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DISTRIBUTION AND DISSUASION EFFORTS OF CASPIAN TERNS (*Hydroprogne caspia*) ON EAST SAND ISLAND OF THE COLUMBIA RIVER: 2019 SEASON SUMMARY REPORT

Fisheries Field Unit

U.S. Army Corps of Engineers, Bonneville Lock and Dam, Cascade Locks, OR 97014

Correspondence: Kyle.S.Tidwell@usace.army.mil

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SUMMARY

To satisfy the requirements of several Biological Opinions that direct the U.S. Army Corps of Engineers to monitor the abundance and distribution of colonial piscivorous water birds on East Sand Island in the Columbia River Estuary, the Fisheries Field Unit conducted monitoring and dissuasion efforts of Caspian Terns (*Hydroprogne caspia*) between 1 May and 30 July, 2019. The objective of the work was to establish a one acre colony for tern nesting, dissuade birds from nesting outside this colony, and enumerate the nesting attempts outside the colony. Here, we report that the dissuasion efforts were largely successful this season: The one acre colony was moved and established, Caspian Terns were enumerated on and off of the colony, nesting attempts were largely dissuaded in off-colony locations, and only one Caspian Tern chick survived hatching. The survival of that chick to fledging was not confirmed.

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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 high 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 (BiOp) 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 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).

Forming in 1984, the primary colony location for CATE was Rice Island (Figure 1), a USACE dredge material deposition site owned by the State of Oregon and Washington. The 1999 BiOp called for the USACE to relocate the Rice Island colony to the downstream site of East Sand Island (ESI) to minimize salmon consumption by increasing the level of estuarine and marine fishes in the CATE diet (Figure 1). East Sand Island is a USACE administered site that has historically been used for dredge material deposition. In 2000, the CATE colony on Rice Island was successfully moved to East Sand Island and dietary monitoring showed that the intended dietary shift had occurred.

Following this action, an Environmental Impact Statement (EIS) was developed in 2005 as part of a lawsuit settlement agreement on tern management in the Columbia River estuary. The EIS evaluated a range of alternatives to reduce the Caspian tern population in the Columbia River estuary; the preferred alternative selected as the Caspian Tern Management Plan involved reducing the tern population by managing habitat on East Sand Island and redistributing a portion of the tern colony to created or enhanced sites outside of the Columbia River basin. The Action Agencies involved in developing the EIS were the United States Fish and Wildlife Service (USFWS), the USACE, and NOAA Fisheries; USFWS was the lead agency for the EIS and USACE and NOAA Fisheries were cooperating agencies. As a guidance document, the Management Plan establishes criteria for desired CATE colony size and breeding bird abundance in the Columbia River estuary to minimize impacts to salmon while maintaining the integrity of the CATE breeding population across the Pacific Flyway.

Implementation of the 2005 EIS Management Plan required Records of Decision (ROD) by the USFWS and USACE, wherein the Action Agencies spelled out what they intended to do to achieve the goals and objectives of the Management Plan. These RODs are now referenced, in conjunction with the 2005 EIS, as the guiding documents of the CATE Management Plan, as well as subsequent decisions evaluated in National Environmental Policy Act (NEPA) Environmental Assessments which supplement and tier to the 2005 EIS. Chief among the CATE Management Plan's and subsequent supporting decision documents objectives are: reduce the ESI breeding colony site to a minimum of one acre of suitable habitat which would theoretically reduce the number of breeding pairs of CATE to a minimum of 3,125 pairs, and simultaneously mitigate for the loss of breeding sites by providing alternative inland avian breeding sites.

Concomitant to fulfilling these actions, the CATE management plan directs that: 1) an Adaptive Management Plan be developed for CATE actions beyond those directed by the EIS CATE Management Plan, and 2) once habitat objectives (the prepared one acre colony) had been met on ESI, the responsibility for the work would transition from a short term monitoring and research mission, to a long term Operations and Maintenance based monitoring mission the Phase One Research Division of the USACE to Phase Two of the Management Plan wherein the USACE Operations Division would continue to conduct long term monitoring. Once initiated, long-term management activities would operate to ensure: 1) CATE are not breeding outside of the one acre colony at East Sand Island, and 2) provide colony estimates every three years to the USFWS for population monitoring metrics.

In 2018, the short term monitoring objectives of the post construction habitat requirements were satisfied and the one acre colony was established on ESI. Management of the East Sand Island CATE colony was transitioned to the Operations Division of the USACE Northwest Portland District. In January of 2019, the Fisheries Field Unit of the USACE began implementing the long term monitoring mission of CATE on ESI. Below we detail the methods and results of the 2019 monitoring season.

METHODS

The one acre CATE colony used by CATE in 2018 required modification due to tidal erosion of the south western aspect of the colony. Heavy machinery was deployed in March 2019 to expand the colony to the east. The colony boundaries were established with T posts and silt fence material. Passive dissuasion materials (T posts, ropes, and flagging) were used to dissuade CATE from near-colony areas and locations historically documented to be areas of nesting

interest. The initial acreage of dissuasion materials equated to 1.78 acres. As the season progressed and CATE showed interest in areas outside the colony that were not originally dissuaded, more dissuasion material was deployed. At these locations an additional 0.33 acres of dissuasion materials were deployed (Figure 2).

The USACE prepared and maintained the one acre colony and conducted off-colony dissuasion and hazing in 2019. Field crews from Oregon State University conducted the monitoring of the one acre CATE colony. Reports from the one acre colony are forthcoming.

Sampling on East Sand Island involved boat based surveys of off-colony CATE abundance counts and nesting attempts. All CATE on the ground and outside the one acre colony were viewed with field glasses, enumerated, and recorded from the boat. Biologists then landed on the island and worked transects in a south-westerly direction to enumerate nesting attempts (i.e. scrapes) outside of the one acre colony. Historically, most scrapes been found near the wrack line of the tidal waters, and the same pattern was observed this year. When a CATE scrape was identified, it was assessed for the presence of an egg. If no egg was present, the scrape was recorded and filled with sand to dissuade future nesting attempts. If an egg was observed, biologists would record the nest from a distance greater than or equal to 15 feet, and continue with the sampling transect, leaving the nest undisturbed. Scrape enumeration walks were conducted in a uni-directional pattern as often as possible to minimize double counting of scrapes and eggs. However, high tides that occluded the path of biologists on the south beach and increased detection by CATE on the colony required some sampling walks be conducted in a step-wise fashion with observers working from east to west and another from west to east. When this was necessary observers would coordinate and attempt to have no overlap of coverage.

All data was collected and recorded in the ARC GIS Collector Application©. This system allowed real time analysis and processing of data and provided visual-spatial details for every datum.

RESULTS

Active dissuasion began on 1 May, 2019 and concluded on 30 July, 2019. A total of 49 days of sampling and dissuasion were conducted. An average of 1049.6 ± S.D. 459.4 individual CATE were recorded per sample day outside the one acre colony (Table 1).

The first CATE scrapes were documented on the south beach of ESI on 7 May (n = 102) (Table 2). The south beach and east beach in aggregate, averaged 343.5 ± S.D. 224.6 CATE scrapes per sample day (Table 1).

The first CATE egg was recorded outside the main colony on 8 May (n = 3). The south beach and east beach, in aggregate, averaged 9.3 ± S.D. 14.6 CATE eggs per sample day (Table 1).

For contrast to historical data, we include the raw data in Table 2.

Two CATE chicks from the same nest were documented hatching outside of the one acre colony. The nest was within the Gull (*Larus spp.*) colony immediately to the southeast of the one acre colony (Figure 3). The first of these CATE chicks hatched on 11 July, 2019. The nest was observed from a distance greater than 15 feet during every observation following and it was noted that one of the two chicks died shortly after hatching. The other chick had not fledged prior to the last sampling period on 30 July, 2019. As such, the final state of the chick is unknown.

DISCUSSION

The USACE successfully met the objectives established by the guiding documents. A one acre CATE breeding colony was established, CATE abundance, scrape, and egg estimates outside of the colony were monitored and recorded, and nesting attempts outside of the one acre colony were dissuaded.

The presence of predators (i.e. Gulls [*Larus spp.*], River Otters [*Lontra Canadensis*], Bald Eagle [*Haliaeetus leucocephalus*]) and daily hazing walks by USACE biologists functioned synergistically to deter the majority of nesting attempts from coming to fruition with hatched chicks. Observations that CATE egg inter-visit survival was low was confirmed by a geo-spatial analysis that assessed where points of egg deposition were, relative to the previous sample day. These anecdotal observations and rudimentary analyses suggest that the vast majority of eggs deposited outside of the one acre colony were depredated or destroyed naturally before the USACE biologists returned to sample the next visit.

As this is the first year of the long term monitoring efforts of the CATE Management Plan on ESI, we make note that although the frequency and duration of hazing and dissuasion efforts were reduced from previous years, the end result was a satisfactory mission with all required metrics being accomplished.

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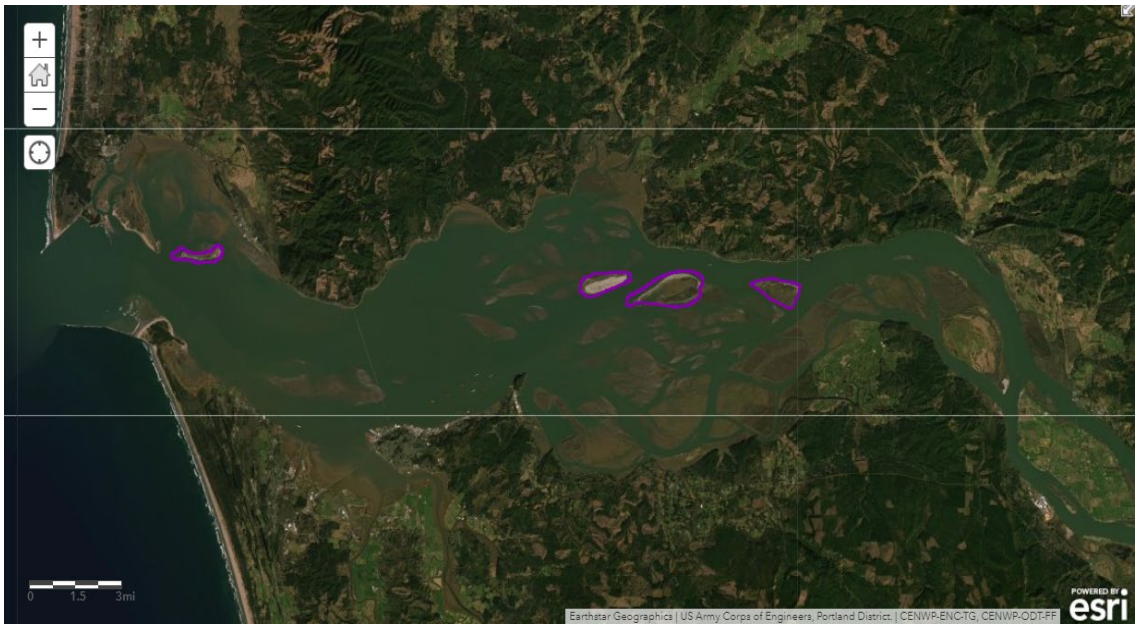

Figure 1. Tern Islands of the Lower Columbia River Estuary left to right: East Sand Island, Rice Island, Miller Sands, and Pillar Island.

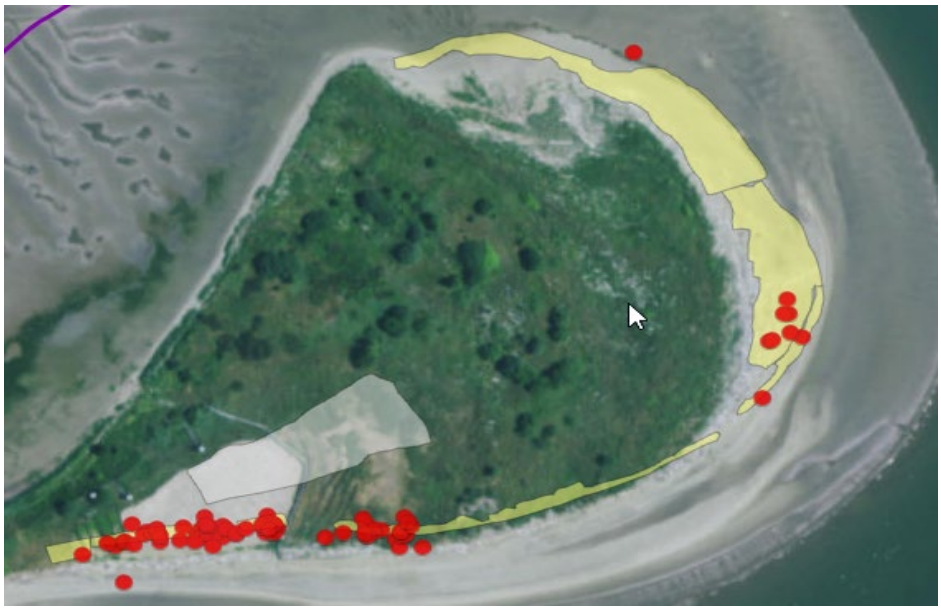

Figure 2. Aerial image of the eastern Portion of East Sand Island. Yellow polygons represent passive dissuasion materials, the grey polygon represents the current 1 acre colony, and red dots indicate where CATE eggs have been recorded. Note: Image of terrain is > two years old. Historic colony is seen in the background to the west of the new colony.

Figure 3. Aerial image of East Sand Island. Teal square marks the location of the nest where two chicks hatched. Yellow polygons represent passive dissuasion materials, the grey polygon represents the current 1 acre colony, and red dots indicate where CATE eggs have been recorded.

Variable	n days monitored	$\bar{x} \pm$ S.D.	Median	Range	n days $= 0$
CATE Abundance	49	1049.6 ± 459.4	1020	0 - 2850	0
CATE Scrape	49	343.5± 224.6	315.5	0 - 859	3
CATE Egg	49	9.3 ± 14.6	4	0 - 75	13

Table 1. Monitoring data for Caspian Tern abundance and reproductive activity outside the one acre colony of East Sand Island in the Columbia River Estuary between 1 May and 30 July, 2019.

Date	# CATE Eggs	# CATE Scrapes	# CATE Outside Colony
30-Jul	1	93	650
24-Jul	0	46	290
18-Jul	4	Missing	350
16-Jul	4	Missing	429
15-Jul	4	490	650
11-Jul	0	254	780
9-Jul	0	241	575
8-Jul	12	314	1800
1-Jul	0	192	930
30-Jun	2	859	1600
29-Jun	2	681	530
28-Jun	8	435	843
27-Jun	7	260	847
26-Jun	7	317	1000
25-Jun	0	317	1450

24-Jun	1	203	1050
23-Jun	23	291	740
22-Jun	34	388	745
21-Jun	75	471	1120
20-Jun	26	536	1175
19-Jun	8	557	1200
17-Jun	8	637	1085
15-Jun	3	490	1490
14-Jun	30	330	1375
12-Jun	4	575	790
11-Jun	26	297	945
9-Jun	8	754	1357
4-Jun	8	579	
3-Jun	24	651	1600
2-Jun	43	614	1700
30-May	18	337	1100
28-May	5	304	885
25-May	0	171	1115
19-May	0	27	665
18-May	0	0	800
15-May	6	365	1650
13-May	5	598	1130
11-May	0	263	1070
9-May	0	210	1020
8-May	3	179	1070
7-May	0	102	1040
4-May	0	0	895
2-May	0	0	750
1-May	0	0	2850

Table 2. Raw monitoring data for Caspian Tern abundance and reproductive activity on East Sand Island in the Columbia River Estuary between 1 May and 30 July, 2019