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Proceedings of the National Peer Review of Science Guidance for Fisheries Protection Policy: Advice on Developing and Reviewing Offsetting Requirements

November 25-26, 2014
Ottawa, Ontario

Chairperson: Jake Rice
Editors: G. Pastershank, M. Lloyd, and J. Kristmanson

Fisheries and Oceans Canada
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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

A National Science Advisory process was held November 25-26, 2014 in Ottawa, Ontario. The purpose of the meeting was to support the development of additional guidance on offsetting (e.g., calculation of losses and gains) that could aid proponents in the development of their offsetting plans and associated monitoring requirements, and aid Fisheries Protection Program officers when assessing proponent submissions.

The advisory process was informed by a working paper and two presentations: one by Fisheries and Oceans Canada's (DFO) Ecosystem Management Policies and Practices group and one by DFO Science researchers. A total of 36 participants from academia, industry, non-governmental organizations, and employees from DFO's six administrative Regions participated in this advisory process.

These Proceedings summarise the discussions held at the meeting. The conclusions and advice from this meeting will be posted on the DFO Science Advisory Schedule as they become available.

SOMMAIRE

Un processus de consultation scientifique nationale a eu lieu les 25 et 26 novembre 2014, à Ottawa (Ontario). La réunion avait pour objet d'appuyer l'élaboration d'autres lignes directrices sur la compensation (p. ex., le calcul des pertes et des gains) pour aider, d'une part, les promoteurs à préparer leurs plans de compensation et le suivi correspondant requis, et d'autre part, les agents du Programme de protection des pêches à évaluer les propositions des promoteurs.

Le processus de consultation s'appuyait sur un document de travail et deux présentations : l'une par le groupe des politiques et pratiques de gestion de l'écosystème de Pêches et Océans Canada (MPO) et l'autre par les chercheurs scientifiques du MPO. Au total, 36 participants provenant du milieu universitaire, de l'industrie, des organisations non gouvernementales et du personnel des six régions administratives du MPO ont participé à ce processus de consultation.

Le présent compte rendu résume les discussions tenues à la réunion. Les conclusions et avis découlant de cette réunion seront publiés, lorsqu'ils seront disponibles, sur le calendrier des avis scientifiques du MPO.

INTRODUCTION

Recent changes to the *Fisheries Act* (2012) have changed the way Department assesses and manages impacts on aquatic ecosystems. The amended *Act* focuses on the sustainability and ongoing productivity of commercial, recreational or Aboriginal (CRA) fisheries.

DFO's Ecosystem and Fisheries Management Sector requested scientific advice and guidance on the science elements needed to implement the Fisheries Protection Program's (FPP) amendments to the *Fisheries Act*. DFO Science has undertaken a series of meetings (i.e., five to date) in which participants have reviewed the best available scientific information related to a suite of questions and program needs and this advice has been used by the Fisheries Protection Program to develop operational guidance.

Thirty-six experts were invited to the meeting (see list of participants in Annex 1). All meeting participants were asked to review the terms of reference, the working paper, and previous products produced at earlier science advisory meetings for FPP (e.g., finalized science advice, research documents, and other associated background documents).

At the beginning of the meeting, the agenda was reviewed, and participants agreed to the structure of the discussion. The Chair then presented an overview of the goals and objectives of the meeting and participants were tasked with addressing the following objectives:

a) Consolidate and integrate existing science advice related to the FPP through the lens of offsetting impacts to fisheries productivity; and
b) Provide detailed advice on acceptable methods to calculate offset requirements including key considerations and assumptions on:
    i) predicting benefits from proposed offset projects (i.e., identification of baseline for both impact and offset sites, predicted loss at impact site, and predicted gain at offset site); and
    ii) calculating equivalency between impact and offset when they are unlike (e.g., focus on different types of habitat and fish species). Key aspects would be to advise how to choose an appropriate common currency and how to ensure that offsetting measures balance project impacts.

It was agreed to fully explore the offsetting concept and then to proceed with drafting the contents of the Science Advisory Report.

The purpose of the meeting was to support the development of additional guidance on offsetting (e.g., calculation of losses and gains) that could aid the:

- Proponents in the development of their offsetting plans and associated monitoring requirements; and
- Fisheries Protection Program in assessing submissions by proponents.

This meeting integrated the information from previous works (e.g., on the subjects of serious harm, choice of offset strategy, and calculating and evaluating offsetting).

PRESENTATIONS

FISHERIES PROTECTION POLICY

By Nick Winfield, Director, Ecosystems Management Policies and Practices, Fisheries and Oceans Canada

An overview of the science-policy collaboration since June 2012 (i.e., three phases) to support the Fisheries Protection Program (FPP), the regulatory review process, the development and implementation of the offsetting policy, and habitat banking were presented. Importantly, FPP emphasized the ongoing need for science advice on how to implement the science aspects of the FPP.

FPP reiterated the goals of the science advisory meeting. Specifically, the need for detailed advice on acceptable methods to calculate offset requirements, including key considerations and assumptions on the prediction of benefits from proposed offset projects, and the calculation of equivalency between the impact and offset when they are unlike. This advice will be used by FPP to:

- Inform the development of guidance on offsetting that will be used by proponents;
- Facilitate communication between staff and proponents; and
- Form the basis of consistency in decision making.

Meeting participants added that the focus is primarily on larger projects, yet, smaller projects can have big impacts. They also noted that a prolonged review creates time pressures on the proponents and the process. Finally, it was highlighted that there is a need to have clear expectations and advice that is applicable for a wide range of projects of differing scales.

DETERMINATION OF OFFSET REQUIREMENTS FOR THE FISHERIES PROTECTION PROGRAM: THE USE OF EQUIVALENCY ANALYSIS

By Mike Bradford, Research Scientist, Salmon & Freshwater Ecosystems, Cooperative Resource Management Institute, Fisheries and Oceans Canada

Within the context of Offsetting Policy, methods used to determine offset requirements were summarized, the adaptation of methods that could be used by the FPP were discussed, equivalency metrics and approaches were compared, and recommendations were made on managing uncertainty and risk. The presentation formed the basis for in-depth discussion amongst the meeting participants, with a focus on determining the amount of offsetting required. Further, seven potential metric classes that could be used to determine offset requirements were introduced:

1. Habitat area
2. Habitat or ecosystem function
3. Habitat suitability index or capacity for select species
4. Fish abundance
5. Fish production
6. Yield/fishery benefits
7. Monetary or other valuation

Many other key considerations to determine offsetting were also presented and discussed, such as time lags, discounting, uncertainty, and risk.

KEY STEPS IN ESTABLISHING EQUIVALENCY

The group accepted the proposed framework as scientifically sound and adequately flexible for application to diverse situations (Figure 1). Participants agreed that advice can be provided within this framework to support the goals of the FPP. The key steps of the presented framework are:

1. Characterize serious harm (predict the impact)
2. Select offset measures (predict benefits)
3. Determine amount of offset (estimate equivalency)
4. Conduct the offsetting measures
5. Monitoring and reporting of effectiveness

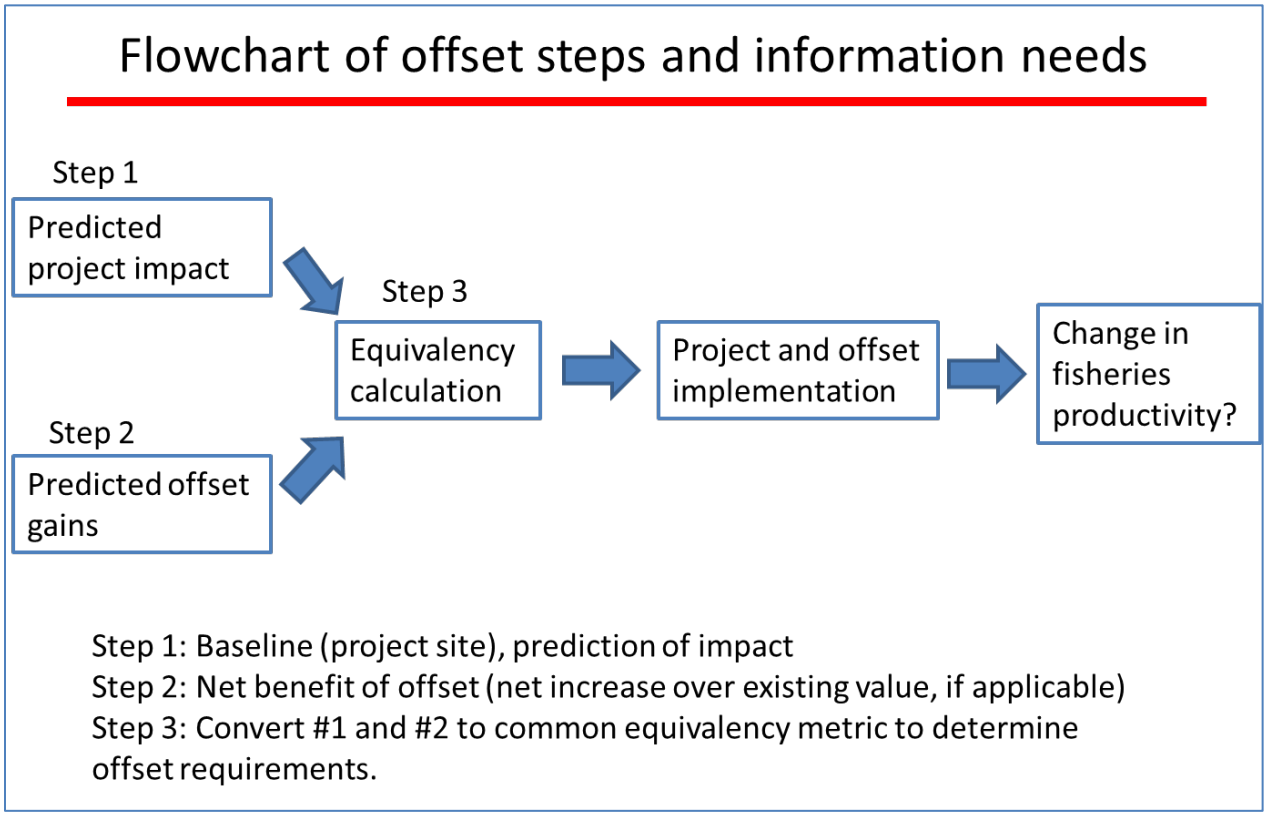

Figure 1. Flow chart outlining the steps involved in determining equivalency for offsetting.

The advice focusses on steps 1, 2, and 3, which are predicting impact, predicting offsetting gains, and calculating equivalency. Although the other two steps, step 4 project and offset implementation and step 5 monitoring, were recognized as key components of a successful and effective application of offsetting.

Participants discussed the similarities and differences between predicting the impacts and the offset gains. In order to calculate equivalency, it was clarified that no matter what metric is used, the same metric needs to be used when predicting the impact and predicting the benefit for comparison. Often there is more information available when predicting project impacts, and there may be higher risk associated with predicting offset gains (greater uncertainty). Participants discussed the relevance of previous advice to use multipliers to address uncertainty, using higher multipliers when there is greater uncertainty. In addition, participants discussed other methods to address uncertainty, using a precautionary approach. For instance,

rather than using the average estimate for the predicted impact or gain, a more conservative measure could be used (such as an appropriate percentile of the estimate) to reflect the need for a more conservative estimate. This approach, requiring guidance from policy, would result in actual gains that are closer to the impact estimate.

Participants also discussed the challenge of determining which species and/or habitat to include in the estimates of impact and offsetting gain. Often it is assumed that impacts and offset gains are linear, however, when different fish species and life stages are impacted, a non-linear process with possible cumulative effects, is a more often a more realistic reflection of the process.

Participants briefly discussed the importance of monitoring to guide effectiveness evaluation of offsetting actions. Previous advice on monitoring was determined to be an appropriate guide to establishing a monitoring plan to address effectiveness. While step 4 - project and offset implementation - was briefly discussed, it was noted that this step is addressed through policy.

The scale of data demands was discussed in relation to the scale or magnitude of project. The framework was determined to be scalable to the magnitude of impact and the concept of minimum standards for all projects was briefly addressed.

DISCUSSION OF THE PROPOSED METRIC CLASSES

The meeting participants discussed six classes of metrics. The seventh class presented, on economic or societal value metrics, was determined to be outside the scope of the request for advice. It would have required additional expertise and was not considered further.

It was agreed that the description of each metric found in the research document would be reduced to one page for the Science Advisory Report (SAR). In addition, a table would be added to the SAR to outline the appropriateness of application of each class to different types of projects (small habitat loses, changes in habitat quality, larger habitat loses, ecosystem loses or transformations, and fish mortality).

Choosing an appropriate metrics was discussed. Participants agreed that while there is no single preferred metric from a scientific perspective, there are circumstances of the initial project that make a metric more applicable for the circumstances. Assumptions and uncertainty associated with the predictions should be clearly documented and accounted for. In addition, a robust monitoring program that allows for comparisons of before and after impacts can play a role in evaluating the effectiveness of offsetting measures over time. The choice of metric can also be affected provincial and territorial government priorities for offsetting (e.g., fish species selection).

The importance of limiting factors was discussed in relation to choosing metrics, especially when unlike offsetting measures are chosen. Knowledge of limiting factors is important and can increase the likelihood of offsetting effectiveness. If limiting factors are known, they can be targeted.

Individual metrics were discussed, including;

1. **Habitat Area**

   For small projects, it was noted that the costs and benefits could scale linearly. However, over larger projects, a more complex scale is probable, making this metric less appropriate. It was noted that this metric assumes that the habitat area that is produced through the offsetting is equivalent to the same habitat area that was impacted in terms of fisheries productivity.

2. Habitat Characteristics and function

The use of production: biomass (P: B) ratio for marine systems was discussed and it was noted that P:B ratios have not been used in marine systems in Canada. There are notable differences between the marine and freshwater environments and the SAR should indicate that the advice is focussed primarily on freshwater.

3. Habitat suitability or capacity for select species

Participants discussed the validation of these types of metrics and felt that field validation of these metrics was important and should be a research priority. Indices could be developed *in situ* or be peer-reviewed. In terms of suitability indexes or ensemble modeling, it would be important to choose a number of indexes/models to increase confidence and then determine the commonalities. It was recognized that dealing with uncertainty in the models would be challenging. It was recommended to use a suite of models and indices in an effort to increase confidence in output, if they converge then there is increased confidence, if not then understanding needs to be improved.

4. Fish abundance

Fish abundance data is often ephemeral and seasonal, especially in the Canadian context of winters. When using fish abundance as a metric, it will be important to be cautious, as sampling methods that kill the fish could deplete populations. Concern was raised that improving habitat for an iconic species may not benefit other fish species. The importance of regional benchmarks, where available, was discussed. To use this metric, data availability, expert opinions, need for validation, and developing an *in situ* model/index were all recognized as important components.

5. Fish production

There are numerous models to determine fisheries production (e.g., Ecopath with Ecosim models). If model-based estimates of production are used, it will be important to establish a minimum standard and ensure validation.

6. Yield/fishery benefits

It was noted that there is compounding uncertainty when using this metric. Fishery yield varies with factors other than habitat. It was noted that this class of metrics was a useful addition to other metrics for conservation. This class of metrics can be effective, especially when linked to clearly identified management and/or societal objectives.

MAIN CONCLUSIONS

Previous advice provided to FPP is relevant and applicable to equivalency calculations.

The framework that was reviewed at the meeting was determined to be relevant to the development and review of offsetting proposals and allows flexibility in its application.

The framework applies to calculating equivalency between impact and offset when they are like and unlike. Relative value or weighting of fish species such as including fisheries management objectives or other societal objectives in the selection of metrics is acceptable practice. Community properties can be protected even though the focus is on one or a few species. Participants agreed that the use of different fish species (i.e., different fish would benefit from offsetting projects than would be impacted in offsetting calculations) is not a science question, but rather a policy or fisheries management issue (i.e., could be identified as a fisheries management objective) and therefore was not addressed explicitly at the meeting. The concept of trading large habitat area of low quality for impact in small habitat area of high quality was discussed. It was noted that some habitat had disproportionate effect on population vital rates and the scale of use by various life history stages could be important and this kind of trade-off would be difficult to calculate.

Limiting factors were determined to be an important component of developing effective offsetting measures, particularly when unlike offsets are proposed.

Participants recommended that uncertainty could be reduced through use of better baseline data collection, use of models, field validation of models, and monitoring. It was agreed that multipliers are effective ways of dealing with uncertainty. Higher uncertainty would require higher multipliers. Uncertainty was not discussed at great lengths at this meeting but participants agreed that past advice is applicable to dealing with uncertainty in equivalency calculations. In addition, participants discussed the calculations involved and the meaning of the term discounting.

There are notable differences between the marine and freshwater environments and the SAR will need to indicate that the document is focussed on freshwater.

The research document and advice provide important scientific considerations to consider when the impact and offset of the projects are unlike and provide detailed advice on acceptable methods to calculate offset requirements.

ANNEX I: MEETING PARTICIPANTS

National Peer Review Meeting on “Calculating Offset Requirements”

November 25-26, 2014

Name	Affiliation
Jake Rice (Chair)	National Senior Ecosystem Science Advisor, Director General's Office, Ecosystem Science Directorate, Fisheries and Oceans Canada
Mike Bradford (Steering Committee)	Research Scientist, Salmon & Freshwater Ecosystems, Cooperative Resource Management Institute, Fisheries and Oceans Canada
Keith D Clarke (Steering Committee)	A/Section Head, Environmental Sciences Division, Ecological Sciences, Fisheries and Oceans Canada
Karen Smokorowski (Steering Committee)	Community Production Scientist, Great Lakes Laboratory for Fisheries and Aquatics Sciences , Fisheries and Oceans Canada
David Browne (External Participant)	Director of Conservation at Canadian Wildlife Federation
Dr. Steve Cook (External Participant)	Associate Professor, Canada Research Chair, Department of Biology, Carleton University
Darryl Chudobiak (External Participant)	Environmental Specialist - Shell Canada Ltd.
Don Jackson (External Participant)	Professor & Ecology and Evolutionary Biology, University of Toronto
Jack Imhof (External Participant)	National Biologist and Director of Conservation Ecology, Trout Unlimited Canada
Brent Mossop (External Participant)	Environmental Specialist, BC Hydro
Mark Ruthven (External Participant)	Assistant Head, Environmental Assessment Group, AMEC Environment & Infrastructure
Bill Tonn (External Participant)	Department of Biological Sciences, University of Alberta
Julie Dahl (Fisheries and Oceans Canada)	Regional Manager, Regulatory Reviews, Fisheries Protection Program
Susan Doka (Fisheries and Oceans Canada)	Research Scientist, Great Lakes Laboratory for Fisheries and Aquatics Sciences
Eva Enders (Fisheries and Oceans Canada)	Research Scientist, Habitat Impacts, Environmental Science
Sophie Foster (Fisheries and Oceans Canada)	Senior Advisor, Fisheries Protection Program Policy Branch
François Hazel (Fisheries and Oceans Canada)	Senior Biologist, Fisheries Protection – Standards Development, Regional Ecosystems Management Branch
Robert Gregory (Fisheries and Oceans Canada)	Research Scientist, Productive Capacity, Environmental Sciences Division, Ecological Sciences
Donald Humphrey (Fisheries and Oceans Canada)	Section Head, Fisheries Protection Program, Maritimes Region
Jason Hwang (Fisheries and Oceans Canada)	Area Chief, BC Interior, Ecosystem Management Branch

Name	Affiliation
Marek Janowicz (Fisheries and Oceans Canada)	Senior Environmental Assessment Analyst, Fisheries Protection Program
Bronwyn Keatley (Fisheries and Oceans Canada)	Senior Advisor, Fisheries Protection Program Policy Branch
Michelle Lloyd (Fisheries and Oceans Canada)	Aquatic Science Biologist, Environment and Biodiversity Science Branch, Ecosystem Science Directorate
Marten Koops (Fisheries and Oceans Canada)	Research Scientist, Great Lakes Laboratory for Fisheries and Aquatics Sciences
James Kristmanson (Fisheries and Oceans Canada)	National Canadian Science Advisory Secretariat (CSAS) Science Advisor
Kristina Makkay (Fisheries and Oceans Canada)	Species at Risk
Mark G McLean (Fisheries and Oceans Canada)	A/Manager, Regulatory Reviews, Fisheries Protection Program
Michel Nardini (Fisheries and Oceans Canada)	Guidelines Development Coordinator, Fisheries Protection Program
Georgine Pastershank (Fisheries and Oceans Canada)	Science Advisor
Anne Phelps (Fisheries and Oceans Canada)	Manager, Fisheries Protection Policy
Bob Randall (Fisheries and Oceans Canada)	Research Scientist, Great Lakes Laboratory for Fisheries and Aquatics Sciences
Mike Stoneman (Fisheries and Oceans Canada)	Manager, Environmental Science, Ecosystem Science
Guy Robichaud (Fisheries and Oceans Canada)	OHM Senior biologist, Habitat Protection and Sustainable Development
Doug Watkinson (Fisheries and Oceans Canada)	Fisheries Biologist, Habitat Impacts, Environmental Science Division
Nicholas Winfield (Fisheries and Oceans Canada)	Director, Ecosystems Management Policies and Practices, Branch
Melisa C Wong (Fisheries and Oceans Canada)	Research Scientist, Coastal Ecosystem Science Division

ANNEX II: TERMS OF REFERENCE

Science Guidance for Fisheries Protection Policy: Advice on Developing and Reviewing Offsetting Requirements

National Peer Review - National Capital Region

November 25-26, 2014
Ottawa, Ontario

Chairperson: Dr. Jake Rice

Context

In November 2013, amendments to the Fisheries Protection Provisions (FPP) of the *Fisheries Act (FA)* came into force. These amendments included Section 6 (s.6), which outlines four factors that the Minister must consider before authorizing a project that has the potential to cause serious harm to fish. Specifically, the Minister must consider the measures and standards to avoid, mitigate or offset serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. In addition, the proponent must include an offsetting plan as regulatory requirement when submitting an application for authorization (*Applications for Authorization under the FA*). This offsetting plan must include the objective, the measures, and an analysis, using scientifically defensible and clearly described methods on how the measure(s) will meet the offsetting objective. The offsetting plan must also outline a monitoring plan that assesses the effectiveness of the offset.

The *Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting* (aka the offsetting policy), was also made public in November 2013. The offsetting policy offers flexibility in choosing offset methods provided that increases in fisheries productivity are achieved and that the four key principles outlined in the policy are met. One of these principles is "balancing losses and gains" between impacts of development projects and the expected gains in productivity from offsetting projects. While the policy notes that achieving such equivalency may be easier to demonstrate when offsets are designed to provide similar function to the affected habitat, it does not clearly describe acceptable methods for calculating losses and gains.

Four main steps to determine acceptable offset(s):

1. Assessment of impact,
2. Choice of offset type,
3. Calculation of offset amount, and
4. Evaluation of offset effectiveness.

The Department of Fisheries and Oceans Canada (DFO) Ecosystems and Fisheries Management has requested scientific advice towards the implementation of the offsetting policy and the associated amendments to the *FA*. The intention is to use this science advice to support the development of additional guidance on offsetting (e.g., calculation of losses and gains) that could aid proponents in the development of their offsetting plans and associated monitoring requirements, and Fisheries and Oceans Canada (DFO) when assessing proponent submissions.

Objectives

The current request for advice is to:

- consolidate and integrate existing science advice related to the FPP through the lens of offsetting impacts to fisheries productivity

- provide detailed advice on acceptable methods to calculate offset requirements including key considerations and assumptions on:
    - the prediction of benefits from proposed offset projects (i.e., identification of baseline for both impact and offset sites, predicted loss at impact site, and predicted gain at offset site).
    - the calculation of equivalency between impact and offset when they are unlike (e.g., focus on different types of habitat and fish species). Key aspects would be to advise how to choose an appropriate common currency and how to ensure that offsetting measures balance project impacts.

Expected Publications

- Science Advisory Report
- Proceedings
- Research Document

Participation

- Fisheries and Oceans Canada (e.g., Ecosystems and Oceans Science and Ecosystems and Fisheries Management)
- Academia or Academics
- Industry
- Other invited experts (e.g., environmental non-government organizations and consultants)

References

DFO Science has already provided the following advice and associated research technical documents to support the implementation of the new FPP:

Assessing impacts on productivity

DFO. 2013. Science Advice to Support Development of a Fisheries Protection Policy for Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/063.

DFO. 2014. A Science-Based Framework for Assessing the Response of Fisheries Productivity to State of Species or Habitats. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/067.

DFO. 2014. A Science-based Framework for Assessing Changes in Productivity, Within the Context of the Amended *Fisheries Act*. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/071.

Choosing types of offset strategies

DFO. 2014. Science Advice on Offsetting Techniques for Managing the Productivity of Freshwater Fisheries. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/074.

High level advice on calculation of offset amount

DFO. 2014. Science Advice for Managing Risk and Uncertainty in Operational Decisions of the Fisheries Protection Program. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/015.

Guidance on monitoring for effectiveness

DFO. 2012. Assessing the Effectiveness of Fish Habitat Compensation Activities in Canada: Monitoring Design and Metrics. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/060.