Proposal

Evaluating the feasibility of Crested Auklet enhancement via habitat restoration at Gareloi Island, Aleutian Islands

For

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The Selendang Ayu Trustee Council has requested advise on mitigation actions to restore seabirds impacted directly by the Selendang Ayu oil spill of December 8, 2004. Thousands of Crested Auklets (*Aethia cristatella*) are believed to have died as a result of the spill. Improving Crested Auklet breeding habitat is a possible option for restoring natural resources damaged by the spill.

This proposal discusses the possibility of restoration by direct enhancement of breeding habitat structure at an active auklet colony. Auklets (*Aethia* spp.) nest in rock crevices produced by coastal erosion (talus slopes and beaches) and in blocky and porous lava flows (http://www.mun.ca/serg/AAHab.html). In the Aleutian Islands, where most of Alaska's Crested Auklets nest, colony sites occur on recent lava flows and talus. Re-vegetation of exposed rock (plant succession - http://www.mun.ca/serg/succession1.html) occurs within decades of a lava flow or seismic event, covering and eventually rendering a site unsuitable for auklet nesting activity. Auklets are therefore limited by the amount of freshly exposed rock with suitable crevices (they are unable to dig their own breeding sites), especially in the Aleutians that are at the southern limit of their breeding range and subject to a mild wet climate that facilitates plant growth. Kiska Island (major lava dome eruption 1966-1968) has the largest patch of fresh lava of any auklet colony in the Aleutians, but has introduced Norway rats (*Rattus norvegicus*) that predate auklets, sometimes severely. Rat-free Gareloi Island (many auklets nesting in lava from a 1938 eruption) has the next largest amount of suitable habitat, mostly covered with advancing vegetation.

This proposal describes a project to test the effectiveness of direct modification of habitat at the Gareloi Island auklet colony – i.e., by creating new rock crevice habitat at a colony affected by advanced plant succession. The assumption is that breeding habitat is limited at Gareloi due to encroachment of vegetation, preventing some Crested Auklets from nesting. We therefore believe that provision of new suitable breeding habitat at the colony site will produce Crested Auklets to replace those killed by the oil spill. New habitat may be provided by cleaning vegetation and peat from existing overgrown sites on the edge of the colony site, or by transporting fresh rock to the site and placing it as new artificial suitable breeding habitat. The aims of this project are experimental: 1) to measure Crested Auklet attraction to new habitat, 2) to measure relative movement of breeding and non-breeding Crested Auklets from the existing colony to the new habitat, 3) to measure the (net) number of new Crested Auklet breeding opportunities created, 4) (using population models) infer the number (bird-years) created, and 5) to thereby determine the viability, form and extent of habitat enhancement required to replace the Crested Auklet bird-years lost due to the Selendang Ayu oil spill.

Methods

Study site Gareloi (GAR-el-eee) island (51º46' N 178º 45' W) is the suggested location for this study. It has a high proportion of Crested Auklets (versus Least

Auklets) in its recently surveyed breeding colonies (Jones and Hart 2006 – see http://www.mun.ca/serg/GareloiBIRDS.html). Gareloi is free of introduced predators. Gareloi's auklet colonies are mostly on old lava flows extensively encroached upon by advancing vegetation, but Crested Auklet numbers are very high – indicating a potential for large numbers of birds able to breed in new habitat. Furthermore, based on ILJ's experience, Gareloi is a relatively safe and accessible location to conduct research and management.

Experimental design The proposed experiment involves at least two seasons of fieldwork with a BACI (before-after control impact design), where data are collected on multiple occasions from both before and after the impact (habitat modification), with two impact and two control sites. In season one (2009), suitable 30 m by 30 m replicated plots for habitat enhancement (treatment) will be surveyed and Crested Auklet use of these areas will be measured by surface counts, capture-mark-recapture and breeding site searches (standard protocols we have developed in collaboration with AMNWR). Later (September 2009), habitat in the plots will be enhanced (methods not covered in this proposal). Crested Auklet use of replicate control plots (not to be habitat modified) will be measured similar to the treatment plots. In season two (2010), Crested Auklet use of the treatment and control plots will be measured by surface counts, band reading, and breeding site searches:

H1 Enhancement has no effect on Crested Auklet surface counts. H1a Crested Auklet surface counts higher in enhanced habitat. Rejection of H1 indicates Crested Auklets are attracted to the new habitat.

H2 Breeding activity same in enhanced plots after enhancement compared to before. H2a Crested Auklet nesting activity higher in enhanced habitat. Rejection of H2 indicates Crested Auklets are breeding in new habitat (and numbers).

H3 Already breeding Crested Auklets move to new habitat. H3a Previously non-breeding Crested Auklets move to new habitat. Rejection of H3 indicates new Crested Auklets otherwise unable to breed are breeding in new habitat (and numbers/relative proportions).

After season two, a population model including previously-measured demographic parameters will be used to estimate the number of new Crested Auklet years created by the experimental habitat modification. If the experiments indicate a net production of new Crested Auklets via the enhanced breeding opportunities, the area/volume of new habitat that needs to be created to replace the Crested Auklet bird-years lost in the Selendang Ayu oil spill can be determined, costed and implemented.

References

Ian L. Jones and Kirk A. Hart. 2006. A survey of inland Least and Crested Auklet breeding colonies at Gareloi Island in the Delarof Islands, Aleutian Islands, Alaska during 2006. Unpublished report for AMNWR.

http://www.mun.ca/serg/Gareloi_REPORT.pdf