U.S. FISH AND WILDLIFE SERVICE

June 2025

Best Practices for Migratory Bird Care During Oil Spill Response

JUNE 2025

Best Practices for Migratory Bird Care During Oil Spill Response

U.S. Fish and Wildlife Service
Ecological Services, Branch of Environmental Response and Restoration
5275 Leesburg Pike
Falls Church, VA 22041-3803

Acknowledgements

The U.S. Fish and Wildlife Service (FWS) wishes to acknowledge and thank Catherine Berg, who edited *Best Practices for Migratory Bird Care During Oil Spill Response (2003),* members of the original workshop that drafted that document, and the following people who helped with this revision*:*

David Anderson — (retired) National Park Service — Fort Collins, CO
Barbara Callahan — International Bird Rescue & Research Center — Sequim, WA
Carly Costello — (formerly) Tri-State Bird Rescue & Research, Inc. — Newark, DE
Bridget Crokus — U. S. Fish & Wildlife Service — Anchorage, AK
Rebecca Duerr — International Bird Rescue & Research Center — Torrance, CA
Mandy Fischer — (formerly) Tri-State Bird Rescue & Research, Inc. — Newark, DE
Barry Forsythe — U. S. Fish & Wildlife Service — Dallas, TX
Samantha Gibbs — U. S. Fish & Wildlife Service — Falls Church, VA
Stephen Czapka — U. S. Fish & Wildlife Service — Falls Church, VA
Craig Giggleman — (retired) U.S. Environmental Protection Agency — Dallas, TX
Charlie Hebert — (retired) Focus Wildlife International — Anacortes, WA
Felix Lopez — U. S. Fish & Wildlife Service — San Juan, PR
Angela Matz — U. S. Fish & Wildlife Service — Anchorage, AK
Rhonda Murgatroyd — Wildlife Response Services — Seabrook, TX
Mike Sams — U. S. Coast Guard — New Orleans, LA
Jenny Schlieps — Focus Wildlife International — Anacortes, WA
Lisa Shender — National Park Service — Fort Collins, CO
Nicole Turner — National Park Service — Fort Collins, CO
Lisa Williams — U. S. Fish & Wildlife Service — East Lansing, MI
Michael Ziccardi — University of California — Davis, CA

This document is based on the work of many individuals and organizations in the field of bird deterrence, rescue, and rehabilitation. FWS gratefully acknowledges the generous assistance of those who permitted their publications to be excerpted or otherwise used here.

Table of Contents

Introduction

Background

Best Practices for Migratory Bird Care During Oil Spill Response, 2003 (2003 *Best Practices)* was the result of a Fish and Wildlife Countermeasures Coordination Project undertaken by the U.S. Fish and Wildlife Service (FWS). The goals of the project included the development of national "best practices" using established protocols for keeping unoiled birds away from an oil spill and for the care of oiled birds. Establishing a standardized approach helps protect wildlife resources, enables On-Scene Coordinators (OSCs) to focus on other aspects of spill response, and helps instill public confidence in response activities.

FWS determined that revisions to the 2003 document were necessary to reflect changes in rehabilitation practices and the availability of new information. A group comprised of FWS spill response personnel, wildlife rehabilitators, veterinarians, and federal response agency representatives reviewed the existing document and provided suggestions for updates. This document, *Best Practices for Migratory Bird Care During Oil Spill Response, 2025 (*2025 *Best Practices),* represents a revision of the 2003 *Best Practices* document, recognizing advances in the care of migratory birds during oil spill response.

Intended Uses

2025 *Best Practices* is intended for use by FWS and other natural resource management agencies, oiled bird rehabilitators, OSCs, and Potentially Responsible Parties (PRPs) as a guide for:

- Developing appropriate sections of Area Contingency Plans.
- Evaluating contractors for oiled wildlife (bird) response.
- Making informed choices during spill responses.
- Evaluating oiled bird rehabilitation activities to improve field practices.

The creators of this document set out to define and recommend the best practices for promoting the welfare of migratory birds during an oil spill response. Practices actually implemented will depend on factors including the size of the spill, species affected, product spilled, time of year, and location. There are significant differences between a spill affecting 10 birds and one involving 1,000 birds. It is important that spill responders and pre-spill planners recognize this difference and the degree of effort and complexity in bird response between small and large events. This document is intended to help pre-spill planners and spill responders make informed decisions to promote the best interests of birds.

Each aspect of a response, including safety, training, capture and handling, stabilization and rehabilitation, and release criteria, is addressed separately in this document. Information presented includes factors to consider with respect to migratory bird care and recommendations for reaching the best achievable standard of care.

2025 *Best Practices* is not intended for use as a training manual. It is to serve as guidance for achieving the best care possible for birds during an oil spill response. Neither is this document an exhaustive list of techniques in this field, in which practical knowledge is being continuously refined and developed. It is intended that this document will periodically be reviewed and updated. If techniques not included here are proposed during an oil spill response, FWS will seek the best and most current information for deriving an educated decision on the appropriate course of action.

Criteria for Evaluating Rehabilitation Groups

FWS and state agencies, as permitting organizations, and in coordination with the incident command and the state veterinarian, should use the following criteria when evaluating bird rehabilitators for conducting oiled-bird response. Bird rehabilitators must:

- Hold all necessary permits for bird-related response activities.
- Have experience in the capture, treatment, and care of oiled birds.
- Have experience conducting bird-related response activities within the Incident Command System structure.
- Have sufficiently trained, equipped (*Appendix* 1), and experienced staff, and the ability to train and equip personnel and volunteers, for bird-related response during an emergency response.
- Be able to quickly mobilize to perform bird deterrence, capture, field evaluation, stabilization, and transport, including to remote locations if necessary.
- Have access to appropriate facilities for treating and housing oiled birds, including the:
    - Ability to establish and operate bird intake, holding, and isolation areas within 12-24 hours of wildlife response activation.
    - Ability to establish and operate bird cleaning and pre-release areas within 72 hours of wildlife response activation.
- Have an agreement with a licensed veterinarian, experienced in the treatment of oiled birds, to provide any necessary veterinary medical care.
- Demonstrate use of best practices as outlined in this document.

Chapter

1

Responsibility & Organization

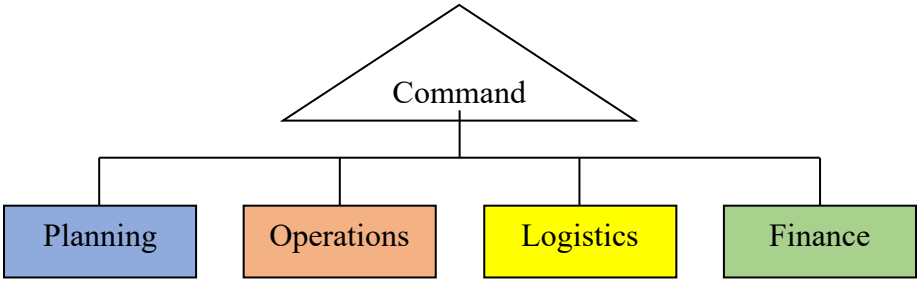
Trust Responsibilities

In the event of an oil spill, trust responsibilities for migratory birds and their habitats are given to FWS through several federal legislative statutes including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Clean Water Act (CWA), National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Migratory Bird Treaty Act (MBTA), and Endangered Species Act (ESA). States also have trust responsibilities for migratory birds within their state boundaries under various state statutes. Because of these shared trust responsibilities, both federal and state agencies are required to respond to spills, or potential spills, that may impact migratory birds. Tribal agencies may also have response capabilities and knowledge that can benefit migratory birds. To facilitate efficient and effective coordination during a migratory bird response, federal, tribal, and state agencies may consider developing Memorandums of Agreement (MOAs) or Memorandums of Understanding (MOUs) that pre-designate regional primary points of contact, establish lead representatives, and define roles for natural resource emergency situations.

Organizational Structure of a Wildlife Response

The organizational structure of a migratory bird response should fit within the Incident Command System (ICS) or the overall spill response structure. Federal directives and some states mandate use of the Incident Command System by their agencies as the emergency management system for oil and hazardous substance spill response. The Incident Command System is a standardized on-scene emergency management system designed to adopt an integrated organizational structure equal to the complexity and demands of an incident without being hindered by jurisdictional boundaries. A simplified chart of the Incident Command System response organizational structure follows:

Example: Response Organization



Command

The Command or Unified Command, which includes the state OSC and federal OSC, is responsible for authorizing and coordinating all incident operations. While the Command may include other entities such as a Responsible Party OSC, only federal and state OCSs have authority over bird-related response decisions. The OSC will coordinate with FWS and state agencies when migratory birds may be impacted to determine appropriate response measures. For incidents that could significantly impact trust resources such as endangered species, the OSC may request that an agency representative become part of the Command.

Planning

When trust resources, such as migratory birds, may be affected by an oil spill, FWS and state wildlife agency representatives will likely become involved in the response effort through the Planning Section. The representatives provide input on the protection of sensitive resources and how to minimize impacts to trust resources, like migratory birds. The spill-specific wildlife response plan created by the "Wildlife Branch" in the Operations Section identifies all bird-related response activities and is shared with the Planning Section. The Planning Section will use the wildlife plan to describe those activities in the Incident Action Plan. The Incident Command must approve all migratory bird response actions. The responsibilities of the Planning Section related to bird response include:

- Identifying sensitive areas, locating birds-at-risk, and recommending response priorities; and
- Identifying the need for consultations; and obtaining permits and authorizations required by the provisions of the Endangered Species Act, MBTA, and other wildlife laws.

Operations

A FWS or state wildlife agency representative should also serve within the Operations Section to provide oversight of the bird-related and other wildlife response activities. Bird-related response and other wildlife activities, including the operation of a wildlife rehabilitation center, are managed under the Wildlife Branch of the Operations Section. Depending on the nature and extent of the spill, such activities may include wildlife impact assessment, wildlife reconnaissance, carcass recovery, hazing, wild bird capture and transport, safety and communications, and rehabilitation and release. The responsibilities of the Operations Section related to bird response may include:

- Developing a plan for bird protection and response strategies (e.g., removing oiled carcasses, pre-emptive capture, hazing, and capture and treatment).

- Minimizing migratory bird losses during spill response.
- Overseeing and coordinating all activities of private migratory bird care groups, including those employed by the responsible party.
- Coordinating early aerial and ground reconnaissance of birds at the spill site and reporting the results to the Situation Unit Leader.
- Collecting oiled carcasses.
- Employing bird hazing measures as authorized in the Incident Action Plan.
- Recovering and rehabilitating impacted birds.
- Collecting necessary samples.
- Identifying and maintaining a central bird processing center for evidence tagging, transportation, veterinary services, treatment and rehabilitation, storage, and other support needs.
- Planning for staffing and resource needs and tracking costs associated with the bird response.

It is critical that all wildlife response activities be coordinated and communicated through the Planning Section's Situation Unit, which is responsible for maintaining the communication of incident information vital to establishing and maintaining an effective command and control environment.

Logistics

The Logistics Section is responsible for providing facilities, services, and materials in support of the incident response. Bird-related support needs are identified in the Incident Action Plan and acquired within Logistics.

Finance

The Finance Section is responsible for financial and cost analysis aspects of the spill response incident. Oiled bird response costs must be reported to the Finance Section.

Chapter 2

Safety and Human Health

Worker health and safety are the primary goals in any bird rescue and rehabilitation effort. The earliest phases of a bird-related response during an oil spill are generally the most hazardous to human health and safety. Thus, safe practices during field collection of birds must be a priority. Bird rescue programs will not be initiated unless personnel can conduct activities safely.

As with all spill response activities, the bird capture and rehabilitation efforts will be coordinated and monitored by the spill response command center operations, safety, and medical staff. A written site safety plan, in accordance with 29 CFR 1910.120(b)(4), must be developed for the rehabilitation facility and submitted to the Spill Safety Officer. If field activities are on-going for bird response, the site safety plan should be expanded to include these activities and any specialized equipment that will be used (e.g., net guns, cannon nets, propane cannons).

Summary of Safety Precautions

Bird capture and rehabilitation workers can minimize the risks associated with physical and chemical hazards by following the precautions:

- Observe all industrial hygiene safety precautions stated in the Health and Safety Plan.
- Know how to use Safety Data Sheets (SDS).
- Take all required training regarding the hazards of the work task and in the proper use and limitations of personal protective equipment (PPE).
- Be aware of and use biosecurity measures intended to protect human health and safety and the health of birds in the field and in rehabilitative care.
- Be empowered to use a stop-work order at any time a worker feels unsafe or lacks the necessary training to complete an assigned task.
- Wear PPE approved for, and appropriate to, the oil spilled to minimize contact with contaminated materials and inhalation of vapors.
- Maintain an awareness of field conditions and hazards (terrain, climate, flora/fauna, etc.) to prevent slips, trips, and falls.

- Keep all oil, cleaning compounds, and contaminated materials away from skin, face, and eyes.
- Always remove PPE and wash hands and face with soap and water or approved cleaners before eating, drinking, or smoking.
- Ensure that all oiled PPE, supplies, and waste material are placed in appropriate receptacles.
- Ensure that work areas are kept clean.
- Never conduct bird work alone; always work in teams.
- Keep birds at or below one's waist level to protect the face and eyes from pokes, bites, and scratches.
- Report all injuries and illnesses to the supervisor and Command Center medical staff.
- Be alert for over-heating and hypothermia.
- Do not overwork. Eat regularly and well.
- Never eat, drink, or smoke in bird handling areas.
- If you have immunosuppressive conditions or are pregnant, do not have direct contact with oil or birds and consult your physician prior to participating in other aspects of bird-related response activities.
- Update tetanus shots.

Training for Bird Rescue and Rehabilitation Personnel

In addition to mastering specific bird capture and rehabilitation tasks, personnel must be trained to recognize and minimize risk of injuries from oil-related and physical hazards associated with bird response operations prior to being allowed to participate in on-site activities. Elements of required and recommended training will vary depending on the tasks of the individuals involved in the response. Training-hour requirements and specific courses vary with level of involvement, agency policy, and OSHA and state regulations.

Required Training

29 CFR 1910.120(e) establishes the training required for hazardous operations site workers, including supervisors. All oiled-bird rescue and rehabilitation personnel must be trained to the minimal levels required in 29 CFR 1910.120 (e)(3)(iii). In addition, there must be adequate on-site supervision by persons who meet the training requirements of 29 CFR 1910.120(e)(4).

Recommended Training

In addition to the training required by federal regulations, further training is highly recommended (and mandated for FWS spill response personnel) for safe and efficient operations during a spill response (Table 1). The following guidance is considered the minimum essential training for oiled-wildlife responders in accordance with the goal of establishing best practices.

At a minimum, any personnel conducting bird deterrence or bird hazing activities should attend an 8-hour bird-deterrent training workshop and, if using pyrotechnics or firearms, should also attend 8-hour firearm safety training and 4-hour range training. Bird-capture, field stabilization, and bird transport personnel should attend a 16-hour basic rehabilitation skills training. Bird washing personnel should attend a 4-hour bird washing skills training session.

Personnel operating a boat should be licensed or certified with 24-hour watercraft operator safety training. Anyone riding in a boat should only ride with a certified or licensed operator. Response personnel performing field functions (e.g., bird surveys) while riding in a small aircraft should complete 8-hour basic aviation safety training. As indicated above, any personnel handling firearms should attend 8-hour firearm safety training and 4-hour range training. Each team operating in the field should have at least one person certified in First Aid and CPR. Response personnel participating in the Incident Command Center should be trained to a minimum level of ICS300.

Table 1. Summary of required and recommended training for oiled-bird response and rehabilitation.

Training / **Personnel**	HAZWOPER	ICS 100, 200, 700	Aircraft Safety	Boating Safety	Firearm Safety	First Aid/ CPR	Basic Rehabilitation Skills	Bird washing	Supervisory and Crisis Management
FWS Response[1]	R	R	R	R	R	R	-	-	H
Rehab Management[2]	R	R	-	-	-	H	H	H	H
Initial Assessment[3]	R	-	H	H	-	H	-	-	-
Bird Deterrent	R	-	-	H	H	H	-	-	-
Field Workers[4]	R	-	-	H	-	H	H	-	-
Facility Workers[5]	R	-	-	-	-	-	H	H	-

R = Required training, if performing the activity
H = Highly recommended for establishing best practices, if performing the activity
[1] = Training requirements established by FWS Director's memorandum March 9,1998
[2] = Supervisory personnel and personnel in charge.
[3] = Personnel conducting resources-at-risk reconnaissance surveys
[4] = Bird capture teams, field stabilization units, transport personnel, etc.
[5] = Bird washers, cage cleaners, pen monitors, etc.

Personal Protective Equipment

Personal protective equipment must be used in accordance with 29 CFR 1910.120 (g)(3) to protect wildlife response personnel from exposure to hazardous substances. To guard against injury from birds, all workers should wear approved PPE appropriate to their task. When workers may be exposed to oil or hazardous substances, the incident-specific Health and Safety Plan should be consulted for compatible materials for gloves and other PPE. When workers are tending birds that have been cleaned, PPE does not need to include protection from oil or hazardous substances.

Recommended PPE

- Full eye protection (e.g., goggles, safety glasses, or face shield) appropriate for the species being handled or environment in which work is being conducted.
- Oil-resistant rain gear or oil-protective clothing (e.g., coated Tyvek®, Saranex™).
- Gloves (e.g., neoprene, nitrile rubber) that are oil-resistant, waterproof, and provide protection against puncture, cuts, and tearing. Note that more than one glove layer may be needed (see below).
- Non-skid, oil resistant, and waterproof shoes/boots.
- Ear protection (muff or ear plug type) when using pyrotechnic devices or operating machinery.
- Personal flotation device when working on or near water.

Respiratory protection from organic vapor hazards may also be required for some operations. If respirators are used, respirator training and fit testing are required in accordance with 29 CFR 1910.134. (FWS personnel must obtain additional supervisory approval to operate in an environment requiring protective gear above Level D, as established in 29 CFR 1910.120, Appendix B, Part A.). All workers must be trained, in accordance with 29 CFR 1910.132(f), on the proper use and limitations of all PPE prior to using the equipment.

In addition to hazards from oil, numerous physical hazards may be associated with bird rescue activities. To protect against bites and scratches, appropriate clothing and equipment should be worn underneath the protective equipment. Workers should be aware of temperature, weather, and other environmental conditions and use PPE to guard against dangerous waters, frostbite, hypothermia, heat stress, and infectious diseases.

Potential health risks to poultry, farm, and domestic animals (including pets) exist from clothing or equipment that has been in contact with wild birds. Decontamination procedures must be established, and workers are required to return used oil spill response equipment and supplies to their supervisor in accordance with 29 CFR 1910.120(k).

Personal Safety When Handling Birds

Human safety is the primary consideration in bird handling; the safety of the bird being handled is important but secondary. In accordance with 50 CFR 21.31, bird capture and handling may only be done by trained and permitted individuals. Handling and restraint techniques appropriate for specific species need to be

applied. The *Restraint and Handling of Wild and Domestic Animals* (Fowler, 2008) serves as a preliminary guide to handling procedures. More recently, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service's (USDA-APHIS) National Wildlife Research Center published a reference document, *Capturing and Handling Wild Animals* (Schemnitz et al*.,* 2009) and FWS (2020) produced a short video highlighting bird handling techniques.

Capturing oiled birds is often physically and emotionally stressful for bird handlers. Dehydration, exhaustion, and poor nutrition can all affect a person's ability to assess and react to a dangerous situation. It is therefore important that workers stay well hydrated and eat nutritionally sound meals. Rest is equally important. A tired, stressed person, the presence of oil, and hazardous terrain are a dangerous combination. Workers should be aware of their own condition and the conditions of those around them. The safety of everyone depends on the alertness of each person.

All rescue and rehabilitation work crews should have a first aid kit on site for minor cuts and scrapes. Bites, scratches, and other injuries should be reported to a supervisor and appropriate treatment should be obtained. Each crew or team should be assigned at least one person trained to provide emergency first aid, including CPR.

Other safety issues are covered in Chapter 4, *Capture, Handling, and Transport,* page 16.

Biosecurity

Wild birds may carry diseases that are transmissible to other birds, other animals, and to people. Infectious avian diseases can be caused by viruses (e.g., avian influenza), bacteria (e.g., *Salmonella* spp., *Chlamydophila* spp., and *Mycobacterium avium*), fungi (e.g., *Aspergillus, Histoplasma capsulatum*), and parasites (e.g., tick-borne diseases or *Giardia* spp.), collectively referred to as **pathogens**. A biosecurity strategy can reduce disease transmission, particularly in facilities with high densities of compromised animals. All personnel should be made aware of potential disease transmission among wild and domestic animals and common routes of transmission (ECCC, 2022).

Additionally, personnel should be prepared for potential disease transmission between wildlife and people (i.e., **zoonotic diseases** or zoonosis) (ECCC, 2022). **People with weakened immune systems are more susceptible to contracting zoonotic diseases.** For a list of zoonotic diseases, modes of transmission, and symptoms, see *Appendix* 2. Zoonotic diseases can be transmitted to people by five primary routes (Open Sanctuary, 2022; CDC, 2021; Merck, 2023):

- Direct contact with bodily fluids (e.g., blood, feces, and saliva).
- Inhalation of pathogens (spores, bacteria) in the air.
- Ingestion of pathogens (e.g., contaminated food and water).
- Dermal (skin) contact with contaminated surfaces.
- Indirectly, via a vector (e.g., insect bites).

A biosecurity plan that reduces the risk of spreading diseases between wild birds and people, and of contracting zoonotic diseases, should be developed before the care of migratory birds begins. **An effective biosecurity plan reduces disease transmission among wild and captive birds and people but does not eliminate the risk.**

A biosecurity plan for an animal care facility should, at a minimum, include measures to:

- Limit the introduction of pathogens (Open Sanctuary, 2022; ECCC, 2022):
    - Pre-screen (and potentially euthanize) animals at a stabilization site prior to entry to the rehabilitation facility.
    - Quarantine incoming birds (i.e., separate from resident birds).
    - Segregate species known to be susceptible to diseases of current local concern from species known to be potential inapparent carriers.
    - Place antiseptic footbaths at facility entrances, exits, and key travel points within the facility.
    - Limit entry to authorized personnel.
    - Consider limiting specific personnel to specific areas of the facility and groups of birds.
    - Eliminate contact between domestic and wild species.
    - Mandate levels of PPE required of workers based on risks from current diseases of concern.
    - Use dedicated clothing (including shoes) inside the facility; direct personnel to change into and out of PPE within the facility (depending on disease risks and work assignment zones).

- Monitor for infectious diseases (ECCC, 2022):

    - Develop surveillance, testing, and isolation protocols for known endemic diseases.
    - Depending on the geographical area or current disease conditions, conduct testing on all incoming individual birds, groups of birds, or birds exhibiting signs of disease. This is very important for reportable, highly transmissible, or pathogenic diseases.
    - Maintain easily accessed lists of clinical signs for diseases of concern for workers.

- Decontaminate and sanitize to prevent disease spread (Merck, 2023; ECCC, 2022; Miller and Schlieps, 2021):

    - Wash hands thoroughly with soap and water on a regular basis, including after handling birds and before and after eating. Hand washing should be done for at least 30 seconds and should cover all portions of the hands and arms.
    - Eat, drink, or smoke in designated areas, away from birds.
    - Clean and treat all cuts and scratches immediately with appropriate antiseptic.
    - Clean and disinfect all animal care areas frequently.
    - Medicate birds to limit infections, as determined by the facility veterinarian.
    - Implement biosecurity measures including separate equipment use, antiseptic footbaths, and proper PPE.

The measures contained in a biosecurity plan may vary depending on the care facility type (e.g., field stabilization vs. rehabilitation), the type of birds being captured and rehabilitated, and disease conditions in the area. The presence of some infectious diseases (such as highly pathogenic avian influenza (HPAI)) in an area may require more robust disease prevention, monitoring, and reporting

measures (USDA, 2022; AFWA, 2022). More information about biosecurity can be found on the Merck Veterinary Manual, CDC, and USDA websites and in Miller and Schlieps (2021).

Precautions for Oil and Hazardous Substances

Bird capture and rehabilitation workers may be exposed to spilled oil and hazardous substances and must be informed of such risks in accordance with 29 CFR 1910.1200(e). Prior to handling a contaminated bird, the Safety Data Sheets (SDS) for the spilled material should be reviewed, and all recommended precautions followed (as established in 29 CRF 1910.1200(g)). A binder of SDSs should be accessible on site. In accordance with 29 CFR 1910.120(h), workers and the rehabilitation facility shall be periodically monitored using calibrated instruments and devices to determine airborne concentrations of petroleum products (e.g., benzene). Appropriate PPE is required (see *Personal Protective Equipment,* page 9). Ventilation in all work areas should prevent the buildup of airborne contaminants (see *Facility Requirements*, page 32*)*.

A portion of the rehabilitation facility should be designated for the storage of contaminated clothing, equipment, and waste (including medical waste) until the items can be decontaminated or disposed of in accordance with 29 CFR 1910.120(k)(2-5).

Volunteers

Wildlife response programs regularly use volunteers, particularly at the rehabilitation facility or for reporting observations of oiled wildlife in areas outside of those directly contaminated by the spill. Wildlife response managers should ensure volunteers are appropriately trained, supervised, and informed of all hazards in accordance with 29 CFR 1910.120(i). Volunteers should be assigned tasks according to their training and experience. A comprehensive volunteer management program is an essential component of an efficient wildlife response. This management program should address, at a minimum, volunteer safety, training, supervision, scheduling, and liability. Whenever possible, volunteers should be converted to paid employees to improve monitoring, accountability, and post-incident tracking.

Chapter

3

Deterrence

During an oil spill, it may be necessary to initiate a deterrence program that disperses and excludes unoiled birds from contaminated areas to reduce bird mortality. If warranted, deterrence activities should be initiated as soon as possible following an oil spill to prevent birds from establishing or continuing regular use of a contaminated area. Any delays may decrease the effectiveness of the program in reducing the overall number of oiled birds. Deterrent devices used to disperse birds include both visual and auditory techniques and may include both simple and sophisticated devices to respond to the unique habits of different bird species, surrounding environments, and spill conditions. Information necessary to help determine whether to begin a deterrence program includes, but is not limited to, spill location; species present; species type; time of year; availability of nearby uncontaminated habitat; and location of species in relation to the spill. This information is often captured as part of the initial wildlife impact assessment. The initial assessment is conducted during the first days of the spill and uses field-level information on actual bird impacts and ongoing risks to birds to ensure adequate personnel and equipment to mount a response. Ongoing reconnaissance captures changing conditions and informs prevention and mitigation measures.

All deterrence activities require authorization from appropriate natural resource management agencies and oversight by the designated FWS representative. Personnel must be trained and certified in bird deterrence techniques to conduct these activities. Deterrence activities must be authorized and coordinated within the Incident Command System. A communication line should be established between deterrence personnel and Air Operations to avoid potential bird/aircraft collisions.

Aerial and Ground Surveys

Reconnaissance surveys for resources-at-risk should be conducted as soon as practical following the spill. The main objective of these surveys is to evaluate the number, species and locations of birds that could be impacted by the oil spill. All surveys must be authorized and coordinated through the Incident Command System. The scope and frequency of subsequent surveys will be incident specific. Written reconnaissance survey results and maps are created by the Wildlife Branch within the Operations Section, or the appropriate Incident Command System subunit within the Planning Section if the Wildlife Branch does not have mapping capability. The maps and survey results, with locations and number of birds observed, will be used by the Planning Section's Situation Unit.

Experienced personnel are essential for effective surveillance. An observer should have the appropriate knowledge to properly identify species, record behavioral characteristics, be familiar with local area ecology,

and make other pertinent observations. Ideally, an aerial survey should be done by helicopter, but fixed-wing aircraft may also be used.

Deterrence Program Considerations

Consider the following points before beginning any deterrence operations:

NOTE: No attempt should be made to disperse oiled birds.

- Worker safety.
- Some types of oil, like gasoline, are highly flammable during the first hours following a spill, due to high concentrations of volatile oil fractions. Deterrence techniques with the potential to induce sparks (such as pyrotechnics) must be avoided in these situations.
- Potential indirect effects.
- Effects of various techniques on people if they would be used near local residents.
- The potential effects of human activity and disturbance on sensitive habitats and species.
- The potential to spread infectious disease (e.g., HPAI) when hazing highly susceptible species into new areas or increasing the concentration of birds in an area.
- Some species, especially those found associated with a human environment, are difficult to deter, especially if chosen deterrents mimic sounds or visual elements associated with that environment.
- Species life stages. Molting birds and juveniles are not easily dispersed and require a combination of different techniques.
- Awareness of oil trajectory predictions to avoid dispersing birds into areas that might become contaminated. Determine if a clean habitat can be made more attractive to birds (e.g., by temporarily limiting access to people, boats. or certain activities).
- Deterrence will be most effective if the entire area of concern can be hazed as continuously as possible. In general, do not start a deterrence operation that cannot be maintained for the required duration.
- In general, expose the area to a variety of devices and techniques, with random variations to control habituation. Be prepared to reduce frequency as events dictate.
- Automatically operated devices, which require checking only once a day or less, when staffing is limited, during bad weather, or at night.
- In general, most deterrence activities are ineffective for areas larger than seven to 10 miles in length or diameter.

- Highly mobile devices (e.g., sound-emitting buoys) that can influence large radiuses may be necessary for larger spills on water.

Remember that each spill situation is unique and preplanned deterrence activities must be viewed as tentative. The pros and cons of every deterrence operation should be evaluated in view of site- and incident-specific details and after consultation with local experts. If pyrotechnics are used, permits may be required from the local fire marshal.

See *Appendix 3* for a discussion of the advantages and disadvantages of various deterrence methods.

Pre-emptive Capture

Pre-emptive capture includes the capture, handling, transportation, short-term holding, and release of healthy, uncontaminated birds. According to 50 CFR 21.31(f)(1)(i), permitted rehabilitators are authorized to temporarily possess healthy, unaffected birds for the purpose of removing them from imminent danger. Pre-emptive capture of federally listed threatened or endangered species should not be conducted without prior consultation with, and approval by, FWS under Section 7 of the Endangered Species Act. No capture activities may be conducted in seabird rookeries. Preemptive capture must be supervised by FWS and authorized by the Incident Commander.

The pre-emptive capture response option has limited application based on species-specific criteria. The primary concerns when conducting pre-emptive capture are human and bird safety and minimizing transportation and holding times. Safety of the birds should focus on stress reduction. Minimize stress by:

- Using personnel with safe capture experience.
- Having the equipment necessary to handle and transport birds quickly and efficiently.
- Minimizing the number of vessels, aircraft, all-terrain vehicles, etc. to herd and capture birds.
- Avoiding unnecessary noise and disturbance during the capture effort.
- Never pursuing birds to the point of exhaustion (this is of particular concern with un-flighted birds during molt. or young during the breeding season).
- Minimizing human contact with birds, except to provide required veterinary care.

Pre-emptive capture techniques for birds may be the same as those used by bird banding operations, such as mist nets and herding molting or flightless birds into corrals. All techniques should be considered in consultation with FWS.

Chapter 4

Capture, Handling, & Transport

Capture

Human safety is the primary consideration before any wildlife capture efforts are made. Hazardous weather conditions, unsafe footing, icy rivers, dangerous seas, or inhalation hazards from the spilled material may preclude a bird rescue attempt. In addition, captured wild birds are often aggressive and should be regarded as dangerous in any sort of confining situation. Only authorized, permitted, and trained individuals may undertake the capture and treatment of oiled birds. Teamwork is essential to minimize additional stress to the birds. To capture and handle oiled birds, rehabilitators must have appropriate licenses and permits in accordance with 50 CFR 21.31. Landowner or land manager permission may be necessary to access capture sites. All capture activities are developed within the Wildlife Branch of the Operations Section or the Planning Section, coordinated within the Incident Command System, and must be authorized by the Incident Command.

A bird capture program should be implemented as early as possible in a spill response to increase the survival rate of birds. Captured birds should receive medical evaluation and preliminary treatment as quickly as possible, so setting up a stabilization area is as urgent as beginning bird capture. The conditions under which oiled birds may be captured can vary widely from one spill to another. A variety of capture methods and techniques may be employed to maximize capture success. The effectiveness of rescue efforts will be influenced by factors such as time of year, type and amount of material spilled, species involved, local terrain, tides, and weather. Birds can be safely captured and transported in a variety of challenging conditions when rescue workers adhere to the following basic guidelines:

Capture Guidelines

- Ensure personnel are trained.
- Put safety first.
- Wear protective clothing.

- Work in teams; never work alone.
- Report injuries.
- Do not allow the presence of domestic animals.
- Do not continue to pursue animals to the point they become exhausted.
- Create a capture strategy using the summary of bird characteristics, natural history, and specific species concerns, located in *Appendix 4,* as a preliminary reference.

Capture Planning

In addition to trained personnel, well-developed plans will contribute to a safe and successful capture program.

Reconnaissance Plan

The reconnaissance plan describes the steps rescuers will take to survey birds in oiled waters and land. The reconnaissance plan should include surveys of nearby feeding, loafing, and roosting areas to detect oiled birds that have moved away from contaminated sites. Knowledge of the local area ecology is critical.

Capture Plan

Capture plans are site-specific and address the following:

- Safety of personnel and birds from chemical and physical hazards.
- PPE and clothing.
- Capture equipment and methods.
- Site access and egress.
- Bird approach and disturbance of unoiled birds.
- Adequate search coverage.
- On-site holding.
- Data collection at time of capture (field retrieval datasheet to be provided at intake).
- Special site considerations (e.g., sensitive habitat, rookeries, habitat use by taxa other than birds, cultural resources, and historic properties).
- Species prioritized for capture, as provided by FWS and state wildlife agencies.

Safety Plan

A safety briefing or plan must be approved by the Incident Command System Safety Officer and available to all members of the capture team. The safety plan includes required PPE, communication instructions, and separate contingency plans for on-land and on-water capture activities, as appropriate. The plan should also include hazards from forecasted weather, terrain, and bird species.

Communications Plan

A communications plan for the capture program needs to be part of the site safety plan. The communications plan identifies the method of communication that will be used by the capture team, types of communications equipment (e.g., radios, cell phones), and how the capture program communications will be monitored. It may be useful to have a designated dispatcher at the stabilization or treatment facility to assist capture teams.

Capture Equipment

An equipment maintenance and inventory-keeping schedule is an essential element of a successful bird capture program. Capture equipment and supplies need to be regularly maintained and restocked to ensure availability, cleanliness, decontamination, and good working condition during an oil spill. The equipment should be readily accessible and easily mobilized. Staging capture equipment in multiple locations can help reducing response time.

Capture Technique

Effective capture of oiled birds occurs swiftly with minimal pursuit and noise, uses correct techniques based on the species pursued and local conditions, and exposes oiled birds to the least amount of stress. Knowing the pursued species' natural history and behavior will increase capture success while decreasing stress on the birds. Unless specifically authorized by FWS, no normal, healthy, unoiled birds may be captured. No capture activities may be conducted in pinniped or seabird rookeries. All bird carcasses discovered during capture need to be collected to prevent secondary oiling. Capture teams should receive guidance from FWS regarding carcass collection protocols and how to record the location and condition of each carcass prior to collection. (See *Dead Oiled Bird Handling,* page 22). Only appropriately trained and permitted individuals, in accordance with 50 CFR 21.31, may carry out the capture of raptors.

The most common capture techniques use dip nets, net guns, and mist nets. Other techniques have been developed to target specific species groups (e.g., the use of foot traps for small shorebirds). The use of spotlights at night is sometimes employed for birds that are especially skittish and difficult to approach during the day.

A capture team consists of two or more people wearing appropriate protective clothing and carrying the capture equipment most likely to be needed. The team should evaluate each capture site and develop strategies to suit the terrain and species being pursued. Prior to entering the search area, the team should form a plan of action, keeping in mind that alternative plans and equipment should be available if the primary plan fails.

Capture by Boat

The first priority in the collection of oiled birds is to deal with birds already beached. Approaching and capturing birds from a boat is considered a secondary strategy. Oiled birds are under stress and should be allowed to come ashore at their own pace. Chasing an oiled bird by boat will use up more of the bird's energy reserves and subject it to further stress. When pursuing birds by boat is necessary, it is important to know the birds' diving habits for best capture results. If capture is not accomplished after repeated (3-4) attempts on the water, a judgment should be made to either back away and allow the bird to come onto land itself or continue pursuit, which may result in the bird drowning. All personnel working near water must wear personal flotation devices.

Bird Handling

All bird handling should be done in a manner that minimizes stress to the bird and ensures that the bird does not injure itself or the handler. Birds have different weapons and strategies for defense, so it is important that oiled birds be handled correctly. The chasing, capturing, and confinement of oiled birds will also increase their susceptibility to secondary and stress-related problems. Use of proper techniques will minimize stress and maximize efficiency. Only authorized, permitted, and trained individuals may handle oiled birds.

The Safety Data Sheets (SDS) for the spilled oil should be reviewed prior to handling a contaminated bird. Birds should be carefully handled through light coverings that minimize damage to the bird's feathers and human exposure to oil. Coverings include sheets, towels, and gloves. No oiled birds should be handled with bare hands. Light gloves and coverings are selected to eliminate skin contact with oil and to afford protection from pecks, bites, and scratches; heavy or bulky gloves are not recommended because they reduce people's dexterity and can result in injury to the bird.

Appropriate Bird Handling

- Wear appropriate personal protective gear, including gloves and eyewear.
- Handle clean birds with clean gloves and equipment.
- Be alert for occasional and unexpected sharp foreign objects, such as fishhooks, in birds.
- Approach a bird from behind or the side; place a towel, sheet, or other light covering over the bird.
- If towels and blankets are unavailable, gain control of a bird's head by grasping the beak where it joins the head, by controlling the neck at the base of the skull, or by cupping the skull with a gloved hand.
- Gain control of a bird's feet to avoid injuries from thrashing and kicking.
- Fold the wings into the bird's body and pick it up while controlling the head.
- Hold birds at waist level and away from the face and other people to avoid injury from pecking and biting.
- Work in teams and request assistance if needed.

NOTE: It is inappropriate to mechanically restrict the bird (e.g., tape, rubber band) from opening its beak/bill.

Appropriate handling techniques are based on the size and species of the bird. For example, small birds, such as shorebirds, are cupped in the hand and placed in small non-plastic, non-abrasive bags (e.g., pillowcase or small cloth bag). The basic technique for medium-sized birds, such as ducks or murres, is a two-handed body hold, making sure to not restrict the bird's breathing. Large birds, such as geese, are usually controlled using the buddy system to ensure a proper hold on the bird. References such as *Restraint and Handling of Wild and Domestic Animals* (Fowler, 2008) and Schemnitz et al. (2009) provide more complete descriptions of bird handling techniques. Aggressive birds may require additional restraint of the head and/or feet and should only be handled by personnel experienced in such techniques.

NOTE: The handling of raptors should be left to appropriately qualified and experienced personnel.

A summary of bird characteristics, natural history, and species-specific concerns is presented in *Appendix 4*.

Containers

Captured birds should be immediately placed into containers that provide safety for both the bird and the handlers. These include well-ventilated, solid-sided carriers such as modified cardboard boxes, plastic carriers, or shipping kennels. Containers should be constructed to meet the hazards and conditions of transportation. Occasionally, qualified, experienced personnel may elect to use pillowcases as temporary field transport containers for small birds due to difficult terrain/access or weather conditions. All containers must meet the following requirements:

Bird container requirements

- Secure lids and tops to prevent escape.
- Sufficient space inside for comfort, but not enough to allow injury.
- Paper or cloth towels on the bottom of the container to absorb oil.
- Adequate ventilation on all sides.
- Labeling to include date, time, location of capture, species (if known), injury (if applicable), and name of person capturing bird.

Each container should contain only one bird unless determined safe to do otherwise by qualified, experienced personnel. If necessary, some gentle, gregarious birds of the same species, such as murres or ducks, may be placed two or three to an appropriately sized container.

Species that can be containerized with other individuals of the same species

Guillemots
Auklets
Murres
Gallinules
Coots
Ducks (except Scoters)
Mergansers
Geese
Terns
Sandpipers
Eared Grebes
Horned Grebes

Birds placed in the same container should be strong, stable, and equally affected by oil. Containers should be checked 5-10 minutes after placing birds together to ensure compatibility.

Conditions for Contained Birds

- Pay attention. Do not leave containers with birds unattended.
- Place containers in a safe and quiet location (e.g., away from noise and activity; above high tideline).
- Minimize temperature extremes (e.g., hot sun).
- Space containers to ensure sufficient ventilation.
- Keep containers away from oil vapors.

When taking birds to a central stabilization/transport site or rehabilitation facility, do not leave them unattended. Containers should be handed over to a site worker. Convey to the site worker, in writing and orally, information about the bird's condition, the location the bird was found, and other important information.

Field Stabilization

Chemical hazards to people also apply to birds. Attempts by oiled birds to clean their feathers through preening can result in oil ingestion and irritation of sensitive membranes of the eyes, mouth, lungs, and digestive tract. In addition, once feathers become matted, weatherproofing and insulating properties are lost, leading to either rapid chilling or overheating. Other problems may occur when food sources become contaminated, or when birds cannot fly or swim well enough to feed adequately. Despite being on water, oiled birds frequently experience dehydration and electrolyte abnormalities.

Oiled birds that are captured by appropriately trained field teams may require stabilization in the field before being transported to an off-site rehabilitation facility. (See *Training for Bird Rescue/Rehabilitation Personnel*, page 7). Field stabilization is provided to oiled birds that are likely to remain in the field longer than 2-3 hours.

Field stabilization is a "first aid" method, rendered only by trained personnel, for administering temporary care and initial treatment to quickly mitigate the effects of oiling on birds soon after capture. This field treatment increases the oiled bird's chances for successful cleaning, rehabilitation, and eventual release. Field stabilization does **not** include washing or taking blood samples, which can stress the bird and is difficult to accomplish effectively in the field.

Steps For Field Stabilization

- Clear mouth, nostrils, and eyes. Heavily oiled birds may have debris and oil built up in their mouths and nostrils, which may impair their breathing. These foreign materials must be removed prior to any additional treatment being rendered.

- Regulate temperature. Oiled birds lose their ability to thermoregulate. When possible, take the bird's temperature and keep warm or cool as appropriate. Once a bird's body temperature is normal, monitor the bird closely monitored for visual signs of chill or overheating.

- Treat for dehydration. Oiled birds are almost always significantly dehydrated and need to be gavaged fluids (fed by stomach tube) on a regular schedule, beginning at field stabilization and continuing as long as presenting conditions do not contraindicate the administration of oral fluids. Lactated Ringer's solution (LRS) or normal saline 0.9% (NS) are recommended for treating dehydration. If Lactated Ringer's or normal saline is unavailable, plain water can be used.

- Minimize stress. Place birds in a safe, quiet, warm, ventilated area away from drafts, human disturbance, and other noises.

- Record field treatments. Transmit treatment records for individual birds, or for groups of birds when treating large numbers of birds, with the bird(s) when they are checked in at the rehabilitation center.

Dead, Oiled Bird Handling

During an oil spill response, all carcasses should be collected to prevent secondary oiling. Oiled bird carcasses should be collected in accordance with incident-specific instructions and chain-of-custody protocols provided by FWS. (See *Records*, page 40). The designated local FWS representative will coordinate the collection, storage, and handling of any dead migratory birds with FWS' Division of Law Enforcement. When collected, each bird carcass is placed in an individual paper bag placed in an outer plastic bag. Where cause-of-death analysis is important, each bird must first be wrapped in clean foil prior to placing in the paper bag to ensure the carcass does not contact the outer plastic bag and potentially contaminate the hydrocarbon sample. Each carcass is labeled with the date, time, location, species (if known), and collector's name; taken to a designated morgue location; and placed in a refrigerated unit. The Alaska Regional Response Team's (ARRT, 2023) Wildlife Protection Guidelines for Oil Spill Response in Alaska provides a more in-depth description of the carcass collection protocol with a job aid and examples of necessary forms for record keeping.

Bird Transport

Captured birds should be moved to an appropriate stabilization or treatment center at the earliest opportunity. Only appropriately trained personnel may transport birds (see *Training for Bird Rescue/Rehabilitation Personnel*, page 7). Birds should be placed in secured containers before being transported to protect them from injury or escape during the transport process. Each transport container should only contain one bird, except for non-aggressive, compatible species, which may be transported with two to three individuals of the same species per appropriately sized container (see *Containers*, page 20).

It is preferable to transport birds in an enclosed vehicle. If birds must be transported in an open vehicle or skiff, all containers should be secured to the vehicle with rope or straps prior to transport. Make sure to compensate for cold outside temperatures and wind chill when moving birds in an open vehicle. Adequate space (at least 1-1/2") should be left between containers during transport to allow sufficient airflow through side vents (top vents alone are not adequate). Freshly oiled birds typically emit hydrocarbon vapors; therefore, always maintain adequate ventilation in the vehicle to protect both people and birds from inhaling such vapors. Containers should be secured to prevent load shifting that could cause the containers to slide together and impede air circulation.

Temperature control and monitoring are critical during transport. Wet birds may require an ambient temperature close to 80°F to be comfortable during transport, while dry oiled birds will require a cooler environment. Birds are acclimated to seasonal temperatures in their environment; geographical variation in comfortable temperatures should be anticipated. Note that birds may overheat inside an air-conditioned vehicle when containers are exposed to direct sunlight. Keep in mind that human comfort during transport may not be the same as the temperature and ventilation needs of birds being transferred.

Birds should be monitored periodically on transports longer than one hour, as directed by the response veterinarian. For trips longer than four hours, birds should be hydrated periodically during the transport. Critical cases require more frequent monitoring. The person transporting birds must maintain contact with the field capture team and the rehabilitation facility to ensure timely departures and arrivals.

Summary of Transport Practices

- Allow 1-1/2" between containers for ventilation.
- Only 1 bird per container unless they are non-aggressive, compatible species.
- Maintain the air temperature inside vehicle at 70°F or higher if birds appear cold.
- Monitor birds periodically; more frequently if unstable.

NOTE: No domestic animals should be allowed in transport vehicles.

Chapter

5

Stabilization and Rehabilitation

In accordance with 50 CFR 21.31, FWS issues permits for migratory bird rehabilitation. A rehabilitation permit is required for the capture, care, and treatment of oiled migratory birds. Only those individuals trained and experienced in oil spill response bird stabilization and rehabilitation techniques may care for oiled birds (see *Training for Bird Rescue/Rehabilitation Personnel,* page 7). During an oil spill response, the Incident Command must authorize all bird rehabilitation activities. These activities are developed within the Wildlife Branch of the Operations Section, in coordination with the Environmental Unit of the Planning Section of the Incident Command System and implemented within the Wildlife Branch of the Operations Section.

The goal in rehabilitating birds during an oil spill response is the release of a healthy bird back into its natural environment. The stabilization procedures described in this section (like those described under "Field Stabilization" in the previous chapter) represent the first medical treatment an oiled bird receives after capture. Stabilization procedures are performed at a designated stabilization site or the primary rehabilitation center. Stabilization should be initiated as soon as possible and is generally provided as supportive care for the first 48 hours prior to being washed.

General Guidelines for Oiled Bird Stabilization

- Stabilize within 2 to 4 hours of capture.
- Minimize stress. Handle the birds as little as possible. Prepare treatments ahead of time. Keep noise to a minimum. Speak in a low voice. Provide visual barriers or "hides" so that the birds do not have to constantly see people or other birds. Predatory species should be housed away from other species.
- Provide appropriate temperature control and ventilation. Oiled birds typically cannot regulate their body temperature and are susceptible to secondary diseases caused by poor ventilation.
- Evaluate oiled birds and consider euthanasia of high-risk birds. Unnecessary suffering should be alleviated and limited resources should be dedicated to birds with a better chance of survival. (See *Euthanasia*, page 27).

- Prevent health risks to people and to other birds. Wear protective eyewear, protective clothing, and masks (if appropriate) when handling oiled birds. Isolate birds with signs of infectious disease. Understand the physical dangers associated with the handling of each species. Secure treatment for injured people, clean all cuts thoroughly with an antiseptic, and obtain medical attention for major wounds.

- Keep complete and accurate records. This helps ensure that each bird receives appropriate medical care. A sequentially numbered, plastic leg band or equivalent ID tag should be applied to identify each bird while in care. (See *Records*, page 40).

Federal regulations require a written agreement with a licensed, oil spill-experienced **veterinarian-of-record**, who will provide medical supervision and oversight during a bird-related response (50 CFR 21.3(c)(5)). The veterinarian is responsible for all medical aspects of the capture and treatment program but does not necessarily have to be physically present during all bird treatment and care actions.

Veterinarian-of-Record Responsibilities

- Joint decision-making with rehabilitation personnel.

- Use of controlled substances (e.g., sedatives, euthanasia).

- Necropsy supervision.

- Triage and pre-release evaluation.

- Quality of medical records.

Evaluation and Admission

The evaluation and admission process involves collection of biomedical data on individual birds to establish the medical and rehabilitation courses of action necessary to care for that bird. **All** personnel performing bird evaluation and admission must wear appropriate PPE to protect them from exposure to oil and potential injury from birds. Additionally, steps should be taken to minimize stress to birds during this process, including speaking in a low voice and rapidly completing the examination to reduce bird handling time.

When prioritizing multiple birds of the same species, treatment prioritization is based on the nature and extent of oiling, physical examination, and blood laboratory tests. Medical attention should be given to those with the greatest probability of survival. Four criteria may be used to establish prognosis: (1) packed cell volume (PCV)/total solids (TS) determinations, (2) body weight relative to norm for the species, (3) body temperature, and (4) physical exam results. Birds that do not meet criteria may be quickly and humanely euthanized to alleviate suffering and to focus resources on less severely affected birds that have a greater chance of rehabilitation.

However, when multiple species are presented for triage, prioritization by species may also be necessary. For example, an individual of an endangered species or a species of special concern with a low probability of survival may be given priority over an individual of a common or exotic species in better condition. Similarly, species more susceptible to secondary injury from captivity (e.g., loons and grebes) may be

prioritized over species less susceptible to iatrogenic injury (e.g., mallards and Canada geese). The incident-specific wildlife recovery and rehabilitation plan addresses species prioritization as an integrated parameter of triage. The designated FWS and state representatives establish the species prioritization, in close consultation with the veterinarian-of-record.

General Steps for Evaluation and Admission

- Start an individual record for each bird.
- Review and record data provided by the field team: capture location, date, time, chain-of-custody information.
- Place a temporary identification band or tag on each bird.
- Record general bird information: ID number, species, age class, sex (if possible).
- Record the overall impression of bird's clinical status (e.g., depressed, hyperactive, alert).
- Record extent and degree of oiling: area(s) of body, degree (heavy, moderate, light, no visible oil), and depth of oil penetration.
- Perform physical examination: record temperature, weight and body condition, presence of overt injuries/disease states, oil-related effects, etc.
- Perform stabilization treatment: manually remove excess oil from nares, mouth, and vent; flush eyes with a sterile saline or equivalent solution; and administer hydration using a balanced electrolyte solution.
- Collect samples: take a blood sample to determine packed cell volume (PCV) and total solids (TS); an oiled feather sample (for evidentiary purposes); a photograph of the bird (for evidentiary purposes); and other specialized samples for additional biomedical diagnostics, as warranted.

Additional Medical Therapies That May Be Warranted

- Parenteral (e.g., not oral) fluid administration.
- Prophylactic use of antifungals (e.g., itraconazole).
- Start of treatment or isolation for overt clinical disease or injuries.
- Start of treatment for hematological abnormalities.
- Treatment of vomiting and seizures.
- Initiation of additional diagnostics when indicated (e.g., blood chemistry panels, complete blood counts, radiographs, or cultures).

Inappropriate Treatments During Admission

- Prophylactic use of antibiotics, eye ointments, or anti-parasitics, in the absence of clinical signs.
- Oral administration of mineral oil.
- Application of pretreatment solutions/solvents.
- Washing bird immediately after initial evaluation and admission.

Euthanasia

During an oil spill response, it may be necessary to humanely euthanize birds. For each spill where bird rehabilitation is undertaken, the bird rehabilitator will prepare a written euthanasia plan in consultation with the designated FWS representative. The plan will consider species, spill, and regional characteristics, including relevant state policies and laws.

Euthanasia is appropriate for any oiled bird with injuries that render it unable to survive in the wild or unsuitable for use in captivity (50 CFR 21.31(e)(3)(ii)). Such injuries include fractured limbs (particularly those affecting a joint), injuries to the beak, extensive soft tissue injuries, and significant visual or auditory deficits. If birds are euthanized in the field, they will be collected following the procedures outlined in Chapter 4 of this document. To prevent secondary contamination or poisoning, euthanized carcasses should never be left in the field.

See *Appendix 5* for additional euthanasia guidelines.

Necropsy

Valuable information can be gained from necropsies of dead birds. This information can be used both to refine treatment protocols for live birds during spills as well as to collect data on the successes and limitations of the rehabilitation process. The spill response veterinarian-of-record should conduct or supervise all necropsies, in consultation with the designated representative of FWS. Prior to conducting a necropsy, FWS representative and veterinarian will agree on which forms to use; which samples to collect (e.g., tissues, feathers); how those samples will be prepared, preserved (e.g., in formalin or frozen), stored, and shipped; and where samples will be analyzed. Reports should be prepared and all samples handled and stored using appropriate chain-of-custody protocols, provided by FWS.

Cleaning

The structure of a bird's feathers provides insulation and waterproofing. When a bird is oiled, waterproofing and insulation capabilities are lost, which may lead to hypothermia. Additionally, inhalation of volatile components of oil; ingestion during preening, drinking, or eating; and oil-induced dehydration may damage the lungs, gastrointestinal and hematological systems, liver, and kidneys.

Due to these potential effects, oiled birds must be medically stabilized for a minimum of 24-48 hours, after which they should be evaluated to ensure they meet the health criteria below before cleaning. The cleaning process is stressful to birds and care should be taken at every step to reduce that stress. Birds should be

monitored for signs of stress or instability during the washing, rinsing, and drying processes. Handlers must work in teams when handling birds during the cleaning process.

Bird Health Criteria for Cleaning

- Bright, Alert, Responsive (BAR); judged stable.
- Stable internal temperature.
- Packed cell volume (PCV) and total solids (TS) within 90% of normal values.
- Exceptions as determined by veterinarian on a case-by-case basis.

Wash Water Criteria

- Pressurized and adjustable system with water delivery at 40-60 psi.
- Temperature 102 to 108°F depending on species, type of oil, and condition of the bird.
- Hardness of 2-5 grains per gallon (some variation in species requirements).
- Large volumes of water with these characteristics available.

Cleaning-agent Criteria

- Able to remove oil from feathers without damaging feather structure or irritating skin and mucosal surfaces.
- Non-toxic.
- Leaves no residue.

NOTE: The only bird cleaning agent previously recommended was Dawn® dishwashing liquid (regular, not anti-bacterial formula) because it removes oil from feathers; is non-toxic; and does not leave a residue. However, that formulation can be difficult to obtain in some instances. Recent studies indicate that other products are acceptable, such as Palmolive® *Ultra* and Seventh Generation® dish soaps. Other methods or products are not recommended for use or testing during an oil spill.

NOTE: Pretreatment agents are used only when absolutely necessary because they are an additional substance that must be removed. Methyl oleate or methyl-soyate are both appropriate agents for pre-treatment of tarry feathers, under close supervision, but must be warm when applied and washed off within 30 minutes.

Drying

The most effective means of drying most bird species is to maintain an ambient air temperature between 90 to 95°F using a pet dryer. Other heat sources, such as heat lamps or brooders, may be more appropriate

for some species including most shorebirds. Blow dryers used for human hair should not be used for wildlife because they can cause severe burns to the delicate skin of birds. Birds should be continually monitored during the drying process to ensure that they do not become overheated. Using net-bottom pens for most water birds will reduce the chances of overheating and allow for better circulation of warm air to ventral (belly) feathers. Some species (e.g., eagles and pelicans), however, require the use of pens with solid floors.

Waterproofing of Water Birds

After water birds (e.g., ducks, murres) are washed and determined to be dry, they are given access to freshwater pools for swimming. Birds are checked regularly to monitor for chilling and incomplete waterproofing. A seabird is considered "waterproofed" if it exhibits normal behavior, body temperature, and buoyancy after 48 hours in a pool with no haul-out. Some reasons for a lack of proper waterproofing may include incomplete removal of oil, incomplete or non-optimal rinsing, underlying injury or disease, poor pool-water quality, and feather loss or damage.

Waterproofing of Terrestrial and Wading Birds

After a terrestrial or wading bird is washed and determined to be dry, it is given access to fresh water for drinking and bathing. Additionally, misting the bird will encourage preening and test for waterproofing. Terrestrial birds should display waterproofing appropriate for their species.

Husbandry

Husbandry encompasses the housing, hygiene, and nutritional aspects of maintaining wild birds in captivity. The goal in rehabilitating oiled birds is the release of healthy birds back into their natural environment. To achieve this goal, it is necessary to treat the presenting problem —injury from oiling— as well as to prevent secondary infections or injuries that may occur while keeping birds in captivity. The key to quality husbandry during an oil spill response is an emphasis on herd-health management.

Housing

Injuries or illnesses from improper captive housing can be a serious problem in the rehabilitation of oiled birds. Appropriate housing can reduce or prevent problems such as pressure sores, feather contamination, foot lesions, and infectious disease transmission. To maximize the chances of survival and release of healthy birds, the following best practices for good housing design and maintenance should be followed:

- Construct pens according to the needs of the species affected.
- Allow appropriate space based on species need.
- Provide padding as necessary.
- Avoid cages with wire walls or floors as these can cause feather damage, beak trauma, and foot lesions.
- Avoid solid floors for species susceptible to keel sores or fecal contamination of feathers.
- Provide perches as required.
- Provide for an adequate thermal gradient (combination of ambient air temperature and radiant heat source) appropriate for birds to maintain normal body temperature.

- Avoid placing washed (clean) birds in housing that previously held oiled (contaminated) birds to minimize the risk of re-oiling clean birds.

- Maintain high water quality through water exchange or overflow to eliminate waterproofing problems by re-contaminating feathers.

- Provide haul-outs as required, considering waterproofing and pre-release condition.

Disinfecting

Preventing disease transmission relies on effective disinfecting and sterilization of all inert objects used to treat the birds. In addition, consistency in technique and frequency of cleaning procedures will help ensure that optimum cleanliness is maintained throughout the response effort. Personnel should be trained in standard cleaning procedures so that these procedures become routine.

Important Disinfecting Guidelines

- Know which pathogens are likely to occur; match disinfectant agents and procedures for best results.

- Clean and disinfect transport cages, holding pens, and restraint equipment after each use. Outdoor steam-cleaning is the preferred method.

- Change papers under net-bottom pens at least twice a day.

- Complete water turnover at least every 4 hours to provide the most effective water filtration or overflow in pools.

Nutrition

Birds should be given sufficient food to increase body weight. Sufficiency is determined by the nutritional value of the food, based on a metabolic formula and the underlying body condition and health status of the bird.

Nutritional and Food-Handling Guidelines

- Food Types and Delivery: In most cases, gavage-feed birds a high-calorie, digestible food slurry prior to washing. For cleaned birds, provide solid food, appropriate for the species, in dishes or containers in a manner that prevents re-soiling of feathers. Feed birds within pools non-oily food in a manner that mimics feeding in their natural environment. Allow all birds grouped together, whether in an enclosure or pool, an opportunity to feed. Keep feeding records for each bird, or pen of birds when housed in large numbers.

- Cleanliness: Wash hands prior to, and after, handling food. Thoroughly clean and disinfect all food preparation utensils and containers after each use.

- Storage: Properly label and store all food in freezers, refrigerators, airtight containers, etc. to prevent contamination and spoiling. Store bird and people food separately. Labels should include the item's name and the date first opened or used. Monitor temperatures of refrigerators, freezers, thawing tubs, and food handing areas to ensure food quality.

Ongoing Health Assessment

After washing, birds must continue to be assessed to determine whether additional medical and rehabilitation intervention is necessary prior to release. These procedures, while not as intensively instituted as during intake, include the same basic components: assessment of hematological values (PCV, TS), evaluation of nutritional state (through successive weighing and assessment of flesh tone), and behavioral observations in pools or pens to gauge appropriate feeding activities, social interactions, waterproofing, and other behaviors. All birds should be handled either with washed hands or powder-free gloves (to maintain waterproofing status) and only non-contaminated exam equipment and areas should be used for assessments. Additional pre-release rehabilitative care may be necessary for some individuals; if birds need to be kept in a hospital situation for an extended period, rewashing may be necessary.

Chapter

6

Facility Requirements

The size and configuration of a rehabilitation facility will vary depending on location and need. Not all spill responses will require the use or be in the vicinity of a permanent bird rehabilitation facility. The size of the spill, its location, and the number of birds oiled will determine the type and location of a facility that can meet the required need. There are three types of oiled bird rehabilitation facilities: fixed, permanent facilities; temporary facilities established in local, fixed structures; and mobile units brought temporarily to a spill location.

The minimum standards for bird rehabilitation facilities are described in 50 CFR 21.31. It is critical that spill responders and pre-spill planners recognize the degree of effort and complexity required to implement a migratory bird response and establish an adequate facility. Pre-spill planning is encouraged to achieve wildlife response systems that are appropriate to the scale of a response. For best achievable care standards, entities planning or authorizing oiled-bird rehabilitation facilities are encouraged to consult with others who have constructed permanent facilities, operated temporary facilities, or conducted facility planning (e.g., OWCN; International Bird Rescue; Tri-State Bird Rescue and Research, Inc.; Focus Wildlife International).

Regardless of the type of facility used for bird rehabilitation during a spill response, the following requirement guidelines apply:

Facility Setup

- Establish and operate intake, holding, and isolation areas within 24 hours of wildlife response activation.
- Establish and operate bird cleaning and pre-release areas within 48 hours of wildlife response activation.

Facility Layout (traffic flow)

- Separate contaminated and uncontaminated areas with a de-contamination area, to eliminate cross-contamination from oil and disease.

- Ensure that the facility layout minimizes audio and visual stimuli (e.g., human traffic and noise) to reduce stress to birds.

- Ensure that the layout facilitates the "traffic flow" of birds through the admission, rehabilitation, and release process.

Established Bird Areas (within a Facility)

- Intake
- Holding
- Wash and rinse
- Drying
- Pools and outdoor caging
- Food preparation
- Hospital and isolation
- Morgue and necropsy
- Storage

In certain situations, and depending on the spill characteristics, areas may have multiple designations (i.e., intake may need to occur in the holding area). However, designations should still follow the above indicated "traffic flow" requirements.

NOTE: As a general guideline for estimating sufficient space for the bird holding area within a facility, including walking and aisle space, allow 6 square feet per average-sized (1 kg) bird. More space may be needed for larger birds.

Facility Temperature

- Maintain air temperature between 65-85°F, adjustable within 2°F increments, in all intake, pre-wash, wash, holding, and hospital areas.

- Maintain the ability to warm or cool individual bird enclosures as needed.

- Maintain temperature in all remaining areas to meet human comfort needs.

Air and Ventilation

- Provide fresh air exchanges via an air/ventilation system that ensures healthy air quality (as indicated by low odor levels, prevention of mold or mildew growth, and minimal dust particles). Use of HEPA filters is highly recommended.

- Optimal: In bird areas, a minimum of 10 to 15 air exchanges per hour, to minimize disease risk.

- Optimal: In human areas, a minimum of 8 air exchanges per hour.

Electricity

- Maintain a reliable electrical supply sufficient for all electrical needs including heating, lighting, ventilation, air conditioning, water heaters, pet dryers, heat lamps, blenders, freezers, refrigerators, pool filters, and computers.

- Provide Ground Fault Interrupters (GFI) in all areas where circuits may be exposed to water.

Water Supply

- Temperature: Provide washing and rinsing water temperatures of 102 to 108°F while maintaining an additional hot water supply sufficient for other uses (e.g., laundry, cleaning, food preparation, warm-water pools).

- Pressure: Provide water pressure at 40-60 psi in wash and rinse area while maintaining sufficient water pressure for other activities (e.g., doing laundry, washing dishes).

- Quantity: Provide supply line(s) large enough for all areas requiring water simultaneously (e.g., washing and rinsing area, pool area, laundry). The quantity should be sufficient to provide a continuous flow of 4 gallons per minute to all indoor outlets along with additional flow for pools.

- Quality: Maintain a water hardness of 2-5 grains per gallon for all bird wash and rinse stations and waterproofing pools. Provide a source of potable water for human use.

Waste Water

- Facilitate disposal of all oily wastewater in accordance with the incident Waste Management Plan and appropriate federal, state, and municipal regulations.

- Facilitate disposal of all gray water (e.g., rinse water, pool overflow) in accordance with appropriate federal, state, and municipal regulations.

- Control storm water and other runoff, as appropriate, to prevent contact with gray water and oily wastewater.

Solid Waste

- Facilitate disposal of all solid waste in accordance with the incident Waste Management Plan and appropriate federal, state, and local hazardous waste, municipal solid waste, and biological waste laws and regulations.

- Ensure that disposal of carcasses proceeds under the direction of the designated FWS representative.

Outdoor Areas

- Maintain a perimeter of restricted access from the public to outdoor areas.
- Provide outdoor space typically as large as the footprint of the facility itself (buildings or structures); may be larger depending on the species.
- Provide sufficient pool size as dictated by release criteria and species (e.g., to demonstrate that grebes can fly, flight space must be provided within the outdoor enclosure).
- Locate the facility in a place that minimizes visual and auditory stress to birds.
- Provide vehicle access and parking.

Non-Bird Areas

- De-contamination area.
- Administration area (e.g., sign in, volunteer orientation, training, record keeping).
- Rest areas and rest rooms for workers.
- Sufficient space for human food storage, preparation, and dining.

Security

- Provide controlled access to the facility and any associated outdoor areas (e.g., pools, bird enclosures).

Pest Control

- Develop and maintain a pest control plan for rodents and insects.
- Develop and maintain a plan for predator exclusion.

Communications

- Ensure adequate access to phones and computers with internet access for all rehabilitation personnel.
- Maintain communication, via radio or cell phone, with all field capture teams and field stabilization units.

Visitor Control

- Coordinate and facilitate all visits by news media through the Joint Information Center within the Incident Command System.
- Limit visitors to no more than two per day.
- Limit the number of persons per visit to minimize stress to birds.

Chapter 7

Release

Release Criteria

The goal of rehabilitating oiled birds is to release healthy birds back into their natural environment. At the time of initial intake, the bird rehabilitator should prepare a release plan for rehabilitated birds, in consultation with the designated FWS and state wildlife agency representatives. The plan is submitted to the Planning Section within the Incident Command System and authorized by the Incident Command. There are certain criteria that must be met prior to releasing birds. For birds that do not meet release criteria, several options are available, following consultation with FWS. These include additional rehabilitation, euthanasia, or placement in a long-term facility.

Bird Release Criteria

Prior to release, birds must:

- Exhibit normal behavior (including natural feeding, swimming, and diving).
- Have body weight within 10% of normal for that species.
- Be fully recovered from any injury or disease.
- Be waterproofed.
- Have normal blood values.
- Have normal physical exam.
- Be free of apparent disease.
- Be acclimated to outdoor temperature and light.
- For pelagic species who have been maintained on fresh water for over 14 days, be re-acclimated to salt water.
- Be free of all temporary leg bands and other ID tags and fitted with a permanent federal metal leg band (if specifically requested by FWS) or, for subsistence or game species, be fitted with a band indicating the bird was oiled and treated.

Release Site Criteria

Release sites must meet the following conditions:

- No oil contamination present.
- No risk of re-contamination.
- Same general geographic area of capture, if possible.
- Appropriate seasonal range for species (important consideration during migration periods).
- Available, natural, uncontaminated food sources.
- Minimal human disturbance (e.g., boats, noise).
- Favorable weather conditions and forecast.
- Appropriate time of day for species.
- Minimal logistics for traveling to site.

Media at Releases

- All releases with media in attendance should be scheduled in advance and coordinated through the Joint Incident Command.
- Guidelines regarding filming procedures and set up should be supplied in advance to ensure bird safety and reduce stress.
- All efforts should be made to ensure the safety and welfare of the birds during the release process (Miller and Schlieps 2021).

Post-Release Monitoring

Post-release monitoring is necessary to determine the long-term effectiveness of oiled bird rehabilitation. Following up on released birds can improve the processes and criteria associated with emergency bird care. Monitoring also enhances biologists' understanding of the effect oil has on both medical and behavioral aspects of bird ecology, such as short-term and long-term survival and breeding. A post-release monitoring plan should be part of FWS-approved release plan.

Several methods may be used for post-release monitoring of rehabilitated birds. The most common is to acquire federal band return data collected by hunters, beach walk programs, or others, to determine mortality rates of released birds. Although this method is relatively simple to employ, it is difficult to determine survival with confidence due to low band return rates. Another method, color banding of released animals, facilitates visual observation and collection of more behavioral information. However, this requires considerable effort and is limited to birds that remain close to land and do not migrate. The most effective, albeit more expensive, way to acquire information on released birds is through telemetry: placing a transmitter on birds prior to release and monitoring the signal by radio receiver (e.g., Motus Wildlife

Tracking System) or satellite. With this approach, biologists may follow birds for months to years after release.

Chapter 8

Records

The importance of record keeping cannot be over-emphasized. Record collection enhances bird care, response evaluations, and the ability to accurately characterize the best practices for care. In-house records are maintained at the rehabilitation facility and copies must be provided to FWS. Final reports from the rehabilitator for the oiled-bird response, including carcass chain-of-custody and sample collection records, must be delivered to FWS within 30 days after either the FOSC declares the response closed or the departure date of the rescue and rehabilitation organization, whichever comes first. Non-compliance may result in revocation of MBTA permits.

Scientific Records and Reports

The following types of records and reports are necessary to preserve vital information for scientific study, for natural resource damage assessment, and to improve rehabilitation practices and techniques:

- Resources-at-risk survey: provides information regarding the location of birds and other animals relative to the spilled oil.
- Oiled bird sightings: records and maps for all reports of oiled birds.
- Field capture report: records for all birds captured in field.
- Live bird log.
- Dead bird log.
- Running tally: list of all in-house birds by species and case number.
- Daily care report: documents care for each bird or enclosure, including feedings, treatments, medications, and normal and abnormal activities.
- End-of-day reports: documents current and next day's work.
- Oiled bird examination record: individual record summary of retrieval, medical exam, diagnostic results, samples collected (chemical, blood, and tissue), cleaning, treatment, evaluation, chain-of-custody, federal bird bands, and final disposition.

- Record of samples collected (chemical, blood, feather, and tissue).
- Lab analyses report: identifies all samples sent to labs, requested analyses, and lab results.
- Federal bird banding report: lists all birds banded for release.
- Necropsy report.

Some sample forms are provided in in *Appendix 6*.

Administrative Records

The following documentation and reports are required within the Incident Command System and must be completed, for FWS Rehabilitation Permit Office of Migratory Bird Management and law enforcement, or others:

- Incident Action Plan – ICS 200: Includes Site Safety and Health Plan, Communications Plan, Organizational Structure, and Group Assignments.
- Daily Activity Log – ICS 214: Summary report of intake and status.
- Pollution Incident Daily Resource Report (USCG Daily Report).
- Chain-of-Custody Record: all migratory birds that die due to contact with spilled oil represent evidence of a potential violation of the Migratory Bird Treaty Act. As such, each bird carcass must be labeled with an *Evidence Seizure Tag* provided by FWS' Division of Law Enforcement or other law enforcement agency, through the designated FWS representative. The Chain-of-Custody is maintained through delivery of the labeled bird carcasses to a central, secure evidence storage area.

The Alaska Regional Response Team's (ARRT, 2023) Wildlife Protection Guidelines for Oil Spill Response in Alaska provide a more in-depth description of evidence collection and examples of necessary forms for record keeping and maintaining chain of custody.

Some sample administrative record forms are provided in *Appendix 6*.

References

Alaska Regional Response Team (ARRT) Wildlife Protection Committee. 2023. Wildlife Protection Guidelines for Oil Spill Response in Alaska. ARRT, version 2020.2. Anchorage, AK. 226 pp. https://www.alaskarrt.org/home/documents/50

American Fish and Wildlife Association (AFWA). 2022. Guidance for State Wildlife Agencies to Reduce the Risk of Highly Pathogenic Avian Influenza Transmission in Wildlife Rehabilitation Facilities. https://www.fishwildlife.org/application/files/2816/4943/1891/AFWA2022HPAIWildlifeRehabGuidance-April2022.pdf

Beaulieu, D. and G. Fitzgerald. 1998. Rehabilitation of Contaminated Birds: Emergency action guide for oil spills. Union Quebecoise De Rehabilitation Des Oiseaux De Proie. 27p.

CDC. 2021. Zoonotic Diseases. https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html

Environment Canada. Oiled Bird Stabilization Training Course. Marine Oil Spill Workforce Manual. Ministry of Environment, Lands and Parks, Victoria, BC. 30 p.

Environment Canada. Oiled Bird Search and Collection Training Course. Marine Oil Spill Workforce Manual. Ministry of Environment, Lands and Parks, Victoria, BC. 33 p.

Environment and Climate Change Canada (ECCC). 2022. Guidelines for Establishing and Operating Treatment Facilities for Oiled Wildlife. https://www.canada.ca/en/services/environment/wildlife-plants-species/national-wildlife-emergency-framework.html#toc6

Fowler, M.E. (editor) 2008. Restraint and Handling of Wild and Domestic Animals, third edition. Wiley-Blackwell. 496 pp., ISBN: 978-0-813-81432-2.

Gilardi, K.V.K. and J.A.K. Mazet. 1999. Oiled Wildlife Response in California: A Summary of Current Knowledge of Populations at Risk and Response Techniques. Oiled Wildlife Care Network, Wildlife Health Center, School of Veterinary Medicine, University of California, Davis, CA. 124 p.

Gorenzel, W.P., T.P. Salmon, and R. Imai. 2010. Response of Water Birds to Hazing with a Red Laser. Proceedings 24th Vertebrate Pest Conference. Timm and Fagerstone, Eds. University of California, Davis, CA. Pp. 235-240.

Greer, R.D., D.J. O'Connor, L Frink, and S. Welte. 1998. Rehabilitation Manual for Oiled Birds. Exxon Biomedical Sciences, Inc. East Millstone, NJ, and Tri-State Bird Rescue and Research, Inc., Newark, DE. 55p.

Greer, R.D. and D.J. O'Connor. 1994. Waterbird Deterrent Techniques. Exxon, Biomedical Sciences, Inc. Marine Spill Response Corporation, Washington, D.C. MSRC Technical Report Series 94-003. 38 p.

Lehoux, D. and D. Bordage. 2000. Deterrent Techniques and Bird Dispersal Approach for Oil Spills. Environment Canada, Canadian Wildlife Service. 80 p.

Merck. 2023. Transmission of Zoonoses between Animals and Humans. https://www.merckvetmanual.com/public-health/zoonoses/transmission-of-zoonoses-between-animals-and-humans

Merck. 2022. Developing a Biosecurity Program for Animals. https://www.merckvetmanual.com/management-and-nutrition/biosecurity/developing-a-biosecurity-program-for-animals

Miller, E. A. and J. Schlieps (editors). 2021. Standards for Wildlife Rehabilitation. National Wildlife Rehabilitators Association, Bloomington, MN. 419 p.

Miller, E.A. (editor). 2000. Minimum Standards for Wildlife Rehabilitation, 3rd edition. National Wildlife Rehabilitators Association, St. Cloud, MN. 77 p.

Oiled Wildlife Care Network: California Department of Fish and Game, Office of Spill Prevention and Response. 2000. Protocols for the Care of Oil-Affected Birds. Wildlife Health Center, School of Veterinary Medicine, University of California, Davis, CA. 74 p.

Open Sanctuary. 2022. Biosecurity Part 1: Introduction. https://opensanctuary.org/practical-biosecurity-measures-for-animal-sanctuaries/

Schemnitz, Sanford D., G.R. Batcheller, M.J. Lovallo, H.B. White, and M.W. Fall. 2009. Capturing and Handling Wild Animals. USDA National Wildlife Research Center – Staff Publications. 1191. https://www.digitalcommons.unl.edu/icwdm_usdanwrc/1191

Tarpley, J. and P. Kelly. 2000. Wildlife Response Plan for California. Oil Spill Prevention and Response, California Department of Fish and Game. 38 p.

U.S. Department of Agriculture (USDA). 2022. Protecting Captive Wild Birds from Highly Pathogenic Avian Influenza. https://www.aphis.usda.gov/publications/animal_welfare/ac-tech-note-captive-wild-bird-biosecurity-508.pdf

U.S. Fish and Wildlife Service, National Conservation Training Center (NCTC). 2020. Video: Inland Oil Spill Response: Handling Birds. https://fws.rev.vbrick.com/#/videos/d21a893b-9bbc-4879-8048-03fc9a91a26a

White, J., S. Patton, A. Kasper, and J. Lainson. 1998. Recommended Protocols for the Care of Oil-Affected Birds. States/British Columbia Oil Spill Task Force. Portland, OR. 73 p.

Appendix 1. Sample Supply and Materials List

Administration/Communications Items:

No.	Item	Purchase (P) or Stockpile (S)
	Air horn	P
	Animal identification and natural history books	P
	Binoculars	P
	Cellular phones	P
	Chairs, folding or stacking	S
	First aid kit (humans)	P
	Food and fluids for volunteers geared to good nutrition and hydration (from a list of local sources prepared in advance)	P
	Maps of impacted area and response facilities	P
	Marine radios (handheld)	P
	Master copies of all forms (designed in advance)	P
	Safety Data Sheet binder (add pertinent sheets as needed)	S
	Office phones	S
	Operations manual (designed in advance)	S
	Portable wi-fi connection	S

Personal Protective Equipment Items:

No.	Item	Purchase (P) or Stockpile (S)
	Chest waders	P
	Ear plugs	P
	Earmuffs	P
	Emergency blanket	S
	First aid kit (humans)	P
	Gauntlet style gloves, butyl or neoprene	S
	Hardhat	P
	Hip waders	P
	Nitrile gloves XL L M S	P
	Personal Floatation Device (PFD)	P
	Protective goggles (non-fogging)	S
	Rain gear XXL XL L M	S
	Raptor or welders' gloves	S
	Safety glasses	S
	Tyvek® coveralls XXL XL L M S	S

Animal Care Items:

No.	Item	Purchase (P) or Stockpile (S)
	Aluminum foil	P
	Antiseptic solution (Povidone iodine; chlorhexidine)	P
	Aprons (full coverage vinyl)	S
	Astro-Bubble® bedding roll	S
	Barrier cream	S
	Bleach	S
	Blender, industrial type	S
	Blood collection tubes: Red top ____ Lavender top____ Green top ____Other types _____	P
	Boots, 16" vinyl (Men's sizes 5-12)	S
	Broad spectrum antibiotic (having wide safety margin)	P
	Brood Rite® heaters 240 500 750 watt units	S
	Buckets, 5 gallon	P
	Butterfly catheters--Pediatric or Scalp vein sizes	P
	Camera, digital (to record each animal on intake)	P
	Can opener	P
	Cardiac and respiratory stimulants	P
	Catch pole	S
	Centrifuge for hematocrit tubes	P
	Clay tray for hematocrit tubes	P
	Cleaning table--sturdy, stable, and water resistant (96"x30"x28")	S
	Cloth tape	P
	Clothes pins	S
	Cotton balls	P
	Cotton swabs	P
	Culturettes	P
	Cutting board	S
	Dawn® or Palmolive Ultra® dishwashing liquid	S
	Diaper pins	S
	Digital gram scale	P
	Dish drainer mat (perforated)	S
	Dishpans, plastic	S
	Disinfectant (Roccal D®)	P
	Drug lock box	S
	Drum lid wrench	P
	Drums, 55 gallon with lids	P
	Elasticon® tape	P
	Electrical adapters (heavy duty, triple outlet, outdoor type)	S
	Euthanasia solution	P
	Exam forms	P

	Exam tables Size(s):	S
	Eye wash bottles	P
	Flashlights	S
	Floatation vest	S
	Floor mats, non-slip, self-draining, anti-fatigue	S
	Foley catheters (12-16 gauge, with adapters) (12 adapters and 30 catheters per dozen animals)	P
	Food processor	S
	Food strainers	S
	Food/water containers Size(s):	S
	Formalin 10%	P
	Galvanized tubs, 17-gallon round, with lids	S
	Garbage can, 33 gal. metal with lid & wheels (rodent proof food storage)	S
	Garden hose (25')	S
	Gauntlet style gloves, butyl or neoprene	S
	Gauze squares	P
	Hand sanitizer	P
	Headlamp	S
	Heat lamp fixtures with inline switch, clamp on type	S
	Heat lamps, 150-watt conical ceramic type	S
	Heating mats, kennel type	S
	Hematocrit tubes	P
	HEPA filtration units (portable)	P
	Hot/cold water mixing valves, accurate +/- 2ºF.	S
	Injectable anesthetic agents	P
	Injectable sodium bicarbonate	P
	Insect repellent	P
	Isopropyl alcohol	P
	IV fluid stand	P
	IV sets (18-25 gauge) Sizes:	P
	Kling® gauze	P
	Knife sharpener	S
	Knives carving paring fillet	S
	KY jelly	P
	Leg bands, plastic, numbered Sizes:_____ Colors: red blue yellow green white other	P
	Lights, portable, on stand	S
	Measuring cups and spoons	S
	Micropore® tape	P
	Microscope	P
	Microscope slide cover slips	P
	Microscope slides	P
	Milk crate, plastic	S
	Multiple animal feeder	S

	Multitest sticks	P
	Necropsy instruments (append list)	P
	Needles (hypodermic) Sizes:	P
	Net, cast	S
	Net, hand	S
	Net, hoop	S
	Net, long handled (21" dip net on 10' extension pole)	S
	Non-steroidal ophthalmic antibiotic solution	P
	Nylon netting rolls (0.5" to 1" mesh)	S
	Oral rehydration fluid (i.e. Pedialyte®)	P
	Penlight	P
	Perching and flooring material Type:	P
	Peroxide	P
	Pet carriers, waxed cardboard Small Large	P
	Pet kennels, plastic L M	P
	Pet dryers, portable	P
	Plastic cups	P
	Pillowcases	P
	Plastic pitchers pint quart gallon	S
	Plastic sheeting, 4-8 mil polyethelene, 8'x100' rolls	S
	Plastic totes (small to large) for food storage	S
	Play pens, soft sided	S
	Plumbing adapters from 1/2" shower head to garden hose	S
	Pool thermometers	S
	Poultry shears	S
	Pretreatment agents (if needed based on type of oil and species involved)	P
	Protective goggles (non-fogging)	S
	Pump hoses for intake and output, hot water resistant	S
	Rain gear XXL XL L M	S
	Raptor or welder's gloves	S
	Refractometer (temperature compensated)	P
	Sea salt (bags and tablets)	P
	Sharps container	P
	Sheets	S
	Shell or crab cracking mallet	S
	Shelving unit (water resistant, sturdy)	S
	Shower heads w/inline shut off valves	S
	Sponges	S
	Spray/mist bottles, quart size	S
	Sterile electrolyte (Lactated Ringers Solution with 2.5% Dextrose; or Normosol)	P
	Sterile gauze wrap Size:	P
	Sterile instruments (list appended)	P
	Sterile saline	P
	Sterile syringes, catheter tip (35-60 cc) Sizes:	P

	Sterile syringes, Luer lock type (1cc-60cc) Sizes:	P
	Stethoscope	P
	Stool	P
	Sump pumps (1/4 HP for small pool drainage)	P
	Sunscreen lotion	P
	Surgical gloves XL L M S	P
	Surgical masks	P
	Survival suit	S
	Tegaderm® skin covering	P
	Telfa® pads	P
	Thermometer calibrated to 108º F (rectal)	P
	Thermometer, photographic calibrated to 120°F. with hanging clips	S
	Tissue sample containers (small)	P
	Toothbrushes (extra soft, child size)	S
	Towels bath size hand size	P
	Trash bags	P
	Tube feeding ingredients (varies by type of animals fed) (append list)	P
	Tyvek® coveralls XXL XL L M S	S
	Utility sink, free standing, only drain plumbed	S
	Valve, inline ball-style, for garden hose	S
	Vetrap® 2" 4"	P
	Vitamin supplements	P
	Water Pic® dental irrigator	S
	Whistle on lanyard (order one per person in the field)	P
	Zipper style plastic bags Sizes:	P

Animal Deterrence:

No.	Item	Purchase (P) or Stockpile (S)
	Animal calls	S
	AV Alarms®	S
	Cannon launched net	S
	Cracker shells (for 12-gauge shotgun)	S
	Decoys	S
	Hip waders	P
	Mist netting with cable ties, stakes, and mallet	S
	Mylar tape	S
	Net Gun	S
	Nylon cord	S
	Phoenix Wailer®	S
	Propane cannon	S
	Propane tank (20 lb.) 2 per cannon	S
	Scarecrow	S
	Seine net	S

	Shallow draft watercraft appropriate to conditions	P
	Shotgun, 12 gauge	P
	Spotlights	S
	Stroboscopic light, revolving	S

Facility Maintenance List:

No.	Item	Purchase (P) or Stockpile (S)
	Batteries (various sizes)	P
	Carabiners	P
	Clock, battery operated	P
	Desk	P
	Desk chair (rolling)	P
	Electrical circuit tester	S
	Extension cords (20amp, outdoor, 100' 50' 25')	S
	Fans, portable	S
	File cabinet or file storage box	S
	Fire extinguishers Type:	P
	Floor squeegee	P
	Folding Metal Tables Size:	S
	Freezer Chest type Upright Lockable? Yes No	P
	Garbage cans, 33 gal. with lid & wheels	S
	Garden type spray nozzle	P
	Generator	S
	Hardware kit: electrical tape, wire nuts, assort. washers, nails, nuts, bolts, screws, rope, duct tape, wire, cotter pins	S
	Heaters, portable electric	S
	Large signs: Quiet Clean Animals Oiled Animals Medical Treatment Clean linens Newspaper Dirty Laundry Volunteer Area No Admittance Other_____	P
	Microwave oven	P
	Mop bucket with wringer & wheels	P
	Multiple-outlet power strips, heavy duty	P
	Paper towel holder	S
	Paper towels	S
	Plumbing Kit: Teflon tape, assort. rubber washers, hose clamps, PVC pipe cleaner and cement, Y hose connectors, male & female end repairs, splice repair kit	S
	Plywood and lumber for pens and pools:	P
	Pool filtration system	P
	Pool(s) Size(s):	P
	Power tool kit: c ordless & corded drills, circular and reciprocating saws with extra blades, drill index, extra batteries and charger for cordless tools, level	S
	Push broom	P
	Refrigerator Size(s):	P
	Room thermometers	S

	Shelving unit metal plastic wood	P
	Shovels	S
	Staple gun (heavy duty)	P
	Staples for staple gun Type: Sizes:	P
	String mop	P
	Tarp, waterproof, grommeted, 20'x20' for pool liners, area covers	S
	Tool kit: hammer, pipe wrench, pliers (channel, clamping, needle nose), hack saw, wire cutter/stripper, slot & Phillips screwdrivers, utility knife, adj. wrench, tape meas.	S
	Trash barrels, 50 gallon, on wheels	P
	Trash can liners 33 gal. 55 gal.	S
	Utility sink	P
	Vacuum cleaner, wet/dry type (Shop-Vac®)	P
	Water cooler	S
	Water heater, high capacity, on demand (90° rise at 3 GPM continuously); this item may require propane/natural gas hook up. Electric units are normally insufficient.	S
	Water pressure gauge	P
	Water pressure pump (maintain 40 PSI at full flow, up to 60 PSI)	S
	Water test kit (pH, hardness, chlorine)	P
	Water treatment system (for hard/soft water, auto regeneration, min. maintenance high capacity)	S
	Water/sewage pump, electric, self-priming, able to withstand hot water & debris	S

Office Supplies List:

No.	**Item**	**Purchase (P) or Stockpile (S)**
	Bulletin board	P
	Binder clips size large	P
	Clip boards	P
	Copier	P
	Thumb drives/external drives compatible with computer Type:	P
	Dry erase markers black red blue green assorted	P
	Duct tape	P
	Fax machine	P
	File folder box	P
	Highlighters pink yellow blue green assorted	P
	Ink/Toner cartridge for Copier Fax Printer Make/Model _____ Cartridge No._____	P
	Manila folders	P
	Masking tape	P
	Name tags or badges	P
	Paper clips large small	P
	Paper compatible with fax machine Ink jet Laser Roll	P
	Paper compatible with printer Ink jet Laser Pin feed	P
	Paper for copier Ink jet Laser	P

	Pencils	P
	Pens	P
	Portable computer w/database, spreadsheet, word processing programs, modem, cables	P
	Portable printer & cables, compatible w/computer model:_____	P
	Poster boards	P
	Post-Its®	P
	Push pins	P
	Rite-in-the-Rain notebooks	P
	Rulers	P
	Scissors	P
	Scotch® tape	P
	Stapler (desk type)	P
	Staples for above stapler size:	P
	Waterproof markers black red other assorted	P
	Whiteboard large medium small	P
	Writing tablets	P

Optional Surgical Item List:

No.	Item	Purchase (P) or Stockpile (S)
	Allis tissue clamps	P
	Disposable drapes	P
	Endotracheal tube	P
	Esophageal stethoscope	P
	Forceps	P
	Hemostats	P
	Instracal or similar sterilizing liquid	P
	Needle holder (5.5 Olsen/Hegar)	P
	Needles Sizes:	P
	Oxygen	P
	Pan (stainless steel 8”x5”x2”)	P
	Scalpel blades No.:	P
	Scalpel handle appropriate to scalpel blades	P
	Small animal anesthetic machine (Isoflurane vaporizer)	P
	Surgical caps	P
	Surgical gowns	P
	Surgical scissors	P
	Surgical table, stainless steel	P
	Sutures	P
	Towel clamps (3.5 Backhaus)	P

Source: Created by Jan White, Wildlife Publications, Maple Valley, WA.

Appendix 2. Zoonotic Diseases of Wild Birds

Organism Common Name / Disease	Mode of Transmission	Usual Source	Reported Species	Signs and Symptoms	Precautions for Handlers
BACTERIAL					
Campylobacter jejuni -Campylobacteriosis	O	Contaminated tissue Fecal exposure	Human, birds, mammals	Abdominal pain, fever, vomiting, headache	PPE/Gloves Handwashing Food hygiene
Chlamydophila psittaci -Chlamydiosis	I	Aerosol droplets	Human, birds	Conjunctivitis, depression, respiratory infection	PPE/Gloves/Mask Handwashing
Clostridia spp. Blackleg/Tetanus -Enterotoxemia/etc.	I, C Puncture Wounds	Fecal contamination Contaminated soil	Human, birds, mammals	Anaerobic wound infections/septicemia, hemorrhagic enteritis/neurotoxin	PPE Vaccination Handwashing Food hygiene
E. coli -Colibacillosis	O, I	Contaminated tissue	Human, birds, mammals	Enteritis, diarrhea	PPE/Gloves Handwashing Food hygiene
Erysipelotrix sp. -Erysipeloid, diamond skin disease	O, C Bites/Scratches	Water/Saliva Fish/Shellfish	Human, birds, cetaceans	Cellulitis, septicemia, rhomboid skin plaque	PPE/Gloves/Masks Handwashing
Listeria monocytogenes -Listeriosis	O	Water/Mud	Human, birds, mammals	Conjunctivitis	PPE/Gloves/Masks Food hygiene

O = Oral I = Inhalation C = Contact PPE = Personal Protective Equipment

Organism Common Name	Mode of Transmission	Usual Source	Reported Species	Signs and Symptoms	Precautions for Handlers
BACTERIAL (Cont.)					
Mycobacterium avium - Mycobacteriosis	I, C, Insect Vectors Scratches	Soil/Water	Human, birds, swine	Pulmonary disease, cervical lymph-adenopathy	PPE/Gloves/Masks
Mycoplasma sp. -Atypical pneumonia	I Aerosols	Mucous membranes	Human, most mammals, birds	Respiratory infection, conjunctivitis	PPE/Gloves/Masks Handwashing
Pasturella multocida -Pasturellosis	I, C, O? Bites/Scratches	Respiratory secretions from carrier birds or mammals	Human, pinnipeds, birds	Cellulitis/respiratory infection, septicemia/enteritis, peracute death	PPE/Gloves/Mask Handwashing
Salmonella/*Shigella plesiomonas* -Infectious Enteritis	O	Tissues from infected animal/fecal contamination	Human, all vertebrates	Enterocolitis, diarrhea, fever, septicemia	Food hygiene Cooking/chilling Handwashing/gloves
Yersinia pseuotuberculosis -Pseuotuberculosis *Yersinia enterocolitica* -Yersiniosis	O, I, C	Fecal shedding, Contaminated food or water	Human, birds	Enlarged mesenteric lymph nodes, enteritis	PPE/Gloves

O = Oral I = Inhalation C = Contact PPE = Personal Protective Equipment

Organism Common Name	Mode of Transmission	Usual Source	Reported Species	Signs and Symptoms	Precautions for Handlers
VIRAL					
Paramyxovirus -Newcastle Disease	I,O	Secretions and excretions	Human, birds	Conjunctivitis, fever, chills, headache	Isolation of suspects Sanitation PPE/Gloves/Mask
Influenza Virus -Influenza A	I, O	Aerosol droplets	birds, harbor, gray, and fur seals, pilot whale, porpoise, fox, skunk, raccoon, bear, human	Upper respiratory tract infection, pneumonia, conjunctivitis	Isolation PPE/Gloves/Masks
FUNGAL					
Aspergillus sp. -Aspergilliosis	I	Spores from mold growth in damp, poorly ventilated areas	birds, cetaceans, human, birds	Respiratory infections, granulomas	PPE/Mask Adequate ventilation
Coccidioides immitis Coccidioidomycosis	I	Spores in dust / soil (esp. following an earthquake)	dolphin, human, sea lion, sea otter	Pyogranulomas in lung/other tissues	PPE/Mask Sanitation
Cryptococcus neoformans Cryptococcosis	I	Spores in soil contaminated by bird droppings	Human, mammals, birds	Pulmonary disease but may disseminate to viscera, skin, bones, or CNS	PPE/Mask Sanitation
Histoplasma capsulatum -Histoplasmosis	I	Spores in dust and soil and bird roosts	Human	Flu-like signs, fever, Respiratory signs	PPE/Mask Sanitation

O = Oral I = Inhalation C = Contact PPE = Personal Protective Equipment

Source: *Recommended Protocols for the Care of Oil Affected Birds*, States/British Columbia Oil Spill Task Force, 1998
Protocols for the Care of Oil-Affected Birds, Oiled Wildlife Care Network (OWCN), 2014

Appendix 3. Deterrence Methods

Gas-Operated Exploders

Gas-operated exploder devices are effective initial deterrence options, but many species are known to habituate to the regularly-timed auditory sounding.

Detonators consist of a bottled gas supply, separate pressure and combustion chambers, an igniting mechanism, and a barrel to aim and magnify the blast. Gas-operated exploders produce a loud directional shotgun-like noise by slowly filling a bellows with propane gas from a tank, then rapidly transferring this gas to a firing chamber and igniting it with a spark. Blasts are emitted at adjustable time intervals. The interval between detonations can be varied from less than one minute to 30 minutes. Some gas-operated exploders can be set to fire at random intervals and rotate after each explosion so that subsequent shots are aimed in different directions. The sound level is approximately 120 dB. An exploder can operate for about two weeks without refueling but needs to be maintained regularly for effectiveness and to ensure that it is working properly.

Note: Gas-operated exploders are extremely dangerous and should be used only by trained personnel.

Advantages

- Deployable onshore and offshore (when placed on anchored rafts) especially when oil is well-confined and where birds are particularly susceptible;
- Protective of relatively large areas (200-1000 m/218-1093 yds or 30-50 ha/74-123 ac);
- Rapidly remobilized;
- Automatically operated and require only minimal staffing;
- Effective during both day and night;
- Especially effective in deterring dabblers and geese;
- Inexpensive to operate and require little maintenance;
- Inexpensive to purchase ($300); and
- Widely available.

Disadvantages

- Birds rapidly habituate to the sound of the blasts (typically no more than two or three days, and for some species, sometimes less than a few hours);
- Not effective in deterring most shorebird species, gulls, coots, grebes and loons;
- Significantly reduced effective range and sound intensity when used in fog and wind;
- Difficult to install and operate on an anchored raft in open water and in bad weather; and
- Disturbing to local residents and responders.

Pyrotechnics

Pyrotechnics devices are effective but require continued staffing for operation and introduce multiple safety concerns.

These devices frighten birds by producing a whistling noise, explosion, or flash of light. Types include shotgun-launched projectiles and a variety of pistol-launched projectiles. When using pyrotechnics, the

danger of igniting spilled oil and vegetation should always be avoided. Both shotgun- and pistol-launched devices should be fired into the wind and away from personnel. Safety goggles and ear protectors (muff or ear plug type) must be worn, and personnel using pyrotechnics must be trained in firearms safety.

Shotgun-launched projectiles include shell crackers and scare cartridges. They are fired from a 12-guage shotgun with the shell shot being replaced by a bulldog or M-80 firecracker that explodes at 100-150 yards (91-136 m). Single barrel shotguns that break and load at the breech are recommended. The shotgun should be fired from the hip at a 45° angle, and shell crackers should explode as close to the birds as possible. Because of the light charge, the shotgun has only a slight recoil.

Note: Pyrotechnics are extremely dangerous and should be used only by trained personnel.

Advantages

- Effective both day and night;
- Easily directed close to water birds;
- Especially effective in deterring open-water birds;
- Relatively high radius of effectiveness (at least 200 m from the source and up to 1 km for some bird species);
- Effective on land or offshore;
- Highly effective in combination with other deterrents (motorboats, ATV, effigies); and
- Relatively inexpensive (roughly $250 per hundred rounds).

Disadvantages

- Short duration of effectiveness (one or two hours);
- Less effective in deterring dabbling ducks;
- Ineffective in deterring gulls and shorebirds;
- Significantly reduced effective range and sound intensity when used in windy situations;
- Requires continuous staffing;
- Potentially hazardous to operators and bystanders if not used carefully;
- Potentially hazardous if used in areas containing volatile oil components; and
- Disturbing to local residents and responders.

Aircraft

Aircraft, especially helicopters, are effective deterrents because of the combination of loud noise and rapid approach from above. They are often effective in hazing birds away from large areas. Helicopters may also be used to herd flightless (young and molting) birds.

Aircraft may be especially useful during early stages of cleanup and hazing operations. They are more effective if used in combination with other devices such as shell crackers and gas-operated exploders. Because of their maneuverability, noise, and lower operating altitudes, helicopters are generally more effective than fixed-wing aircraft.

However, not all bird species will take flight in response to overhead disturbances. Some waterbirds (e.g., loons and alcids) dive rather than fly when approached by aircraft, and others who are young or in their molting or brood-rearing stage may be incapable of flight. Flightless birds may be herded with a helicopter, or by ground patrols after the helicopter has departed. Helicopters have been used successfully to drive

flightless Canada geese over water, exposed tidal flats, and dense sedge in Alaska with the helicopter remaining 10 to 20 m (33-66 ft) behind the geese at an altitude of 1-15 m (3-49 ft). (Timm and Bromley, 1976).

Advantages

- Readily available to deploy to remote and roadless areas;
- Disperses birds in different types of habitats (e.g., marsh birds, offshore birds);
- Rapidly disperses birds while oil is still offshore;
- Requires minimal staffing; and
- Highly effective at deterring geese.

Disadvantages

- Less effective at deterring species other than geese, especially during molt;
- Less effective for birds gathered in very attractive sites like feeding or nesting grounds;
- Increased potential of bird-aircraft collisions during low flying activities;
- Ineffective at night;
- Reduced or limited feasibility during bad weather (especially fog);
- Time consuming for deterring birds on a large scale basis;
- Relatively high cost of charter aircraft;
- Limited ability to procure helicopters, in heavy demand during an oil spill; and
- Deployment potentially hazardous during bad weather or when flying at low altitudes.

Motorboats

Utilizing motorboats can increase the efficacy of hazing birds offshore but are limited by weather conditions.

Birds located offshore can be difficult to haze using techniques deployed from the shoreline; however, motorboats may be effective in dispersing some offshore birds. Studies conducted during the last 20 years have demonstrated the potential of boats to be an effective deterrent. Birds are more sensitive to boats propelled by outboard motors. A powerboat causes virtually instantaneous flight as soon as it appears on the water, causing most birds to leave. There is speculation that the larger the flock, the more sensitive it is to an approach (Batten, 1977). The hazing of diving birds with boats is generally considered slow, labor intensive, and may be ineffective. Boats may be useful for herding flightless waterfowl away from spilled oil to boomed areas of lagoons, or overland to inland lakes.

Advantages

- Useful in deterring birds located at a distance from the shoreline;
- Rapidly implemented for deterring birds while oil is still offshore;
- Works well with most species except diving birds;
- Covers relatively large areas; and
- Requires limited staffing.

Disadvantages

- Deployment is potentially hazardous during bad weather, icy conditions, or darkness;
- Limited ability to locate birds, especially in rough seas; and
- Difficult to direct dispersed birds to unoiled waters.

All-Terrain Vehicles (ATVs)

All-terrain vehicles (ATVs) such as quad-runners are moderately effective for hazing many species of waterfowl and shorebirds. Human presence reinforces the effects of the noise and rapid movement of the vehicle. A quad-runner can also be equipped with air horns or sirens or used with pyrotechnics.

Advantages

- Efficient for covering larger shore areas (between 3 and 5 km/1.8 and 3.1 m, instead of 1-2 km/0.6-1.2 m by foot); and
- Most effective when used in combination with other methods (e.g., noisemakers).

Disadvantages

- Limited to birds on shore;
- Limited to daylight use; and
- Potentially destructive to certain habitats.

Electronic Sound Generators

These devices broadcast loud, intermittent electronically synthesized sounds in the audible range of birds. The devices can be adjusted to the most effective range of sound for the target species, and sound patterns within this range can be varied over time to decrease habituation. Sound generators can be positioned on land, mounted on boats, or housed within a raft or buoy for use in open water and marine situations.

Advantages

- Useful in open water environments;
- Rapidly deployed;
- Project sound over large areas;
- Readily deployed on leading edge of drifting oil slick;
- Maximize potential of dispersing birds away from contamination when deployed directly into oil slick;
- Reduce the potential of bird habituation because the buoys move with the wind and current to encounter new groups of birds;
- Limited habituation of birds, even when anchored, due to the diversity of sounds produced;
- Operable and effective day and night;
- Operable during bad weather (fog and rain);
- Readily retrievable;
- Easy to handle and operate by two persons;
- Constructed to withstand fire and explosion sometimes associated with oil slicks;
- Long-lasting effectiveness (>two weeks);
- Low maintenance (requires four marine batteries: two in the unit and two on full charge).

Disadvantages

- May be less efficient in areas where birds are accustomed to loud background noises, where hunting pressure is low, or where birds congregate in very secure habitats;
- Batteries are expensive and must be replaced or recharged after 8 hours of operation;
- Requires a boat or a helicopter to be deployed offshore;
- Regular daily monitoring recommended to ensure effectiveness;
- Range of effectiveness decreases during high winds and rough seas;

- Requires monitoring when used in oil slick, to ensure the device stays in the slick;
- Duration of effectiveness unknown when the buoy is used in a stationary mode;
- Disturbing to local residents and responders;
- Expensive; more so if the costs of radio beacon transmitters and receivers are included; and
- May not be immediately available.

Biosonics

These techniques use distress, warning, or alarm calls that are broadcast by tape players to disperse single or closely related species from the immediate area. In general, individuals or small flocks are less responsive than large flocks. The effectiveness of biosonics can be increased by supplementation with pyrotechnics.

Advantages

- Effective at lower sound intensities; and
- Slower habituation compared to some other methods.

Disadvantages

- Highly species-specific;
- May attract rather than deter birds, depending on life stage; and
- May attract predators and scavengers.

Balloons

All-weather helium balloons are considered effective if properly maintained and frequently refilled and repositioned. They are generally 20-30 inches (50-75 cm) in diameter and, to reduce stress from wind resistance, should not be fully inflated. Balloons may be suspended from land or from a floating object in the water. They should not be located near trees or other objects that could cause puncturing. Balloons should be tethered on 40-75 feet (12-23 m) of 48 lb (22 kg) or stronger monofilament line and initially spaced at least every 200 yards (183 m). Some balloons should be set very high to deter birds from flying overhead.

Advantages

- Inexpensive; and
- Readily available.

Disadvantages

- Rapid habituation;
- Ineffective at night;
- Do not function well in winds over 16 kph (10 mph);
- Potentially subject to ultraviolet degradation; and
- Deflated balloons and associated lines may pose an ingestion hazard to wildlife.

Flags

Flags are considered an effective and inexpensive hazing device for waterfowl. They can be constructed by mounting a three-by-two-foot (91-61 cm) sheet of black plastic to a four-foot (1.2 m) stake. The stakes should be driven into the ground at an angle so the flags will move in light wind. They should be erected every 100 to 200 feet (30-61 m) on land, or on buoys over water. Mylar car dealership flags can also be effective for hazing waterfowl. Flags can be used in conjunction with gas-operated exploders.

Advantages
- Inexpensive; and
- Readily available.

Disadvantages
- Rapid habituation; and
- Ineffective at night.

Human Effigies and Predator Models

Human effigies (e.g., traditional scarecrows) and raptor models may be effective if they appear lifelike, have motion, are frequently repositioned, and are used in combination with loud sounds or recorded distress calls. Human effigies are more effective if you first establish the human form as being potentially detrimental (e.g., have response personnel create disturbance in the area before deploying human effigies), and are dressed similarly to personnel operating in the area.

Advantages
- Readily put in place;
- Easily remobilized;
- Most do not constitute an auditory disturbance near populated areas or responders;
- Effective in good and bad (winds, rain, etc.) weather; and
- Relatively inexpensive (<$200).

Disadvantages
- Effectiveness limited to daylight, except if equipped with lights or combined with audio deterrents;
- Rapid habituation by birds (typically within a few days); and
- Small range of effectiveness (100 m/109 yd or 4-8 ha/9-18 ac).

Reflectors, Mirrors, and Reflecting Tape

Reflector devices can be constructed by attaching aluminum or tinfoil pie plates to a line suspended over land or water. These devices can be used in association with lights to haze waterfowl. Hand-held mirrors that reflect sunlight may also be effective. Mylar® reflecting tape is another deterrent for many species of birds. This silver and red-coated tape is generally twisted and strung between support posts. The tape reflects sunlight and vibrates under windy conditions producing a humming noise. It should be noted that some species (e.g., corvids) may be attracted to silver shine from reflective tape.

Advantages
- Inexpensive.

Disadvantages
- May attract rather than deter birds;
- Ineffective at night; and
- If not properly maintained, tape may pose entanglement hazard for wildlife if it is broken or sagging into the water.

Lights

Strobe, barricade, search, and revolving fixed lights have been used to haze birds. They should be combined with other deterrent techniques such as exploders and pyrotechnics. Although lights may be partially effective for deterring waterfowl during the night, some bird species may be attracted to lights, especially during rain, fog, or heavy cloud cover.

Advantages

- Inexpensive.

Disadvantages

- May attract, rather than deter, birds.

Lasers

Lasers, particularly red lasers, have been shown to be effective at hazing birds over larger areas, especially at night (Gorenzel *et al.*, 2010).

Advantages

- Silent;
- Multiple sizes and methods of deployment (handheld, pattern display, etc.);
- Lightweight and easy to transport; and
- Can be used in areas where flammable materials may be present.

Disadvantages

- May require multiple applications during the night to be effective for some species;
- Birds habituated to human presence may be less responsive; and
- May require coordination with aviation personnel.

Lure Areas and Bait Stations

Birds may be lured from one area to another with the use of bait food. However, bait stations require large quantities of bait food to be available over a period of days. Because lure areas need to be relatively close to a spill so that the food can be detected, this proximity may increase the oiling risk to birds attracted into the general area. Lure areas are recommended only when, after careful evaluation, alternative techniques are expected to be ineffective.

Advantages

- Passive form of deterrence.

Disadvantages

- May attract birds not normally present in the area and increase the potential for oiling as birds disperse from baited site.

TECHNIQUES GENERALLY NOT RECOMMENDED

Dyes

The feasibility of using dyes for deterring birds from oil spills is unknown because of data gaps including species-specific reactions to colors, habituation potential, dye toxicity, dye solubility in various types of oil,

concentration required, and rates of dye weathering. Therefore, use of dyes is NOT currently recommended as a bird deterrent during oil spill response.

Trained Falcons and Hawks

Trained falcons and hawks are sometimes used at airports to disperse birds from runways. If used in a contaminated or oiled area, these trained birds could potentially themselves become oiled or contaminated or could potentially chase or disperse birds into contaminated areas. Using trained falcons and hawks is NOT recommended as a bird deterrent during oil spill response.

Decoys and Visual Devices

Dead-bird decoys or bird carcasses are sometimes used to discourage birds from using an area. However, placing dead-bird decoys or bird carcasses in a contaminated or oiled area may attract healthy birds of prey or mammalian predators, potentially causing such predatory species to become contaminated or oiled. Using decoys and carcasses is NOT recommended as a bird deterrent during oil spill response.

Underwater Acoustics

These include devices that put sound into water, such as sweep frequencies, killer whale vocalizations, and underwater percussion devices. These devices have not been studied enough to allow for guidance or to determine advantages and disadvantages and, therefore, are NOT recommended for use as bird deterrents during oil spill response.

Sources:

Timm, D.E. and R.G. Bromley. 1976. Driving Canada geese by helicopter. Wildlife Society Bulletin 4(4):180-181.

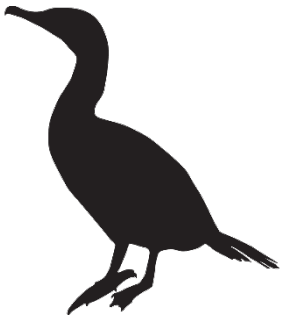
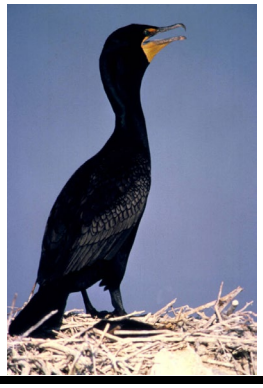
Lehoux, D. and D. Bordage. 2000. Deterrent Techniques and Bird Dispersal Approach for Oil Spills. Canadian Wildlife Service.

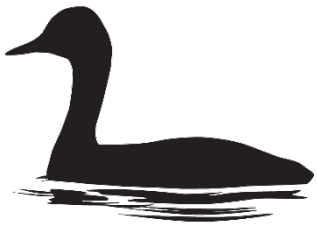
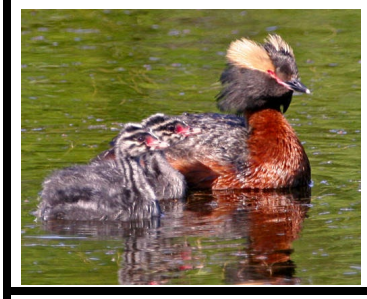
Greer, R.D., D.J. O'Connor, L. Frink, and S. Welte. 1998. Rehabilitation Manual for Oiled Birds. Exxon Mobil Biomedical Sciences, Inc. and Tri-State Bird Rescue and Research, Inc.

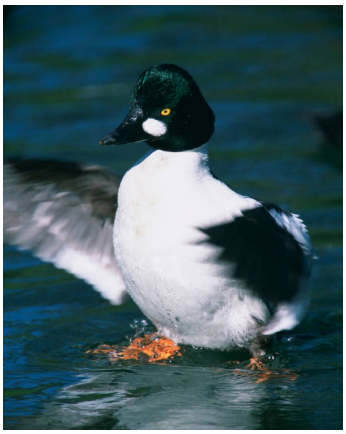
Gorenzal, P. and T. Salmon. 2008. Bird Hazing Manual: Techniques and Strategies for Hazing Birds from Spill Sites. University of California Division of Agriculture & Natural Resources.

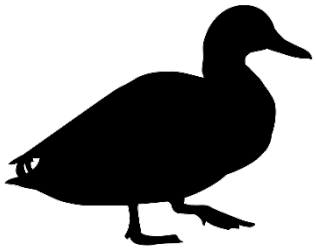
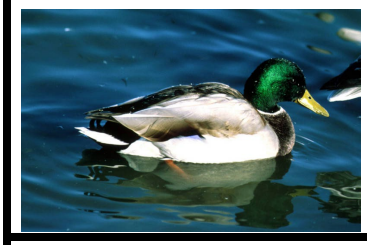
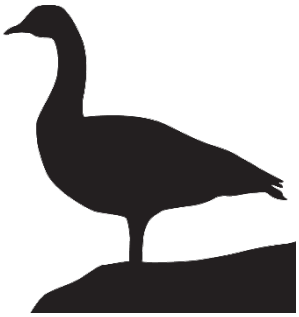
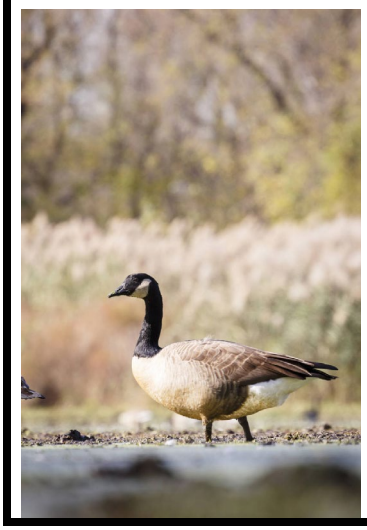
Gorenzel, W.P., T.P. Salmon. and R. Imai. 2010. Response of waterbirds to hazing with a red laser. Proceedings 24th Vertebrate Pest Conference. Timm and Fagerstone, eds. University of California, Davis, CA. Pp. 235-240.

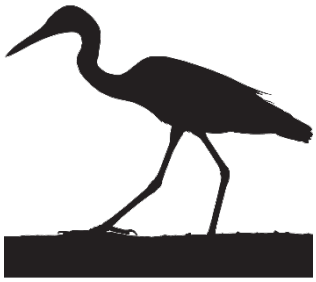
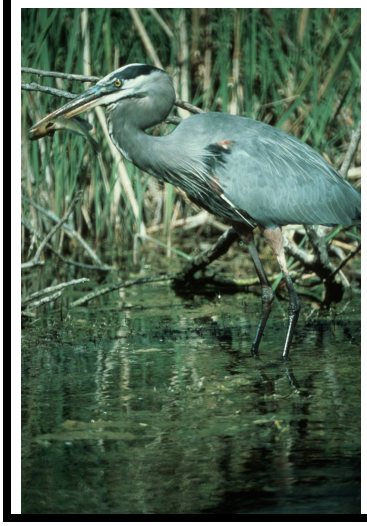
Appendix 4. Bird Natural History and Special Concerns

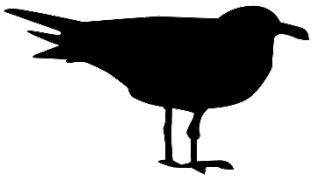
Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	**ALCIDS** (Charadriiformes) Common Murre Rhinoceros Auklet Cassins Auklet Pigeon Guillemot Tufted Puffin **Marbled Murrelet *** Ancient Murrelet	Divers that use short narrow wings to "fly" underwater and use feet to steer. Short legs attached toward rear of chunky body; short-tail, large head, three toes (all webbed), and dense waterproof plumage. Most cannot stand on land. Most prefer open sea, very gregarious, most nest in colonies on offshore islands. Nest disturbance can seriously reduce the success of a breeding season. Most molt all their flight feathers at once and are flightless for a period of time	Some may be able to stand, but padding should be provided if housed in a box or pen; those that stand on the entire foot up to the ankle are more awkward on land. Prone to foot and joint infections. Smaller alcids should be provided with hiding places. Can be aggressive; be careful of sharp beak. Birds will often be comforted by presence of others of their species in the same pen. Murres on water that have lost waterproofing will sometimes create a lot of splashing by flapping their wings to try to stay afloat.
 	**CORMORANTS & PELICANS** (Pelecaniformes) Brandt's Cormorant **Double-crested Cormorant** Pelagic Cormorant Brown Pelican	Foot-propelled diving birds with short legs to the rear of a stout body, long neck with long beak, sharply hooked at tip with no external nostril openings, long stiff tail, webbed feet (all 4 toes). Very aquatic and strong fliers. Feathers not completely waterproof. Gregarious, nest in colonies. Can sink partly or completely below surface by squeezing air out of plumage. Swim low on the water. Can often be seen perching with wings held out.	Allow bird to breathe through its mouth. Always maintain head control; can strike and inflict a severe bite. They walk poorly; should provide rocks or slumps for perching in pen and padding in box or pen. Supporting the strong feet when holding for tubing, etc. may help keep them still and easier to work with.

Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	GREBES (Podicipediformes) **Homed Grebe** Eared Grebe Red-necked Grebe Western Grebe Clark's Grebe	Foot propelled diving birds with short wings, rudimentary tails, slender pointed bill, four lobed toes with partial webbing, legs far back on body, and soft plumage. Very aquatic; weak fliers. Rarely occur on land, even to breed.	Head needs to be controlled to avoid handler being struck by sharp beak. Awkward on land; will feel safest in the water. Not likely to come ashore. Prone to getting sores on keel, so need lots of padding in boxes and pens. Likely to become soiled in pens because they don't move away from their own droppings. Handers should try to avoid projectile feces. May fight among themselves and peck at each other in crowded conditions. Prone to impacted cloaca.
 	LOONS (Gaviiformes) Pacific Loon **Common Loon** Red-throated Loon	Large, foot propelled diving birds, with legs far back on long body, straight sharp beak, stiff compact plumage, wings narrow and pointed. Four toes; front three are webbed. Rarely on land, except to breed on the shore of lakes and ponds. Extremely sensitive to human disturbance near nest. Migratory. Flightless during fall molt.	Strong birds with sharp beaks: must always control head, usually need two people to handle a loon. Wear goggles. Will feel safer in the water; and unlikely to come onshore. Awkward on land. Very susceptible to stress of captivity. Prone to sores on keel so need lots of padding in boxes and pens. May fight among themselves and hurt each other in crowded conditions. Prone to impacted cloaca. Likely to become soiled because they don't move away from their own droppings. Light oiling on surface feathers may not penetrate enough to destroy waterproofing. Handlers should try to avoid projectile feces.

Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	SEA DUCKS BAY DUCKS (Anseriformes) Canvasback Surf Scoter Black Scoter White-winged Scoter Bufflehead **Common Goldeneye** Barrows Goldeneye Harlequin Duck Lesser Scaup Greater Scaup Long-Tailed Duck (Old Squaw)	These sea ducks & bay ducks have relatively short legs and tails. Most have broad, flattened beaks and dense plumage. The three front toes are webbed and the hind toe is lobed. Diving ducks are foot-propelled with large, widely spaced feet that make them less balanced on land than dabblers. Legs are short and towards the rear of their bodies. Diving ducks have smaller, more pointed wings than dabbling ducks. Some diving ducks use both feet and wings when swimming underwater. Found in open ocean and bays. Most are migratory.	Diving ducks must build up air speed before taking off. Prone to sternal lesions and foot and joint damage; should have padding in box or pen. Divers are less inclined to come ashore than dabblers. A light oiling on the surface of dense plumage may not affect waterproofing. Most duck beaks are not dangerous to handlers. Male and female ducks usually have very different plumage. Males are often aggressive toward females and subadults, especially in crowded pens. Scoters will often go limp when being handled; this is not an indication that they are in serious trouble. They can be aggressive, hissing and striking out, but there is little chance they will hurt handlers.
 	STIFF-TAILED DUCKS (Anseriformes) **Ruddy Duck**	Stiff-tailed ducks have big feet and long tails, often held erect. Ruddy ducks' feet are so far back that they are nearly helpless on land. They are the most aquatic of diving ducks and can quietly sink below the surface without making a ripple. Found in ponds, lakes, and shallow bays.	Stiff-tailed ducks can be very shy; should be given hiding places. Ruddy ducks are nearly helpless on land and need padding in boxes and pens.

Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	DABBLING DUCKS (Anseriformes) Eurasian Wigeon Northern Shoveler American Wigeon Green-winged (Teal) Northern Pintail Gadwall **Mallard**	Dabbing ducks have short legs placed more towards the front of the body; feet generally smaller than those of diving ducks; larger, less pointed wings than the divers; and dense plumage. Unlike sea ducks, the hind toe is not lobed or flattened. Usually feed in shallow fresh or salt water by tipping up the tail and reaching below the surface. Rarely dive except to escape danger.	Dabbling ducks can bound directly from a surface into flight, so pens should be covered (i.e., netting) and boxes should not be opened completely until handler is ready to hold the duck. Easiest of the water bird groups to handle and more resistant to the stress of captivity. Males may be aggressive toward subadults or females, especially in overcrowded pens. Light oiling on surface feathers may not penetrate enough to destroy waterproofing.
 	GEESE (Anseriformes) Brant Snow Goose **Canada Goose** White-fronted Goose	Geese have a large body, long neck, stout bill and dense plumage. Legs of geese are placed further forward on the body than on ducks and swans, giving them better balance for walking. Geese swim and feed at water's surface, often tipping back end up. Highly social. Have strong family bonds and lasting pair bonds.	Can be very aggressive, especially during breeding season (threatening displays are common). Powerful wings and legs; some have bony knob at carpal joint of wings that can inflict injury. It may help to hold a goose against the ground while its wings are controlled, and then wrap a sheet around the wings and lower body so it can be picked up and carried more easily. Can walk and run well. Because of dense plumage, light oiling on surface feathers may not penetrate enough to destroy waterproofing.

Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	SHOREBIRDS (Charadiiformes) Oystercatcher **Turnstones** Plovers Dunlins Sandpipers Phalaropes	Most are long-legged and walk, run, or wade in or near the water. Larger shorebirds have long necks; most have slender, specialized bills. They have dense plumage and are good fliers. They are primarily wading shorebirds and often occur in large flocks. Most probe mud or sand. Can walk and run quickly.	Smaller shorebirds can benefit from being boxed or penned together. Many species are shy and hiding places should be provided in pens. Many species are small and delicate, requiring careful handling, and are very susceptible to hypothermia. Oystercatchers nest on offshore rocks and islets (on rocks and gravel) and in spring can be easily disturbed by people or boaters. Many prefer mud flats (areas where oil will persist).
 	HERONS (Ciconiiformes) **Great Blue Heron** Little Blue Heron Green Heron Tricolored Heron Great Egret Snowy Egret Cattle Egret	Long necked, long-legged waders with long, rounded, broad wings; short tail; long bill; and four long widely spread toes. Most are wading feeders. They are usually solitary except during breeding season.	Long legs are subject to trauma, especially in cramped quarters. Have sharp, pointed beaks; may aim for eyes of handlers, so always maintain head control. Wear goggles. Very shy and sensitive to human presence; provide visual barriers. Should be provided a hiding place and housed alone.

Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	TERNS, (Charadriiformes) **Common Tern** Caspian Tern Forster's Tern Least Tern Sandwich Tern	Long, narrow wings; dense, waterproof plumage; long tail; usually forked, sharp, pointed bill, no hook; webbed feet, short legs. Not strong swimmers on water's surface. Often hover and plunge head-first into water. Colonial breeders, migratory. Most mate for life. Long distance fliers.	Poor swimmers. Do not swim well on the water's surface. Have sharp, cutting beaks.
 	GULLS and JAEGERS (Charadriiformes) Glaucous-winged Gull California Gull Thayer's Gull Bonaparte's Gull Heermann's Gull Black-legged Kittiwake Mew Gull **Herring Gull** Laughing Gull Ring-billed Gull Western Gull Parasitic and Pomarine Jaeger	Long pointed wings, dense waterproof plumage. Short, fan-shaped tail, bill hooked at tip, webbed feet. Agile walkers and runners, good swimmers on water's surface. Usually feed from surface. Gregarious. Colonial breeders. Migratory.	Can take off straight up from the ground or water's surface. Have sharp beaks. May regurgitate food if alarmed. Dense plumage; light oiling on surface may not penetrate enough to destroy waterproofing.

Body Shape	Group (Order) and Examples	Physical Characteristics and Natural History	Bird Collection, Care, and Special Concerns
 	TUBE-NOSED SWIMMERS (Procellariiformes) Northern Fulmar Black-footed Albatross Fork-tailed Storm Petrel Leach's Storm Petrel Sooty Shearwater **Pink-footed Shearwater** Short-tailed Shearwater	Tube-nosed swimmers have a hooked, deeply grooved bill with nostrils enclosed in one or two tubes on the top of the bill (excess salt is evacuated through tubular nostrils and small pockets in the nasal passages may sense velocity of air currents). They have long narrow wings, webbed feet, and thick plumage. Migratory, offshore seabird. Some, like the Black-footed Albatross and Northern Fulmar, will follow and sometimes land near ships in search of food (and are attracted to fish oil thrown overboard). Most are colonial breeders. Usually come ashore only for breeding.	Shearwaters and Fulmars often rest weight on toes and lower legs, giving them a somewhat slouching posture on land. May require padding in boxes and pens. Many medium and large size members of this group can deliver hard bites. May regurgitate strong smelling stomach oil when alarmed, and this may soil nearby birds. Live birds are not usually found onshore unless they are sick or oiled. Shearwaters have strong feet and sharp nails which can inflict wounds.
 	SEA BIRDS (Suliformes) Blue-footed Booby Brown Booby Masked Booby Red-footed Booby **Northern Gannet** Magnificent Frigatebird	Heavily bodied sea bird with a heavy, sharp bill; pointed tail; and long slender wings. Webbed feet. Migratory, offshore seabirds. Boobies and Gannets are divers, whereas the Frigatebird skims the surface because it lacks feather waterproofing. Colonial breeders.	Have sharp, pointed beaks and may aim for eyes of handlers, so always maintain head control. Wear goggles.

*Species name bolded are pictured in Body Shape column.

Sources:

Cornell Lab of Ornithology. 2019. All About Birds. Bird family silhouettes. Cornell Lab of Ornithology, Ithaca, New York. https://www.allaboutbirds.org Accessed on July 12, 2023.

BC Environment. *Oiled Bird Search and Collection Training Course,* Marine Oil Spill Workforce Manual.

U.S. Fish and Wildlife Service. USFWS National Digital Library. https://digitalmedia.fws.gov/digital.

Appendix 5: Euthanasia Guidelines

1. Euthanasia should be considered for a bird with serious injuries requiring extended treatment or injuries that render it unable to survive in the wild. Serious injuries can include fractured limbs (particularly those affecting a joint), injuries to the beak, extensive soft tissue injuries, and significant visual or auditory deficits.

2. When large numbers of birds are contaminated in a spill, it is necessary to prioritize treatment of birds with the greatest probability of survival. Packed cell volume (PCV), relative weight, and body temperature may be used to identify those birds having reduced chances of survival.

3. Birds with a PCV of less than 20 percent may require an extended period of treatment and are at a greater risk of developing secondary complications. This is especially true for seabirds that may have little resistance to terrestrial disease organisms. Birds that are both underweight and hypothermic (relative to other birds of the same sex and species involved in the spill) have been shown to have a significantly decreased survival rate. A bird having consistently low body temperatures (less than 100º F), despite attempts to warm the animal, is considered a poor risk.

4. Birds showing signs of infectious disease should be isolated and either supported until a diagnosis is made or euthanized and necropsied. Birds with lesions characteristic of avian pox (warty lesions around the eyes and mouth, or on the feet) should be isolated and precautions taken to prevent exposure of other birds. Other signs that may indicate infection include bloody or mucous discharge from the eyes, nose, or mouth; moist or gurgling respiratory sounds; watery or bloody diarrhea; regurgitation; rapid weight loss; or pronounced neurologic signs.

5. Birds that show signs of chronic disease, such as extreme emaciation, have a very poor prognosis. Consider euthanasia for a very underweight bird that has wasted pectoral musculature and a prominent keel. However, note that the keel is normally very prominent in species such as herons and egrets at certain times (the end of winter or after migration); birds may also have reduced muscle mass with no underlying disease process; and severely dehydrated birds are often underweight but will regain weight rapidly with rehydration.

6. The degree of oiling, the temporary presence of bleeding from the GI tract, and molting are NOT considered adequate grounds for euthanasia.

7. Approval by Federal or State agencies is required before certain birds can be euthanized. This applies to threatened or endangered birds, migratory birds, uncommon birds with small local populations, and species with low reproductive potential. Before authorization to euthanize is given, the U.S. Fish and Wildlife Service's (FWS) Division of Law Enforcement will be consulted to determine the impact the euthanized birds may have on any civil or criminal investigation being conducted by the FWS or other agencies.

8. Techniques for euthanasia should be:

    a. Appropriate for the size of the animal;
    b. Designed to minimize stress;
    c. Reliable and rapid; and
    d. Safe for personnel administering technique.

9. Chemical injection is recommended and preferred, as discussed below. Alternative techniques are mentioned and may be considered, but are not discussed in detail.

    a. Injection, according to dosage guidelines, of a commercial euthanasia solution, with prescribed routes usually being the medial metatarsal, right jugular, or brachial veins, will quickly and painlessly kill most birds.
    b. **Most euthanasia solutions are restricted drugs and subject to control by the Drug Enforcement Administration: professional supervision, inventory control, and locked storage are required.** All solutions must be obtained through a veterinarian and used under veterinary supervision.
    c. Ensure that animals euthanized by this method **do not become food for carrion eaters.**

10. Alternative techniques of chemical euthanasia include inhalation of anesthesia or toxic gases. Physical euthanasia is not recommended.

11. Refrigerate all dead birds until necropsied. Postmortems conducted in-house can yield information that may help in determining treatment protocols for live birds at the facility. All carcasses should be disposed of consistent with spill incident-specific instructions and chain-of-custody protocols.

Page ____ of ____

LIVE BIRD SURVEY FORM

(Only one Division per form)

Date:_____ Survey Crew Members:_____Contact Info: _____

Division Name:_____ Beginning Lat/Long*:_____
(or geographic landmark)

Ending Lat/Long*:_____
(or geographic landmark)

Survey Mode: Foot _____ Boat____ Other(specify)_____ Weather:_____ Start Time: _____ End Time:_____

LIVE BIRD OBSERVATIONS

Species Code	Time of Observation	Total No. Observed	No. Checked for Oil	No. Oiled	Band Info	Behavior Flying (F) Ground (G)	Direction of Flight Relative to Observer	Comments

Attach additional sheets if necessary

***Note:** Please indicate the length of Division covered in kilometers, if known. If unknown, please indicate beginning and ending coordinates, major geographical boundaries or percentage covered of a Division.

COLLECTED BIRD SURVEY FORM

(Only one Division per form)

Date:_____ Survey Crew Members:_____Contact Info: _____

Division Name:_____ Beginning Lat/Long*: _____
(or geographic landmark)
Ending Lat/Long*: _____
(or geographic landmark)

Survey Mode[1]: _____ Weather: _____ Start Time: _____ End Time:_____

LIVE/DEAD BIRDS COLLECTED

Live or Dead	Time Collected (24-hour)	Tag Number[2]	Position relative to high tide line[3]	Species Code	Oiling[4]	Scavenging[5]	Age[6]	Photo (ID No.)	Disposition (Morgue or Rehab Center)	Comments

[1] Survey Mode: F = Foot, A = Airboat, B = Boat, V = Vehicle, O = Other (specify)
[2] Tag: If available, attach a tag with a unique identification number to each bird collected.
[3] Position: U = Upper W = Wrack L = Low (wash zone)
[4] Oiling: 0 = not visibly oiled; 1 = <2% of body; 2 = 2-25% of body; 3 = 25-50% of body; 4 = 50-100% of body; X = not evaluated or unknown
[5] Scavenging: F = freshly dead whole carcass with little or no evidence of scavenging, L = lightly scavenged, H = heavily scavenged, M = mummified or skeletal; X = not evaluated
[6] Age: HY = Hatch Year JUV = Juvenile AD (*or blank*) = Adult

Attach additional sheets if necessary

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
DIVISION OF LAW ENFORCEMENT

CHAIN OF CUSTODY RECORD

FILE NO.
INV.

DATE AND TIME OF SEIZURE:	REGION -	EVIDENCE/PROPERTY SEIZED BY:

SOURCE OF EVIDENCE/PROPERTY (person and/or location):
- ☐ TAKEN FROM:
- ☐ RECEIVED FROM:
- ☐ FOUND AT:

CASE TITLE AND REMARKS

ITEM NO.	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag Numbers and any serial numbers):

ITEM NO.				
	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE	RELEASE DATE	DELIVERED VIA: ☐ U.S. MAIL ☐ IN PERSON ☐ OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE	RECEIPT DATE	
ITEM NO.				
	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE	RELEASE DATE	DELIVERED VIA: ☐ U.S. MAIL ☐ IN PERSON ☐ OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE	RECEIPT DATE	
ITEM NO.				
	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE	RELEASE DATE	DELIVERED VIA: ☐ U.S. MAIL ☐ IN PERSON ☐ OTHER:
	TO: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE	RECEIPT DATE	

OWCN Oiled Wildlife Intake & Processing Form

QR Code:

SPILL/OES#: **SPECIES:** **LOG #:** **TEMP. BAND/TAG:**

CAPTURE

Date Collected (mm/dd/yyyy)		Time Collected	
Collector			
Name(s)			
Location Name		Longitude	
Latitude			

PROCESSING

Evidence	Photo Feathers Pelage Other Tissue Swab — Date / Time Processed:
Evidence Collected By	
Processing Comments	
Processor	
Oiling Status	No oil Yes- visibly oiled abnormal plumage/pelage Yes- oil smell Yes- skin burned Unk- skin wet/not waterproof Unk- NA
Oiling Percentage	<2% 2-25% 26-50% 51-75% 76-100% Oil present/extent indeterminable No oil NA
Oiling Depth	Surface Moderate Deep NA
Oiling Location	Bill/mouth only Body- 1 spot only Spotty- multiple Waterline Entire body NA

INTAKE EXAM

Sedation/Anesthesia	Yes No		
Exam Date / Time		Weight (g)	
Dehydration	None Mild Moderate Severe	Age	
Attitude	Alert Quiet Depressed Obtunded Stuporous Nonresponsive	Sex	Unknown Male Female
Mucous Membrane	Pink Pale White Blue Yellow Pigmented Dark Red	BCS	Emaciated Thin Reasonable Good Plump
Color Mucous	Moist Tacky Oily	Temperature	◦F ◦C
Membrane Texture Eyes	NE / NSF / Abnormal		
/ Ears / Mouth / Nares	NE / NSF / Abnormal		
Neurologic	NE / NSF / Abnormal		
Heart / Lungs	NE / NSF / Abnormal		
GI / Vent	NE / NSF / Abnormal		
Musculoskeletal	NE / NSF / Abnormal		
Feathers / Fur / Skin	NE / NSF / Abnormal		
Body	NE / NSF / Abnormal		
Wings/Arms	NE / NSF / Abnormal		
Legs / Feet / Hocks			
Treatments			
Comments			
Examiner		Scribe	

SPECIES: LOG #: TEMP. BAND/TAG:

DISPOSITION												
	Disposition	Released	Transferred	DOA	Died +24hrs	Died in 24hrs	Euthanized +24hrs	Euthanized in 24hrs				
	Date		**Location Name**					**State**				
	Latitude		**Longitude**									
	Reason					**Dispositioned By**						
	Federal Band #					**Age Code**	HY	AHY	SY	ASY	TY	ATY

NE= Not Examined *NA= Not Applicable* *NSF= No Significant Fi DOA= Dead on Arrival* *updated March 2021*

PATHOLOGY REPORT

Clinic No. _____ Pathology No. _____
Species _____ Sex _____ Age _____ Date _____
Pathologist _____
Clinician _____ Student _____ Student _____

Owner _____ Address _____
Dr. _____ Address _____
Specimen Preserved _____ Died or Killed _____ Destroyed by _____
Post Mortem State _____ Nutritional State _____
Recorder _____

Pathological Diagnoses:

Clinical Abstract: _____

Integument: _____

Peritoneum: _____

Digestive Canal: _____

Liver: _____

Pancreas: _____

Spleen: _____