatic Ecosystem (RAE) Objective 2: The project is well-aligned with the Riparian and Aquatic Ecosystem Workgroup's goal to maintain a range of habitat temperatures needed by native species. It also contributes to evaluating a newly proposed TRRP thermal target.
3. Methodology: The use of turtle annuli growth as a biological indicator of thermal conditions is effective. The proposal includes a clear and practical field sampling plan, including criteria for site selection and temperature monitoring.
4. Feasible timeline and modest budget: The work is well-scoped and achievable within FY2026 constraints.

Attachment: SAB Evaluation and Ranking

Specific comments by A. Paul:

1. Appreciate the thorough and thoughtful responses to the SAB's previous input on the proposal.
2. The primary hypothesis of the study is to determine if rehabilitation sites are warmer than mainstem sites. The definition around "warmer" is that microhabitats in the rehabilitation sites exceed 21ºC in mid summer or 4ºC above adjacent main channel temperatures, but how will this actually be measured and statistically tested. What happens if you have one measurement of 21ºC at a mainstem site? Is the null hypothesis supported and we conclude no thermal difference? Also, I'm concerned with the sampling method that states "*Additionally, we will measure water temperature at additional locations that are noticeably warmer or colder*." How does that happen in an unbiased fashion? There needs to be a clear linkage made between the hypothesis being tested, the field data collected and the statistical analysis proposed.

Specific comments by J. Buffington:

The authors of both proposals have done a nice job responding to reviewer comments and revising the proposals accordingly. The proposals are each relevant to the Science Plan and are well grounded in Program objectives and the RFP.

The turtle proposal (Alvarez et al.) is important because 1) turtles have received less attention by the Program and 2) it has the potential to inform restoration design using a novel database of shell growth rings (annuli) that can be linked to specific calendar years and, thus, the water types and management activities in those years, allowing direct measurement of biological response to natural and anthropogenic conditions. However, the authors acknowledge that locating a sufficient number of turtles may be problematic, nor is it clear that the selected study sites will provide the desired range of thermal conditions for documenting within and between site differences in turtle growth (i.e., being able to compare growth at sites with low vs. high thermal diversity). Given these uncertainties, the proposal is more of an explorative, pilot study, but is potentially valuable nonetheless. Furthermore, on second read, I found the use of multiple sampling strategies for temperature a bit confusing (i.e., continuous temperature measurement at a fixed elevation below the water surface vs. profiles through the water column vs. spot measurements (?) at unspecified depths, some of which will be measured in potential turtle habitat vs. observed/occupied habitat vs. randomly selected wetted areas that may or may not be occupied); while the approach is ambitious, I worry that this matrix of multiple methods will not be directly comparable and that each will have limited numbers of observations, reducing analytical power and confidence of the results. As such, I recommend that the authors hone their sampling strategy to increase its potential success and/or further defend the current approach before the proposal is funded.

Specific comments by J. Hayes:

There are two main parts to the proposed study: 1) to test the hypothesis that rehabilitation sites provide more thermal diversity than control sites, and 2) to test the hypothesis that increased thermal diversity results in greater growth rate of turtles (i.e. turtle growth rate benefits from warmer water habitats provided by rehabilitation sites).

Attachment: SAB Evaluation and Ranking

The first hypothesis has high chance of being successfully tested because it simply relies on physical measurements. However, I share Kurt's reservations on how the various temperature measurements will be analysed.

Testing of the second hypothesis has moderate risk of being unsuccessful because too few turtles might be found for sufficient statistical power. Concerns have also been raised by SAB reviewers that the study design and effort might be inadequate to demonstrate that thermal variability offered by rehabilitation sites causes increased growth of turtles. The authors' response to this limitation is reasonable. Their expectation, given limited budget, is to simply find positive correlative evidence between turtle growth and the occurrence of warmer water habitats in rehabilitation sites, rather than causative evidence. Nevertheless, the likelihood of low sample size also risks achieving the correlative objective.