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December, 2020

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: 2020 SEASON SUMMARY REPORT

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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 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 Act. The upland placement sites of concern are located at Rice Island, Miller Sands spit and Pillar Rock Island. No Caspian Terns or Double Crested Cormorants nested within these upland placement sites in 2020.

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 23 April and 5 August, 2020. The objective of the work is to dissuade birds from the primary island of nesting interest, Rice Island. Here, we report that the dissuasion efforts were successful this season, and no Caspian Tern (*Hydroprogne caspia*) eggs were observed on Rice Island this season. The abundance of terns and the number of tern nest scrapes was lower than the previous year. The daily maximum number of terns observed this year was 200. The distribution of the terns was slightly different on Rice Island this season, likely as a result of the extensive habitat manipulation that occurred due to dredge material placement in 2019. The abundance and distribution of Double-Crested Cormorants (*Phalacrocorax auritus*), 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 Act. To comply with this condition in 2020, the USACE Fisheries Field Unit (FFU) operationalized a monitoring and dissuasion effort on Rice, Miller, and Pillar Islands, funded by the Columbia & Lower Willamette Rivers federal navigation channel project. The objective of the effort was to deter CATE and DCCO interest in these sites and insure 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 an extensive array of 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 23 April, through 5 August, 2020.

METHODS

Surveys and Dissuasion

Installation of dissuasion materials began on 31 March, 2020 and resulted in an array of 4.1 acres of ropes and flagging outlined using red polygons in Figure 2. Materials and methods of flagging and passive dissuasion are identical to the previously employed contract work on the islands (Harper and Collis 2018). This included metal T-posts supporting twisted polypropylene rope that had yellow "Caution" tape woven through it in three foot segments to create a visual distraction and harassment array of material. The flagging was placed over the highest portion of the newly placed dredge material. The upper berm of Rice Island has historically been a preferred nesting location but has re-vegetated and was deemed to no longer be of interest for CATE (Figure 2).

Active hazing walks and bird monitoring began on 23 April and consisted of sporadic monitoring when travel was approved under the COVID-19 guidelines. Monitoring was conducted within one hour of sunrise every monitoring day. Some afternoon monitoring efforts were made to assess bird behavior in the late afternoon and evening hours. Miller and Pillar Islands were assessed initially everyday Rice Island was monitored. However, low CATE presence supported a reduced design of monitoring only when CATE were observed on Rice Island (Table 1).

All 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 season and marked on the boats GPS navigation system. 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. Rice Island observations were a combination of boat-based and on-the-ground sampling. Again,

systematic survey transects of the island were established prior to the arrival of the CATE and were sampled each monitoring day for replication and consistency purposes.

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.

All data were recorded on handheld devices using the ArcGIS Collector Application®. This application allows GPS points and polygons to be geospatially recorded with associated data of bird abundance and nest scrape distribution (Figure 2).

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

Figure 2. View of dissuasion materials placed on Rice Island. A total of 4.1 acres of dissuasion were deployed (red polygons). Grey polygons are areas of documented CATE interest but did not receive dissuasion flagging.

RESULTS

Abundance and Distribution:

A total of 20 days of monitoring and dissuasion were conducted this season on Rice Island. On 12 of these days, sampling was completed on Miller and Pillar Islands. This is a much lower resolution of monitoring than previous years (for comparison in 2019, Rice Island was monitored on 47 days and Miller and Pillar were monitored on 28 days). This reduction in monitoring days was a direct result of COVID-19 induced travel restrictions. Travel and monitoring were conducted when possible. Despite the lower resolution of monitoring, the Corps remained in compliance with Term and condition 1.k. of the 11 July 2012 Biological Opinion and no Caspian Terns or Double Crested Cormorants nested within these upland placement sites in 2020.

The average daily abundance estimate of CATE on Rice Island was 49.6 ± 55 birds (Table 1). The distribution of CATE on Rice Island were like previous years wherein, birds preferred the center of the dredge material placement site. In response to a high count of 200 CATE at this location on 3 June, more dissuasion was installed which successfully kept birds

deterred from using the area (Figure 2). The most scrape activity was observed on the south-western rim and received two additional arrays of dissuasion to deter the activity at the site.

No CATE eggs were observed on Rice Island this season, but a daily average of 31.1 ± 55.0 scrapes were recorded (Table 2). Nest scrapes were recorded in the early hours of the morning and in locations that were not heavily dissuaded. This indicated that CATE were using the island as a roost in the evening or early morning period, however we do not have enough data to investigate the true diurnal use of the site. For contrast to previous reports of this work on Rice Island, the raw observation data are listed in Supplementary Table 1.

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 abundance and distribution monitoring of DCCO on Rice, Miller, and Pillar yielded generally low numbers (n < 200) on Miller and Rice Islands. There was an increase of DCCO on the Eastern wrack line and nearby pile dikes of Rice Island on 14 May (i.e. ≤ 1500 DCCO). and all observation of DCCO made in the of islands. The majority of the DCCO observed near the three island of interest were on the northern pilings of Pillar Island and the eastern pilings off of Rice Island. At these sites we documented an average of 154 ± S.D. 115.9 DCCO of the days observed.

Table 1. Abundance monitoring data for Caspian Tern abundance on Rice, Miller, and Pillar Islands in the Columbia River Estuary between 23 April and 5 August, 2020.

		CATE ABUNDANCE		
Site	*n* days monitored	$\bar{x}$ ± S.D.	Range	*n* days = 0
Rice Island	20	49.6 ± 55.0	0 - 200	3
Miller Island	12	2.9 ± 7.0	0 - 21	10
Pillar Rocks	12	6.0 ± 9.8	0 - 28	7

Table 2. Abundance monitoring data for Caspian Tern nest scrapes on Rice, Miller, and Pillar Islands in the Columbia River Estuary between 23 April and 5 August, 2020. Note that Millar 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	20	31.1 ± 55.0	0 - 259	9
Miller Island	12	0	N/A	N/A
Pillar Rocks	12	0	N/A	N/A

DISCUSSION

The management objective of CATE and DCCO dissuasion from Rice, Miller, and Pillar Islands was successful this year. Abundance and nesting attempts on Rice Island were suppressed by the active and passive dissuasion effort and no CATE eggs were found. Moreover, no DCCO were observed above the shoreline in the study area.

Similar to last year, CATE abundance and nesting attempts were far below the numbers reported in 2018 (Harper and Collis, 2018). The three-year trend would suggest that CATE interest in nesting on Rice Island is diminishing. However, given the highly reduced monitoring design due to COVID-19 induced travel restrictions there were many days not sampled. Therein, this years data do not allow direct contrast with previous years data but are suggestive of a continual decline in CATE interest.

The objective of the USACE was to ensure no DCCO attempted to nest within the dredged material placement sites on Rice, Miller, or Pillar Islands. This objective was accomplished and no DCCO were seen in the upland portions of any of these islands. All DCCO observations were below the high water mark. DCCO abundance and distribution appear to be similar to what has been discussed previously with the Avian Management Team. However, reduced monitoring days of DCCO abundance in these location makes contrast to previous years difficult at this time. That said, personal communication with researchers from other studies suggest that the abundance and distribution of DCCO above Rice Island on the pylons and navigation markers is similar to the last several years.

The placement of new dredge material in the bowl at Rice Island created a challenge to this year's efforts due to the increased viable habitat created. It was fortunate the CATE abundance and persistence at the sight was low. In the coming year an automated dissuasion system involving a laser will be tested to determine if such devices are plausible and effective management tools.

ACKNOWLEDGEMENTS

We recognize the support of the Real Time Research Crew (Ken Collis, Allen Evens, and James Tennyson) and Oregon State Universities, Cooperative Research Unit (Dan Roby and Tim Lawes) to cross training and get the USACE research crew at the FFU briefed on monitoring techniques. We also recognize the diligent monitoring efforts of FFU research staff that provided to this data set. Thank you to: Rebecca Cates, Darren Gallion, Karrie Gibbons, Deven McCanna, Nathan McClain, Steven Sachs, Bjorn Van der Leeuw, and Robert Wertheimer.

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Supplementary Table 1. Raw data for Rice Island Caspian Tern monitoring during the 2020 season. Dates not presented were not sampled.

RICE Island	N Bowl	shoreline	N Scrapes	Total CATE
23-Apr	103	56	259	159
28-Apr	0	60	1	60
5-May	0	37	0	37
7-May	0	0	0	0
14-May	22	0	0	22
17-May	22	50	44	72
19-May	0	58	38	58
21-May	67	0	0	67
23-May	0	18	35	18
26-May	0	7	35	7
28-May	0	55	0	55
1-Jun	130	0	84	130
3-Jun	200	0	75	200
5-Jun	0	0	27	0
8-Jun	0	33	9	33
11-Jun	5	10	15	15
22-Jun	0	0	0	0
9-Jul	0	12	0	12
29-Jul	0	22	0	22
5-Aug	1	23	0	24