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ABUNDANCE, DISTRIBUTION, AND DISSUASION EFFORTS OF CASPIAN TERNS (*Hydroprogne caspia*) and DOUBLE CRESTED CORMORANTS (*Phalacrocorax auritus*) ON RICE, MILLER, AND PILLAR ISLANDS OF THE COLUMBIA RIVER: 2021 SEASON SUMMARY REPORT

Fisheries Field Unit

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SUMMARY

This report documents compliance with Term and condition 1.k. of the 11 July 2012 Biological Opinion issued by NMFS for the Columbia River Navigation Channel Operations and Maintenance, Mouth of the Columbia River to Bonneville Dam, Oregon and Washington. Term and condition 1.k. requires the U.S. Army Corps of Engineers to monitor dredge material placement sites during the nesting season and discourage any avian predators that are found attempting to nest near the dredged material placement site consistent with the Migratory Bird Treaty Act. The upland placement sites of concern are located at Rice Island, Miller Sands spit and Pillar Rock Island. No Caspian Terns (*Hydroprogne caspia*) or Double Crested Cormorants (*Phalacrocorax auritus*) nested within these upland placement sites in 2021.

To satisfy the requirements of the Biological Opinion, the Fisheries Field Unit conducted monitoring and dissuasion efforts to document and dissuade piscivorous water bird species at these sites between 2 March and 9 August 2021. The objective of the work is to dissuade birds from the primary island of nesting interest, Rice Island, and from the nearby dredge material placements sites of Miller Sands spit and Pillar Rock Island. Here, we report that the dissuasion efforts were successful this season: one Caspian Tern egg was collected in accordance with the dissuasion and take efforts and all other nesting attempts were successfully dissuaded. The authorization and operation of the autonomic green laser (Mark II AVIX laser®, Bird Control Group, Wilsonville, OR. 97070) was utilized to deter CATE from roosting in the bowl of Rice Island. The abundance and distribution of Double-Crested Cormorants, another colonial piscivorous water bird species found to significantly impact salmonid stocks, was also monitored and was observed within the historic observation estimates. Low numbers were recorded daily at the water's edge of Rice and Pillar Islands. No cormorant nesting was documented on any of the dredge material placement islands.

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BACKGROUND

Long-term evaluation of Caspian Terns (CATE; *Hydroprogne caspia*, formerly *Sterna caspia*) and Double-Crested Cormorants (DCCO; *Phalacrocorax auritus*) in the Columbia River estuary has revealed that strong concentrations of the birds can lead to significant impacts to some endangered salmonid stocks (Evans et al. 2012, 2019, Adkins et al. 2014). In response to the increased presence and abundance of these bird species in the Columbia estuary, NOAA fisheries issued a biological opinion in 1999 requiring the U.S. Army Corps of Engineers (USACE) to dissuade colonial water birds (i.e., CATE and DCCO) from nesting on USACE managed and operated lands in the estuary. These avian associated requirements of the 1999 Biological Opinion (BiOp) have been reissued in every BiOp since and have led to complex management efforts to balance the impacts of avian predators on ESA listed salmonids while preserving the integrity of the avian populations in the Pacific Flyway (NOAA 1999, 2005, 2012).

Formed in 1984, the primary colony for CATE had historically been Rice Island, a state-owned island used by the Corps for placement of dredged material. In 2000 the CATE colony on Rice Island was successfully moved to East Sand Island (ESI) in the lower estuary near the mouth of the Columbia River. The dissuasion and hazing methods developed to move the colony from Rice Island to ESI have since been employed to continually deter re-colonization of Rice Island and the nearby deposition sites of Pillar Rock and Miller Sands Islands (NOAA 2005, Figure 1). Continued monitoring and dissuasion is required to ensure that CATE and DCCO do not attempt to recolonize these dredge material placement sites.

Specifically, term and condition 1.k. of the 11 July 2012 Biological Opinion issued by NMFS for the Columbia River Navigation Channel Operations and Maintenance, Mouth of the Columbia River to Bonneville Dam, Oregon and Washington requires the Corps to monitor upland [dredged material placement] sites during the nesting season and discourage any avian predators that are found nesting at an upland [dredged material placement] site, consistent with the Migratory Bird Treaty Act. To comply with this condition in 2021, the USACE Fisheries Field Unit (FFU) operationalized a monitoring and dissuasion effort on Rice, Miller, and Pillar Islands, funded by the Columbia and Lower Willamette Rivers federal navigation channel project. The objective of the effort was to deter CATE and DCCO interest in these sites and ensure no CATE or DCCO successfully reproduced on these islands. Using the methods developed by Real Time Research™ and with personal communications and support from

independent contractors, the OSU-USGS avian research cooperative unit, and various USACE personnel, the FFU deployed dissuasion materials on Rice Island and recorded CATE abundance and breeding activity on Rice, Miller, and Pillar Island. This report documents the monitoring and dissuasion efforts from our first day on Rice Island on 2 March 2021 into our monitoring season from 13 April 2021 through 9 August 2021.

METHODS

Surveys and Dissuasion

We deployed passive dissuasion materials (i.e., ropes, stakes, and flagging) on Rice Island during the 2021 season to deter birds when observers were not present. Active hazing walks and bird monitoring began on 13 April 2021. Miller and Pillar Islands were initially assessed (i.e., boat-based surveys) everyday Rice Island was monitored. However, low CATE presence justified a reduced monitoring frequency for these upstream islands (i.e., only on days when CATE were observed on Rice Island; Table 1).

All avian abundance data were collected by FFU biologists using 10 x 42 field glasses from boat and ground-based observation surveys. To enhance inter-count reliability, boat-based surveys of Miller and Pillar Islands were conducted using the same transects in the water and the same observation points established before seasons' start. If CATE were documented on Miller or Pillar Islands observations crews were trained to make landfall and sample the site where birds were present to look for nesting activity. All Rice Island observations were a combination of boat-based and on-island sampling.

Nest fill data were collected by enumerating the number of nests encountered on the sampling transects. All nests were filled with sand after enumeration to avoid double counting. To further avoid double counting, observers stayed within the designated boundaries of the transects and therein reduced the number of boot prints on the island that can change with wind to resemble a nest scrape. Biologists regularly walked or drove an ATV around the entire western rim on Rice in order to observe activity on the north side of Rice; there was none in 2021.

All data were recorded on handheld devices using the ArcGIS Collector Application® and is reported here as the mean estimates and associated standard deviation for all results of the 2021 data.

To enhance passive dissuasion efforts, we submitted a proposal for an autonomic green laser (Mark II AVIX laser®, Bird Control Group, Wilsonville, OR. 97070) to be situated over the west end berm on Rice Island to deter CATE. The autonomic solar-powered green laser is class 3B and was operated from 495mW to 499mW within the safety classification of <500mW. The laser deters birds by performing or emitting a set of movements/patterns continuously during a pre-programmed set time. Our proposal was granted by the US Fish and Wildlife Service on 18 May 2021 and the green laser was installed the following day, 19 May 2021. The intention of the autonomic green laser was to dissuade CATE from the historic roosting area on the west end of Rice Island (Figure 2) and minimize human presence on the island while reducing the use of plastic materials. This was effective as we deployed less than 0.5 acres of dissuasion materials (ropes, stakes and flagging) which was less than the 4.1 acres of passive dissuasion deployed in 2020. Prior to turning the laser on, we surveyed for Streaked Horned Lark (*Eremophila alpestris strigata*) on 1 June 2021, and none were observed near or in the west end berm. No Streaked Horned Lark have been observed attempting to nest or foraging in the bowl since dredge placement in 2018. The green laser was turned on in the evening of 2 June 2021 for a 12-hour period – 30 min before sundown to 30 minutes after sunup when boat-based traffic in the river was at its lowest. A USACE biologist stayed on the island on 2 June 2021 and monitored the laser during the time of operation to ensure compliance with requirements.

Figure 1. Aerial image of Rice, Miller, and Pillar Islands (left to right).

Figure 3. Aerial image of Rice Island. The black dot indicates the location of the green laser. The two blue dots south of the black dot represent documentation of one CATE egg and dissuasion material placement. The blue dot to the east of the black dot represents the last scrapes documented on the island on 7 June 2021.

Figure 4. USACE biologist installing the autonomic green laser on Rice Island, 19 May 2021.

RESULTS

Abundance and Distribution:

A total of 24 days of monitoring and dissuasion were conducted this season on Rice Island. On 13 of these days, sampling was completed on Miller and Pillar Islands. CATE were observed for three days on Miller Island and two days on Pillar Rock Island (Table 1). Rice Island was surveyed every day of the 24 sample days. The average daily abundance estimate of CATE on Rice Island was 203.8 ± S.D. 155 birds and an average scrape estimate of 85.3 ± S.D. 112.6 scrapes per day (Table 1). One CATE egg was observed on Rice Island on 12 May and was collected pursuant to the dissuasion and egg take permit granted by the US Fish and Wildlife Service. In response to a one-day high count of 535 CATE and 114 scrapes on 27 April .5 acres of dissuasion materials (i.e., ropes, stakes, and flagging) were deployed (Table 1, Figure 3).

Our results from the 12-hour operation of the autonomic green laser are inconclusive, therefore in 2022 we will propose to roll out the use of the laser earlier. On 1 June 2021 before the laser was turning on, we report 71 CATE scrapes 120 meters to the west of the laser (Supplemental Table 1). To reiterate while it was turned on and operating, we had a biologist on the island the duration of the time. We report that when the laser came near the CATE, they moved away, and flew around assessing the green laser which effectively displaced them from the west end berm area. After the 12-hour operation of the laser the biologist reported that the CATE had moved inland due east of the laser (Figure 3). The biologist recorded 87 scrapes 450 meters behind the laser upland on 2 June 2021. (Supplemental Table 1). We actively dissuaded the inland CATE and completed nest fills being cognizant regarding nearby Streaked Horned Lark nesting locations. We successfully deterred CATE from the center of the island without disturbing Streaked Horned Larks and report CATE abundance dropped to zero on the island and no more nesting attempts were observed on Rice Island after 7 June 2021. Subsequently, CATE numbers remained low on Miller and Pillar indicating CATE interest in the observation area of the three islands had diminished come June. In adhering to our US Fish and Wildlife permit requirements, the green laser did not cross into the nearby Streaked Horned Lark habitat. Gulls moved away from the sweeping laser beam and no Streaked Horned Lark were observed in the west end berm area of the island.

Biologists conducted point counts for DCCO from Rice Island to Pillar Island. 17 days of sampling occurred for the East Rice Pilings and Rice Pilings, and we report that by 15 June 2021 no DCCO were seen on the North Pillar Piles (Table 3). Of the days observed there were an

average of 134.6 ± S.D. 146.8 DCCO on the northern Pilings of Pillar and 613.1 ± S.D. 507.2 DCCO on the eastern pilings next to Rice (Table 2, Table 3). No DCCO were seen in the upland portions of any of these islands. All DCCO observations were below the high-water mark.

For contrast to previous reports of this work on Rice Island, the raw observation data are listed in Supplementary Table 1.

Table 1. Abundance monitoring data for individual Caspian Tern abundance on Rice, Miller, and Pillar Islands in the Columbia River Estuary between 2 March and 9 August 2021.

		CATE ABUNDANCE		
Site	*n* days monitored	$\bar{x}$ ± S.D.	Range	n days = 0
Rice Island	24	203.8 ± 155	0 - 535	6
Miller Island	13	44.6 ± 96.0	0 - 300	10
Pillar Rocks	13	13.2 ± 40.3	0 - 140	10

Table 2. Abundance monitoring data for Caspian Tern nest scrapes on Rice, Miller, and Pillar Islands in the Columbia River Estuary between 2 March and 9 August 2021. Note that Miller and Pillar Islands are not monitored for scrapes unless Caspian Terns are observed in the upland areas.

		CATE SCRAPE		
Site	*n* days monitored	$\bar{x}$ ± S.D.	Range	n days = 0
Rice Island	24	85.3 ± 112.6	0 - 390	6
Miller Island	13	0	N/A	N/A
Pillar Rocks	13	0	N/A	N/A

DISCUSSION

The management objective of CATE and DCCO dissuasion from Rice, Miller, and Pillar Islands was successful this year (nesting efforts were reduced and none were successful). CATE abundance and nesting attempts on Rice Island were suppressed by dissuasion efforts and the installation of the autonomic laser. We report that the autonomic laser did deter CATE from

roosting in the western bowl of Rice Island (Figure 2). The distribution of CATE on Rice Island was different in 2020 when birds preferred the center of the dredge material placement site. In 2021, CATE gathered on the southwestern rim of the island. Moreover, no DCCO were observed above the shoreline in the study area.

CATE abundance and nesting attempts declined on Rice Island in 2021 after the installation of the autonomic green laser and persistent adaptive management. The three-year trend would suggest that CATE interest in nesting on Rice Island is still present. The persistent early season interest in Rice Island in 2021 suggests that CATE re-establishment of the colony may occur if dissuasion and monitoring efforts are not consistently applied. Historical records show 808 total scrapes in 2019, 622 total scrapes in 2020 and 1280 total scrapes in 2021 (Tidwell 2019; Tidwell 2020). Therefore in 2022, the USACE plans to submit approval for use of the AVIX autonomic green laser again to the US Fish and Wildlife Service. It is too soon to know if the autonomic green laser will have a continual impact on the determent of attempted CATE nesting on Rice Island, but we report that the use of the autonomic green laser in 2021 did not have negative implications to Rice Island wildlife. The results from this season are encouraging but need further evaluation and this will be possible by operating the autonomic green laser earlier in 2022 pending authorization.

For DCCO, the objective of the USACE was to ensure none attempted to nest within the dredged material placement sites on Rice, Miller, or Pillar Islands. The USACE met the management objectives for DCCO in the Rice, Miller, Pillar management area because no DCCO or DCCO nests were observed within the placement sites (Table 3-4). All observations of DCCO near these islands were made outside of dredge material placement sites. As such, no DCCO nests were observed on placements sites. The majority of the DCCO observed near the three islands of interest were on the eastern pilings next to Rice Island and no nesting attempts were documented. DCCO abundance and distribution appear to be similar to what has been discussed previously with the Avian Management Team.

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Table 3. Double Crested Cormorant point counts on East Rice Pilings.

Date	Point Count
22-Apr	8
27-Apr	130
29-Apr	355
4-May	310
12-May	840
19-May	680
25-May	587
1-Jun	310
7-Jun	120
9-Jun	50
13-Jul	0
15-Jun	142
16-Jun	1220
22-Jun	1167
29-Jun	145
13-Jul	645
9-Aug	900

Table 4. Double Crested Cormorant point counts on N. Pillar Piles.

Date	Point Count
27-Apr	27
29-Apr	90
4-May	350
12-May	278
19-May	318
25-May	13
1-Jun	0
7-Jun	1
15-Jun	0
22-Jun	0

Supplementary Table 1. Raw data for Rice Island Caspian Tern (CATE) monitoring during the 2021 season. Dates not presented were not sampled.

Date 2021	# CATE Eggs	# CATE Scrapes	# CATE
2-Mar	-	-	0
22-Apr	-	9	310
27-Apr	-	114	535
29-Apr	-	120	260
4-May	-	135	63
12-May	1	260	220
19-May	-	-	0
20-May	0	0	0
25-May	0	390	183
1-Jun	-	71	-
2-Jun	-	87	0
7-Jun	-	94	133
15-Jun	-	0	20
22-Jun	-	0	110
29-Jun	-	0	0
13-Jul	-	0	0
9-Aug	0	0	-