APPLICATION FOR A SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior

National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
Exp. Date (6/30/2007)
Form No. (10-741a)

Name of the National Park Service area you are applying to: Redwood National and State Parks

Type of application:	**Please enter numbers for permit renewal or modification requests:**
Renewal application	**Previously assigned NPS study number:** REDW-00117 **Previously assigned NPS permit number:** REDW-2010-SCI-0004

Contact information for the current principal investigator

Principal investigator: Richard Golightly	**Office phone:** (707) 826-3952
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Additional investigators or key field assistants (first name, last name, office phone, office email)

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Scientific Study Information

Project title (maximum 300 characters)

Taste aversion conditioning on Stellerâ s Jays

Purpose of the study (maximum 4000 characters)

Predation on nests of Marbled Murrelets appears to have dramatically increased in recent years throughout the murrelet breeding range in Oregon and California. Several factors are likely contributors to this change. Murrelets nest close to natural gaps in the forest canopy due to their morphological constraints in flight ability when entering the nest. Changes in the landscape over the last fifty years caused such gaps to be increasingly provided by hard, anthropogenic forest edges. Those new edge habitats are high in structural diversity and usually close to human habitation or traffic and attract a variety of predators by providing a wide array of new food sources. Generally high structural diversity and the availability of anthropogenic food sources in fragmented, human altered landscapes support a dramatically higher population density of opportunistic omnivores like Stellerâ s Jays not only along edges but all throughout much of the current murrelet breeding habitat in comparison to simply structured, contiguous old growth forest. A species that depends to a large degree on crypsis to evade nest predation like the Marbled Murrelet is especially vulnerable to the dramatically elevated risk of detection due to such an increase in predator density.

Stellerâ s Jays are suspected to be responsible for the major proportion of egg predation on nests of Marbled Murrelets in Northern California and Oregon. They are most successful and abundant in habitats that are rich in structural diversity, including anthropogenic and human altered environments. Recent evidence from nest camera video suggests that jays preying on a murrelet egg had experience with this situation, behaving in a systematical pattern that successfully removed the incubating parent from the egg and subsequently opened and ate the egg. Based on this evidence it seems likely that individual territorial jays remember and return to murrelet nests that they have previously preyed upon. Acting in concert with the described effect, the increase in jay densities may have reduced jay territory sizes significantly such that the risk of an encounter with a murrelet nest during the 28 day incubation period is quite great.

Stellerâ s Jays are moderately territorial, with the least amount of territorial overlap and intrusion tolerance during the breeding season. Thus it is likely that a limited subset of the jay population is responsible for a high proportion of the loss of murrelet eggs and can be targeted as a short term emergency management strategy.

The stable, territorial structure and long life expectancy of Stellerâ s Jays presents a good opportunity for behavioral training of the candidate nest predators to avoid murrelet eggs in the future through conditioned taste aversion (CTA). To form a CTA an animal must ingest a toxic food item and associate the resulting illness, after a single or small number of exposures, with the taste and associated identity cues of that food CTA can be caused deliberately by administering an emetic, and has been successfully tested in a number of predator species for exploitation in non-lethal predator management. Experiments on crows and other predators have shown the potential of CTA to reverse even robust food preferences and influence food selection for at least 8 months in free-ranging populations. Based on this evidence we propose a strategy for introducing conditioned taste aversion to murrelet eggs in resident jay pairs within known murrelet nest habitat. After establishing a safe, effective aversive agent for Steller's jays we propose the following 2 stages to the project:

1) Broadcast of treated and control eggs throughout murrelet nesting habitat in the field several weeks prior to the murrelet nesting season;

2) Repeat of broadcast at the start of the murrelet nesting season to monitor effectiveness of aversion conditioning in protecting eggs;

Summary of proposed field methods and activities (extract from the study proposal where appropriate - maximum 4000 characters)

1)CTA field treatment

Several weeks prior to the start of the 2010 murrelet nesting season (April-August) we will broadcast 250 Carbachol-laced, murrelet-colored eggs and 250 untreated, control-colored eggs throughout known nesting habitat of Marbled murrelets. Exact timing of the broadcast will depend upon the outcome of phase 2 of the project. The range of broadcast dates will be chosen so that the time period of optimal aversion retention overlaps the murrelet egg incubation period in northern California to the largest possible degree.

We will select 250 trees that provide platforms suitable for placing an egg on at least two separate branches located in the sub-canopy below 45â . Trees with such platforms below 30â will be given preference so as to make egg distribution feasible within the given time frame of one week to ten days. Trees of sufficient age and size to provide murrelet nesting sites in the high canopy are very unlikely to have platforms for egg placement below 45â , and will explicitly be excluded from experimental treatment. Eggs will not be placed in the high canopy that murrelets actually use for nesting. This will keep both climbers and jays away from actual murrelet nest sites. Since the jays will be trained to avoid eggs based on color, not on position in the tree, it is reasonable to assume that the CTA will transfer to real murrelet eggs high in the canopy. Trees will be chosen to create an evenly spaced, systematic treatment and sampling scheme throughout the study area. One platform per tree will receive a Carbachol-laced, murrelet-colored egg, another platform on the same tree will receive an untreated, control-colored egg. One week to ten days after broadcasting we will climb the trees again and assess predation rates on treated and control eggs.

2)Effectiveness monitoring

At the start of the murrelet nesting season in April 2010 we will repeat the broadcasting scheme employed in phase 3 on the same set of trees. We will again assess predation rates on both treated and control eggs. The effectiveness of the aversion conditioning treatment in protecting murrelet-colored eggs from predation will be determined by comparing the ingestion rate of murrelet-colored eggs to control-colored eggs between the first and second egg broadcast.

Study Schedule	Field Schedule
Initial starting date of the study: Feb 03, 2010	**Date to begin study within the park this application year:** Feb 01, 2011
Estimated date the entire study may end: Dec 31, 2013	**Date to end study within the park this application year:** Sep 01, 2011
	Will field study need to continue within the park next year: Yes

Activity Type: Research

Do you anticipate receiving funding assistance from the U.S. Federal Government for this study? (Yes or No)

Yes

If yes specify the agency(s):

Dept. of Interior - U.S. Fish and Wildlife Service

Where will data, maps, photos, etc. (not specimens) reside upon completion of this study?

Richard Golightly's office, Humboldt State University

Location(s) where you propose activities will take place within the National Park System area(s):

Within the National Park. Trees chosen, in consultation with NPS biologists, will be based on the availability of suitable sites below 30â for placement of experimental eggs; expecting the majority of those trees to be species other than redwoods, or redwoods of an age that would be unlikely to provide murrelet nesting habitat.

Your proposed method of access (vehicles, aircraft, boat, snowmobile, foot, etc.):

motor vehicles on access roads as close as possible to experimental locations, hiking on foot to experimental trees