

Western Ecological Research Center

Publication Brief for Resource Managers

Release:

March 2006

Contact:

Dr. Steven E. Schwarzbach

Phone:

916-278-9490

Email and web page:

steven_schwarzbach@usgs.gov

<http://www.werc.usgs.gov/hq/schwarzbach1.asp>

USGS Western Ecological Research Center, 3020 State University Dr. East, Modoc Hall, Rm. 3006, Sacramento, CA 95819

California Clapper Rail Reproductive Success

The only breeding population of the federally endangered California clapper rail is located in the intertidal margins of San Francisco Bay. Present-day tidal-marsh habitat in the Bay is about 15% of historical acreage, and remaining California clapper rail habitat is extremely fragmented. Understanding the causes of what appears to be baywide low fecundity of the clapper rail is important to support management and habitat-restoration efforts for its recovery. Contaminants and egg predation appear to be major factors limiting the reproductive success of California clapper rails in both North and South bays, according to a study in the January issue of *The Auk* by USGS scientist Dr. Steven Schwarzbach and coauthors Joy Albertson and Carmen Thomas of the U.S. Fish and Wildlife Service. The study's findings indicate that strategies to increase the population will need to do more than provide new tidal-marsh habitats.

The study was conducted in six tidal marshes in the northern and southern reaches of San Francisco Bay during four breeding seasons (1991, 1992, 1998, 1999). The authors determined that productivity of clapper rails was much reduced over the natural potential. Only 69% of clapper rail eggs whose viability could be assessed were viable. Hatchability of eggs in North Bay and South Bay marshes was 65% and 70%, respectively. Only 45% of the nests successfully hatched at least one egg. Despite mean clutch sizes of 6.7 and 6.9 in the North and South bays, respectively, clapper rails produced only 1.9 and 2.5 young per nesting attempt. Flooding was a minor factor, reducing the number of eggs available to hatch by only 2.3%; the loss that occurred was related to spring flood tides in El Niño years of 1992 and 1998. Predation on eggs was a major factor affecting nest success, reducing productivity by a third.

Failed eggs were examined for abnormal development and contaminant concentrations. Contamination

Management Implications:

- For egg hatchability to improve, sufficiently protective sediment- and water-quality objectives, particularly for mercury, must be achieved within the San Francisco Bay habitat.
- To minimize flooding losses during the incubation phase, new tidal marshes from wetland-restoration efforts need to be designed to achieve appropriate elevations during spring, when clapper rails are constructing nests.
- New marshes will also require significant buffers from residential areas and active predator-control efforts to address predation of both nests and adult clapper rails.

appeared to adversely influence clapper rail reproductive success. Evidence included deformities; embryo hemorrhaging; embryo malpositions; a depressed rate of hatchability; concentrations of mercury, barium, and chromium greater than known avian embryotoxic thresholds; and a correlation of deformities with elevated concentrations of some trace elements in eggs that failed to hatch. Mercury was the only significant contaminant common to all marshes.

Predation and pollution effects might interact at many life stages. Contaminants such as mercury may slow growth or impair the ability of young to detect predators, impair ability to fly or forage for food, and compromise the effectiveness of parental care for young. All these contaminant-induced adverse effects would give an advantage in the wild to potential predators.

*Schwarzbach, S. E., J. D. Albertson, and C. M. Thomas. 2006. Effects of predation, flooding, and contamination on the reproductive success of California Clapper Rails (*Rallus longirostris obsoletus*) in San Francisco Bay. *Auk* 123:45–60.*