ISLAND CONSERVATION

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Fall Field Trial Plan

November 27-December 18, 2012

on the Farallon National Wildlife Refuge

Trial Plan for U.S. Fish and Wildlife Service
Farallon National Wildlife Refuge
San Francisco Bay Refuge Complex

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Farallon National Wildlife Refuge Field Trial: November-December 2012

OBJECTIVES

- Monitoring:
  - Establish roosting gull numbers on South Farallones prior to and after hazing efforts
  - Assess the relative success of various avian hazing techniques by comparing pre-trial gull densities to gull densities seen during and after hazing operations
  - Monitor and document the effects of avian hazing operations on pinnipeds resting on the island
- Hazing:
  - Haze a maximum number of gulls from Southeast Farallon, West End Island, and offshore islets using some or all of the following techniques:
    - Human movements
    - Effigies
    - Gas exploder or "Zon"
    - Biosonics (Bird Gard, Long Range Acoustic Device—LRAD)
    - Lasers
    - Spotlights
    - Pyrotechnics
    - Helicopter
    - Kites
    - Mylar
    - As staff and funds allow: trained dogs, from a boat, and either government and/or civilian-owned remote-controlled aircraft (UAVS)
  - Document where and to what extent successful clearing of loafing gulls can be achieved and which islands/locations serve as effective retreat zones for gulls; map these areas and monitor the number of gulls there.
  - Determine the effective ranges of techniques or a combination of techniques on gulls and at what distances they cause disturbances to pinnipeds
  - Gauge how quickly gulls may habituate to the different hazing techniques
  - Track the personnel hours required to effectively haze gulls in order to inform an operational plan
  - Determine equipment, supply and staff time required to effectively haze gulls off the islands to inform an operational plan
- Bait trials:
  - Perform a bait availability study to determine the uptake rates and availability of Diphacinone bait on the Marine Terrace
  - Establish and monitor bait degradation cages for placebo pellets for registered Diphacinone and Brodifacoum bait.
  - Determine the feasibility of hazing gulls off areas where placebo bait pellets have been broadcast into the terrestrial environment

OVERVIEW

TIMING

The trial is scheduled to run from November 27, 2012-December 17, 2012. Some gear and supplies may be sent out to the island prior to the trial in Late October –early November either via chartered vessel, USCG helicopter, or on a PRBO patrol boat. It is also possible that a small strike team will be sent out earlier than Nov. 27 to prepare for the arrival of the hazing team (either on a PRBO patrol boat or a chartered vessel).

TRANSPORTATION

Most personnel and equipment will be transported to the island via a chartered vessel at the beginning of the trial. Two personnel change-overs will be supported by an additional boat charter or by utilizing scheduled tour-charter vessels.

LOGISTICS

Fuel for the helicopter will be transported to the island via U.S. Coast Guard helicopter. This trip will likely occur on or around November 13. Some gear and supplies will be sent out prior to the trial on other boats (USFWS or PRBO patrol boats, chartered vessel) as possible. Personnel will meet to check-in and load personal gear and equipment at the dock ion Sausalito on November 26 and spend the night in hotels. Personnel will depart for the island from the dock at Sausalito at sunrise on Tuesday, November 27, weather conditions permitting.

STAFFING

Staffing for the hazing trial will be provided primarily by the core Farallon Restoration Project Partners (Island Conservation, USFWS, and PRBO). Supplemental expert staff will come from Oiled Wildlife Care Network and USDA-APHIS. Each of these entities will provide two personnel weeks (two personnel for one week each). A personnel schedule can be found in Appendix 1. To maximize the efficacy of the hazing, an Incident Command Structure (ICS) will be utilized for the duration of the trial.
The ICS can be found in Appendix 2 of the plan. It is anticipated that personnel will be working 12-14 hour days, as needed, to completely haze gulls off the islands. Some pre-dawn and post-dusk hazing may be needed. It is likely that dawn and dusk will be the busiest times for hazing, with less intensive hazing being required at night and during mid-day.

The following staffing needs have been identified and filled:

- A Hazing Coordinator whose sole role is to coordinate island-wide hazing activities and communicate with monitoring personnel to signal to hazers when disturbance to pinnipeds is caused. The Hazing Coordinator will also coordinate with the PRBO staff lead that is not directly involved in the monitoring or hazing activities
- A minimum of four hazers who have no other responsibility but to police their sectors of the islands
- Minimum of two personnel capable of using all pyrotechnic devices (ATF permitted) such as bird bombs, cracker shells, and CAPA launchers—one for each island. Ideally there should be four such personnel. Federal and state employees are not required to possess an ATF permit, but must abide by all state and federal laws regarding the use of explosive pest control devices.
- Minimum of four monitoring personnel during daylight hours (one for West End, three for Southeast Farallon)

According to the schedule, as many as eleven people would be brought onto the island for the express purposes of the hazing trial, and would be housed for the most part in the USFWS/USCG house, with one or two in the PRBO house, as space permits.

BRIEFINGS AND TRAINING

Prior to departing the mainland, personnel will be asked to take part in an on-line training course on the Incident Command Structure (ICS), which is useful for those who have never been a part of an ICS in the past. Personnel will also be briefed on appropriate biosecurity for transporting gear and personal items to the island. During the boat transfer to the islands, briefings will be conducted for safety during the landing and the transport of gear and personnel to the island. Immediately upon arrival at the island, a circumnavigation of the islands will be conducted to orientate the team to the islands' geography and place names. Upon transfer of crew and equipment to the island, a team meeting will be held and an on-island orientation will occur. Training sessions will commence on the afternoon of the first (Day I) and will likely continue onto the following day (Day II) and include the following components:

- Prior to island deployment:
  - Biosecurity protocol
  - ICS (all personnel to complete two on-line training courses before November 5, 2012)
- On-island trainings:
  - General Orientation
  - ICS for the trial (IC)
  - Natural Resource Protection
  - Radio Communications (IC)
  - Safety (GENERAL, aviation, pyrotechnics)
  - Helicopter Protocols (IC + pilot)
  - GPS use (IC)
  - Data Collection/Record keeping (PRBO)
  - Hazing Methods (deployment and general functioning) (USDA + OWCN)

Designated partners will be responsible for conducting each of the above components.

Throughout the course of the trial, the Incident Advisory Group (IAG—see Appendix 2) will meet daily to recap the progress of the trial, as well as review IHA numbers and overall hazing success. Daily Hazing Team and Monitoring Team assignments and individual daily work assignments will be made and distributed at this time.

PERMITS

An Incidental Harassment Permit (and Section 7 Consultation) for Level B harassment of pinnipeds from NOAA is currently in process. The application was published in the Federal Register on August 27th. The last day for public comment is September 26th, 2012, and an IHA will be issued in October. The result of this application will dictate what degree of disturbance to pinnipeds will be tolerated and thus, which hazing activities will be permitted and how frequently pinnipeds may be incidentally harassed.

A Wilderness Determination will need to be obtained in order to use the Wilderness Area on West End Island. Use of these areas might include on-the-ground hazing as well as aerial harassment and monitoring.

All personnel intending to use any pyrotechnic device other than whistlers will need to be permitted by the Bureau of Alcohol, Tobacco, and Firearms. Island Conservation is currently applying for a user permit, hoping to receive the permit in time for the trial.

Finally, a Special Use Permit for all hazing activities will need to be issued by the USFWS manager of Farallon NWR, as well as an Overflight Permit from the GFNM Sanctuary.

Any monitoring conducted using an unmanned aerial vehicle (UAV) will need to obtain a Certificate of Authorization (COA) from the FAA. At present, permits are being sought to allow for the use of NASA Ames UAVs in December 2012, and/or UAVs from the USGS Rocky Mountain Science Center in March 2013 to determine the use of these vehicles in the monitoring of gulls and pinnipeds. The USGS permitting process requires at least 135 business days (45 days for Spectrum Request approval from the Army, 90 days for COA approval).

SAFETY

Based on the current certification and experience levels of personnel on-island, a Safety Director will be assigned who will be responsible for daily implementation of this safety plan (see Appendix 3). The safety plan encompasses both general safety and aviation safety.

BIOSECURITY

As a unique island ecosystem which sees a frequent exchange of personnel and gear between the archipelago and the mainland, FNWR is at risk of experiencing future invasions by introduced species. In general, the success of biosecurity measures rests on the inspection and packaging of supplies, equipment, and personal gear transported to the island, as well as on-island awareness. In an effort to minimize this risk to the archipelago during the course of the Fall 2012 field trial, all personnel will follow the guidelines set out below when assembling and packing supplies, equipment and personal gear destined for the islands.

A biosecurity checklist has been developed and can be found in Appendix 4. All personnel travelling to the island will be asked to review and sign off on the biosecurity protocol.

BACKGROUND INFORMATION

The vast majority of information available on gull hazing methods comes from those individuals and groups attempting to haze gulls from airfields, agriculture, aquaculture and landfill facilities, and chemical hazard sites. There are a wide range of techniques available, including lethal and nonlethal methods, those requiring substantial manpower and those requiring relatively little. For succinct descriptions of advantages and disadvantages of these techniques, see: Gorenzel & Salmon 2008 and Harris & Davis 1998.

There are many cases where the greatest efficacy in hazing gulls is achieved through integrating a number of methods into the hazing program. Harris and Davis (1998), in their report to the Canadian Government , list pyrotechnics, falconry, distress and alarm calls, and shooting (lethal removal) as key components of any effective hazing program, citing the use of effigies as a possible supplementary technique. The use of multiple audible and non/lethal techniques were more effective than multiple visual deterrents such as mylar & balloons (Cook et al. 2008). On-demand systems or those systems responsive to changes in animal behavior, as opposed to continuous or randomly activated systems, were also found to be most effective in dispersing problem birds (Ronconi and St. Clair 2006).

Lasers & lights

Lasers are concentrated light beams used in low lighting conditions to disperse or deter roosting & feeding birds. They remain one of the most effective tools for dispersing birds at night, when most other techniques are ineffective. Lasers emit either green or red light and are highly portable (Gorenzel and Salmon 2008). Lasers are not effective on all bird species, but there is considerable evidence that lasers can be used to effectively deter gulls (Blackwell et al. 2002, Baxter 2007). All-night control of gulls at a reservoir found that lasers could be used to disperse a population of 5,000 gulls, with no individuals remaining at daybreak. Researchers also observed an additive effect, whereby fewer and fewer gulls attempted to return to roost once hazing had begun. No habituation to the laser was seen for the duration of the 26-day trial and gull response to the laser was always immediate (Baxter 2007).

A study conducted on geese reduced use of the treated area by 34-93%, but prior use of the laser did not deter geese from using the treated area during the daytime. Researchers suggested that geese which were most responsive (populations which saw greatest reductions) were those exposed to little human disturbance and accustomed to very little ambient light during the night (Sherman and Barras 2004). There has been some use of moving spotlights or beacons to disperse or deter birds. In one instance, the intermittent use of a spotlight to deter waterfowl from contaminated bodies of water cut the number of birds using ponds by 90% and reduced bird mortality to less than one-third of that recorded the previous year. During the second year of operation, the beacon further reduced bird mortality to one-sixth of that seen during the first year (Read 1999). Gorenzel & Salmon (2008) also recommend the use of spotlights or strobes, though they suggest that efficacy is variable and other methods may need to be used to supplement spotlight use.

Biosonics (Bird Gard & LRAD)

Biosonics, or bioacoustics, as a hazing method, involves using animal alarm or distress calls to alter the behavior or behavioral patterns of target species, typically causing them to vacate or avoid an area. The vocalizations used are usually those emitted by a predator of the target species or the alarm or distress call of the target species (or a closely related species). Vocalizations are typically broadcast from commercially available units or can be assembled from their component parts. (Gorenzel and Salmon 2008). Biosonics have often been used to haze a variety of seabirds at locations such as: landfills, in association with airfields, at aquaculture facilities, and contaminated ponds (Gosler et al. 1995, Mott and Boyd 1995, Stevens et al. 2000, Cook et al. 2008).

The efficacy of biosonics has been found to be highly variable from one situation to the next. In studies specifically concerned with gulls, the numbers of gulls are typically reduced significantly within the first few weeks (Gosler et al. 1995, Baxter et al. 1999, Baxter 2000). Stout et al. (1975) found that distress

calls were more effective at dispersing gulls than alarm, mew, trumpet, or choke type calls. In one study at a UK landfill where distress calls were the only method used, the numbers of gulls observed was reduced by 66-83% (Baxter 2000). Gosler (1995) observed that distress calls can be effective at dispersing and deterring gulls from returning, if there are alternate sites available to these individuals. Habituation to this method has been observed in a number of gull species and starts within one to four weeks of initiating hazing by this method (Baxter 2000, 2001, Soldatini et al. 2008).

When using distress calls, Gorenzel & Salmon (2008) recommend using distress calls from the target species, preferably from individuals inhabiting the same region as target individuals. Montoney & Boggs (1995) found that Laughing Gulls (*Leucophaeus atricilla*) are responsive to the distress calls of other species, although Baxter (1999) found conspecific bird calls to be significantly more effective than congeneric calls in dispersing birds. Interviews conducted by Harris & Davis (1998) indicated that distress calls enhanced by the use of pyrotechnics were more effective than calls alone. There has been only limited research into the effect of predator calls on target species. Harris & Davis (1998) reported that Gunn (1973) found gulls to be responsive to Peregrine Falcon calls.

Effigies

Typically, human effigies or models (scarecrows) or predator models are recommended as a bird hazing technique (Curtis et al. 1996, Gorenzel and Salmon 2008). However, the use of dead bird effigies (gulls and vultures) has been shown to be effective in scaring birds (Stout et al. 1975, Seamans 2004). Stout et al. (1975) conducted a comprehensive study which found that effigies positioned on their sides (with wings folded) or effigies with wings outstretched elicited the greatest response from gulls. Taxidermy gulls were more effective at dispersing gulls than other imitation (fiberglass molded & partial taxidermy mounts) models, but these specimens often deteriorated in wet weather. They also showed that the greatest effect was seen in groups of gulls exposed to both effigies and distress calls, with no habituation in individuals. In the presence of food, however, gulls resisted dispersal. The combination of distress calls and effigies was the most effective method when food was available, yet still not successful in completely dispersing birds. Stout & Schwab (1979) found that by using very life-like models of Ring-billed Gulls (*Larus delawarensis*), Herring Gulls (*Larus argentatus*), and Laughing Gulls, that they were able to reduce the number of loafing gulls by 80% in a popular loafing area. In another study, effigies placed in loafing areas achieved similar results (gulls retreated to alternative sites), whereas effigies placed in areas of nesting or food sources had little effect (Seamans et al. 2007). Habituation to this technique was seen after as little as four weeks and as long as eight months after deploying effigies (Stout and Schwab 1979, Seamans et al. 2007).

Mylar tape

Mylar flags or tape have frequently been prescribed as a stimulus used to deter birds from cropland or contaminated areas (Littauer 1990, Gorenzel and Salmon 2008). Mylar is a reflective plastic ribbon with one side colored either red or yellow. It is often tied to poles or suspended from overhanging lines, where its motion in the wind creates a humming or crackling sound and it reflects sunlight. It has been shown to be of variable efficacy in preventing passerines from feeding on food crops (Gilsdorf et al. 2002). Belant & Ickes (1997) conducted an experiment on Herring Gulls and showed that mylar was 50% effective in reducing the number of gulls using loafing areas, but was totally ineffective in deterring populations of nesting birds.

Pyrotechnics

Pyrotechnics describe a wide variety of tools which can be used to non-lethally haze birds. Pyrotechnics are primarily an auditory stimulus, creating a loud bang or report, but many charges also produce bright flashes or spiraling light. Pyrotechnic charges are fired from a handheld pistol-style or shotgun-style launcher (Gorenzel and Salmon 2008). Pyrotechnics are used by a majority of airport control programs throughout North America (Harris and Davis 1998). When trialed individually against other techniques (taste deterrents sprayed on refuse) at a landfill, pyrotechnics were effective at reducing the number of foraging gulls from 2,000-2,500 gulls to between 40-50 gulls (Curtis et al. 1995). A study at another landfill in Denver, CO reflected similar findings of 90-95% reduction in gulls—sometimes 100% (Barnes et al. 1999). Habituation to this method can occur, if pyrotechnics are not used sparingly to disperse groups of gulls (Harris and Davis 1998). Some of the frequently cited advantages to this method are: relatively low cost, highly portable, and simple to execute (Curtis et al. 1995, Harris and Davis 1998, Gorenzel and Salmon 2008).

Trained Dogs

Trained dogs—typically border collies—are commonly used to haze or "run off" problem birds (including gulls and geese) from urban areas such as golf courses, often achieving 100% hazing success in treated areas (Castelli and Sleggs 2000, Holevinski et al. 2007). Outside of the urban environment, border collies have been used to a limited degree at air force installations. At airfields (with mixed bird species, including some gulls), clearance rates ranged from 40% to 99.9% within a 2 kilometer radius (Carter 1999, Patterson 2000). In another instance, a 57% reduction in bird strikes was observed at an airfield (Froneman and van Rooyen 2003). It was noted, however, that as soon as dogs were removed from a treated area, birds returned, even over the course of just a weekend (Carter 1999). The success of border collie programs are largely dependent upon skilled handlers and properly trained dogs (Froneman and van Rooyen 2003). Carter (1999) suggests that a single dog and handler can maintain an area of 50 square kilometers (usually runways, and thus flat ground) free of unwanted animals. Collies are not bred or trained to harm wildlife and can be used to safely disperse birds or mammals.

Kites/balloons

Kites in the shape of predators or painted with predators have been used in the past to deter birds from feeding at aquaculture and agriculture facilities. These stimuli typically take the form of a traditional kite or consist of a kite held aloft by a Helium-filled balloon—a Helikite® (Harris and Davis 1998). The unpredictable movement of a kite in the wind serves to slow the habituation of gulls to this method, while not disturbing pinnipeds. There has been limited research conducted to fully evaluate this technique, but one study indicated that the use of Helikites® had no effect on gulls persisting at a landfill site (Baxter 2001). A report to Transport Canada indicated that the usefulness of kites "is limited by habituation [and] are recommended only for situations where short-term and local control is sufficient" (Harris and Davis 1998).

Gas exploder or "Zon"

Gas exploders, also called propane cannons or "Zon guns," produce a loud, directional blast similar to that emitted by a cracker shell from a 12-gauge shotgun (D. Milsaps, pers. Comm.). They are easily and readily moved, can be automated and used with an on/off timer, firing either regularly or randomly. Some models can also be placed on a stand and programmed to rotate after each blast (Gorenzel and Salmon 2008). Unless zons are moved frequently and blasts randomly fired, gulls readily habituate to this method, often within a few days (Harris and Davis 1998). Hazing with zons has been found to have

an effect, but a study by Washburn et al. (2006) indicated that zons did not significantly alter gull behavior at an airport, even when reinforced with lethal control methods.

METHODS

SCOPE

A general schedule of preparatory, hazing, monitoring, and bait-related activities can be found in Appendix 5.

Hazing and monitoring personnel will need access to the greatest extent of the South Farallon islands, including West End Island. Personnel may require access to other such areas as: Fertilizer Flat and Shell Beach. If IHA restrictions prevent gull hazing activities for 2 weeks in all areas, some specified areas with listed or sensitive pinnipeds may be excluded from the full 2 weeks hazing operation. Saddle Rock and other small islets might be designated as roosting refugia if adaptive management requires it.

Monitoring of gulls and pinnipeds will take place by personnel on foot, from the air during daily crepuscular helicopter flights, and by using the Cal-Academy web-camera, as needed.

A hazing strategy was developed with an eye to evaluating specific techniques in isolation, beginning with some of the more passive/stationary techniques during the day, in conjunction with more intensive hazing at dawn and dusk. It is hoped that this approach will effectively haze a substantial portion of gulls on WEI and SEFI, although habituation is expected to occur within a few days, at which point hazers will resort to combined hazing methods and finally moving on to pyrotechnics. The whole trial has been broken down into four phases. The general scheme of the four phases can be found below in Table 1.

Table 1. The general scheme of the four-phased monitoring and hazing approach to be used during the fall trial.

Trial Phase	1	2	3	4
Dawn	Surveys: gull & pinniped	Humans Lasers	Humans Lasers	Humans Lasers Pyrotechnics
Daytime		Humans Effigies Zon Stationary Kites Biosonics	Humans Effigies Zon Stationary Kites Biosonics Ambulatory Kites Ambulatory Effigies Helicopter	Humans Effigies Zon Stationary Kites Biosonics Ambulatory Kites Ambulatory Effigies Helicopter Pyrotechnics
Noon		Gull Survey	Gull Survey	Gull Survey
Dusk	Surveys: gull & pinniped	Humans Lasers	Humans Lasers	Humans Lasers Pyrotechnics
Night		Humans Lasers	Humans Lasers	Humans Lasers

Phase 1: MONITORING GULLS & PINNIPEDS

Prior to the initiation of hazing activities, a complete gull census of areas visible from Southeast Farallon (shown in orange in Figure 1) will be conducted every morning for a minimum of five days at 0800 and 1600 to establish a baseline population for gulls on the islands.

Based on the schedule for weekly visits to WEI, an archipelago-wide census of pinnipeds, including the numbers of each species and the loafing areas being used by these animals will be conducted by PRBO staff. A map of areas being used by pinnipeds will be generated, with an eye to identifying sensitive areas which need to be considered during monitoring and hazing operations.

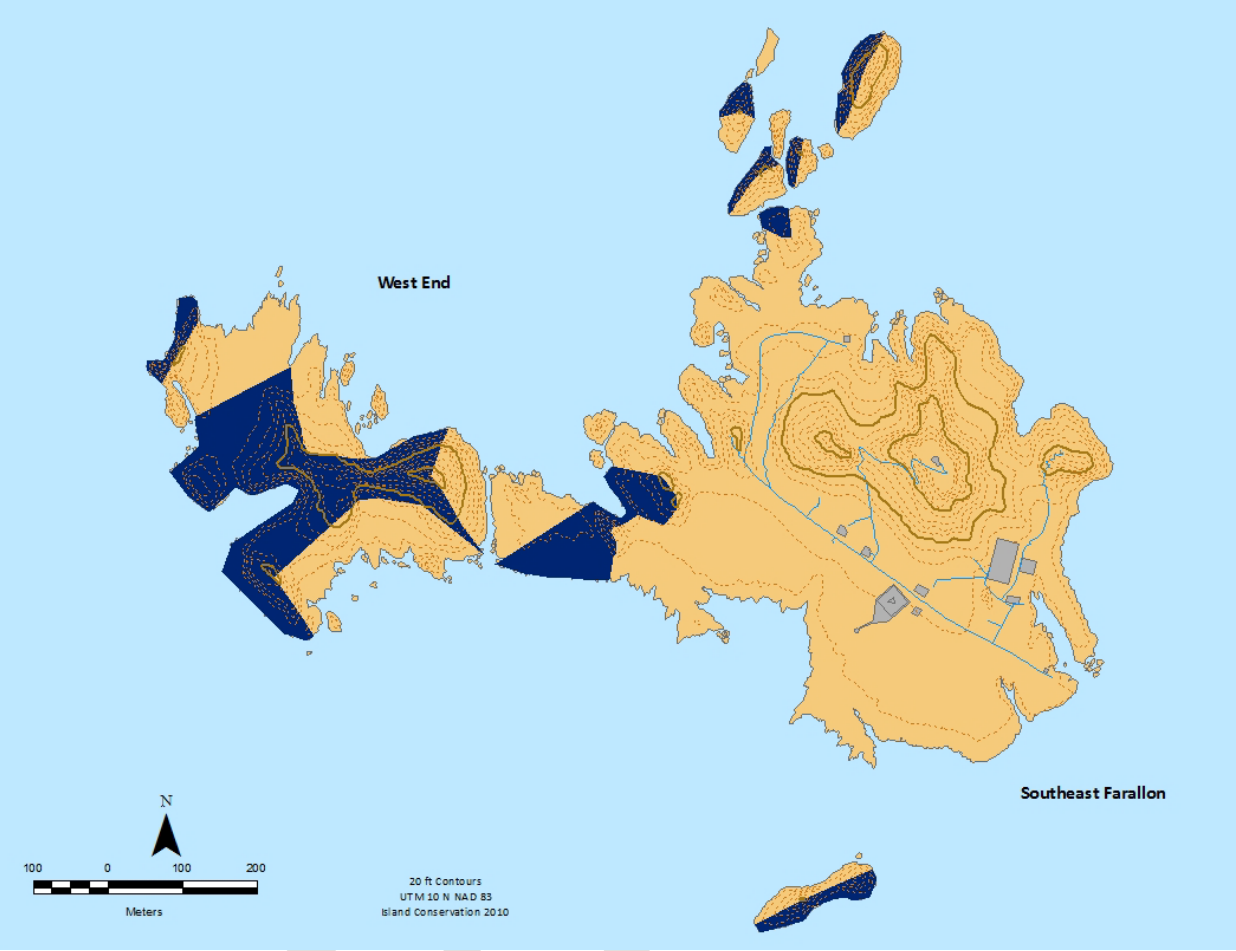


Figure 1. The gull census encompasses all orange areas not blocked out in dark blue, which are not visible from either Lighthouse Hill or from the ground on SEFI.

On Day II, the entire island will be surveyed to map the presence and number of gulls and pinnipeds, and any other sensitive resources present. This survey will be conducted on foot, from the lighthouse, and from the air.

Phase 2: STATIONARY HAZING, MORNING HAZING AND MONITORING OF PINNIPEDS AND GULLS

Monitoring and Hazing: Sectors and Responsibilities

Monitoring during phase 2 and other phases will require at least four individuals: one person on WEI, one person on foot on SEFI, and two personnel at the Lighthouse (Figure 2). Hazing of gulls on the islands will require another four personnel with identical assignments. Each monitor or hazer will be responsible for tracking the behavior and movements of gulls and pinnipeds in one of the following areas:

- Ground: West End Island—western portion, excluding the eastern extreme of maintop—and Weather Service Peninsula
- Ground: Tower Point, area above North Landing, Sea Lion Cove, Corm Blind Hill and intertidal areas surrounding, southwest face of LHH , Fertilizer Flat, Shubrick Point

- Lighthouse: Maintop, Weather Service Peninsula, Marine Terrace, and Saddle Rock
- Lighthouse: Aulon Peninsula, Fertilizer Flat, Blowhole Peninsula

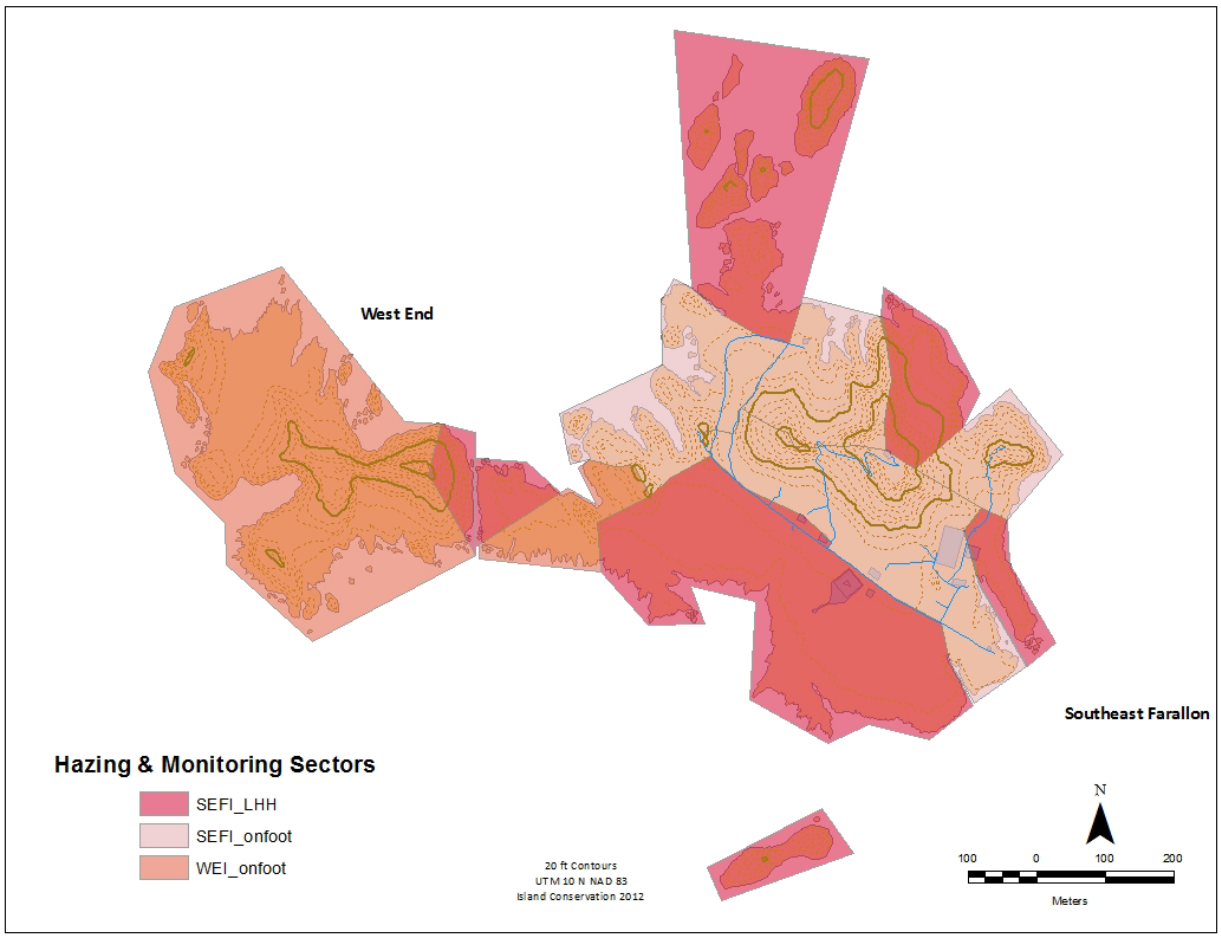


Figure 2. Proposed sectors for monitoring gull and pinniped activity and hazing on the Farallon NWR during the 2012 Fall Field Trial

The sectioning of the islands will likely evolve over time as gulls respond to hazing efforts and adapt their loafing and roosting behavior.

During hazing periods, the Hazing Coordinator is responsible for:

- Ensuring that hazers coordinate hazing efforts to maximize the effect of hazing activities on gulls
- Identifying where gulls are retreating to and communicating this information to relevant hazers
- Relaying incidences of pinnipeds harassment to hazer/monitor teams whose activities have affected animals in a different sector

Hazing personnel have the following responsibilities:

- To track the amount of effort and the number of supplies used while carrying out hazing activities.
- To record and assess the effectiveness of stationary hazing methods during Phase 2.

- To "police" their respective sectors, working to keep a maximum of gulls off their sector for the duration of Phase 3.
- When using lasers and pyrotechnics, communicate with designated monitor to ensure that
    - the monitor is prepared to record animal responses to hazing
    - the monitor is managing to record gull behavior
    - the monitor is managing to record pinnipeds responses/harassment incidents

Monitoring personnel have the following responsibilities:

- Phase 2:
    - Work with designated hazer to quantify numbers of gulls responding to early morning and evening laser treatments
- Phase 3:
    - To communicate with designated hazer in order to:
        - Ensure they are ready to document animal responses
        - Ensure that sufficient personnel is available to record any responses to hazing
        - Document the number of pinnipeds prior to hazing activities, quantify those responding to activities, and categorize their responses to hazing activities
        - Characterize the responses of gulls to hazing activities and quantify the percentage of gulls responding

As monitors, PRBO staff will take the lead in documenting harassment or disturbance caused by hazing activities as required by the Section 7 IHA permit and granting agency requirements. PRBO and USFWS staff have prior experience in counting and documenting disturbances to the pinniped populations and PRBO will develop the protocols and training necessary for other field staff to conduct the monitoring of their areas.

PRBO will also develop the protocols necessary to support proper documentation of gull numbers and retreat sites prior to and during hazing operations, as well as up to seven days after the cessation of hazing activities. These data will be collected by PRBO and USFWS staff who are well-versed in quantifying gulls.

Areas which cannot be monitored from personnel stationed on land (Figure 1) will be monitored by helicopter. The helicopter will specifically be used to support the monitoring of gull roosts and congregation sites. The helicopter will mainly be used to survey these blind spots in the morning, at noon, and in the evening, weather permitting. It is possible that the helicopter will be used to support the monitoring of pinnipeds during over-flights of the island.

Hazers will also take part in nighttime patrols on southeast Farallon to ensure that gulls have not returned to roosts since nightfall. These patrols will take place between the hours of 20.00 and 22.00. Personnel would not need to patrol for the full two hours, but simply walk the perimeter of the island, ensuring that primary roost sites are clear of gulls, hazing individuals with lasers or spotlights as needed.

Hazing Strategy: Phase 2

Hazing will begin on Day III (see Tables 1 and 2 for Hazing Gantt chart for each of SEFI and WEI). At the beginning of the trial, dawn and dusk hazing sessions will consist of the use of lasers and human activity. In the hazing trial conducted in January 2011, lasers were effective 30 minutes after sunset until about 15 minutes before sunrise (for a table of sunrise/sunset times predicted for San Francisco, CA, see Appendix 6). Hazing and monitoring personnel will work as a team, travelling within their sector to haze and record gull numbers. In the morning, with low levels of light, it will be difficult to accurately count the number of gulls using the islands or being impacted by hazing. In this case, monitors will use spotlights to estimate the numbers of gulls flushing up into the air in response to laser use.

After hazing gulls off the island during the dawn session using lasers, several passive and stationary hazing methods will be installed across the islands (See Figure 4), including kites, zons, effigies, and bioacoustic systems. When visual devices (such as effigies and kites) are deployed, the hazer will fire a single cap towards nearby loafing or roosting gulls in an effort to draw their attention to these tools.

These hazing tools will be assessed regularly for signs of habitation and gull encroachment. Personnel will determine the effective radius of tools based on distance markers placed at a standard distance from each installed method. Gulls persisting in or around these tools will be tolerated for a maximum of two days, at which point, an additional method may be added or the original method may be swapped out for another tool. Visual stimuli (such as effigies) which proved ineffective after two days would likely complemented by an audio-based stimulus (such as a zon), and vice versa.

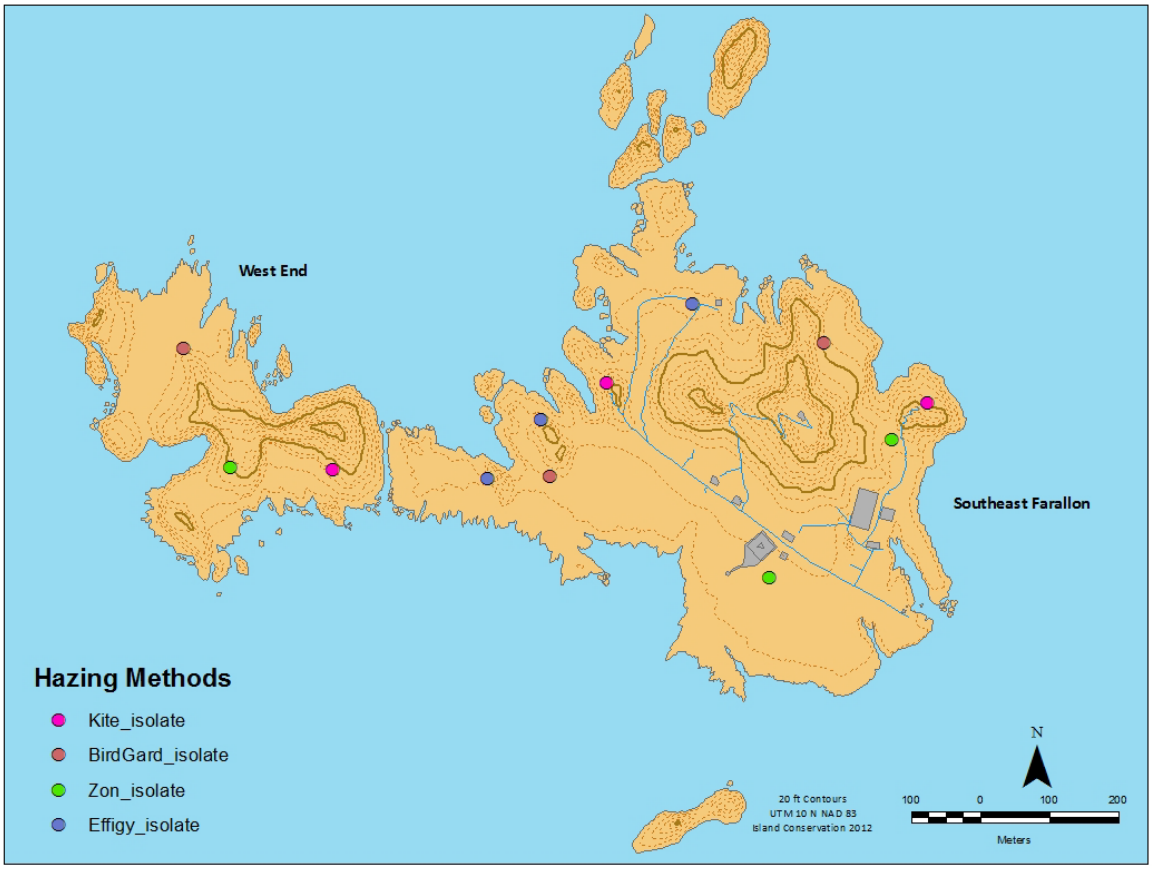


Figure 4. Hazing tools will be placed in isolation from one another during Phase 2 of the trial. This map indicates where specific tools will initially be trialed in an attempt to assess habituation to these tools in gulls.

It is anticipated that with daytime hazing tools in place, daytime hazing activities will largely involve personnel walking around and inspecting loafing sites and checking on the condition of hazing tools. In this phase of the trial, gulls found loafing around hazing methods shall be tolerated until Phase 3 is initiated (On Day V or VI.

Dusk hazing will again consist of using lasers in an effort to prevent gulls from accessing nighttime roost sites. Gulls persisting on loafing sites not targeted during daytime hazing activities should be subject to laser treatment at this time, allowing monitors to record the number of gulls using loafing sites.

Phase 3: COMBINED METHODS

Hazing Strategy: Phase 3

The third phase of the trial will involve combining methods to cover the entirety of the islands as effectively as possible. Loafing and roosting gulls will not be tolerated anywhere on the islands at this point in the trial. The efficacy of combined methods will be assessed, where possible, and methods will be moved or changed as gull behavior requires. Additional daytime hazing tools used might include personnel walking around the islands with effigies on poles or guiding kites. Figure 5 illustrates where certain methods might be effectively employed across SEFI and WEI, though actual locations are subject to change according to on-the-ground requirements.

Morning and evening hazing (lasers) and monitoring activities will continue as before.

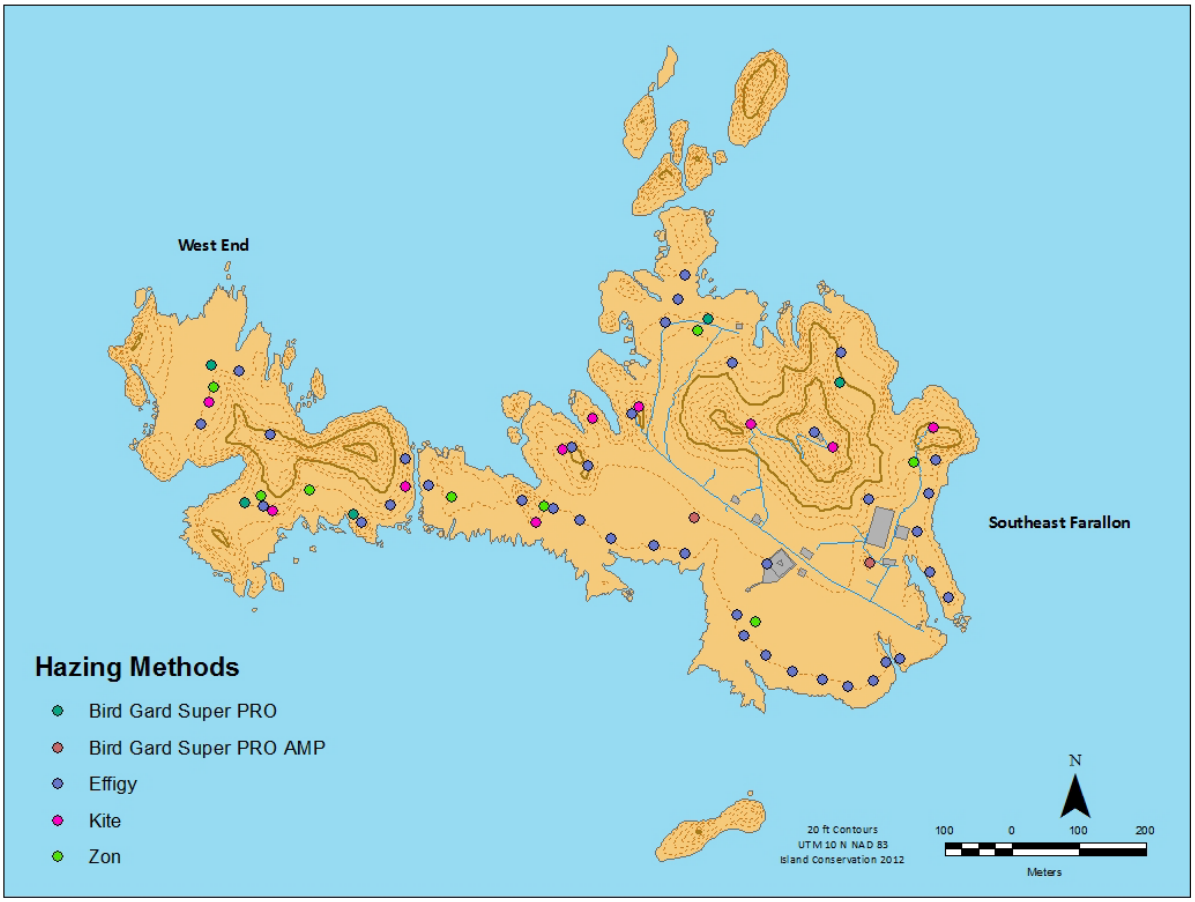


Figure 5. Effigies, kites, biosonics, and zons will be trialed in combination across the islands in Phase 3.

Phase 4: PROTECHNICS

The focus of Phase 4 is to introduce the use of pyrotechnics as a hazing tool, once other methods have been ineffective in achieving 100% clearance of gulls from the islands. Personnel will rely mainly on simple bird bombs and whistlers (fired from a pistol-style record launcher), though cracker shells and CAPA charges will likely also be employed in an effort to reach more distant groups of gulls. It is anticipated, that at this point in the trial, gulls will have retreated to isolate pockets where they cannot be flushed by any other means.

Pyrotechnics will be used by each hazer within their assigned sector, no closer than XXXX meters from nearby pinnipeds. Pyrotechnics will primarily be used at dawn and dusk, but will also be employed during the daytime, as needed. Pyrotechnics will only be employed in the morning once personnel can see well enough to document any incidences of pinniped harassment. Prior to that time of day, lasers will continue to be used.

Hazers will need to work closely with their designated monitor to track pinniped responses to pyrotechnics and ensure that their efforts lead to successful data collection and hazing

Additional hazing methods

By boat On those days where a vessel has been chartered to come out to the island, monitoring personnel and at least one hazer will be transported to the vessel for a trip around the island. The monitor will record any congregations of gulls which cannot be seen from the island as well as the effects of hazing from the boat. The hazer will use pyrotechnic devices to flush any gulls detected on these areas, especially offshore and northern islets, and the backside of the Great Arch.

As weather permits, certified personnel may also use the Safeboat to perform some hazing and/or monitoring from this vessel.

Trained Dogs If possible, an experienced dog handler and trained dog will come out to the Farallones in an effort to test trained dogs as a dispersal method and learn about how this method might be useful in an eradication. Ideally, a trained dog would be used to haze the large gull roosts on SEFI (Mussel Flats, Mirounga Beach) early on in the trial. The dogs would be used to disperse groups of gulls congregating on the Marine Terrace, North Landing, and around the catchment pad and cistern. Dogs might become increasingly less useful as gulls retreat to only the most inaccessible locations. Should dogs be brought out to the island, appropriate housing and containment will need to be provided for the dog.

If it is not possible to get a trained dog out to the island, there could be great value in an experienced handler travelling out to the island for a site visit. This site visit could either coincide with other hazing activities so that they can learn more about currently proposed methods, or at an earlier date (depending on available transport).

BAIT TRIALS

Two placebo (non-toxic) versions of the two registered bait pellets will be tested during the trial:

- ~1.1g (3/8" diameter) Bell Laboratories, Inc. Conservation Dry Formulation pellet (25D)
- ~1 g Hacco, Inc. Ramik Green® pellet (D50)

Both products are designed to mimic exactly the toxic forms of these bait products. Both products will also be infused with the non-toxic biomarker 0.2% pyranine (also known as Solvent Green 7). The presence of this biomarker can be detected with an ultraviolet light.

Targeted Bait Test

In an effort to determine if gulls can be successfully hazed off a plot of land which has had a placebo bait broadcast at an established and uniform density, four areas across West End and Southeast Farallon have been chosen for close monitoring for the consumption of bait pellets by gulls. These small plots (≤1.5 ha) have been chosen for the ease of hand broadcasting bait pellets and monitoring subsequent gull behavior at these sites.

Prior to hazing activities—on Day II or III—four plots (see Figure 5) will be demarcated using pin flags. Once hazing has begun—on Day V or VI of the trial—these four plots will be hand-broadcast with one of the two bait types. The bait product manufactured by Bell Laboratories, Inc. will be broadcast at a

density of 18 kg/ha, as per the label registration limit. The bait product manufactured by Hacco, Inc. will be broadcast at a density of 50 kg/ha.

The boundaries of these areas will be clearly marked with pin flags so that observers can monitor the area from a distance. The monitoring team will track gull activity within these plots during regularly-scheduled island-wide counts.

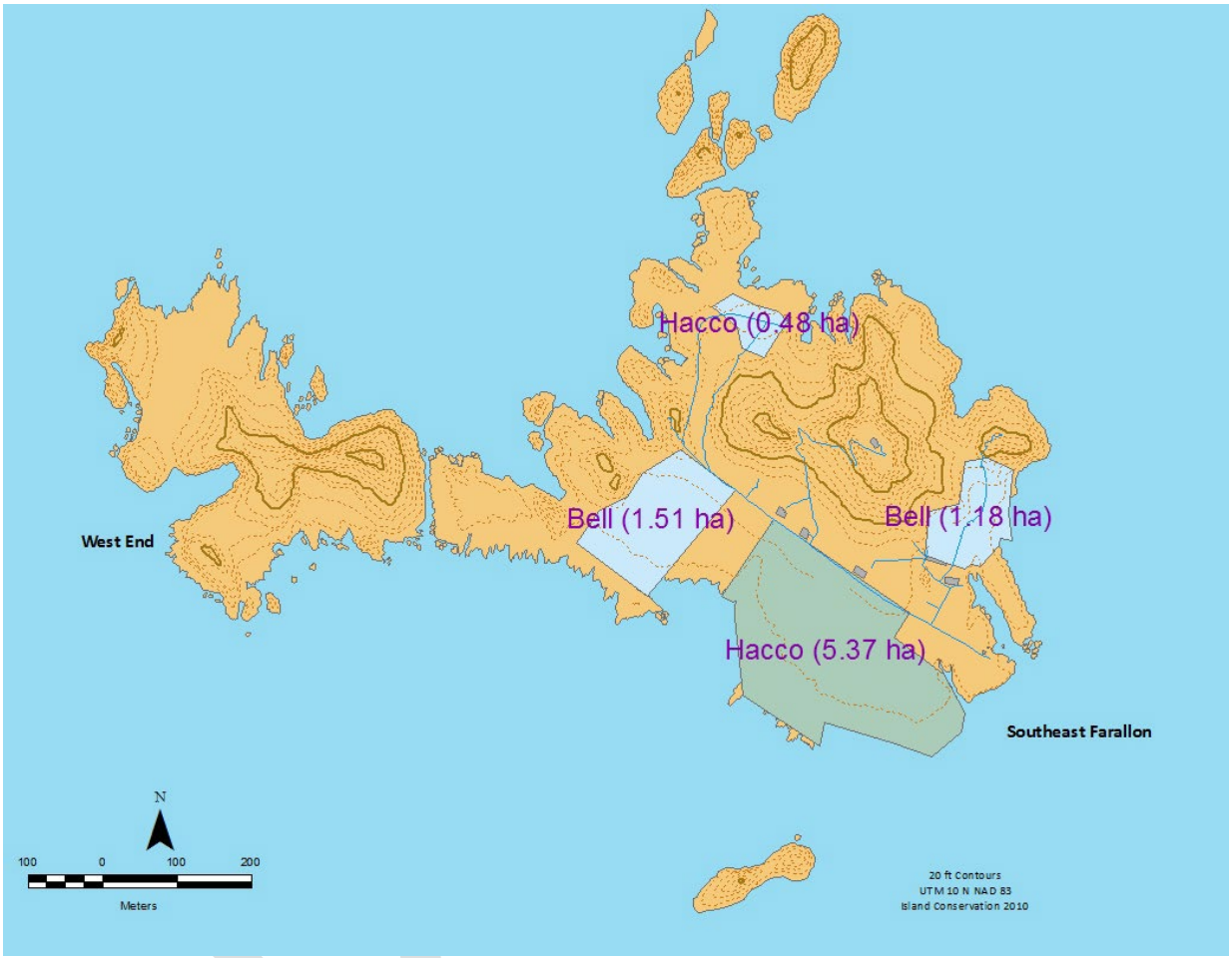


Figure 5. A map of areas to be baited by hand-broadcast. Areas in blue represent plots which will be subject to the targeted bait tests, while the area in green will be used for the bait availability study. The types of bait (referred to by name of manufacturer) and the areas of these plots are indicated.

Bait Degradation

A bait degradation (weathering) trial will be conducted using placebo versions of the two types of legally available bait pellets. Bait cages of wire hardware cloth will be used to prevent the pellets from being consumed or disturbed by mice or birds. Each cage, which has 16 compartments, will have eight pellets of each formulation placed in each cage. One to two cages will be placed in each of three locations: the

Water tank at the saddle on the lighthouse trail, the cisterns on the Marine Terrace, and North Landing (See Figure 6.) Cages will be tested on bare soil, rock and vegetated substrate.

The establishment of bait degradation cages will likely occur early in November during a 1-day strike team visit to the island to transfer supplies to the island.

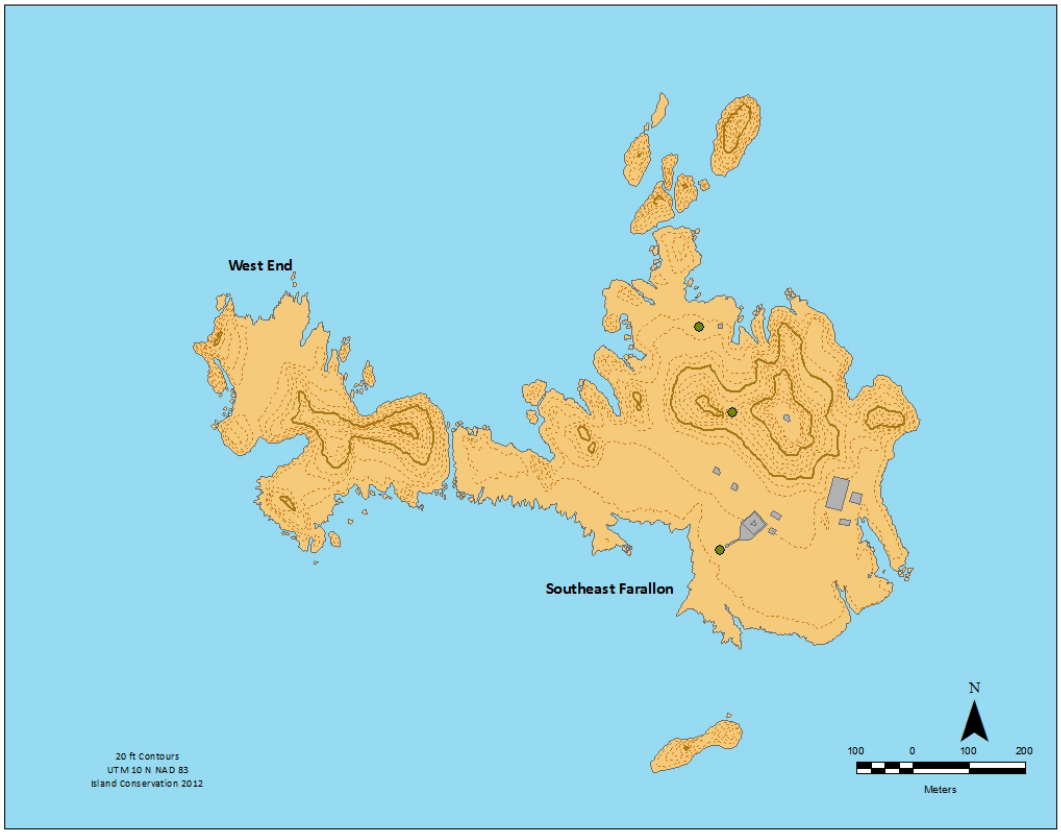
Cages will be sampled 7, 14, and 21 days after deployment by PRBO staff. Each pellet in each cage will be inspected for signs of degradation and classified according to a modified Craddock Scale (Appendix 7). Cages will be monitored weekly by PRBO until April 1?.

Bait Availability

In November 2010, a bait availability study was conducted using the Bell Laboratories, Inc. pellet. A similar trial will be conducted during this trial, using the 1 g Hacco, Inc. Ramik Green pellet.

Subsequent to the island-wide gull and pinniped census slated for Days II/III, X bait availability plots (measuring 1m x 25m) will be established on the Marine Terrace. On day V/VI, once hazing activities have been initiated, a ~5-hectare portion of the Marine Terrace (see Figure 5) will be hand-broadcast with the Hacco, Inc. bait at a density of 50 kg/ha. Immediately following the bait broadcast, these plots will be calibrated to contain a representative number of pellets for a bait application of 50 kg/ha. The availability of pellets within these plots will be monitored every day for a total of seven days.

Figure 6. Location of Bait Degradation Cages (green dots)



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APPENDIX 1: STAFFING

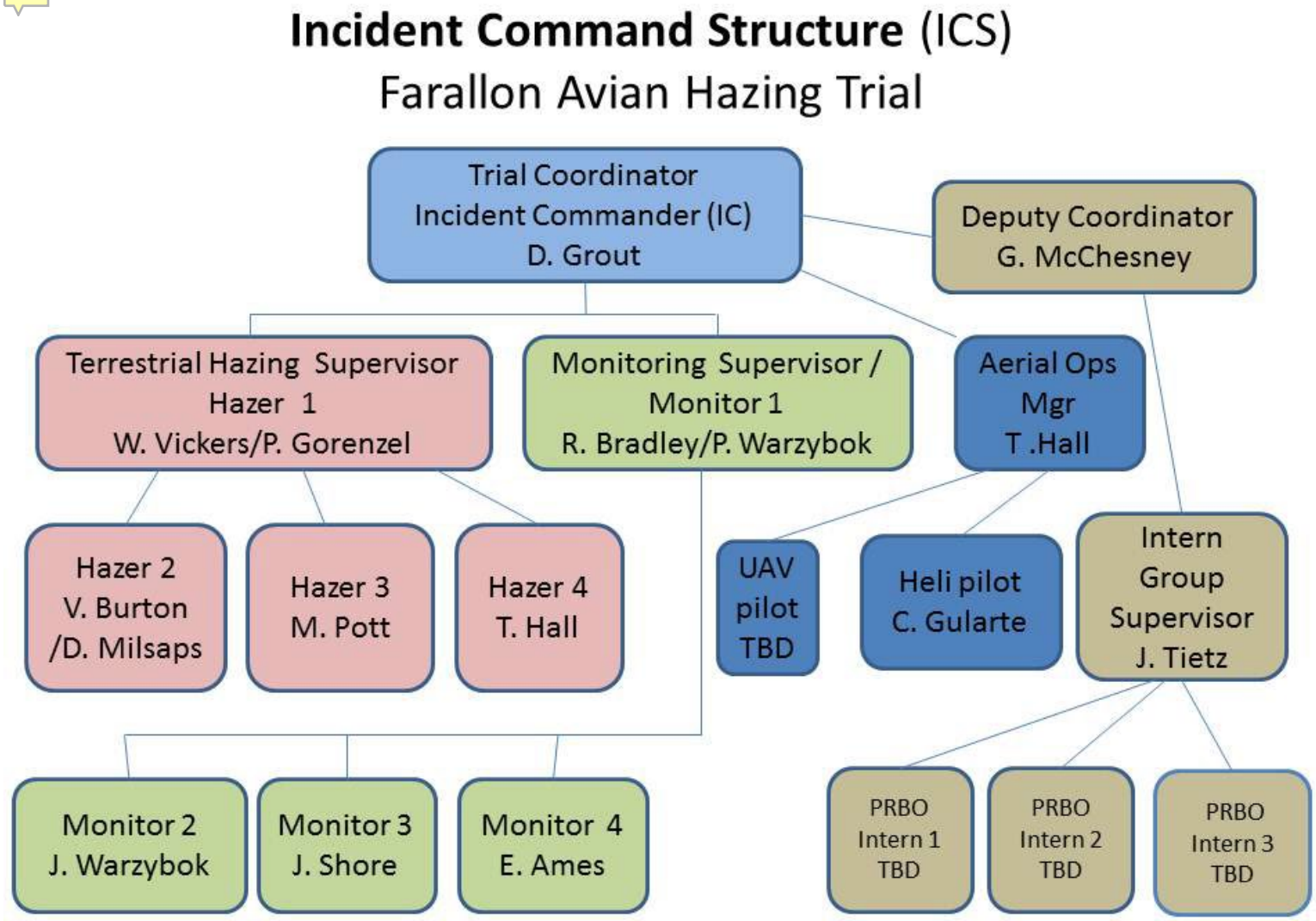
This Gantt chart indicates which staff will be on-island for the hazing trial between November 27 and December 17, 2012. The days outlined in heavy black represent the extent of the 14-day hazing period. Transportation is not yet confirmed and subject to change.

	Transport		B								B				PRBO			B					B
	Trial Day	**0**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	**XV**	**XVI**	**XVII**	**XVIII**	**XIX**	**XX**	**XXI**
	Date	**26-Nov**	**27-Nov**	**28-Nov**	**29-Nov**	**30-Nov**	**1-Dec**	**2-Dec**	**3-Dec**	**4-Dec**	**5-Dec**	**6-Dec**	**7-Dec**	**8-Dec**	**9-Dec**	**10-Dec**	**11-Dec**	**12-Dec**	**13-Dec**	**14-Dec**	**15-Dec**	**16-Dec**	**17-Dec**
	Personnel																						
1	Dan Grout (IC)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Madeleine Pott (IC)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	Tommy Hall (IC)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	Jonathan Shore (USFWS)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
5	Gerry McChesney (USFWS)	x	x	x	x	x	x	x	x	x	x												
6	Russ Bradley (PRBO)	x	x	x	x	x	x	x	x	x	x												
7	Pete Warzybok (PRBO)										x	x	x	x	x	x	x	x					
8	Jon Warzybok (PRBO)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9	Liz Ames (PRBO)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	Winston Vickers (OWCN)	x	x	x	x	x	x	x	x	x	x												
11	Paul Gorenzel (OWCN)										x	x	x	x	x	x	x	x					
12	Valerie Burton (USDA-APHIS)	x	x	x	x	x	x	x	x	x	x												
13	Derek Milsaps (USDA-APHIS)										x	x	x	x	x	x	x	x					
14	Chris Gularte (Specialized Aviation)				x	x	x	x	x	x	x	x	x	x									
15	UAV pilot 1 (TBD)																						
	Hazing personnel:	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4					
	Monitoring personnel:	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4					
	Total personnel:	**10**	**10**	**10**	**11**	**11**	**11**	**11**	**11**	**11**	**10**	**10**	**10**	**10**	**9**	**9**	**9**	**5**	**5**	**5**	**5**	**5**	**5**

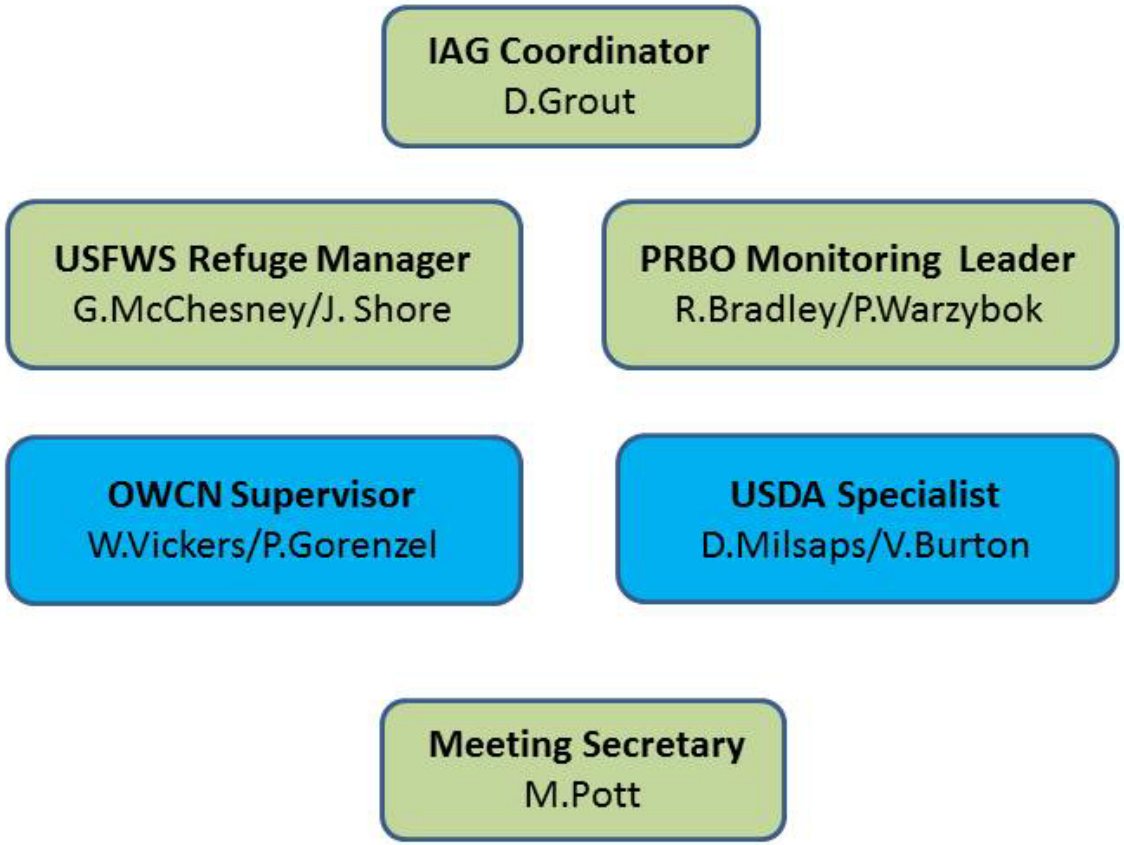
Red type font indicates personnel who are currently allowed under federal law to use EPCDs

Blue type font indicates personnel who have been included under Island Conservation's ATF User permit application

APPENDIX 2: Incident Command Structure



Incident Advisory Group (IAG)
Farallon Avian Hazing Trial



APPENDIX 3: SAFETY PLAN (to be added by Nov 1)

APPENDIX 4: BIOSECURITY PROTOCOL

Packing for the island

- All gear will be inspected and cleaned (if necessary) before being brought to the island. This includes clothes and boots. Carefully inspect any items with Velcro.
- All food will be packed in rodent-proof containers (hard sided, closed tightly).
- As much gear as possible will be packed in rodent-proof containers. If rodent proof containers are limited or too small, items will be packed in dry bags or contractor bags (thick trash bags) and sealed tightly.
- Gear will be cleaned and packed in a location that is free of insects and seeds, preferably indoors.
- If possible, soft gear (tents, boots, clothing, tarps, etc.) should be frozen for 48 hours prior to going out to island.
- Corrugated cardboard will not be used.
- When packing, we will be wary of leaving containers open/exposed for extended lengths of time. Containers should only be open when they are being packed or something is being taken out.

Transportation to Island:

- We will contract with vendors who agree to allow us to inspect their vessel and/or require necessary preventative measures be in place.

While on Island:

- All gear will be unpacked in the Coast Guard House. All doors and closets will be kept shut during unpacking.
- A can of bug spray will be available to deal with any invertebrates that may be found while unpacking.
- Prior to each entry into a Wilderness Area (all of West End and the restricted area on SEFI) the soles of boots (especially mud), laces, and the pockets and hems of clothes/equipment will be carefully inspected and cleaned. Any seeds will be removed and bagged in a ziplock for incineration.

APPENDIX 5: GENERAL SCHEDULE

Transport									**B**								**B**					**PRBO**			**B**					**B**
Trial Day	**T-7**	**T-6**	**T-5**	**T-4**	**T-3**	**T-2**	**T-1**	**0**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	**XV**	**XVI**	**XVII**	**XVIII**	**XIX**	**XX**	**XXI**
Date	**19-Nov**	**20-Nov**	**21-Nov**	**22-Nov**	**23-Nov**	**24-Nov**	**25-Nov**	**26-Nov**	**27-Nov**	**28-Nov**	**29-Nov**	**30-Nov**	**1-Dec**	**2-Dec**	**3-Dec**	**4-Dec**	**5-Dec**	**6-Dec**	**7-Dec**	**8-Dec**	**9-Dec**	**10-Dec**	**11-Dec**	**12-Dec**	**13-Dec**	**14-Dec**	**15-Dec**	**16-Dec**	**17-Dec**
Activity																													
Island-wide marine mammal survey	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)																					
Complete SEFI-based gull census						x	x	x	x	x																			
Meet & check-in Sausalito								x																					
Depart for islands									x																				
Training/orientation									x	x																			
Mark baiting zones										(x)	x																		
Helicopter arrives on-island											x																		
Gull and pinniped monitoring											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hazing											x	x	x	x	x	x	x	x	x	x	x	x	x	x					
Hand-broadcast bait													x	(x)															
Calibrate availability plots													x	(x)															
Monitor bait availability													x	x	x	x	x	x	x	(x)									
Personnel arrival/change-over/departure									x								x							x					x
Activities in brackets indicate that the timing of the activity will be time dependent and may be pushed to another day.																													

APPENDIX 6: PREDICTED SUNRISE, SUNSET & MOON PHASES FOR SAN FRANCISCO, CA

Date	Sunrise	Sunset	Moon Phase
27-Nov-12	7:03 AM	4:52 PM	
28-Nov-12	7:04 AM	4:52 PM	Full
29-Nov-12	7:05 AM	4:51 PM	
30-Nov-12	7:06 AM	4:51 PM	
1-Dec-12	7:07 AM	4:51 PM	
2-Dec-12	7:08 AM	4:51 PM	
3-Dec-12	7:09 AM	4:51 PM	
4-Dec-12	7:10 AM	4:51 PM	
5-Dec-12	7:11 AM	4:51 PM	
6-Dec-12	7:11 AM	4:51 PM	
7-Dec-12	7:12 AM	4:51 PM	
8-Dec-12	7:13 AM	4:51 PM	
9-Dec-12	7:14 AM	4:51 PM	
10-Dec-12	7:15 AM	4:51 PM	
11-Dec-12	7:15 AM	4:51 PM	
12-Dec-12	7:16 AM	4:51 PM	
13-Dec-12	7:17 AM	4:52 PM	New
14-Dec-12	7:18 AM	4:52 PM	
15-Dec-12	7:18 AM	4:52 PM	
16-Dec-12	7:19 AM	4:52 PM	
17-Dec-12	7:20 AM	4:53 PM	

Data generated for: San Francisco, CA with the following coordinates: W122 26, N37 46
Data compiled from: Astronomical Applications Department, U.S. Naval Observatory
http://www.usno.navy.mil/USNO/

APPENDIX 7: BAIT DEGRADATION SCALE AFTER CRADDOCK (2004)

	Pellet matrix	Change in shape	Presence of mold	Loss of volume
Condition 1 ***Fresh pellets***	Identical to fresh bait	Identical to fresh bait	None	None
Condition 2 ***Soft pellets***	<50% pellet matrix is or has been soft/moist	Pellet still intact; smooth surface may have been lost	<50% bait pellets mold	Little or no volume lost
Condition 3 ***Mush pellets***	>50% bait matrix is or has been soft/moist	<50% pellet has lost distinct shape, cracking observed, some pitting of surface	>50% bait pellets have mold	Bait has lost some volume (<50%)
Condition 4 ***Pile of mush***	100% of bait matrix is or has been soft	Pellet has lost distinct shape & resembles a pile of mush with some grain particles in matrix showing distinct separation from main pile	>50% bait pellets have mold	Bait has lost some volume (<50%)
Condition 5 ***Disintegrating Pile of mush***	100% of bait matrix is or has been soft	Pellet has completely lost original form and resembles a pile of mush with >50% of the grain particles in the bait matrix showing distinct separation from each other and the main pile	>50% bait pellets have mold	Bait has lost a significant amount of volume (>50%)
Condition 6 ***Bait gone***	Bait is gone or is recognizable as only a few separated particles of grain or powder.	Bait is gone or is recognizable as only a few separated particles of grain or powder.	Bait is gone or is recognizable as only a few separated particles of grain or powder.	Bait is gone or is recognizable as only a few separated particles of grain or powder.

Craddock, P. 2004. Environmental breakdown and soil contamination by Pestoff poison bait (20ppm brodifacoum) at Tawharanui Regional Park, north of Auckland- Winter 2003 trial. Unpublished report for Northern Regional Parks, ARC.