

Projecting impacts of a mortality event on a Western gull population

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We present a case-study of the potential impacts of a one-time mortality event on Western gulls (*Larus occidentalis*), such as may result from exposure to rodenticide directed at eradicating house mice at the Farallon Islands National Wildlife Refuge.

Using Point Blue’s long-term datasets, we conducted a population viability analysis (PVA) to model future population trends while accounting for stochastic variation in demographic parameters driven by environmental conditions, including the probability of colony-wide breeding failure, which has occurred intermittently in recent years.

First, we considered three scenarios defined by the probability of naturally occurring future breeding failure: “optimistic” (no failure), “realistic” (long-term average rate determined from 26 years of Point Blue monitoring), and

“pessimistic” (high frequency of failure).

Assuming no additional mortality, under the “optimistic” scenario, our model predicted population growth of 12.4% after 20 years. The population is expected to decline by 6.6% and 26% under the “realistic” and “pessimistic” scenarios, respectively.

Secondly, we assessed the potential impacts of a one-time mortality event by re-running the PVA with varying levels of mortality to determine the maximum level that would yield population trends indistinguishable from normal trends ($\geq 95\%$ overlap in expected outcomes after 20 years).

The models suggest that a mortality event of up to 3.3% of the adult population under the “realistic” scenario, 2.8% in the “optimistic” scenario, or 4.2% in the “pessimistic” scenario would be unlikely to alter projected population trends. Our results demonstrate that

the greater the stochastic variation, the greater the mortality event must be to be able to discriminate a long-term effect against the backdrop of environmental variability. Note that these values do not represent actual estimates of anticipated mortality but rather provide a threshold of detectability to evaluate potential mortality events.

Main Points

Western gull population trends are dependent on environmental conditions and likelihood of breeding failure.

Additional mortality up to 3.3% of the population would not significantly alter existing trends.

It is critical to incorporate stochasticity into projections of impacts of mortality events.

Nur, N., Bradley, R.W., Lee, D.E., Warzybok, P., Jahncke, J. 2021. [Projecting long-term impacts of a mortality event on vertebrates: Incorporating stochasticity in population assessment](#). *Ecosphere* 12(1):e03293. 10.1002/ecs2.3293. Point Blue contribution #2033.