

Reviewer Report on Fish Passage Program Review

Reviewer #1

June 6, 2018

Background:

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) is responsible for the stewardship of the nation's ocean resources. Fish passage is an important component of NMFS' approach for protecting and recovering diadromous fish species through its focus on providing access to critical freshwater habitats these species depend on to complete their life cycle. Dams and barriers fragment river systems and impede or block fish movement to spawning and rearing habitat. This can extirpate species or populations or put significant downward pressure on population productivity, which can have socio-economic impacts including effects on harvest and trust responsibilities.

The purpose of the review was to obtain external input into where NMFS is doing well and where it can improve upon current practices to enhance the success of NMFS' Fish Habitat Enterprise, which is comprised of activities associated with the Hydro Program (HP) and Community-based Restoration Program (CRP). This will result in increased access to critical habitat for target diadromous fish species and bolster population productivity. The external review panel reviewed NMFS' Fish Habitat Enterprise in the context of the seven questions identified below.

General Observations and Recommendations:

Overall, the HP and CRP are well managed. The high degree of variability and issues among the Regions, and approaches to resolve them, was evident throughout the review. The value in allowing and empowering each Region to address and resolve its unique issues and challenges was also apparent, along with the focus, dedication, and competency of NMFS staff to their projects and approaches.

NMFS developed a suite of excellent presentations for the review panel, and the agenda allowed significant check in points for questions and answers during the 3-day review. However, the review was overly focused on success stories not failures, and sometimes it is our failures that provide the greatest opportunity to gain insights into how to make changes to increase program effectiveness.

Responses to the seven review questions can be summarized into the following key recommendations:

1. Provide more guidance to Regions: NMFS headquarters (HQ) needs to provide more guidance to the Regions. It was clear how diverse the regional issues are, but it was also clear that there is a need to provide as much standardization among Regions and actions as possible. For example, a successfully-applied, highly prescribed standard for

assessing fish passage success (e.g., a survival floor, ceiling, and adaptive management plan to achieve the ceiling target if survival is between the two targets) at Federal Energy Regulatory Commission (FERC) projects in the West Coast Region (WCR) is also a good template for developing standards at FERC projects in the Southeast Region (SER). HQ should look for ways to provide guidance to the Regions so that standards are developed in a more consistent manner to increase Program effectiveness. This should be done in a manner that will still provide Regions the flexibility to be creative and efficient with available resources to meet the requirements of the various target species in each Region.

2. Increased focus on environmental stochasticity: The analysis of how environmental variability in the future may affect Program effectiveness can be improved by including internal (NOAA) or external sources of environmental predictions into prioritizations and actions. Predictions could include, for example, increases in peak flood magnitude and frequency, changes in stream temperatures, and effects on summer flow conditions. A high priority watershed or project today may be nullified by changes over the next 50 years, and a watershed approach may need to be changed based upon the predictions. In other words, look further ahead by incorporating decadal changes in physical conditions and associated biological effects during watershed prioritization and planning.
3. Initiate stakeholder and partnership building earlier for key FERC actions: In key watersheds where FERC relicensing opportunities are clearly a high priority, initiate stakeholder partnerships and visioning earlier. Pull the partners in, rather than push them along. Key elements of successful approaches presented to the panel included partnerships, developing a shared vision among partners, and building trust between stakeholders and applicants. These all take time to initiate and foster.
4. Continue internal HP and CRP reviews: Continue the internal program reviews by hosting reviews that focus across the various Regions on lessons learned from dam removals, application of fish passage standards, monitoring that was conducted, evaluation methodologies used for assessments, and case studies from each Region of both successes and failures (i.e., what worked and why, and what didn't work and why not).
5. Improve HP and CRP performance metrics: First, reassess what metrics are needed to support HP and CRP actions and accomplishments. Second, identify the monitoring needed to calculate and evaluate the metrics. Third, incorporate regional variability into the framework if different metrics are needed in different Regions.
6. Increase the use of the NMFS Science Centers: Wherever possible, increase the incorporation of scientific-based justifications into prescriptions or actions. This enhances the strength of actions taken and increases the likelihood of forming strong partnerships and successful outcomes.
7. Address monitoring data management issues and data use: For CRP monitoring, continue to focus on data management with a goal of assembling and making data available for analysis by Science Centers, contractors, or external partners. Use results of the analyses through an adaptive management process to adjust implementation priorities and improve CRP effectiveness. For the HP, periodically review (i.e., conduct a

synthesis or lessons learned) of monitoring prescribed under Federal Power Act Section 18 prescriptions, how well the monitoring provided the information needed to assess the effectiveness of the prescription, and whether adjustments to monitoring conducted under future prescriptions are needed.

8. If needed, improve FERC-to-NMFS alignments: Identify key issues where FERC's decisions and processes are impeding fish passage, habitat restoration effectiveness and species recovery that need to be discussed between the agencies. Target policy-level agreements at the staff level, and the Commission-Administrator level if needed.
9. Standardize freshwater science capacity among NMFS Science Centers: The Northwest Fisheries Science Center scientific enterprise is tightly linked to WCR and Restoration Center freshwater and estuarine habitat restoration needs. Other Science Centers lack a similar level of capacity to support what the Region's need to implement science-based fish passage and freshwater habitat restoration actions. A common theme observed during the presentations was a need to increase the development of science-based approaches to passage and restoration. This strengthens the justification for prescriptions and actions and will result in increasingly successful outcomes. HQ should discuss how to address the variability in scientific capacity that exists among the Science Centers to support non-marine habitat actions to increase the scientific underpinnings of actions prescribed and implemented in freshwater.
10. Report out: The value of any recommendations from external review panels are only fully realized if they are acted upon. One year from now NMFS should provide a report that communicates how NMFS has considered and addressed the recommendations provided in the external review summary report. The document should be available to external partners and the public and produced annually, or periodically, as warranted.

Key (specific) Findings and Recommendations.

- **Question 1: Our goal is to, “conserve habitat for managed fisheries and protected resources,” and one of the strategies for achieving this goal is expanding available habitat type by “increasing access to historic riverine rearing and spawning habitat for targeted diadromous fish species.” Where do you see us excelling in achieving this goal? What kinds of things could we be doing or doing more of to help us achieve this goal?**
 - Observations
 - Strengths
 - NMFS is achieving its goals across an incredibly diverse suite of sites and challenges.
 - A total of 4,700 miles of habitat has been accessed; 300 CRP projects among the Regions have been funded through 16 Federal Funding Opportunities (FFOs).
 - Excellent HP and CRP reviews (surveys) were conducted in preparation for the external review, which shows commitment to self-reflection and lessons learned.

- The HP and CRP are looking ahead regarding how to meet future FERC relicensing workload requirements within existing budgets.
- Proposals within FFO grant solicitations are evaluated and ranked according to consistent guidance.
- Each Region has the autonomy to focus on their areas of needed expertise and approach; where additional resources or focus are required, HQ allocates additional funding to strategically address key relicensing and restoration actions.
- Some, but not all Regions are engaged with constituents in communicating NOAA's expertise and information on predicted environmental changes and variability (WCR and Alaska Region seemed most focused on this).
- Challenges
 - The overall goal for the Habitat Enterprise (i.e., increase access by 2020) is extremely vague and has already been accomplished.
 - CRP is more focused on opening access than restoring habitat once access is provided.
 - A strategic plan for addressing environmental stochasticity is lacking.
- Recommendations
 - The Habitat Enterprise Strategic Plan for 2016-2020 has 3 strategies (prioritize fish passage actions, address fish passage barriers and other riverine conservation needs, and align conservation efforts) that are broad and non-specific. Develop a more focused vision statement and strategic goals that provide a clearer vision for the expected outcomes NMFS wants to see achieved and targets to make progress toward achieving the goals over time.
 - Expand predictions of water quality and quantity in the future into future goals, programs, and objectives.
 - The internal HP and CRP reviews (surveys) conducted ahead of the panel review were very helpful to the panel – they formalized how monitoring results and lessons learned can be incorporated through adaptive management into future actions. The next step is to take these lessons learned and apply them to improve the effectiveness of these programs in the future.
 - Engage the NMFS Science Centers more in restoration planning and analysis. The Greater Atlantic Region (GAR) has a good approach for assessing effects (a dam impacts assessment model) as does the WCR (life cycle models, technical recovery plans, and additional habitat modeling). For project prioritization there is a need to evaluate dam impacts and outcomes from proposed actions in a more scientific, rigorous context, rather than using an ad hoc (opportunistic) approach.
 - Preparation for the external review also helped NMFS to identify key questions and issues regarding program implementation (i.e., self-reflection) and convey to staff how the various Regions approach prioritization, monitoring, and evaluations. The recommendation is to conduct repeated (e.g., annual) internal program reviews. These could be conducted through webinars to reduce cost, and each review could address topical themes (e.g., lessons learned from dam removals, fish passage standards applied, monitoring needed, fish passage and

survival evaluation methodologies used, and case studies from each Region of wins and losses (what worked and why, and what didn't work and why not)).

- **Question 2: How do we better integrate Hydropower regulatory requirements and timelines with voluntary habitat restoration opportunities into a strategy for addressing highest priority barriers?**

- Observations

- Strengths

- Case studies in the Northern California coast and Chesapeake Bay involved strong partner-led prioritization, which allowed more detailed information on barriers to be incorporated into the prioritization process including habitat quality and quantity above the barriers. The result seemed a good way to prioritize culvert repair (Northern California) and dam removal (Chesapeake Bay). There were multiple benefits associated with these approaches.
- Each Region can prioritize activities and projects based on its own set of unique conditions, challenges, and opportunities.
- In SER, scoring changed the priorities compared to simply using the FERC relicensing calendar as the basis for prioritization, and the scoring was also used to prioritize workload among staff and effort among offices. The scoring also allowed NMFS to communicate to applicants or partners why certain projects are priorities.
- The approach used to prioritize efforts in California's Central Valley was GIS-based and structured, where priority watersheds were identified and then priority areas within priority watersheds were selected for restoration. The prioritization was based on the amount and quality of habitat available above barriers and on NMFS and state recovery plans and tribal plans. This approach results in a record being developed for FERC submissions, and provides a defensible record for FERC proceedings. The approach evaluates the engineering and biological feasibility of prescriptions and builds support among stakeholders for the proposed approach. It was designed to be qualitative and flexible to adapt as actions are implemented. This seemed like a good approach that could be adapted for use in other Regions.

- Challenges

- A key challenge is the high diversity of issues and constraints across the Regions. For example, in Northern California the counties own the culverts, whereas in the northeast the towns own the culverts, and the nearly 5,000 barriers in Chesapeake Bay are almost totally under single ownership. This results in a small, large, and enormous number of owners to deal with, respectively.
- Given this large diversity of issues, geographic scale, and species requirements across Regions, it is challenging to provide universal guidance to the Regions.

- Overall, prioritization in GAR and SER is simple, first order, but is not based on detailed analyses of population-level responses; this is needed but would likely take too long to be useful and can't be done everywhere, so NMFS staff must prioritize where support from the Science Centers will be most beneficial. The prioritization approach adopted in part is based on the demographics of the species or populations affected. If the affected fish run is part of a single, large population, then accessing habitat anywhere there is an opportunity or quality habitat exists above barriers makes sense. If the populations are highly structured, as Pacific salmon are, then greater attention to prioritization efforts using science-based approaches is warranted.
 - Recommendations
 - Review how the GAR approach has changed how projects have been implemented based on the prioritization scheme. It seems to be a nice first-order approach for identifying priority watersheds. However, it was done within NMFS, was qualitative not quantitative, and was based on human not ecological drivers. How useful has it been to focus actions in priority watersheds using this approach, and have the actions selected resulted in increased biological benefits to the population (e.g., productivity, abundance, and resilience)?
 - Extend the partner-based prioritization process used in Northern California, the WCR (Pacific Northwest), and Chesapeake Bay to other watersheds and Regions if possible.

- **Question 3: How do we better incorporate a “watershed” approach into high priority fish passage habitat restoration?**
 - Observations
 - Strengths
 - The goal is commendable, and NMFS recognizing its importance is an important first step.
 - Each Region can develop its own watershed approaches according to regional needs and drivers.
 - HQ considers how to prioritize available funding among Regions. For example, San Joaquin River salmon and steelhead stocks are at high risk due to water diversion, rim dams, and drought; because of this the basin has been assigned a high priority for application of discretionary HP funds.
 - Challenges
 - In general, there is a need to increase the scientific basis (e.g., population-level responses associated with project outcomes, identification of critical uncertainties, and identification of impaired habitat processes or population bottlenecks) being incorporated into watershed approach formulation processes. Scientific studies and analyses can help identify expected changes in habitat capacity and productivity associated with habitat access

and restoration actions, and estimate expected biological responses and outcomes.

- Recommendations
 - Suggest that HQ develop a strategic approach for working with FERC to improve the development of watershed approaches through collaborative or strategic agreements on desired outcomes for watershed plans. For example, establish arrangements whereby re-opening a FERC relicensing process may be considered if future conditions (further population declines in abundance or extirpation) warrant additional actions. While FERC is not likely to change, they might if a clear and compelling reason for change can be articulated.
 - HQ should consider (if this hasn't already occurred) how to enhance watershed approach development and implementation through periodic meetings among all Regions on lessons learned and successes. A questionnaire survey was conducted ahead of the expert panel review, but focused only on monitoring implementation. The goal of these meetings would be to identify ways for NMFS to conduct watershed approaches in a more structured manner, compared to the opportunistic approach.
- **Question 4: How can we better coordinate our Hydropower and Community-based Restoration projects to build momentum within a watershed to open and create more opportunities for accessible habitat?**
 - Observations
 - Strengths
 - CRP conducted a review that identified five areas to improve upon, so the process has been initiated.
 - This question being raised to the external review panel highlights an identified need to look for ways to identify additional opportunities to access habitats.
 - NMFS is seeing benefits already, some tangible (stream miles opened up) and some intangible (increased communication, agreement on roles, prioritized watersheds, building partnerships, and improved decision-making).
 - In SER, third-party partnerships stimulated coordination, development of a holistic approach, and increased funding effectiveness.
 - Challenges
 - Approaches developed and used among the Regions are independent.
 - Actions to build collaboration are ad hoc; they are initiated at the local or individual project level.
 - Recommendations
 - The expert panel heard that partnerships stimulate coordination and increase opportunities; therefore, seek ways to increase partnerships.
 - For GAR, continue current efforts to forge partnerships. For SER, expand what has been started in the Cape Fear watershed. In Northern California, the Eel River is an example of where NMFS could tie their recovery plans, perhaps additional scientific analysis, hydro relicensing, and CRP actions together into a

science-based and science-driven approach. Once developed, the plan could be discussed with stakeholders and partners to build consensus. Then CRP could work on high-priority actions in areas that will become accessible when fish passage is provided, and actions that provide increased habitat capacity (e.g., in-stream flow, in-channel and off-channel habitat restoration) below Scott Dam to support increased production that results from access being provided above Scott Dam.

- Hydro is decentralized and is coordinated at HQ, CRP is centralized. Suggest thought be given to increased coordination at HQ between Hydro and CRP so there is a forum to address and resolve key issues that are elevated. This likely occurs now to some degree, but the FERC relicensing schedules are well known and there should be plenty of lead time to develop an integrated (Hydro, CRP, and Protected Resources Division (PRD)) approach to prioritization.
- **Question 5: How can we improve our strategy and structure for evaluating agency-wide fish passage program outcomes?**
 - Observations
 - Strengths
 - NMFS should be commended for recognizing the need for, and developing, a CRP monitoring framework that is clear, flexible, and adaptable.
 - It is encouraging to hear that CRP recognizes the need for data storage, adaptive management, and self-evaluation of CRP implementation and its products.
 - Challenges
 - In terms of overall performance metrics, miles of access opened up is not capturing all of the benefits generated through the CRP and HP. For example, improving passage conditions at existing fish passage facilities (e.g., a fish ladder or a poorly performing juvenile fish collection system) in systems where access is currently provided at a suboptimal level but is not sufficient to sustain the productivity of the target populations, is not captured in the metric. Stream miles opened is a starting point, and NMFS recognizes the numerous limitations and shortfalls associated with this simple, summary statistic for program performance.
 - Organizing an effective monitoring approach, coordinating and managing monitoring efforts, and analyzing the data produced using an adaptive management framework or structured decision making requires allocating a tremendous amount of time and resources to monitoring.
 - Grant awards can be limiting (i.e., of limited duration) relative to the time scale of monitoring required to observed changes in physical conditions or fish colonization of new areas after an action has been completed.

- Data collection, management, and retrieval has started for Tier I monitoring. The key question is what are the next steps for analyzing the data and using it to adapt the CRP going forward to increase CRP effectiveness and communicate progress to constituents and stakeholders?
- NMFS needs to develop a fully functioning feedback loop between monitoring data and grant decisions to make better project priority and resource investment decisions.
- Recommendations
 - Program success metrics beyond stream miles opened have been identified and are being discussed, but it doesn't appear this issue is being pursued further in a substantive manner. If improved metrics are important for how the agency is viewed by its constituents (e.g., the Office of Management and Budget [OMB] and Congress), stakeholders, and partners, and to improve program effectiveness, a more a focused effort is needed. Recommend a two-step approach be considered for improving how NMFS' Fish Habitat Enterprise outcomes are evaluated. First, analyze the existing monitoring data. This is a retrospective look at whether the data NMFS and its grantees have in hand is meeting the needs of the HP and CRP. Once the data are collected and organized into a database, analysts can query the data. This could be done through a contractor or the NMFS Science Centers. Second, consider establishing an initiative or task force to brainstorm and recommend additional metrics that meet HO and CRP, can be standardized across projects and Regions, and can be collected at a reasonable cost. Staff from both the Science Centers and Regions need to be involved. Begin with the end in mind—what is the question the data are addressing? What analyses will be conducted using the data? What are the metrics that support the approach? Once the task force develops an approach, roll it out internally and then externally to partners for input and consensus.
 - Consider developing a data portal (and portal manager) for warehousing all existing and new data. Once centralized, the data can be made available internally or externally for analysis to address a variety of questions. If restrictions prohibit this, seek ways to resolve the restriction. Data collected with federal funds should be made publicly available. Data collected by FERC license holders can be more difficult to obtain but ideally should also be made available; this could be a topic for discussion with FERC.
- **Question 6: Within our program activities, what is the most effective balance for investing in implementation and monitoring and evaluation?**
 - Observations
 - Strengths
 - CRP is looking at monitoring costs relative to total project expenditures to estimate the percentage of total funds dedicated to monitoring versus

implementation. To date, approximately 5 to 10% of program funds are being directed towards monitoring. In general, this proportion is in line with other large habitat restoration programs I am familiar with.

- Monitoring within Tier II is strategic, applied, and well designed to achieve Program goals to the fullest extent possible.
- Challenges
 - This a difficult, but common, question to address for any habitat restoration program. There is no single answer to the question, and there is also an inherent tension imbedded in the question between the need to implement actions on the ground and the need to evaluate what has changed and use that information to communicate progress and adaptively manage a program.
 - Monitoring is costly, it needs to be collected using standardized formats if it is going to be used as metadata for assessing program effectiveness, it requires a data management plan, and the data need to be used.
- Recommendations
 - CRP: It wasn't clear from the presentations and discussions whether this question is being driven by an inability to answer questions from Congress, OMB, or partners based on the monitoring currently being conducted, or whether it is a more generic (i.e., what's the best balance?) question. To address the question, a better articulation of, or focus on, the questions that monitoring needs to address at the Program level is in order. The recommendation flows from the main recommendation above under Question 5: First, address what metrics are needed to support HP and CRP actions and accomplishments. Second, identify the monitoring needed to calculate and evaluate the metrics. Third, incorporate regional variability into the equation—are different metrics needed in different Regions? Once these aspects of “what's needed” have been developed, then costs and the appropriate proportion can be estimated. This approach requires one or more iterative steps to arrive at a final suite of monitoring metrics that are effective and are a reasonable proportion of the overall program budgets.
 - HP: HP project monitoring costs are largely covered by license holders. However, it might be worthwhile to conduct a review (or a synthesis of lessons learned) of monitoring prescribed under Section 18 prescriptions. The goal would be to: 1) take a retrospective look at how well the monitoring that has been prescribed and conducted has met its intended needs; 2) identify any new monitoring and evaluation methodologies that have been developed recently that can be incorporated into monitoring plans (e.g., fish tagging or genetic analysis techniques); and 3) take a prospective look forward to upcoming relicensing activities to see if existing monitoring prescriptions need to be adjusted for the future prescriptions.
- **Question 7: What are steps we can take to improve our outreach to ensure we are effectively communicating the importance of fish passage?**

Note: This question was well covered in the last session of the last day of the review. Bennett Brooks facilitated a good exchange of ideas on the strengths, challenges, and solutions associated with communicating the importance of fish passage among NMFS, its partners, and the review panel. The key messages were captured on flip charts and can be incorporated into the review report by Bennet and Tushar. Below are some additional thoughts in response to the question.

- Observations
 - Strengths
 - NMFS is focused on external partnerships and communicating what NMFS has accomplished and improvements that have been made to date using media platforms and summary documents on websites (e.g., WCR).
 - Media tools for communication continue to expand and NMFS is aware of and is using them.
 - Challenges
 - Changing demographics—the proportion of our society that fishes recreationally and commercially is decreasing. This is likely affecting how constituents view the need for fish passage and habitat restoration. Also, society in general and recent generations specifically are interested in protecting the environment, but may not understand the linkages between fish passage, healthy ecosystems, and clean and sustainable water supplies.
- Recommendations
 - This seems less a question for an external review panel and more a question for NMFS to review internally. A common theme that spans most of the topics covered during the external review is that issues are highly variable and best handled at the local (project or watershed) level. Given that backdrop, the recommendation is that HQ engage the Regions to solicit ideas on how to identify opportunities for working with partners on ways to communicate the benefits to society, broadly, from implementing fish passage improvements, and specifically, communicating how these actions will result in progress toward reaching NMFS programmatic goals.
 - Recommend that consideration be given to identifying strategic approaches years ahead of the time that focused effort on a high priority FERC relicensing project will begin. For example, develop a strategy for enhancing partnership building that results in a broader consortium of stakeholders and support 5 years ahead of a relicensing that NMFS knows is a high biological priority. This recommendation is in response to a general observation that successful FERC relicensing projects are built on a solid foundation of trust between NMFS, stakeholders and applicants, and projects that have had consistent (stable) NMFS representation from the start of the process.
 - Integrate PRD and Office of Habitat Conservation views for a watershed and FERC relicensing project into a common NMFS vision that is then presented

early in the relicensing process. In other words, identify the target at the start to bring partners along to support the vision.

- Develop an approach to message young children and the public on the role fish passage, access to habitat, habitat quality, and restored habitat-forming processes have in supporting healthy aquatic ecosystems, which in turn support multiple socio-economic needs beyond commercial and recreational fishing and harvest.

Conclusions:

NMFS staff are dedicated and passionate about the work they do and should be proud of their numerous accomplishments. NMFS fish passage programs are successful, large in scope, and diverse both spatially and in terms of the species affected. It was certainly a pleasure to listen to and learn from the many excellent presentations and talk to staff about their activities, challenges, and successes. I commend NMFS for identifying the need for this external review and spending the time to organize the questions for the panel and the many presentations and look forward to future reports of how the review panel's comments were considered.

There are always ways to further improve the effectiveness of the programs reviewed. The ideas that came to mind during the review are meant to be constructive and are summarized into the ten key recommendations identified above in the General Observations and Recommendations section.

A final comment not related directly to the seven questions above is the unique skills and expertise required to develop successful fish passage engineering prescriptions, and the time it takes for newly hired staff biologists and engineers to become knowledgeable of NMFS' fish passage engineering guidelines and approaches to be able to conceive and negotiate successful prescriptions. This suggests that NMFS continue to look for ways to develop its workforce through use of temporary detail assignments and coordination among Regions, and to support university programs focused on producing fish passage engineers and biologists similar to existing programs to train stock assessment analysts to fill that critical need for the agency.