

FLEDGING CHRONOLOGY OF CRAVERI'S MURRELETS *SYNTHLIBORAMPHUS CRAVERI* ON ISLA ALCATRAZ, GULF OF CALIFORNIA, MEXICO

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Received 16 June 2011, accepted 22 September 2011

Craveri's Murrelet *Synthliboramphus craveri* is a small, secretive alcid. It is listed as vulnerable in the IUCN's Red List (IUCN 2010) and endangered, the most severe listing, under Mexico's NOM-059-SEMARNAT-2010 (Secretaría de medio ambiente y recursos naturales [SEMARNAT] 2010). Although there is a population estimate of 22 000 (Pitman *et al.* 1995), few nesting locations have been identified. Nests of this species have been reported on several islands in the northern and southwestern Gulf of California and on a few islands off the Pacific coast of Baja California (Streets 1877, Brown 1909, Bancroft 1927, DeWeese & Anderson 1976, Breese *et al.* 1993). Nests in the Eastern Midriff Islands are more rarely reported (DeWeese & Anderson 1976, Breese *et al.* 1993).

Nest sites are located in cavities and cracks as well as under boulders near the high tide line. Nesting occurs between February and May. Craveri's Murrelets vocalize primarily when nesting or when on the water with newly fledged chicks. They are known to vocalize when moving between their nests and the sea while switching shared incubating duties (DeWeese & Anderson 1976). This exchange is only performed in darkness (DeWeese & Anderson 1976), possibly to avoid predation (Breese *et al.* 1993). The only record of incubation time (Brown 1909) is 22 d, and fledging behavior of this species has never been documented. In the only study quantifying fledging age, Breese *et al.* (1993) recorded chicks fledging within 31–38 h after hatching. The closely related and better studied Xantus's Murrelet *Synthliboramphus hypoleucus* appears to have similar biology, behavior and habitat requirements (Carter *et al.* 2005, Karnovsky *et al.* 2005). Xantus's Murrelets chicks fledge

between 1–5 d (average 2 d) (Murray *et al.* 1983, Carter *et al.* 2005) and vocalize intensively as both adults lead chicks from their nest into the water (Murray *et al.* 1983).

We found active murrelet nests on Isla Alcatraz (also known as Isla Tassne) (28°49'N, 111°55'W), a 144 ha island in the Eastern Midriff Islands region of the Gulf of California, Sonora, Mexico (Felger 1966). Nests were found by two observers carefully searching all caves, crevices, fallen boulder piles and vegetation on the rocky southwest section of the island from the high-tide line to <25 m inland. To record fledging chronology, nests containing eggs were monitored every other day until one egg hatched. One such nest was then checked daily until fledging occurred. Monitoring was quiet and rapid to minimize disturbance. The fledging was observed at night from a distance of roughly 5 m from the nest.

Isla Alcatraz is 1.4 km from the town of Kino Bay in Sonora, Mexico. It is characterized by sparse halophytic vegetation and consists of a 130 m ridgeline over a flat alluvial plane (Felger 1966, Pfister *et al.* 2006) The volcanic andosite cliffs are irregular, containing fault-lines, caves and cavities. The island is protected by the Mexican Commission for Natural Protected Areas, having been declared an Area of Protection for Flora and Fauna in 1978 (Lillo *et al.* 2000).

On 4 March 2009 we found five active Craveri's Murrelet nests on Isla Alcatraz. All were in small, enclosed, dark spaces within large crevices or under boulder piles. They had entrances with narrow access points that would exclude larger avian predators and contained flat, even surfaces of rock or sand where incubation took place. All nests were found close to shore, from <1 m to 16 m from the high tide line.

When first encountered, four of these nests contained one adult murrelet with one or two eggs, while one nest contained one adult with two chicks. We checked all nests the following day at 11h30, when the nest that had contained chicks was empty; we presume that fledging had occurred. It is unknown when these chicks had hatched.

On 10 March 2009, we found chicks in one of the nests that we had discovered on 4 March and checked daily thereafter. The chronology of hatching and fledging for this nest was as follows. On 10 March at 10h00, this nest contained one chick covered with thick dry down and one partially hatched egg with an oval pipping hole of approximately 3 cm × 1 cm; the chick had fully emerged from the shell by 10h30. Because precocial seabirds are believed



Fig. 1. Craveri's Murrelet chicks in nest shortly after second chick hatched at 10h30 on 10 March 2009. Photo © Emma Hurley 2009.

to be synchronous hatchers (Murray *et al.* 1983), we assumed the first chick hatched earlier on the same day or previous night. That chick was vocal and greatly mobile within the confines of the small nest platform, while the second chick was at first less coordinated and vocal. The adult moved roughly 20 cm off the nest platform, owing to disturbance, but was observed from afar to return once immediate human presence was removed. The chicks and adult vocalized frequently in the following two hours after the second chick hatched.

The chicks and one adult were still present when we checked the nest on 11 March at 17h00. The sun set at 18h34 (US Naval Observatory [USNO] 2010). At 19h40, a series of high trilling whistles was heard from the nest cavity. These loud calls were uttered in rapid succession and could clearly be heard from approximately 18 m away from the nest. Three minutes later, a similar call was heard from the water, which we determined to be from the second adult bird. In the next eight minutes vocalizations were exchanged between both adult birds. These calls consisted of several rapid notes uttered in quick succession. Periods of silence lasting approximately 20–120 s separated answering calls. The bird in the water could not be seen, but its calls became louder over the course of this exchange, indicating that it had moved closer to shore. We could not determine whether this individual ever came onto land. The chicks were also vocal at this time. Call exchanges between the chicks and the adult in the nest occurred throughout the louder vocalizations exchanged by the two adults. A rapid succession of loud high-intensity whistles was heard 11 min after the first vocalizations began. These whistles lasted roughly 1.5 min and were followed by complete silence. The nest was checked 30 min later, and it was empty, confirming that fledging had occurred.

Both adult murrelets were present for fledging. The entire fledging process, as defined by vocalizations heard, was brief (12 min). It occurred during a slack low tide of 0 m at 20h00, in almost total darkness. The waning moon was 99% illuminated (USNO 2010), but had not climbed high enough to illuminate the nest location. We observed two Yellow-footed Gulls *Larus livens* in the water roughly 9 m from the fledging location, yet we did not note any interaction between the two species. Large gulls species are known to take alcids as prey; there have been documented cases of Western Gulls *Larus occidentalis* taking Xantus's Murrelet adults (Oades 1974) and chicks (Murray *et al.* 1983), as well as Cassin's Auklets *Ptychoramphus aleuticus* (Manuwal 1979).

Fledging occurred 33 h 20 min after the second chick hatched, which supports the suggestion by Breese *et al.* (1993) that this species is one of the most precocial seabirds. This is the first time a nest has been documented on Isla Alcatraz since 1974 (DeWeese & Anderson 1976). The secretive nature of the nesting and fledging behaviors of Craveri's Murrelets is exemplified by the fact that Isla Alcatraz has been the subject of many biological studies for more than 10 years, yet their presence had not been observed during that period (Prescott College & Jimenez-Serrania 2005). Isla Alcatraz's proximity to the town of Kino Bay increases the likelihood of human disturbance by local fishermen and tourists and of predator introduction from the mainland. The House Mouse *Mus musculus*, whose impact on Craveri's Murrelets is unknown, is an introduced species inhabiting the island. Our findings hold special significance for the conservation priority of Isla Alcatraz, as the Craveri's Murrelet is the only species currently nesting on this island that is listed as endangered under NOM-059-SEMARNAT-2010

(SEMARNAT 2010). Because this species is of special conservation concern, it is recommended that additional protection be placed on Isla Alcatraz.

ACKNOWLEDGEMENTS

This project was conducted as a component of the Research and Conservation Program of the Prescott College Kino Bay Center for Cultural and Ecological Studies, in collaboration with the Área de Protección de Flora y Fauna Islas del Golfo de California. Special thanks to Lorayne Meltzer, who was the mentor for this project and liaison with Área de Protección de Flora y Fauna Islas del Golfo de California. Her tireless efforts in project implementation proved invaluable. Financial support was provided by the Wild at Heart Foundation, the David and Lucile Packard Foundation Gulf of California Program and Prescott College. Prescott College Kino Bay Center staff members Tom Donovan and Cosme Damian Becerra provided invaluable field, boat, safety and logistical support. Thanks to Abram Fleishman, Prescott College Research Fellow, for his helpful comments and suggestions, GIS mapping, field assistance and shared passion for this species. Additional thanks to Dawn Breese, Tom Fleishner, Mark Reigner, Greg Clark and Greg Budney.

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