

# Final Independent External Peer Review Report Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement



Prepared by  
Battelle Memorial Institute

Prepared for  
Department of the Army  
U.S. Army Corps of Engineers  
National Planning Center of Expertise for Ecosystem Restoration  
Rock Island District

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Columbus, Ohio 43201

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## Executive Summary

### PROJECT BACKGROUND AND PURPOSE

The Double-Crested Cormorant (DCCO) Management Plan Environmental Impact Statement (EIS) is a National Environmental Policy Act (NEPA) document that will recommend a long-term, comprehensive approach for managing DCCO in the Columbia River Estuary. Avian predation is an identified impact in the Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp). This predation by DCCO is a source of ongoing challenges in the region due to species listed under the Endangered Species Act (ESA) that migrate through the system and in particular DCCO nesting on East Sand Island. The decision document will not require Congressional authorization, and the Record of Decision (ROD) will be signed by the U.S. Army Corps of Engineers (USACE), Northwestern Division (NWD).

East Sand Island is managed by USACE and is at the mouth of the Columbia River. The island is approximately 60 acres in size and is located in the Columbia River estuary. East Sand Island has become home to two of the largest colonies of waterbirds (Caspian terns and DCCO) in the world. It is also the largest nighttime roost in the world for Brown Pelicans, which were recently ESA delisted. Brandt's Cormorants nest within the DCCO colony and are a species of concern for the state of Washington. Upwards of 60,000 birds (terns, cormorants, gulls, and pelicans) can be present on the island during the nesting season between March and July. The nesting season overlaps with the out-migration of millions of ESA-listed juvenile salmon and steelhead, which are a prey source for these birds.

In 2010, 2011, and 2012, it was estimated that the DCCO colony on East Sand Island consumed an average of 19.2, 20.5, and 18.9 million Columbia River basin juvenile salmonids as they migrated out to the Pacific Ocean. These numbers equate to approximately 18 percent of the entire Columbia River out-migrating salmon for those years. The 2008 FCRPS BiOp Reasonable and Prudent Alternative (RPA) Action 46 stated: "The FCRPS Action Agencies will develop a cormorant management plan encompassing additional research, development of a conceptual management plan, and implementation of warranted actions in the estuary." Since the issuance of the 2008/2010 FCRPS BiOp, the U.S. District Court for the District of Oregon remanded the BiOp to address certain insufficiencies. National Oceanic and Atmospheric Administration (NOAA) Fisheries released the Final 2014 FCRPS Supplemental BiOp in January 2014, which modified RPA Action 46 to read: "The FCRPS Action Agencies will develop a cormorant management plan (including necessary monitoring and research) and implement warranted actions to reduce cormorant predation in the estuary to Base Period levels (no more than 5,380 to 5,939 nesting pairs on East Sand Island)." (NOAA Fisheries, 2014).

To address 2008 RPA Action 46, USACE began preparing a cormorant management plan with a DCCO technical working group in 2010. This group included representatives from Federal agencies (NOAA Fisheries, U.S. Fish and Wildlife Service [USFWS] and Bonneville Power Administration), state agencies (Oregon Department of Fish and Wildlife [ODFW], Washington Department of Fish and Wildlife [WDFW]), several Columbia Basin tribes, and research biologists from Oregon State University and Real Time Research. USACE has developed the EIS for the cormorant management plan with interested government agencies and tribes as cooperating agencies. The USFWS, the U.S. Department of Agriculture Animal Plant Health Inspection Service (APHIS)-Wildlife Services, the WDFW, and ODFW are participating as cooperating agencies in the development of the EIS, including the development of the purpose and need and the range of alternatives that are included in the draft EIS. Some of the alternatives include lethal take, which will require a permit from USFWS; and it is anticipated APHIS will assist USACE in implementing the selected alternative. Each of the Federal agencies will complete their own ROD for their respective actions.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement (hereinafter: DCCO Management Plan EIS IEPR) in accordance with procedures described in the Department of the Army, USACE, Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB) *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing economic and environmental analyses contained in the DCCO Management Plan EIS IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on October 1, 2014.

## Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an IEPR of the DCCO Management Plan EIS IEPR. As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the DCCO Management Plan EIS. The IEPR was external to the agency and conducted following guidance described in USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the Panel. Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the DCCO Management Plan EIS and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: economics, avian biology, and fisheries biology. Battelle screened the candidates to identify those most closely

meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of final candidates to confirm that they had no COIs, but Battelle made the final selection of the three-person Panel.

The Panel received an electronic version of the 427-page DCCO Management Plan EIS, along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

Each IEPR panel member reviewed the DCCO Management Plan EIS individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 10 Final Panel Comments were identified and documented. Of these, three were identified as having medium/high significance, two had a medium significance, four had medium/low significance, and one had low significance.

## Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the DCCO Management Plan EIS. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

Based on the Panel’s review, the DCCO Management Plan EIS is comprehensive, readable, and well-written, and contains a good background description of context and policy process, with an explicit recognition of public concerns. The Panel was especially impressed with the up-front discussion on the complexity of the decision-making process. The Panel identified several elements of the project that should be clarified or revised.

**Economics:** From an economics standpoint, the analyses of the impacts and values associated with salmonids are rigorous and show a high level of expertise in understanding fisheries economics. One of the primary economics concerns is that economic value and impact analyses are limited to effects on salmonids, and do not include effects on avian populations, especially wildlife viewing-based activities. This limitation makes the Panel’s ability to assess the net marginal economic benefits of the alternatives difficult because the differences in value and market impact associated with non-salmonid wildlife do not appear to have been considered. The Panel believes this issue can be resolved by quantifying the project-related changes in population size for other species, particularly birds, and estimating the economic value (or socioeconomic significance) of these population size changes, such as via wildlife viewing recreation. The Panel believes the EIS could also benefit from an estimate of the costs of actions

that avoid substantial mortality for DCCO or other bird species, yet still reduce DCCO salmonid predation. Another important issue identified by the Panel is that the EIS does not explicitly identify the timeframe for effects of the alternatives, which can affect the magnitude of the net present value of benefits and costs. The Panel recommends that the EIS clearly specify the full time period for which benefits and costs for each alternative are likely to accrue, and provide an estimate of these benefits and/or costs. Of lower significance, the Panel suggests that details on the economic model and the assumptions and data sources used to calculate regional economic impacts should be added to the EIS.

**Environmental (Avian and Fisheries Biology):** From an environmental perspective, the fisheries data used in the EIS are very comprehensive and the document examines the natural resources holistically and at the watershed scale. The climate change-related effects analysis is discussed at a very high level, with excellent use of relevant empirical data and the results of various modeling approaches. The cormorant population models include stochastic elements and associated credible intervals on estimates, which are critical components and help to understand predictions fully. The Panel noted that the description of lethal control measures includes appropriate information about training, incidental take of Brandt's and Pelagic cormorants, appropriate measures for success or termination of control activities, and guidance for monitoring. Finally, the Panel was pleased that the affected area is well-defined using relevant biological data gathered by USACE-funded studies, leaving fewer assumptions from outside-collected data for model development.

Of particular concern to the Panel is that no explanation is given for using 100% additive mortality in the population model, an assumption that may overestimate the true predation rates on fish. To resolve this issue, the Panel encourages USACE to add language to the EIS clearly justifying the assumption of completely additive mortality and describing the consequences of this assumption on fish predation rates. In addition, the Panel does not believe the EIS fully considers the environmental impacts on other wildlife, especially co-nesting birds and that this can have implications for the justification of management recommendations; the Panel suggests that the EIS could include a more detailed discussion of the impacts on other wildlife and specific examples of proposed management actions. The Panel is also concerned that the EIS does not evaluate the habitat impacts associated with the placement of rock armor, or the guano-related water quality impacts of the terrain modification activities. If armoring is a necessary component of the preferred alternative, the Panel suggests investigating other armoring techniques for the shoreline and identifying mitigation measures for habitat impacts. Regarding the water quality impacts, the Panel believes this issue could be resolved by performing soil analyses to determine the human health and/or environmental risk and describing mitigation or avoidance measures. The Panel believes that the EIS could include a better description of how the 20% annual reduction in DCCO carrying capacity was calculated, as well as evidence to support why a relatively small steelhead survival benefit (3.6%) is worthy of the described level of lethal control. Finally, the Panel believes the clarity of the document could be improved by better describing why different time periods and analytical methods were used (by NOAA and USACE) to evaluate salmonid survival benefits.

**Table ES-1. Overview of 10 Final Panel Comments Identified by the DCCO Management Plan EIS IEPR Panel**

No.	Final Panel Comment
<b>Medium/High – Significance</b>	
1	The EIS assumption that all cormorant predation of juvenile salmonids is additive is not well-supported and therefore may overestimate the actual predation rates on fish.
2	The discussion of environmental impacts is primarily directed towards juvenile salmonids and neglects other wildlife species, which may have implications for the justification of management recommendations.
3	The economic analyses are limited to effects on salmonids and do not consider effects on other species.
<b>Medium – Significance</b>	
4	The appropriate and complete timeframe for cost and effects is unspecified, which complicates the interpretation of the net present value of benefits and costs.
5	The EIS does not address the impacts on fish and wildlife habitat associated with the Preferred Alternative's placement of 30,000 cubic yards of rock armor (riprap) on the northern shoreline.
<b>Medium/Low – Significance</b>	
6	The EIS does not address guano-related water quality impacts associated with the terrain modification included in the Preferred Alternative.
7	Justification is not provided for how a 20% reduction in carrying capacity using lethal and non-lethal control is assumed or will be calculated.
8	The EIS does not provide detailed evidence to support why a 3.6% increase in steelhead survival warrants culling more than 15,000 adult cormorants.
9	Specifics on the economic model and the assumptions and data sources used to calculate regional economic impacts are not provided.
<b>Low – Significance</b>	
10	The EIS does not explain clearly why NOAA's 2014 FCRPS Biological Opinion and the EIS use different time periods and different analytical methods to evaluate potential survival benefits to juvenile salmonids and how these different inputs affect the results and conclusions.

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## LIST OF ACRONYMS

<b>APHIS</b>	Animal Plant Health Inspection Service
<b>ATR</b>	Agency Technical Review
<b>BiOp</b>	Biological Opinion
<b>COI</b>	Conflict of Interest
<b>DCCO</b>	Double-Crested Cormorant
<b>DrChecks</b>	Design Review and Checking System
<b>EC</b>	Engineer Circular
<b>EIS</b>	Environmental Impact Statement
<b>ER</b>	Engineer Regulation
<b>ERDC</b>	Engineer Research and Development Center
<b>ESA</b>	Endangered Species Act
<b>FCRPS</b>	Federal Columbia River Power System
<b>IEPR</b>	Independent External Peer Review
<b>MHHW</b>	mean higher high water
<b>NEPA</b>	National Environmental Policy Act
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NWD</b>	Northwest Division
<b>ODFW</b>	Oregon Department of Fish and Wildlife
<b>OEO</b>	Outside Eligible Organization
<b>OMB</b>	Office of Management and Budget
<b>PDT</b>	Project Delivery Team
<b>ROD</b>	Record of Decision
<b>RPA</b>	Reasonable and Prudent Alternative
<b>USACE</b>	United States Army Corps of Engineers
<b>USFWS</b>	United States Fish and Wildlife Services
<b>WDFW</b>	Washington Department of Fish and Wildlife
<b>WRDA</b>	Water Resources Development Act

## 1. INTRODUCTION

The Double-Crested Cormorant (DCCO) Management Plan Environmental Impact Statement (EIS) is a National Environmental Policy Act (NEPA) document that will recommend a long-term, comprehensive approach for managing DCCO in the Columbia River Estuary. Avian predation is an identified impact in the Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp). This predation by DCCO is a source of ongoing challenges in the region due to species listed under the Endangered Species Act (ESA) that migrate through the system and in particular DCCO nesting on East Sand Island. The decision document will not require Congressional authorization, and the Record of Decision (ROD) will be signed by the U.S. Army Corps of Engineers (USACE), Northwestern Division (NWD).

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assist USACE in implementing the selected alternative. Each of the Federal agencies will complete their own ROD for their respective actions.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement (hereinafter: DCCO Management Plan EIS IEPR) in accordance with procedures described in the Department of the Army, USACE, Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB) *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing economic and environmental analyses contained in the DCCO Management Plan EIS IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on October 1, 2014.

## 2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic and environmental analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the DCCO Management Plan EIS was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

## 3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. Table 1 presents the major milestones and deliverables of the DCCO Management Plan EIS IEPR. Due dates for milestones and deliverables are based on the award/effective date of August 5, 2014. Note that the work items listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on December 15, 2014. The actual date for contract end will depend on the date that all activities for this IEPR are concluded.

**Table 1. Major Milestones and Deliverables of the DCCO Management Plan EIS IEPR**

Task	Action	Due Date
1	Award/Effective Date	8/5/2014
	Review documents available	6/25/2014
2	Battelle submits list of selected panel members	8/18/2014
	USACE confirms the panel members have no COI	8/26/2014
3	Battelle convenes kick-off meeting with USACE	8/7/2014
	Battelle convenes kick-off meeting with USACE and panel members	9/18/2014
4	Panel members complete their individual reviews	9/29/2014
	Panel members provide draft Final Panel Comments to Battelle	10/10/2014
5	Battelle submits Final IEPR Report to USACE	10/30/2014
6 <sup>a</sup>	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/1/2014
	Battelle submits pdf printout of DrChecks project file to USACE	12/15/2014
	Contract End/Delivery Date	1/30/2015

<sup>a</sup> Task 6 occurs after the submission of this report.

Battelle identified, screened, and selected three panel members to participate in the IEPR based on their expertise in the following disciplines: economics, avian biology, and fisheries biology. The Panel reviewed the DCCO Management Plan EIS and produced 10 Final Panel Comments in response to 13 charge questions provided by USACE for the review. This charge included two questions added by Battelle that sought summary information from the IEPR Panel. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

## 4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

### 4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the DCCO Management Plan EIS IEPR review document. The following summarizes the Panel's findings.

The panel members agreed on their "assessment of the adequacy and acceptability of the economic and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the DCCO Management Plan EIS. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel's findings.

Based on the Panel's review, the DCCO Management Plan EIS is comprehensive, readable, and well-written, and contains a good background description of context and policy process, with an explicit recognition of public concerns. The Panel was especially impressed with the up-front discussion on the complexity of the decision-making process. The Panel identified several elements of the project that should be clarified or revised.

**Economics:** From an economics standpoint, the analyses of the impacts and values associated with salmonids are rigorous and show a high level of expertise in understanding fisheries economics. One of the primary economics concerns is that economic value and impact analyses are limited to effects on salmonids, and do not include effects on avian populations, especially wildlife viewing-based activities. This limitation makes the Panel's ability to assess the net marginal economic benefits of the alternatives difficult because the differences in value and market impact associated with non-salmonid wildlife do not appear to have been considered. The Panel believes this issue can be resolved by quantifying the project-related changes in population size for other species, particularly birds, and estimating the economic value (or socioeconomic significance) of these population size changes such as via wildlife viewing recreation. The Panel believes the EIS could also benefit from an estimate of the costs of actions that avoid substantial mortality for DCCO or other bird species, yet still reduce DCCO salmonid predation. Another important issue identified by the Panel is that the EIS does not explicitly identify the timeframe for effects of the alternatives, which can affect the magnitude of the net present value of benefits and costs. The Panel recommends that the EIS clearly specify the full time period for which benefits and costs for each alternative are likely to accrue, and provide an estimate of these benefits and/or costs. Of lower significance, the Panel suggests that details on the economic model and the assumptions and data sources used to calculate regional economic impacts should be added to the EIS.

**Environmental (Avian and Fisheries Biology):** From an environmental perspective, the fisheries data used in the EIS are very comprehensive and the document examines the natural resources holistically and at the watershed scale. The climate change-related effects analysis is discussed at a very high level, with excellent use of relevant empirical data and the results of various modeling approaches. The cormorant population models include stochastic elements and associated credible intervals on estimates, which are critical components and help to understand predictions fully. The Panel notes that the description of lethal control measures includes appropriate information about training, incidental take of

Brandt's and Pelagic cormorants, appropriate measures for success or termination of control activities, and guidance for monitoring. Finally, the Panel was pleased that the affected area is well-defined using relevant biological data gathered by USACE-funded studies, leaving fewer assumptions from outside-collected data for model development.

Of particular concern to the Panel is that no explanation is given for using 100% additive mortality in the population model, an assumption that may overestimate the true predation rates on fish. To resolve this issue, the Panel encourages USACE to add language to the EIS clearly justifying the assumption of completely additive mortality and describing the consequences of this assumption on fish predation rates. In addition, the Panel does not believe the EIS fully considers the environmental impacts on other wildlife, especially co-nesting birds and that this can have implications for the justification of management recommendations; the Panel suggests that the EIS could include a more detailed discussion of the impacts on other wildlife and specific examples of proposed management actions. The Panel is also concerned that the EIS does not evaluate the habitat impacts associated with the placement of rock armor, or the guano-related water quality impacts of the terrain modification activities. If armoring is a necessary component of the preferred alternative, the Panel suggests investigating other armoring techniques for the shoreline and identifying mitigation measures for habitat impacts. Regarding the water quality impacts, the Panel believes this issue could be resolved by performing soil analyses to determine the human health and/or environmental risk and describing mitigation or avoidance measures. The Panel believes that the EIS could include a better description of how the 20% annual reduction in DCCO carrying capacity was calculated, as well as evidence to support why a relatively small steelhead survival benefit (3.6%) is worthy of the described level of lethal control. Finally, the Panel believes the clarity of the document could be improved by better describing why different time periods and analytical methods were used (by NOAA and USACE) to evaluate salmonid survival benefits.

## 4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

## Final Panel Comment 1

**The EIS assumption that all cormorant predation of juvenile salmonids is additive is not well-supported and therefore may overestimate the actual predation rates on fish.**

### Basis for Comment

The EIS includes a short discussion (Section 4.6.5) outlining the inherent uncertainty in using limited data to make predictions about future system performance. In general, key assumptions are clearly stated throughout the EIS with respect to possible areas of uncertainty in models. The assumption of compensatory mortality is obviously a critical one with respect to the justification for, and predicted consequences of, lethal cormorant control.

The EIS clearly states that the best available information suggests that this mortality is neither fully compensatory nor additive (Section 4.6.5 [Chapter 4, p. 93]; Hostetter et al. 2012), but somewhere in between. Despite this acknowledgment from studies funded as part of the development of this EIS, the model seems to assume (although it is not specifically stated) that all cormorant predation of juvenile salmonids is additive. No explanation is given for choosing completely additive mortality.

This is a huge assumption and may overestimate, to an unknown degree, the true predation rates on fish. Given the seemingly low survival benefits, mostly less than 4% for the various salmonid species, it is possible that cormorant predation of juvenile salmonids is being overestimated. If true, this could affect the choice of alternative, or perhaps the need for any cormorant control at all.

### Significance – Medium/High

If cormorant predation of juvenile fish is overestimated based on the additive assumption, then the justification for cormorant control would be weakened.

### Recommendation for Resolution

1. Clearly state, if appropriate, that the model assumes all cormorant predation is completely additive.
2. Add a paragraph to Section 4.6.5 that clearly justifies the assumption of 100% additive mortality used in the cormorant model.
3. In this same paragraph, include a statement about the consequences of this assumption on the estimated (probably overestimated) fish predation rates by cormorants.

### Literature Cited

Hostetter, N. J., Evans, E. F., Roby, D. D., and K. Collis (2012). Susceptibility of Juvenile Steelhead to Avian Predation: the Influence of Individual Fish Characteristics and River Conditions. *Transactions of the American Fisheries Society* 141:1586–1599. Available online at: <http://www.birdresearchnw.org/Hostetter%20et%20al.%202012.pdf>.

## Final Panel Comment 2

**The discussion of environmental impacts is primarily directed towards juvenile salmonids and neglects other wildlife species, which may have implications for the justification of management recommendations.**

### Basis for Comment

A thorough consideration of a range of management options, each with a clear presentation of environmental consequences, is necessary to select the best and most defensible management strategy. The EIS includes a thorough discussion of impacts on salmonids and cormorants, including predicted outcomes under a range of management scenarios. However, the EIS does not consider the effects on other wildlife, especially co-nesting birds.

For example, there are potential consequences for other birds that nest or roost on East Sand Island (Table 3-2). The text that accompanies this table is brief, as is the treatment of these and other species in Chapter 4. The nesting period for most of these species overlaps with that of Double-crested Cormorants (p. 18), so activities that occur during the nesting season could cause significant disturbance. However, there is no discussion of how disturbance from lethal cormorant control might affect roosting (and possibly nesting) Brown Pelicans, or if this level of disturbance to 10% of the Pacific Coast Brown Pelican population could cause important population consequences. Nor does the EIS describe the specific actions that would be implemented to reasonably ensure that Brown Pelicans (and other wildlife) will not be negatively affected by proposed management activities to control cormorants. Also lacking is a discussion of the economic values and market impacts associated with effects on other wildlife species.

### Significance – Medium/High

The discussion of environmental impacts is primarily directed towards juvenile salmonids and a more balanced treatment of other wildlife is needed to better justify management recommendations.

### Recommendation for Resolution

1. Expand the discussion of environmental impacts on other wildlife and include specific examples of proposed management actions.
2. Discuss the effects of lethal cormorant control on species that co-nest with DCCO on East Sand Island.
3. Describe how other birds and wildlife will be protected from management activities used to control DCCO.

### Final Panel Comment 3

**The economic analyses are limited to effects on salmonids and do not consider effects on other species.**

#### Basis for Comment

The EIS provides extensive detail on the effects of the proposed alternatives on salmonid populations in the Lower Columbia River, but not for other species identified as likely to be affected by the management alternatives.

The Principles and Guidelines (P&G) (WRC 1983) that govern economic analyses by USACE recognize recreation as a category for consideration and valuation, and wildlife viewing is a widely practiced and valuable form of recreation. Current directives from the White House (CEQ 2013) increase the burden on USACE to consider the economic values (benefits and costs) of environmental effects, and in response, USACE is currently updating its economic guidelines (P&G).

The economic analysis by The Research Group (TRG) concludes that wildlife viewing activity and market value is greater than for hunting and fishing combined in Oregon overall. Although the EIS references this information, it does not consider how the economic values and market impacts could vary among the alternatives. This would entail considering the amount and economic value of wildlife viewing in the project area, and the differences in effects on this activity among alternatives.

The EIS indicates that there are means to reduce DCCO predation of salmonids, but these means are expensive and time-consuming. The EIS frames the tradeoff comparison of salmonid populations vs. the DCCO population and the alternatives describe the potential for less invasive (albeit more expensive and time-consuming) approaches to reducing DCCO predation of juvenile salmonids. These increased costs, however, are the appropriate tradeoff for the benefit of maintaining other wildlife population levels, including DCCO and Caspian Terns, while still achieving reduced salmonid predation. Given the established greater value of wildlife viewing over fishing, the Panel believes that expending greater costs to accomplish reduced salmonid predation (or increased salmonid survival) with more protection of other wildlife populations could be warranted. However, the DCCO EIS does not provide sufficient information to evaluate this tradeoff.

The economic value of DCCO is implied to be low on the margin by noting the rapid increase in population size in recent years in the lower Columbia and suggesting the population increase is attributable to human activity.<sup>1</sup> That is, there are plenty of DCCO, possibly at unnaturally high levels. But the EIS also states that the western DCCO population is still much lower than historical levels, and has not recovered as successfully as Midwestern and eastern DCCO populations. So in reality, western DCCO populations might still be scarce, and have high value on the margin to wildlife viewing. In addition, the EIS indicates that other identified species on Sand Island are very scarce.

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<sup>1</sup> Margin is used here in the economic sense, to represent the value of one more, or one fewer DCCO. Resources that are plentiful have lower marginal value than when they are scarce.

### Significance – Medium/High

The net marginal economic benefits of the alternatives are difficult to assess because the differences in value and market impact associated with non-salmonid wildlife are not considered and the EIS does not provide information on possible tradeoff comparisons.

### Recommendation for Resolution

1. Quantify the likely changes in population size for other wildlife populations, particularly bird species, in the project area that are expected to feel substantial effects. Estimate the economic value of these changes in population size, likely via wildlife viewing recreational benefits but possibly other benefit types as well. Describe the socioeconomic significance of these population size effects when not economically valued.
2. Estimate the costs of actions to reduce DCCO salmonid predation that avoid substantial mortality for DCCO or other bird species. Or determine and state that no means are available to reduce DCCO salmonid predation while avoiding these other population effects.

### Literature Cited

WRC (1983). Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. Water Resources Council (US), March 10. Available online at: [http://planning.usace.army.mil/toolbox/library/Guidance/Principles\\_Guidelines.pdf](http://planning.usace.army.mil/toolbox/library/Guidance/Principles_Guidelines.pdf)

CEQ (2013). Updated Principles and Guidelines for Water and Land Related Resources Implementation Studies. Executive Office of the President, White House Council on Environmental Quality. Available online at: <http://www.whitehouse.gov/administration/eop/ceq/initiatives/PandG>

## Final Panel Comment 4

**The appropriate and complete timeframe for cost and effects is unspecified, which complicates the interpretation of the net present value of benefits and costs.**

### Basis for Comment

The Office of Management and Budget (OMB 2003) and USACE guidelines (WRC 1983) for economic analysis specify that benefits and costs should be considered over time sufficient to capture all relevant effects and market impacts. In particular the Principles and Guidelines state that

- “The period of analysis is to be the time required for implementation plus the lesser of—
- (1) The period of time over which any alternative plan would have significant beneficial or adverse effects; or
  - (2) A period not to exceed 100 years.”

Economic impacts should similarly be considered for the full timeframe of associated activity. The EIS does not explicitly identify the timeframe for effects of the alternatives. For example, it is not clear if the effects of the alternatives end with the completion of the implementation time period, which can last up to four years.

The timeframe for effects can affect the magnitude of the net present value of benefits and costs. It is highly likely that the effects of the alternatives (in comparison to the baseline No Action Alternative) will extend beyond the four-year implementation period. If benefits vary among alternatives, particularly for categories of benefits not estimated in the EIS (such as wildlife viewing benefits of DCCO and other bird species), the relatively small differences in costs among alternatives might justify a more expensive but less disruptive approach than adult culling, particularly if the benefits of a less disruptive approach accrue for an extended time period. If benefits and costs of the alternatives extend beyond the implementation period for an alternative of up to four years, or if the time period for benefits and costs varies significantly between alternatives, the timeframe(s) should be carefully specified, and appropriate time discounting applied.

### Significance – Medium

The timeframe can have an effect on the differences in the net present value of costs vs. benefits for alternatives.

### Recommendation for Resolution

1. Identify and specify the full time period for which benefits and costs for each alternative are likely to accrue.
2. If benefits or costs are likely to extend beyond the four-year implementation period, estimate these benefits and/or costs.
3. Account for time discounting of future benefits and costs. Current USACE guidance for discount rates specifies a rate of 3.5 percent (USACE 2013).

## Literature Cited

OMB (2003). Circular A-4. Regulatory Analysis. Office of Management and Budget. Available online at: [http://www.whitehouse.gov/omb/circulars\\_a004\\_a-4](http://www.whitehouse.gov/omb/circulars_a004_a-4).

WRC (1983). Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. Water Resources Council (US). March 10. Available online at: [http://planning.usace.army.mil/toolbox/library/Guidance/Principles\\_Guidelines.pdf](http://planning.usace.army.mil/toolbox/library/Guidance/Principles_Guidelines.pdf)

USACE (2013). Economic Guidance Memorandum, 14-01, Federal Interest Rates for Corps of Engineers Projects for Fiscal Year 2014. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. October 17. Available online at: <http://planning.usace.army.mil/toolbox/library/EGMs/EGM14-01.pdf>.

## Final Panel Comment 5

**The EIS does not address the impacts on fish and wildlife habitat associated with the Preferred Alternative's placement of 30,000 cubic yards of rock armor (riprap) on the northern shoreline.**

### Basis for Comment

The only impact that the EIS identifies from placing 30,000 cubic yards of riprap associated with the Preferred Alternative is that it "would constitute a fill to jurisdictional waters" (Section 4, p. 3). The EIS does not discuss specific habitat impacts associated with this proposed action, nor does it clearly justify the placement of this riprap, particularly within the context of Reasonable and Prudent Alternative (RPA) 46, and given that the northern shoreline is not facing the wind waves that enter the estuary.

Riprap placement (armoring) along the northern shoreline would permanently eliminate physical habitats. Based on a 2012 Google Earth aerial photograph, these eliminated habitats would include upper beach and intertidal habitats with value to juvenile salmonids and forage fish species. The extent to which habitat is directly eliminated would depend on the final footprint of the riprap placement, which is not provided in the EIS. In addition to the direct habitat loss, there would also be a habitat type conversion, from a gradually sloping shallow shoreline to an armored, deeper, abruptly sloping shoreline. Large wood recruitment (accumulation) potential would also likely be affected and potentially impaired along the armored segment of the shoreline.

While the shoreline portion to be armored is small when considered at the estuary or even smaller scales, species such as juvenile salmonids and forage fish may experience habitat losses and habitat changes at micro-habitat scales. Also, generally speaking, one of the ecological significances of habitat loss induced by riprap placement is related to the incrementally cumulative adverse effects it causes (Shipman et al. 2010). Given that RPA 46 is intended to reduce juvenile salmon mortality, one would not expect to see in the Preferred Alternative projects elements that may have adverse effects on habitat for those species.

### Significance – Medium

The potential for the riprap placement to have negative effects on salmonid habitat indicates that some elements of the Preferred Alternative need to be assessed and/or described in more detail.

### Recommendation for Resolution

1. Determine whether there is a real need to armor the northern shoreline within the context of RPA 46, and provide a justification and explanation in the EIS in the following sections: Chapter 2, p. 17; Section 4.2; Appendix B, under Jurisdictional Waters of the U.S. on East Sand Island, p. 5, and Project Description, p. 6; and in any other pertinent sections.
2. Consider the use of bioengineering and soft-armoring techniques that minimize habitat impacts, if the shoreline armoring is in fact needed.
3. Evaluate the specific habitat impacts associated with the proposed shoreline armoring (regardless of the technique and materials that may be proposed), identify appropriate mitigation measures, and include all this information in the EIS.

## **Literature Cited**

Google Earth (2012). Aerial photograph of the lower Columbia River. Available online.

Shipman, H., Dethier, M.N., Gelfenbaum, G., Fresh, K.L., and Dinicola, R.S., eds. (2010). Puget Sound Shorelines and the Impacts of Armoring—Proceedings of a State of the Science Workshop, May 2009: U.S. Geological Survey Scientific Investigations Report 2010–5254, 262 pp.

## Final Panel Comment 6

**The EIS does not address guano-related water quality impacts associated with the terrain modification included in the Preferred Alternative.**

### Basis for Comment

The EIS describes the proposed action (Chapters 2 and 5), which includes terrain modification to East Sand Island. These modifications would occur as part of a long-term management plan and involve excavation of approximately 300,000 cubic yards of sand on the westernmost portion of East Sand Island to create inlet channels and lagoon type areas to inundate the island and preclude nesting by DCCOs in that location. Section 4.2.1 of the EIS includes a discussion on why contaminants derived from bird guano are likely to have a short residence time in the East Sand Island's soil profile before being flushed through and into the river system. The EIS states (Appendix B, pp. 6 and 8), based on this information, that it is unlikely that chemical contamination is present in the dredged material, and that the disposal of excavated sand would have little to no effect on chemical contaminants to the Columbia River (p. 8).

However, Section 4.2.1 also states that "It is unknown what effect the DCCO colony may have had or may currently be having on East Sand Island's soil nutrient status." Based on this statement, it is unclear to the Panel whether soil testing has been performed. In addition, given that the terrain modification would take place after the DCCO nesting season, and within the construction season for this river system, part of the argument provided in Section 4.2.1 regarding the flushing effect of the rain on guano may not be relevant because significant rain events may not occur before the excavation takes place. Furthermore, the potential water quality impacts associated with avian-related viruses and bacteria that may be present in the excavated sand are not specifically addressed in Section 4.2.1 or any other section of the EIS.

Chemical and biological contaminants could be introduced into the Columbia River if they are present in the excavated sand, and if such sand is placed below or immediately above the mean higher high water (MHHW). While the effects of nutrients on water quality could be localized, such effects could have implications on micro habitat potentially used by juvenile salmonids and forage fish species along the East Sand Island shoreline. For example, an accelerated macroalgae growth could occur within and along adjacent shoreline areas if guano-derived nutrients are released during the growing season. Other chemical contaminants as well as viruses and bacteria could have adverse implications, not just on salmonids and forage fish species. While these potential impacts may only be localized and not at the estuary scale, their significance should be specifically addressed in the EIS.

Finally, while sand placement below the MHHW can be considered a sediment nourishment technique, with beneficial habitat effects, its potential impacts, both beneficial (nourishing beach areas) and adverse (filling existing habitat areas) should be addressed in the EIS. In general, given that RPA 46 is intended to reduce juvenile salmonid mortality, any potential impacts on this species, its forage base, or its habitat resulting from proposed project actions should be avoided or minimized.

### Significance – Medium/Low

The EIS does not describe the potential impacts (positive and negative) of the terrain modification and sand placement activities of the Preferred Alternative, which indicates the EIS is not complete.

### Recommendation for Resolution

1. Perform soil testing following the DCCO nesting season, and at a time of the year consistent with weather characteristics representative of the conditions expected at the time the terrain modification would occur.
2. Analyze soil samples for both chemical and biological contaminants.
3. Based on the testing results, determine whether there is a direct or indirect human health or environmental risk and provide an explanation in the EIS, including how such risks would be avoided or minimized.
4. Evaluate the specific habitat impacts associated with the proposed sand placement (i.e., its footprint) below the MHHW, explain whether juvenile salmon or forage fish habitat would be affected, identify appropriate mitigation measures if needed, and include this information in the EIS.

## Final Panel Comment 7

**Justification is not provided for how a 20% reduction in carrying capacity using lethal and non-lethal control is assumed or will be calculated.**

### Basis for Comment

The cormorant population model (Appendix E-2) is a standard 2-age-class model that is used to predict cormorant population growth. The model and its assumptions generally make sense; however, it does not explain how or why a 20% annual reduction in carrying capacity was calculated.

A definition of carrying capacity usually integrates a description of resources (e.g., nesting sites, food, etc.) and the maximum number of individuals that can be sustained indefinitely (which is included elsewhere in the EIS). From this baseline, particular changes (e.g., 20%) should be clearly justified. The model seems to assume that planned management activities under the Preferred Alternative will result in a 20% reduction in carrying capacity for each of the four years, but this is never clearly stated.

### Significance – Medium/Low

The basis for a 20% reduction in carrying capacity is needed to fully evaluate the feasibility of the model.

### Recommendation for Resolution

1. Add a paragraph that justifies how the 20% change in carrying capacity for the cormorant population model was calculated.

## Final Panel Comment 8

**The EIS does not provide detailed evidence to support why a 3.6% increase in steelhead survival warrants culling more than 15,000 adult cormorants.**

### Basis for Comment

One of the central themes in the EIS is the trade-off between increasing juvenile salmonid survival and reducing DCCO populations that prey on those salmonids. NOAA's 2014 Supplement to the FCRPS Biological Opinion indicates that the 3.6% increase in steelhead predation from the base to the current period warrants reducing the cormorant population from 15,000 to about 5,000 pairs.

The 3.6% increase in survival seems like a small benefit from such an extensive cormorant control program. The EIS gives no information to help interpret how well the 3.6% survival benefit was estimated. For example, there is no discussion on what the estimate's variance or 95% confidence interval was, nor on how close the lower confidence interval limit was to zero, which would indicate that the benefit could be much less than 3.6%. It is important to establish the uncertainty in this estimate in order to understand the survival benefits more fully and strengthen the selection of the Preferred Alternative.

### Significance – Medium/Low

A more complete justification of the 3.6% survival benefit is needed as a basis for the selection of the Preferred Alternative.

### Recommendation for Resolution

1. Report a measure of precision (preferably a 95% confidence interval) for the 3.6% survival increase for juvenile steelhead.
2. Provide a clearer justification for why such a seemingly small survival benefit warrants removing more than 15,000 adult cormorants under the Preferred Alternative.

## Final Panel Comment 9

**Specifics on the economic model and the assumptions and data sources used to calculate regional economic impacts are not provided.**

### Basis for Comment

Because of the variability that exists in the practice of economic impact analysis, it is important to provide transparency and documentation of methods, data sources, assumptions, and geographic boundaries. The EIS does not sufficiently describe or reference the methodology used to estimate regional economic impacts. There is good detail and documentation of the estimates of effects of reduced DCCO predation on salmonids and salmonid market values, but the changes in salmonid availability are not extended to estimates of regional economic impact.

There are many techniques for estimating economic impacts on markets of the types of actions and effects associated with the identified alternatives. Results can be highly sensitive to the type of analysis and model applied. The magnitude of impact estimates increases as the modeling approach moves beyond direct expenditures under an alternative into secondary and induced impacts, and from the footprint of the direct expenditures to a wider geographic region. Extending the timeframe for expenditures similarly expands the magnitude. It can also be important to demonstrate whether impacts are gross or marginal (e.g., whether the impacts are measured from baseline expenditures, how the funds would be spent without the alternative, or whether the expenditures would not have occurred in the geographic area without the alternative).

### Significance – Medium/Low

The specific methods, data sources, assumptions, and geographic boundaries for the regional economic impact analyses are not documented sufficiently to determine if the magnitude of impacts could be sensitive to these assumptions and bounds.

### Recommendation for Resolution

1. Summarize the geographic boundaries, direct impacts, and any indirect or induced market impacts included in the regional economic impact estimates. This summary could be in footnotes or a brief appendix.
2. Clearly delineate economic impact results from benefit and cost analyses. If any commercial models or data sets were used (e.g., IMPLAN, REMI), cite those sources and the years applied. TRG does provide this distinction in their reports.

## Final Panel Comment 10

**The EIS does not explain clearly why NOAA’s 2014 FCRPS Biological Opinion and the EIS use different time periods and different analytical methods to evaluate potential survival benefits to juvenile salmonids and how these different inputs affect the results and conclusions.**

### Basis for Comment

The EIS states (p. 32) that different time periods and different analytical methods were used to evaluate potential survival benefits to juvenile salmonids.

Regarding the different time periods, NOAA’s GAP analysis looked at specific agency policy periods (base: 1983-2002 and current: 2003-2009) for Endangered Species Act (ESA) consultation. In the EIS, USACE looked at a more recent period (2004-2013).

Regarding the analytical method, NOAA used bioenergetics in their gap analysis to determine a DCCO colony size. In the EIS, USACE used passive integrated transponder (PIT) tag data for evaluating benefits to fish. Section 1.1.6 of the EIS provides a description of the two techniques for assessing DCCO predation to smolts.

The reason why different time periods and analytical methods were used and an explanation of the potential implications of doing so are not clearly provided in the EIS.

### Significance – Low

The clarity of the EIS and the perception of the objectivity of the analyses performed are negatively affected when there is no clear explanation of why USACE and NOAA used different time periods and analytical methods, and the implications of this approach.

### Recommendation for Resolution

1. Explain in the EIS why different time periods and analytical methods were used (Section 1.1.6, and Chapter 4, p. 32).
2. Explain in the EIS what the implications are of using different time periods and analytical methods on conclusions and on the selection of the Preferred Alternative (Chapter 4, p. 32 and other applicable sections).

## 5. REFERENCES

CEQ (2013). Updated Principles and Guidelines for Water and Land Related Resources Implementation Studies. Executive Office of the President, White House Council on Environmental Quality. Available online at: <http://www.whitehouse.gov/administration/eop/ceq/initiatives/PandG>

Google Earth (2012). Aerial photograph of the lower Columbia River. Available online.

Hostetter, N. J., Evans, E. F., Roby, D. D., and K. Collis (2012). Susceptibility of Juvenile Steelhead to Avian Predation: the Influence of Individual Fish Characteristics and River Conditions. *Transactions of the American Fisheries Society* 141:1586–1599. Available online at: <http://www.birdresearchnw.org/Hostetter%20et%20al.%202012.pdf>.

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OMB (2003). Circular A-4. Regulatory Analysis. Office of Management and Budget. Available online at: [http://www.whitehouse.gov/omb/circulars\\_a004\\_a-4](http://www.whitehouse.gov/omb/circulars_a004_a-4).

Shipman, H., Dethier, M.N., Gelfenbaum, G., Fresh, K.L., and Dinicola, R.S., eds. (2010). Puget Sound Shorelines and the Impacts of Armoring—Proceedings of a State of the Science Workshop, May 2009: U.S. Geological Survey Scientific Investigations Report 2010–5254, 262 pp.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.

USACE (2013). Economic Guidance Memorandum, 14-01, Federal Interest Rates for Corps of Engineers Projects for Fiscal Year 2014. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. October 17. Available online at: <http://planning.usace.army.mil/toolbox/library/EGMs/EGM14-01.pdf>.

USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) 1165-2-214. December 15.

WRC (1983). Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. Water Resources Council (US), March 10. Available online at: [http://planning.usace.army.mil/toolbox/library/Guidance/Principles\\_Guidelines.pdf](http://planning.usace.army.mil/toolbox/library/Guidance/Principles_Guidelines.pdf)

# APPENDIX A

IEPR Process for the DCCO Management Plan EIS

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## A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the schedule followed in executing the Double-Crested Cormorant (DCCO) Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement (EIS) Independent External Peer Review (IEPR) (hereinafter: DCCO Management Plan EIS IEPR). Due dates for milestones and deliverables are based on the award/effective date of August 5, 2014. The review documents were provided by U.S. Army Corps of Engineers (USACE) on June 25, 2014. Note that the work items listed under Task 6 occur after the submission of this report. Battelle will enter the 10 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

**Table A-1. DCCO Management Plan EIS Complete IEPR Schedule**

Task	Action	Due Date
1	Award/Effective Date	8/5/2014
	Review documents available	6/25/2014
	Battelle submits draft Work Plan <sup>a</sup>	8/19/2014
	USACE provides comments on draft Work Plan	9/29/2014
	Battelle submits final Work Plan <sup>a</sup>	9/30/2014
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	8/11/2014
	USACE provides comments on COI questionnaire	8/12/2014
	Battelle submits list of selected panel members <sup>a</sup>	8/18/2014
	USACE confirms the panel members have no COI	8/26/2014
	Battelle completes subcontracts for panel members	9/5/2014
3	Battelle convenes kick-off meeting with USACE	8/7/2014
	Battelle sends review documents to panel members	9/17/2014
	Battelle convenes kick-off meeting with panel members	9/18/2014
	Battelle convenes kick-off meeting with USACE and panel members	9/18/2014
	Battelle sends mid-review clarifying questions from panel members to USACE (in lieu of a teleconference)	9/25/2014

**Table A-1. DCCO Management Plan EIS Complete IEPR Schedule (continued)**

Task	Action	Due Date
4	Panel members complete their individual reviews	9/29/2014
	Battelle provides panel members with talking points for Panel Review Teleconference	10/2/2014
	Battelle convenes Panel Review Teleconference	10/2/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	10/3/2014
	Panel members provide draft Final Panel Comments to Battelle	10/10/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	10/11/2014 - 10/21/2014
	Panel finalizes Final Panel Comments	10/22/2014
5	Battelle provides Final IEPR Report to panel members for review	10/24/2014
	Panel members provide comments on Final IEPR Report	10/28/2014
	Battelle submits Final IEPR Report to USACE <sup>a</sup>	<b>10/30/2014</b>
6 <sup>b</sup>	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	11/3/2014
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	11/3/2014
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	11/3/2014
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	11/18/2014
	Battelle provides the panel members the draft PDT Evaluator Responses	11/19/2014
	Panel members provide Battelle with draft BackCheck Responses	11/24/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/25/2014
	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/2/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	12/8/2014
	Battelle provides final PDT Evaluator Responses to panel members	12/10/2014
	Panel members provide Battelle with final BackCheck Responses	12/11/2014
	Battelle inputs the Panel's final BackCheck Responses in DrChecks	12/12/2014
	Battelle submits pdf printout of DrChecks project file <sup>a</sup>	12/15/2014
	Contract End/Delivery Date	1/30/2015

<sup>a</sup> Deliverable.

<sup>b</sup> Task 6 occurs after the submission of this report

At the beginning of the Period of Performance for the DCCO Management Plan EIS IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. In addition, 13 charge questions were provided by USACE and included in the draft and final Work Plans. Battelle added two questions that seek summary information from the IEPR Panel. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and within nine days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge as well as the DCCO Management Plan EIS and the reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **Double-crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary, Draft Environmental Impact Statement (427 pages)**
- Endangered Species Act Section 7(a)(2) Supplemental Biological Opinion, Consultation on Remand for Operation of the Federal Columbia River Power System (January 17, 2014) (610 pages)
- Final Environmental Assessment: Management of Double-Crested Cormorants Under 50 CFR 21.47 and 21.48 (84 pages)
- Economic Effects and Social Implications Section of the Double Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary (63 pages)
- Public Comments (~50 pages)
- USACE guidance *Civil Works Review* (EC 1165-2-214; 15 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

About halfway through the review of the DCCO Management Plan EIS IEPR documents, Battelle sent USACE eight clarifying questions from the Panel concerning the review documents or projects. USACE was able to provide responses to all of the questions within the next three days via email.

In addition, during the review period, USACE provided a document at the request of panel members. This document was received by Battelle and then sent to the Panel as additional information only and was not part of the official review:

- Economic Effects and Social Implications From Federal Mitchell Act Funded Hatcheries, The Research Group (August 2009).

## **A.2 Review of Individual Comments**

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of

the review, Battelle summarized the individual comments in a preliminary list of 13 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

### **A.3 IEPR Panel Teleconference**

Battelle facilitated a three-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

At the end of these discussions, the Panel identified 10 comments and discussion points that should be brought forward as Final Panel Comments.

### **A.4 Preparation of Final Panel Comments**

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the DCCO Management Plan EIS IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Panel Comments:** Each Final Panel Comment was presented as part of a four-part structure:
  1. **Comment Statement** (succinct summary statement of concern)
  2. **Basis for Comment** (details regarding the concern)
  3. **Significance** (high, medium/high, medium, medium/low, and low; see description below)

4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
    1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a “showstopper” issue.
    2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the Planning process. Comments rated as medium/high indicate that the Panel analyzed or assessed the methods, models, and/or analyses available at this stage in the Planning process and has determined that if the issue is not addressed, it could lead to a “showstopper” issue.
    3. **Medium:** Describes an issue with the project, which does not align with the currently assessed level of risk assigned at this stage in the Planning process. Comments rated as medium indicate that, based on the information provided, the Panel identified an issue that would raise the risk level if the issue is not appropriately addressed.
    4. **Medium/Low:** Affects the completeness of the report at this time in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium/low indicate that the Panel does not currently have sufficient information to analyze or assess the methods, models, or analyses.
    5. **Low:** Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information that was mislabeled or incorrect or that certain data or report section(s) were not clearly described or presented.
  - Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel’s overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 10 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in the main report.

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# APPENDIX B

Identification and Selection of IEPR Panel Members  
for the DCCO Management Plan EIS Project

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## B.1 Panel Identification

The candidates for the Double-Crested Cormorant (DCCO) Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement (EIS) Independent External Peer Review (IEPR) (hereinafter: DCCO Management Plan EIS IEPR) Panel were evaluated based on their technical expertise in the following key areas: economics, avian biology, and fisheries biology. These areas correspond to the technical content of the DCCO Management Plan EIS IEPR review documents and overall scope of the DCCO Management Plan EIS project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected three experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.<sup>2</sup> These COI questions serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm<sup>3</sup> in the Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement (hereinafter: DCCO Management Plan EIS).
- Previous and/or current involvement by you or your firm<sup>2</sup> in ecosystem restoration in the Pacific Northwest.
- Previous and/or current involvement by you or your firm<sup>2</sup> in DCCO Management Plan EIS-related projects.
- Previous and/or current involvement by you or your firm<sup>2</sup> in the conceptual or actual design or restoration of any DCCO Management Plan EIS -related projects.
- Current employment by the U.S. Army Corps of Engineers (USACE).

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<sup>2</sup> Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

<sup>3</sup> Includes any joint ventures in which the candidate's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Previous and/or current involvement in paid or unpaid expert testimony related to the DCCO Management Plan EIS.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors (for pay or pro bono), including U.S. Fish and Wildlife (USFWS), U.S. Department of Agriculture -Wildlife Services (USDA-WS), Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), NOAA Fisheries, and/or U.S. Geological Survey's (USGS) Oregon Cooperative Fish and Wildlife Research Unit.
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Columbia River Estuary on the border of Oregon and Washington state.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Portland District.
- Current firm<sup>2</sup> involvement with other USACE projects, specifically those projects/contracts that are with the Portland District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Portland District. Please explain.
- Any previous employment by USACE as a direct employee, notably if employment was with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by USACE as a contractor (either as an individual or through your firm<sup>2</sup>) within the last 10 years, notably if those projects/contracts are with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning ecosystem restoration and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in DCCO Management Plan EIS-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm<sup>2</sup> revenues within the last 3 years came from USACE contracts.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to DCCO Management Plan EIS.
- Participation in relevant prior and/or current Federal studies relevant to this project and/or DCCO Management Plan EIS., including the Federal Columbia River Power System Biological Opinion, the Final Environmental Assessment on the Management of Double-Crested Cormorants Under 50 CFR 21.47 and 21.48.
- Previous and/or current participation in prior non-Federal studies relevant to this project and/or DCCO Management Plan EIS.
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project

- Past comments by you, your spouse, your children, or organizations you are affiliated with on the draft EIS during the public comment period or previous avian management NEPA documents prepared by the USACE for this study or related studies.

Other considerations:

- Participation in previous USACE technical review panels
- Other technical review panel experience.

## **B.2 Panel Selection**

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Two of the three reviewers are affiliated with a consulting company; the other is an independent consultant. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

An overview of the credentials of the three members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table B-1. More detailed biographical information regarding each panel member and his area of technical expertise is presented in Section B.3.

**Table B-1. DCCO Management Plan EIS IEPR Panel: Technical Criteria and Areas of Expertise**

Technical Criterion	Buckley	Dinsmore	Carrasquero
<b>Economics</b>			
Minimum 10 years of demonstrated economics experience	X		
Able to evaluate the conclusions and rationale made regarding the economic impact of Double-crested cormorant (DCCO) predation of juvenile salmonid	X		
Familiar with National Environmental Policy Act (NEPA) analysis performed for the Socio-Economic portions of Environmental Impact Statements (EISs)	X		
Familiar with evaluating economic resources of the Affected Environment and impacts from alternatives in the Environmental Consequences Chapter of EISs	X		
Minimum M.S. degree in economics or a related field	X		
<b>Avian Biology</b>			
Minimum 10 years of demonstrated experience in the field of avian biology		X	
Familiar with methods for evaluating bird habitat suitability		X	
Understands colonial water birds in the Pacific Northwest		X	
Familiar with Migratory Bird Treaty Act		X	
Experienced in wildlife management		X	
Minimum M.S. degree in a related field		X	
<b>Fisheries Biology</b>			
Minimum 10 years of demonstrated experience in the field of fisheries biology			X
Familiar with the integration of environmental evaluation and compliance requirements pursuant to ER 200-2-2			X
Familiar with procedures for implementing NEPA			X
Has particular knowledge of Endangered Species Act (ESA) fisheries in the Pacific Northwest related to avian predation			X
Minimum M.S. degree in a related field			X

### B.3 Panel Member Qualifications

#### **Mark Buckley, Ph.D.**

**Role:** Economics experience and expertise.

**Affiliation:** ECONorthwest

**Dr. Buckley**, a partner and senior economist at ECONorthwest, a consulting firm located in Portland, Oregon, has 16 years of experience. He earned his Ph.D. in 2007 with an interdisciplinary focus on environmental studies and economics from the University of California, Santa Cruz and earned a B.S. in economics in 1998. He develops economic models and analytical methods for planning and behavior involving natural resources, specifically, water resources and land management. In particular, he combines microeconomic and game-theoretic techniques with competence in the biophysical aspects of natural systems. His focus is economic benefit, cost, and impact analysis for policy design and evaluation. He has worked on such topics as benefits of watershed-scale river restoration in Utah, cost-effective approaches to policy and finance for restoring Puget Sound (particularly salmon habitat), and levee setbacks and restoration on the Green River in King County, Washington. He has also developed natural resource valuation tools for the Jamaican national government with funding from the United Nations Development Programme for the country's Environmental Impact Assessment process.

Dr. Buckley is able to evaluate the conclusions and rationale made regarding the economic values and market impacts of Double-crested cormorant predation of juvenile salmonid. He has worked heavily in analysis of economic values of natural resource effects and the associated market impacts. He has extensive experience in salmonid issues, particularly in the Columbia River basin, and is familiar with Double-crested cormorant predation issues. He has conducted studies of economic value and impacts on salmonids in the Columbia Basin including a project that assessed impacts of lower levels for Lake Roosevelt and increased downstream flows in the Columbia River. He has estimated the use and non-use values and market impacts associated with salmonid population improvements from various projects and programs in the Yakima River basin. Additional project experience includes the identification of costs and long-term funding strategies for the Action Agenda's Strategic Initiatives concerning salmon habitat, urban stormwater, and shellfish beds for the Puget Sound Partnership. He has identified types of impacts of potential endangered species establishment on private lands and provided strategies for species restoration compatible with private land use. In addition, he estimated the cost of offsetting the impact of once-through cooling operations for power plants on California's central coast as well as the east coast, including market and non-market values for tradeoffs between cooling options. The target habitats included estuaries and near-shore marine with endangered bird and marine mammal species.

Dr. Buckley is familiar with NEPA analysis performed for the socio-economic portions of EISs, and has worked frequently on economic analyses for NEPA/EIS for Federal agencies. Currently, he is leading the economic analyses for all EISs for Bureau of Reclamation and Washington Department of Ecology projects as part of the Yakima Integrated Water Resource Management Plan. He also developed the models and conducted the analyses for the earlier stages of this work on the overall plan. The efforts included estimating the economic value and impacts associated with improved water supply under drought and climate change conditions, including for instream flows and habitat enhancement for the full range of values on affected salmonids. He was recently asked by the USACE Los Angeles District to present his findings on this work to their staff as well as to their economists in San Francisco. These presentations and conversations are in part motivated by the update to economic guidelines for USACE currently under way.

In addition, for King County, Washington he identified and estimated the benefits of levee setback and riparian restoration for the Green River and analyzed and described the environmental and social justice implications across the project scenarios. Furthermore, his project work includes economic analyses to compare damages from a proposed power plant expansion to fish benefits of proposed restoration activities for Morro Bay and Moss Landing, California, as well as power plants on the East Coast, applying and improving standard Habitat Equivalency Analysis techniques.

Dr. Buckley is familiar with evaluating economic resources of the Affected Environment and impacts from alternatives in the Environmental Consequences Chapter of EISs through his studies and through his consulting experience. He has conducted economic analyses and written associated EIS chapters and sections for a range of other projects including transmission lines in Oregon, Washington, Idaho, and Montana and water management for Lake Roosevelt on the Columbia River (Grand Coulee Dam). He is currently leading the economic analyses for the EIS in support of BLM's two Resource Management Plans under way for the northern and southern portions of western Oregon. This work includes estimating the economic values of goods and services (market and non-market) provided by the Bureau of Land Management, including effects on fish and wildlife and the development of EIS sections.

Dr. Buckley has several publications in peer-reviewed journals and edited books including a 2008 Conservation Biology article titled the "Negative Off-Site Impacts of Ecological Restoration: Understanding addressing the Conflict" and a New England Complex Systems Institute working paper "Emergence of Cooperation in an Agent-Based Predator-Prey Model." Relevant presentations include a 2013 talk at the Puget Sound Partnership in Tacoma Washington where he discussed "Integrating Ecological Function into Floodplain Economies." He has also served as an adjunct professor of environmental economics at Portland State University.

### ***Stephen Dinsmore, Ph.D.***

**Role:** Avian biology experience and expertise.

**Affiliation:** Iowa State University

**Dr. Dinsmore** is an avian biologist with more than 28 years of experience in research and academia. His current work is broadly centered on the intersection of avian ecology and population biology and often emphasizes applied questions that are related to specific management issues. He earned his Ph.D. in fishery and wildlife biology from Colorado State University in 2001. Dr. Dinsmore is currently a professor in the Department of Natural Resource Ecology and Management at Iowa State University. He has taught graduate and undergraduate courses in ornithology, avian ecology, and applied wildlife population ecology. Throughout his career, he has advised 14 graduate students in avian biology research. He has served in numerous professional leadership positions including associate editor for *The Auk* and has published more than 50 peer-reviewed articles on birds.

Dr. Dinsmore is familiar with methods for evaluating bird habitat suitability from his work on the population ecology of birds. Much of his research centers on understanding the influence of habitat at varying spatial scales. He has also researched site-specific habitat characteristics and other factors to correlate with (for example) avian nest survival, fledgling survival, and annual survival. He is familiar with the details of a Habitat Suitability Index (HSI) and models to evaluate HSI in birds.

Dr. Dinsmore has an understanding of colonial water birds from project experience as an avian ecologist. His work has included such projects as monitoring nesting Least Terns (Federally threatened) at a single nesting colony in Iowa since 1988, participating in surveys of colonial nesting waterbirds that included Double-crested Cormorants, Brown Pelicans, several tern species (including Caspian Tern), and Laughing Gulls at multiple large colonies (some >10,000 pairs) in North Carolina from 1991 to 1995, designing and conducting the first comprehensive survey of colonial nesting waterbirds in Mississippi in 2004 and 2005, and conducting annual surveys (since 2010) of colonial nesting birds including Double-crested Cormorants, American White Pelicans, Great Blue Herons, and Great Egrets on the Mississippi River in Iowa. In addition to the above formal surveys, he has spent considerable time in the Pacific Northwest working on many bird-related projects. He has visited many large nesting colonies from Oregon north to Alaska. His background as an avian ecologist and avid birder provided him with familiarity with the colonial nesting bird community in this region.

Dr. Dinsmore is familiar with the Migratory Bird Treaty Act through his research activities where permits are required by the Act for research and through his courses in ornithology and avian ecology, which discuss the Act in detail. He has experience in wildlife management through his education, which focused on wildlife management. He is broadly familiar with the philosophy, tools, and application of appropriate tools to solve management issues. Many of his research projects seek to provide management solutions for birds and other wildlife.

In addition, he has twice written (and will be revising it again in 2015) a chapter on wildlife population analysis for the Wildlife Techniques Manual published by The Wildlife Society. He has been a member of the Cooper Ornithological Society since 1993, a member of The Wildlife Society since 1997, the American and Wilson Ornithological Societies since 1994. He was voted an elective member of the American Ornithologist Union in 2006 and voted a Fellow in 2011.

### ***José Carrasquero***

**Role:** Fisheries biology experience and expertise.

**Affiliation:** Herrera Environmental Consultants, Inc.

**Mr. Carrasquero** is a fisheries and marine biologist with 25 years of experience in fluvial and coastal ecological studies and restoration, habitat characterization, reach assessment, fish population assessment, habitat impact assessment, and habitat restoration, with a targeted, career-long focus on the Pacific Northwest. He earned his B.S. (1995) and his M.S. (1997) from the University of Washington School of Fisheries. He has evaluated the ecological characteristics of lacustral, fluvial, and coastal systems in the State of Washington and Oregon, particularly within the context of salmon recovery, and has conducted biological assessments for habitat restoration, construction, and maintenance projects.

Mr. Carrasquero is familiar with the integration of environmental evaluation and compliance requirements pursuant to USACE's Engineer Regulation (ER) 200-2-2. Specifically, he has integrated this requirement following NEPA procedures for more than 50 Federally funded projects requiring permits from USACE. He has coordinated environmental permits to help clients obtain approval for Clean Water Act section 404 and 401 permits, as well as local permits and approvals. In addition, he has followed 33 CFR 230 procedures for implementing NEPA on transportation and other projects, including preparing and/or reviewing environmental assessment (EA) and EIS technical sections.

Mr. Carrasquero's experience with Pacific Northwest fisheries includes a particular knowledge of ESA fisheries related to avian predation. He has analyzed the effects of predatory bird species on juvenile salmonid fish in lakes and rivers, including Double-crested Cormorant in the Columbia River. Mr. Carrasquero also prepared a white paper for the Washington Department of Fish and Wildlife that analyzed the effects of in- and over-water structures, including how such structures provide habitat for Double-crested Cormorant and other bird species. Among other things, this white paper assessed empirical and anecdotal data and information on avian predation, analyzing relationships between these structures and modification of fish behavior (e.g., migration) in freshwater environments. It also analyzed how the structures influence avian predation on salmonids by providing perch sites for predatory birds.

Mr. Carrasquero also assisted Century Pacific LP with a biological assessment for compliance with the land use code of the Seattle Department of Construction and Land Use. The proposed project consisted of the repair and replacement of an existing boatyard on Lake Union in Seattle, Washington. Mr. Carrasquero conducted a biological evaluation of the potential effects of the proposed construction activities. This evaluation included a determination of the effects of increased shaded areas, increased impervious surface areas, and construction activities on juvenile Chinook salmon, its habitat, and its prey. Specifically, the evaluation considered the potential negative effects on juvenile Chinook rearing habitat, the potential increase in habitat for fish that are predators of juvenile Chinook, and the potential increase in the number of predator fish. Mr. Carrasquero also estimated the potential loss of Chinook rearing habitat and the potential increase in juvenile salmon predation due to the increase in the lake's shaded areas. In addition, he has reviewed construction projects to assess whether they comply with ESA requirements. For these project reviews, he evaluated construction plans, recommended best management practices (BMPs) and mitigation measures, and coordinated with project managers to include these measures in the project design and facilitate concurrence with regulatory agencies.

Mr. Carrasquero's experience includes a familiarity with the Migratory Bird Treaty Act. He has evaluated potential impacts on migratory birds for more than 15 projects in accordance with 16 USC 703-712. This effort included evaluation of BMPs to avoid protected bird take and allow transportation project implementation. He also has experience in wildlife management, having collaborated in the preparation of fish and wildlife management documents intended to address large river corridors in Washington State. Mr. Carrasquero is active in the American Fisheries Society.

# APPENDIX C

Final Charge to the IEPR Submitted  
to USACE on August 5, 2014 for the  
DCCO Management Plan EIS  
Project

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# **CHARGE QUESTIONS AND GUIDANCE TO THE PANEL MEMBERS FOR THE IEPR OF THE DOUBLE-CRESTED CORMORANT MANAGEMENT PLAN TO REDUCE PREDATION OF JUVENILE SALMONIDS IN THE COLUMBIA RIVER ESTUARY ENVIRONMENTAL IMPACT STATEMENT**

## **BACKGROUND**

The Double-Crested Cormorant (DCCO) Management Plan EIS is a National Environmental Policy Act (NEPA) document that will recommend a long-term, comprehensive approach for managing DCCO in the Columbia River Estuary. Avian predation is an identified impact in the Federal Columbia River Power System (FCRS) Biological Opinion (BiOp). This predation by DCCO is a source of ongoing challenges in the region due to species listed under the Endangered Species Act (ESA) that migrate through the system and in particular DCCO nesting on East Sand Island. The decision document will not require Congressional authorization, and the Record of Decision (ROD) will be signed by the U.S. Army Corps of Engineers (USACE), Northwestern Division (NWD).

East Sand Island is managed by USACE and is at the mouth of the Columbia River. The island is approximately 60 acres in size and is located in the Columbia River estuary. East Sand Island has become home to two of the largest colonies of waterbirds (Caspian terns and Double-Crested cormorants) in the world. It is also the largest nighttime roost in the world for Brown Pelicans, which were recently ESA delisted. Brandt's Cormorants nest within the Double-Crested cormorant (DCCO) colony and are a species of concern for the state of Washington. Upwards of 60,000 birds (terns, cormorants, gulls, and pelicans) can be present on the island during the nesting season between March and July. The nesting season overlaps with the out-migration of millions of ESA-listed juvenile salmon and steelhead, which are a prey source for these birds. In 2010, 2011, and 2012, it was estimated that the DCCO colony on East Sand Island consumed an average of 19.2, 20.5, and 18.9 million Columbia River basin juvenile salmonids as they migrated out to the Pacific Ocean. These numbers equate to approximately 18 percent of the entire Columbia River out-migrating salmon for those years.

The 2008 FCRPS BiOp Reasonable and Prudent Alternatives (RPA) Action 46 stated: "The FCRPS Action Agencies will develop a cormorant management plan encompassing additional research, development of a conceptual management plan, and implementation of warranted actions in the estuary." Since the issuance of the 2008/2010 FCRPS BiOp, the U.S. District Court for the District of Oregon remanded the BiOp to address certain insufficiencies. NOAA Fisheries released the Final 2014 FCRPS Supplemental BiOp in January 2014, which modified RPA Action 46 to read: "The FCRPS Action Agencies will develop a cormorant management plan (including necessary monitoring and research) and implement warranted actions to reduce cormorant predation in the estuary to Base Period levels (no more than 5,380 to 5,939 nesting pairs on East Sand Island)" (NOAA Fisheries, 2014).

To address 2008 RPA Action 46, USACE began preparing a cormorant management plan with a DCCO technical working group in 2010. This group included representatives from Federal agencies (NOAA Fisheries, USFWS, and BPA), state agencies (ODFW, WDFW), several Columbia Basin tribes, and research biologists from OSU and Real Time Research. USACE has developed the Environmental Impact

Statement (EIS) for the cormorant management plan with interested government agencies and tribes as cooperating agencies. The U.S. Fish and Wildlife Service (USFWS), the U.S. Department of Agriculture Animal Plant Health Inspection Service (APHIS)-Wildlife Services, the Washington Department of Fish and Wildlife (WDFW), and Oregon Department of Fish and Wildlife (ODFW) are participating as cooperating agencies in the development of the EIS; including the development of the purpose and need and the range of alternatives that are included in the draft EIS. Some of the alternatives include lethal take, which will require a permit from USFWS; and it is anticipated APHIS will assist USACE in implementing the selected alternative. Each of the Federal agencies will complete their own ROD for their respective actions.

## OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement (hereinafter: DCCO Management Plan EIS IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214; December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the DCCO Management Plan EIS documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members or the Panel) with extensive experience in economics, avian biology, and environmental resources/fisheries biology as it is related to the EIS.

The Panel will identify, recommend, and comment upon the assumptions underlying the analyses, and will evaluate the soundness of models. The reviewers should be able to evaluate whether the interpretations of analyses and conclusions are technically sound and reasonable, provide effective review in terms of both usefulness of results and credibility, and have the flexibility to bring important issues to the attention of decision makers. The reviewers will address factual inputs, data, analyses, assumptions, and other scientific and engineering tools/methodologies to inform decision-making.

## DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials provided for the review.

### Documents for Review

The following documents were provided for review or as supplemental information:

Review Documents	
Title	Number of Pages
<b>Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary, Environmental Impact Statement</b>	427
Supplemental Documents	
Endangered Species Act Section 7(a)(2) Supplemental Biological Opinion, Consultation on Remand for Operation of the Federal Columbia River Power System (January 17, 2014)	610
Final Environmental Assessment: Management of Double-Crested Cormorants Under 50 CFR 21.47 and 21.48	84
Economic Effects and Social Implications Section of the Double Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary	63
Public Comments	50

## Documents for Reference

- USACE guidance *Civil Works Review*, (EC 1165-2-214; 15 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

## SCHEDULE

This final schedule is based on the September 17, 2014 receipt of the review documents by the Panel.

Task	Action	Due Date
<b>Conduct Peer Review</b>	Battelle sends review documents to panel members	9/17/2014
	Battelle convenes kick-off meeting with panel members	9/18/2014
	Battelle convenes kick-off meeting with USACE and panel members	9/18/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	9/25/2014
	Panel members complete their individual reviews	9/29/2014
<b>Prepare Final Panel Comments and Final IEPR Report</b>	Battelle provides panel members with talking points for Panel Review Teleconference	10/2/2014
	Battelle convenes Panel Review Teleconference	10/3/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	10/6/2014
	Panel members provide draft Final Panel Comments to Battelle	10/14/2014

Task	Action	Due Date
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	10/15/2014-10/22/2014
	Panel finalizes Final Panel Comments	10/23/2014
	Battelle provides Final IEPR Report to panel members for review	10/24/2014
	Panel members provide comments on Final IEPR Report	10/28/2014
	Battelle submits Final IEPR Report to USACE	10/30/2014
<b>Comment/ Response Process</b>	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	11/3/2014
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	11/3/2014
	USACE provides draft PDT Evaluator Responses to Battelle	11/18/2014
	Battelle provides the panel members the draft PDT Evaluator Responses	11/19/2014
	Panel members provide Battelle with draft BackCheck Responses	11/24/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/25/2014
	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/1/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	12/8/2014
	Battelle provides PDT Evaluator Responses to panel members	12/10/2014
	Panel members provide Battelle with final BackCheck Responses	12/11/2014
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	12/12/2014
	Battelle submits pdf printout of DrChecks project file	12/15/2014

## CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the DCCO Management Plan Draft EIS are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic and environmental resources. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

## General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the DCCO Management Plan EIS documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also, please **do not** comment on or make recommendations on policy issues and decision-making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Corey Wisneski, [wisneskic@battelle.org](mailto:wisneskic@battelle.org)) or Program Manager (Karen Johnson-Young, [johnson-youngk@battelle.org](mailto:johnson-youngk@battelle.org)) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young ([johnson-youngk@battelle.org](mailto:johnson-youngk@battelle.org)) immediately.

4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Corey Wisneski, [wisneskic@battelle.org](mailto:wisneskic@battelle.org), no later than September 29, 2014, 10 pm ET.

# IEPR of the Double-Crested Cormorant Management Plan to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement

## CHARGE QUESTIONS AND RELEVANT SECTIONS AS SUPPLIED BY USACE

1. Is the technical work adequate, competently performed, and properly documented; does it satisfy established quality requirements and yield scientifically credible conclusions?
2. Determine whether the technical approach and scientific rationale presented in the EIS are valid.
3. Have the geographic areas of interest, regions of influence, or resource assessment boundaries for each resource been established appropriately to document existing conditions for the affected environment?
4. Has the character and scope of the affected environment been adequately described, and is it appropriate in terms of undertaking a systems/ecosystem based approach?
5. For your particular area of expertise, provide an in-depth review of whether the analyses of the existing social, economic, and natural resources within the project area are sufficient to support the estimation of impacts (direct, indirect, and cumulative) for the range of alternatives.
6. Please comment on the conclusions in Chapter 4 environmental consequences. Do you envision other potential probable outcomes?
7. Are there natural resources included that do not need to be discussed or excluded that do need to be discussed?
8. Please comment on areas of uncertainty in the EIS with regard to environmental consequences and outcomes, giving focus to compensatory mortality in the context of the FCRPS BiOp and EIS. Are assumptions rational and supported?
9. Review the population model in entirety and equations used to arrive at conclusions and comment on the validity of the equations and overall methodology. Compare to 2014 USFWS Environmental Assessment methodology.
10. Was a reasonable range of alternatives considered in the EIS?
11. Have the significance of the impacts been appropriately and clearly identified and addressed?
12. Are there any unmitigated environmental impacts not identified?
13. Does the EIS adequately quantify damages related to the migratory bird treaty act?

## Overview Questions as Supplied by Battelle

1. Please identify the most critical concerns (up to five) you have with the project and/or review documents.
2. Please provide positive feedback on the project and/or review documents.

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