

A In addition to 2022 activities summarized below, the Action Agencies will continue to develop a coordinated strategy for avian management and monitoring consistent with our implementation authorities and mitigation obligations. The Action Agencies will continue participating in the Fish Passage Operation and Maintenance Regional Forum workgroup to coordinate avian predation management and monitoring activities consistent with their authorities; the Corps will continue to coordinate avian predation research activities through the Studies Review Work Group (e.g., predation rate analysis). The Action Agencies have also been meeting regularly following release of the Avian Predation Synthesis Report on March 31, 2021. The Synthesis Report included a number of recommendations that the Action Agencies will continue to consider for both ongoing, and potential future, avian predation management and monitoring actions; any future actions will be coordinated with NMFS and U.S. Fish and Wildlife Service prior to implementation.

A summary of the Action Agencies' planned 2022 avian predation management actions and monitoring activities are provided below. All these avian predation management actions are intended to reduce avian predation of juvenile ESA-listed salmon and steelhead in the lower Snake and lower Columbia Rivers. The Action Agencies have been involved in efforts to reduce avian predation impacts on ESA-listed salmon and steelhead for decades and are continuing those efforts where feasible, practicable, and within agency authorities. The Action Agencies are also actively engaged in multiple regional forums where avian predation issues and concerns are discussed and considered; we will continue to participate in these forums as a means of gathering information and gauge interest in management and monitoring activities.

1. Avian Predation Management and Monitoring at Dams: The Corps will continue avian predation deterrence and monitoring activities at all eight lower Columbia and lower Snake River dams. At each dam, bird numbers will continue to be monitored, birds foraging in dam tailraces will be hazed (to include, in some circumstances, lethal reinforcement) and passive predation deterrents, such as irrigation sprinklers and avian wire arrays, will be deployed. Hazing typically involves launching long-range pyrotechnics at concentrations of feeding birds and occurs primarily near the spillway, powerhouse discharge, and juvenile bypass outfall areas. In 2020, the Corps' Portland District began considering the possibility of adding lethal reinforcement techniques to hazing efforts at Bonneville, The Dalles and John Day dams. The review of lethal removal, including compliance with relevant environmental laws and regulations, will continue in 2022. Specific avian predation management activities at these dams will be documented in Appendix L of the 2022 Fish Passage Plan (in development, <http://pweb.crohms.org/tmt/documents/fpp/>).

2. Inland Avian Predation Management Plan (IAPMP): At Crescent Island, the Corps will monitor presence / absence and magnitude of Caspian terns (1-2 site visits or aerial flights during the breeding season) and will report findings to the Fish Passage Operations and Maintenance (FPOM) workgroup. The Corps will work with USFWS McNary National Wildlife Refuge to implement non-ground disturbing activities to dissuade terns from nesting on Badger Island. Key updates will be recorded in meeting minutes and supporting documents will be communicated via FPOM and recorded in meeting minutes and supporting documents located at <http://pweb.crohms.org/tmt/documents/FPOM/2010/>.

Reclamation will continue to monitor colony size and passively and actively dissuade Caspian terns within the North Potholes Reservoir. At Goose Island, Reclamation will continue to implement management actions, including non-lethal hazing and lethal take of up to 200 tern eggs and monitoring of colony size. Active dissuasion efforts for the 2022 season will be significantly increased to reduce the number of nesting and loafing terns below the thresholds set in the IAPMP guidelines.

3. Blalock Islands Operation and Monitoring: From April 10 - June 1 (or as feasible based on river flows), the John Day reservoir elevation will be held between 264.5 feet and 266.5 feet to inundate sandy portions of the Blalock Islands Complex to delay Caspian terns from nesting until after the majority of the Upper Columbia and Snake River steelhead have passed downstream of this area. The Action Agencies intend to begin increasing the forebay elevation prior to initiation of nesting by Caspian terns; operations may begin earlier than April 10 (when the reservoir is typically operated between 262.0 to 266.5 feet). The operation may be adaptively managed due to changing run timing; however, the intent of the operation is to begin returning to reservoir elevations of 262.5-264.5 feet on June 1, but no later than June 15, which generally captures 95% of the annual juvenile steelhead migration. During the operation, safety-related restrictions would continue, including but not be limited to maintaining ramp rates for minimizing project erosion and maintaining power grid reliability. Following this operation, the John Day reservoir elevation would return to 262.5 – 264.5 feet operating range through August 31. Monitoring of the operation will include flight surveys during (April 10 to June 1) and following the implementation period (June 1 to mid-July). The number of Caspian terns nesting at the Blalock Islands Complex during the special operation will be quantified and referenced to respective reservoir operations (and water surface elevations) at the time of photo imaging. Aerial photos will be analyzed, and the area of suitable nesting habitat will also be quantified. Comparisons will be made to previous model outputs and be assessed for potential future use by Caspian terns. Results will be communicated to NMFS, USFWS and regional partners. Walla Walla District Planning will provide a summary of the operation and results in a Memorandum for the Record by 31 December. The Memorandum will be provided to SRWG and FPOM.

4. Caspian Tern Management Plan: On East Sand Island, the Corps will continue to implement management actions, including preparation of 1.0 acre of suitable tern nesting habitat and non-lethal hazing outside the 1.0 acre tern nesting area. The Corps will use Civil Air Patrol (CAP) flights to monitor peak colony size (nesting pairs) and will collect data to enable predation rate analysis on ESA listed juvenile salmon based on recovery of PIT tags if prioritized by SRWG and funding is available. As in 2021, pre-season control tags will be sewn by Corps personnel prior to the 2022 nesting season. The need for post-season PIT tag recovery using Corps personnel and a service contract for predation rate estimates will be coordinated throughout the 2022 nesting season. At the estuary dredge material placement Islands (Rice, Miller, Pillar and other locations as warranted), the Corps will conduct non-lethal hazing, take up to 200 tern eggs, and monitor tern presence / absence, per commitments under a separate 2012 NMFS Biological Opinion. Monthly updates will be provided at FPOM (<http://pweb.crohms.org/tmt/documents/FPOM/2010/>) and reports will be provided, as required under the BiOp(s).

5. Double-crested Cormorant (DCCO) Management Plan: On East Sand Island, Phase 1 and Phase 2 of the Management Plan have been completed. In 2022, The Action Agencies may monitor peak colony size and may collect data to enable predation rate analysis on ESA listed juvenile salmon based on recovery of PIT tags if prioritized by SRWG and funding is available. As in 2021, pre-season control tags will be sewn by Corps personnel prior to the 2022 nesting season. The need for post-season PIT tag recovery using Corps personnel and a service contract for predation rate estimates will be coordinated throughout the 2022 nesting season. In the Columbia River Estuary, the Corps may also monitor dispersal, disposition (e.g., roosting, nesting, etc.) and colony size as needed per the 2020 BA Clarification Letter sent to the services April 1, 2020. On the estuary dredge material placement Islands (Rice, Miller, Pillar and other locations as warranted), the Corps will conduct non-lethal hazing, apply for permits to lethally take up to 250 DCCO eggs, and monitor DCCO presence / absence, per commitments

under a separate 2012 NMFS Biological Opinion. Monthly updates will be provided at FPOM (<http://pweb.crohms.org/tmt/documents/FPOM/2010/>) and reports are provided, as required under the BiOp(s).

6. Monitoring of Other Piscivorous Waterbird Colonies: For 2022, Bonneville Power Administration (Bonneville) will continue to assess the distribution and size of piscivorous waterbird colonies in the Columbia River basin above Bonneville Dam to the Mid-Columbia region, including estimating the colony-specific and cumulative, system-wide impacts of colonial waterbirds on salmonid smolt survival in the Columbia River basin; this includes assessing colony size and estimating per capita predation rates by Double-crested Cormorants nesting on the Astoria-Megler Bridge, the largest unmanaged colony in the Columbia River estuary. Overall, this effort is similar to monitoring activities conducted in 2021 and is part of the Columbia Basin Fish and Wildlife Program's continued commitments to monitor avian predation in the near term, as described in the Action Agencies' 2020 Biological Assessment.