

AVIAN PREDATION ON THE MID-COLUMBIA RIVER: COLONY SIZES AND TRENDS FOR CASPIAN TERNS, DOUBLE-CRESTED CORMORANTS, AND OTHER PISCIVOROUS WATERBIRDS NESTING ON THE COLUMBIA PLATEAU

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ABSTRACT

Caspian terns (*Hydroprogne caspia*) and double-crested cormorants (*Phalacrocorax auritus*) are responsible for the vast majority of losses of salmonid smolts (*Oncorhynchus* spp.) to avian predators along the mid-Columbia River. There were two breeding colonies of Caspian terns on the mid-Columbia River in 2008: Crescent Island in the McNary pool and Rock Island in the John Day pool. The Crescent Island Caspian tern colony consisted of 388 breeding pairs in 2008, 9% more than in 2007, and still the largest Caspian tern colony on the Columbia Plateau and the 4th largest colony in the Pacific Northwest. Nesting success at the Crescent Island tern colony was only 0.28 young fledged per breeding pair, down about 60% from 2007, and the lowest nesting success recorded for this colony. At Crescent Island, salmonid smolts represented 68% of tern diets in 2008, similar to diet composition during 2000-2007. Based on bioenergetics calculations, Crescent Island Caspian terns consumed about 330,000 juvenile salmonids in 2008 (95% c.i. = 230,000 – 440,000), the lowest annual estimate since 2000. Total annual smolt consumption by this tern colony is inversely related to May-June river flows ($r^2 = 0.43$, $P = 0.05$).

The Rock Island Caspian tern colony consisted of about 100 breeding pairs in 2008, up from about 40 pairs in 2007. The Rock Island tern colony nearly failed in 2008, as only 3 young were fledged. This is the third consecutive that the Rock Island Caspian tern colony has failed or nearly failed. Although no diet data were collected at the Rock Island tern colony, numbers of smolt PIT tags recovered on the colony indicated that salmonids were a significant proportion of the diet.

Three other Caspian tern colonies were monitored on the Columbia Plateau in 2008: about 290 pairs nested on Goose Island in Potholes Reservoir, about 25 pairs nested on Twining Island in Banks Lake, and about 10 pairs nested on Harper Island in Sprague Lake. Diet data for these colonies in 2008 were limited to smolt PIT tag recoveries on Goose and Twining islands, which indicated that at least some terns were foraging on salmonid smolts, particularly steelhead from the mid- and upper Columbia River. Together with the colonies at Crescent Island and Rock Island on the Columbia River, a total of ca. 820 pairs of Caspian terns nested on the Columbia Plateau in 2008, about a 20% decline since 2001. Interestingly, 18 of the 30 banded Caspian terns that were re-sighted on the new tern island on Crump Lake, Warner Valley, Oregon, were banded at Crescent Island, suggesting that the new island is attracting terns that formerly nested at colonies on the Columbia Plateau over 450 km to the north.

In 2008, the only double-crested cormorant colony on the mid-Columbia River was on Foundation Island in McNary pool, and consisted of > 357 pairs nesting in trees. The largest cormorant colony on the Columbia Plateau, however, was on Potholes Reservoir, where about 1,000 pairs nested in trees at the north end of the reservoir. Sizes of the Foundation Island and North Potholes cormorant colonies have not changed appreciably in the last three years, indicating that the overall cormorant breeding population in the region has been nearly stable in the short term. Based on limited diet data for Foundation Island cormorants in 2008, the proportion of salmonids in the diet was higher than in 2007 and varied widely across the nesting season; in early and mid-May salmonids represented > 50% of the diet, while in June salmonids were nearly absent from the diet. Smolt PIT tag recoveries from 2007 and 2008 suggest that the impact of Foundation Island cormorants on salmonid smolt survival is now comparable to that of Caspian terns nesting at Crescent Island. A new double-crested cormorant colony was discovered on Harper Island in Sprague Lake, where about 35 pairs nested in 2008.

Stomach contents of 38 over-wintering double-crested cormorants collected in 2007 at dams on the lower Snake River indicated that salmonids comprised 11.8% of the diet; only 1 of 4 salmonids found in stomachs was from a listed run of fall Chinook. Surveys in late 2008 indicated that about 375 cormorants over-winter along the lower Snake River, one-third of which are associated with the four lower Snake River dams.

The American white pelican colony on Badger Island in McNary pool is the only known breeding colony for the species in the State of Washington. In 2008, counts of adult pelicans on the island during late incubation averaged 1,350, the highest count so far recorded at this colony; the breeding colony is now likely to consist of > 1,000 nesting pairs. Due to the special conservation status afforded this colony by the State of Washington, island access is restricted and estimates of salmonids consumed by pelicans nesting at this colony are lacking. However, recoveries of smolt PIT tags on-colony after the nesting season indicate that smolt consumption is increasing, but still considerably less than that of the nearby Caspian tern and double-crested cormorant colonies.

Tens of thousands of pairs of California and ring-billed gulls nest on islands on or near the mid-Columbia River. While the gulls at these colonies generally consume few fish and even fewer juvenile salmonids, recent increases in the numbers of smolt PIT tags recovered on the gull colony at Miller Rocks in The Dalles pool have raised new concerns about the impact of gull predation on survival of salmonid smolts in the mid-Columbia River. The increase in consumption of PIT-tagged smolts by Miller Rocks gulls apparently reflects a change in foraging intensity at nearby mainstem dams, rather than an increase in the size of the Miller Rocks gull colony. The magnitude of predation on salmonid smolts by Miller Rocks gulls appears to be unique to this gull colony, which is situated midway between The Dalles and John Day dams.