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INTRODUCTION AND BACKGROUND

INTRODUCTION

This manual serves as a supplement to the Basic Supervisors course offered by the Oiled Wildlife Care Network (OWCN), California Department of Fish and Game. It should serve as a referral guide outlining some of the basic procedures and protocols to follow in the event of an oil spill response or the occasional oiled bird. It is important that these procedures are understood and followed by all participants in the OWCN. By using the most current procedures and protocols, we should be able to provide the “best achievable treatment” for all wildlife affected by oil in the state of California. In addition, the standardization of this information allows for more accurate collection of data for analysis, which then may yield further improvements in protocols. The procedures and protocols outlined in this manual are a *work in progress*, with constant changes being made as research and clinical experience suggest improvements.

AN OVERVIEW OF THE OILED WILDLIFE CARE NETWORK

The *Lempert-Keene-Seastrand Oil Spill Prevention and Response Act* of 1990 required the California Department of Fish and Game’s Office of Spill Prevention and Response (OSPR) to establish rescue and rehabilitation stations for aquatic birds, sea otters, and other marine mammals in California. Amendments to the Act in 1993 and 1995 guarantee the construction of regional oiled wildlife care facilities and ongoing operations and maintenance funding for the Oiled Wildlife Care Network. These regional facilities have been or are in the process of being established in the north coast, San Francisco Bay, Monterey Bay, central coast, Los Angeles Harbor, Orange County, and San Diego areas. The OWCN provides statewide protection through its geographic coverage and by capitalizing on the considerable talent and resources which exist within the community of marine wildlife care providers in California. Working with the University of California at Davis and International Bird Rescue Research Center, the OWCN provides annual trainings for supervisors in participating organizations. In addition, the OWCN administers a competitive grants program overseen by advisors from wildlife trustee agencies, academic and research organizations, the oil industry, and wildlife rehabilitators. This program enables the OWCN to develop and evaluate current treatment methods to ensure that wildlife are protected and that those released can contribute to free ranging populations.

ESSENTIALS OF THE UNIFIED COMMAND SYSTEM

When oil spills occur in California, the actions that are taken to protect wildlife resources are called Wildlife Operations. Wildlife Operations are guided in the initial phase of a response by an Area Contingency Plan that has been developed jointly by the United States Coast Guard and OSPR. All activities of the oil spill response are coordinated through the Unified Command (UC). The UC is the governing body responsible for all decision making processes during the spill response and is made up of a Federal On-Scene Coordinator (OSC) (usually a U.S. Coast Guard Captain of the Port for the affected area), a State Incident Commander (IC) (usually the OSPR administrator or his/her designee), a local government representative (MAC Group representative), and a qualified individual from the responsible party (RP), if known (see Unified Command Structure and detail of Wildlife Operations Branch, Appendix 1). The OSC has the ultimate responsibility for directing the oil spill response if a consensus cannot be reached among the members of the UC. However, the State IC usually takes the lead for environmental clean-up issues and the wildlife response. Early but prudent initiation of a wildlife response and the development of the Wildlife Operations section of the UC ensures timely mobilization of dedicated staff, equipment, and volunteers.

The Recovery and Rehabilitation sections of the Wildlife Operations branch are primarily staffed by OWCN personnel. The structure of the UC, and thus that of the OWCN, is designed to be flexible and scalable to the size of the oil spill response. The reporting structure for the OWCN response personnel is illustrated in Appendix 2 along with brief descriptions of the duties associated with each position. Only those positions necessary and appropriate for a specific spill incident are filled, and most oil spill responses do not require the filling of all listed positions. The OWCN Director must be aware of the number of staff in each personnel category for every response to ensure a smooth operation, to better assess additional staffing needs, and to arrange for reimbursement from the RP. If an individual is responding to an oil spill for the OWCN for the first time in a non-volunteer position, the OWCN Director must determine that individual's qualifications and assign him or her to an appropriate personnel category. Similarly, all requests for additional staffing, equipment, supplies, or changes in operational activities should pass through the chain of command to the OWCN Director (Appendix 2). If the chain of command is diligently followed, all appropriate personnel are included in communications and the response effort is much more efficient. Responses to oil spills since the implementation of the UC and adherence to chain of command protocols have been significantly less chaotic and resulted in more efficient wildlife handling and an overall improvement in wildlife care.

THE ROLE OF VOLUNTEERS

The OWCN is operated primarily by a cadre of dedicated, trained wildlife rehabilitation volunteers. Because volunteers are crucial to all oil

spill responses, we greatly value their commitment and dedication and hope to be able to provide them with the training necessary for them to adequately complete their desired jobs within the OWCN. If a volunteer feels that he or she has not been adequately trained for the duties requested, has been dealt with unfairly or inappropriately, or has concerns about his or her role in Wildlife Operations, those concerns should be immediately brought to the attention of his or her supervisor. In the case of a problem arising between the volunteer and the supervisor, concerns should be voiced directly to the Volunteer Coordinator. All volunteer issues are important to the operation of the OWCN. Unfortunately, no volunteers under the age of 18 will be allowed to work with wildlife, within a response facility, or within the hot zone of an oil spill due to federal restrictions on the use of volunteers for potentially hazardous activities.

CHAIN OF CUSTODY PROCEDURES

Systematic searching, recovery, transportation, processing, and treatment of all affected wildlife are critical for gaining an understanding of the short-term and long-term consequences to wildlife populations and guiding response actions. In order to track the samples and data collected during an oiled wildlife response, the OWCN must adhere to strict chain of custody procedures. Data on live animals are compiled on standard OWCN log forms (Appendix 3) for tracking purposes. During large-scale responses, log forms will be completed by wildlife agency personnel or their agents; however, OWCN personnel should be familiar with the forms and their completion for smaller-scale responses and for the occasional oiled bird. As detailed in the agreements between OSPR and OWCN organizations, data on all oiled birds must be collected and the OWCN Director immediately notified upon receipt of oiled wildlife. The occurrence of oiled birds prior to declared oil spill events has been critical to the early detection of oil pollution in the environment and the establishment of oiled wildlife responses. In addition to the tracking of live animal data, all samples (carcasses, feathers, photos) which may be used in legal cases must be tracked and secured at all times. An additional chain of custody form (Appendix 4) must be completed for all such samples. Once the spill has been declared over, the original records from oiled animals during a response must be completed and sent to the OWCN administrator at the Wildlife Health Center within four weeks.

Return all records and evidence samples to the OWCN within four weeks after completion of the spill

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GENERAL HUMAN AND ANIMAL CONCERNS

THE EFFECTS OF OIL ON WILDLIFE

There are many different effects that petroleum products have on the health of wildlife. These effects vary depending on the types of petroleum involved and on the type of wildlife affected by oiling. For instance, major distillates such as diesel fuel and kerosene are highly volatile and often result in inhalant pneumonia, emphysema, and skin and ocular burns. Crude oils are less likely to cause these problems, but more likely to cause abnormalities related to ingestion of toxic substances.

The initial effect that any type of petroleum product has on any bird is rapid penetration into the feathers, leading to loss of insulation, buoyancy and flight. Because of this disruption in waterproofing, birds lose thermoregulatory abilities and rapidly become hypothermic while in the environment. This hypothermia can cause rapid death or force the bird to beach itself, leaving it vulnerable to predators and unable to feed and hydrate. Additionally, because of this loss of the ability to maintain appropriate body temperature, when brought into captivity, animals may also become hyperthermic if not carefully monitored.

When oil is preened from feathers, a variety of toxic materials are ingested. Most of the toxic effects result from ingestion of substances known as polyaromatic hydrocarbons (PAHs). Once absorbed across the gastrointestinal tract, well documented effects include gastrointestinal irritation and motility disturbances, dehydration, hemolytic anemia, liver abnormalities and long term reproductive failure (Leighton, 1995).

Secondary effects of oil on wildlife are those that result from prolonged periods of time in captivity. Many birds are immune suppressed and thus susceptible to a number of infectious diseases, including aspergillosis. Aspergillosis begins as a fungal respiratory disease and can quickly become a systemic disease in captive seabirds. Chronic anemia is also seen from malnutrition, chronic disease and the stress of captivity. Holding aquatic birds out of the water for too long in captivity can lead to the development of pressure sores. These pressure sores tend to develop over the keel, hock joints and feet. Therefore, one of the goals of the rehabilitation effort is to avoid these secondary problems through the use of proper nutrition and housing and a knowledge of the “window of opportunity” for successful rehabilitation that exists for different species of birds.

Effects vary depending on the type of petroleum

Hypothermia and toxic effects are common

Captivity related problems can result with improper husbandry

HUMAN HEALTH AND SAFETY CONSIDERATIONS

Human safety comes first!

Always wear appropriate PPE

Always wash hands after handling animals to prevent zoonotic disease transmission

Working at an oil spill presents many different challenges to human health and safety. Along with the Basic Supervisors Training, a minimum of 4-hours HAZCOM training is required of all supervisors. It must be kept in mind that the petroleum product is often a hazardous substance, therefore all personnel should be familiar with the Material Safety Data Sheet (MSDS) on the product with which they are working. Appropriate personal protective equipment (PPE) is required at each oil spill response, which can include safety goggles, protective suits, latex or nitrile gloves, and protective footwear. Do *not* touch oiled birds with ungloved hands. In addition, personnel working on search and collection will be required to undergo more extensive safety training and may be required to wear other forms of PPE, including Personal Flotation Devices (PFDs). The Site Safety Officer will supervise all aspects of human health and safety.

Remember that human safety always come first in any response effort! If anyone is bitten, scratched or otherwise injured, report the injury to the supervisor immediately and seek appropriate medical attention. Safe lifting practices should be observed when lifting animals and equipment. In the rehabilitation facility, special attention should be paid to the potential for slips, trips, and falls. Recognize areas of particular potential for harm to both humans and animals, e.g., heat lamps hanging near sheets, inadequate ventilation leading to an accumulation of toxic fumes, and certain drugs or disinfectants that may have undesirable secondary effects.

While disease transmission between oiled birds and humans is uncommon, the potential for these to occur exists. A list of zoonotic diseases is presented in Appendix 5. The key to avoiding these diseases is to practice good preventative techniques. These techniques include making sure that all staff are adequately rested, fed and have current tetanus vaccinations. Pregnant or immune compromised personnel should not participate in direct animal care and should consult with their physicians before working during a spill response. Always wash your hands after handling any animals or their caging material and before eating, drinking, or smoking (However, no smoking is allowed inside the rehabilitation facility). For more details on these topics, please refer to the 24-hour HAZWOPER manual (Berliner, 1994).

ANIMAL HANDLING AND RESTRAINT

Ask for help before handling unfamiliar species

Minimize visual and auditory stressors

Always remember that human safety is your primary consideration, closely followed by the safety of the animal being handled. Handling and restraint techniques will vary from species to species, so an unfamiliar species should only be handled with the guidance of a more experienced supervisor. In general, most birds in the rehabilitation facility are restrained by placing a towel or sheet over the bird, holding the head behind the neck and holding the wings to the body. Keep birds at waist level in order to avoid injuries to the handler's face. With this in mind, the bird can be moved to another area or passed to another person, transferring first the body, then the head, and

making sure to communicate your actions to the other person. Visual and auditory stresses should be minimized as much as possible whenever animals are handled. Thus, cages should be covered with a visual barrier, such as a towel or sheet, and loud noises avoided in areas of animal housing. Again, be sure to wear any required personal protective equipment, such as exam gloves, safety goggles and protective clothing when handling animals. If handling a clean, nonoiled bird, always use clean latex gloves and a clean towel to prevent feather contamination.

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SEARCH AND COLLECTION

GUIDELINES

Unless specifically authorized by appropriate trustee agencies, no normal, unoiled animals will be collected during spill incidents. Preemptive capture and/or hazing will be accomplished only under the supervision of the wildlife trustee agencies. Only trained and authorized individuals may handle oiled birds. Search and collection personnel are assigned duties by the OWCN. Because search and collection duties vary with each response and may involve more risk than other duties, the OWCN will determine the level of training appropriate for field response personnel for each spill incident. No volunteer will be compelled to perform any task that they feel is dangerous or beyond their skill level. Human safety is the first priority for animal rescues.

Teamwork is essential to safe, efficient collection of oiled birds. A rescue team will consist of two or more people. A plan of action should be discussed among all search and collection personnel prior to entering the search area. Each capture site should be evaluated and strategies developed to suit the terrain and species involved. Have all equipment ready and in working condition. These materials may include dip nets, carrying boxes or pillowcases, towels or sheets, two way radios and all safety equipment. Two way radios and cellular telephones are often used to communicate between search and collection teams and with the search and collection coordinator. In addition to PPE required by the site safety officer, appropriate attire for capture teams includes closed-toed shoes or boots, long sleeves, long pants, and organizational identification (e.g., name tags, marked clothing). A central field stabilization site where oiled birds are brought as soon as possible after collection should be established prior to search and collection teams dispersing into the field.

Only trained and authorized individuals may handle oiled birds

Develop a plan of action

Have all equipment ready and in working condition

TECHNIQUES

During search and collection efforts, always be aware of any hazards in the surrounding environment such as incoming tides or slippery cliffs. Collection during periods of low tide may yield more successful results than

Always be aware of environmental hazards

Knowledge of species habits is helpful

Field stabilization techniques should be employed

those planned during other times. Never attempt to rescue animals in areas of dangerous access. When working near water, one member of the capture team should be assigned to watch the ocean and warn of dangerous wave activity. Other potential physical hazards can also include hypothermia or hyperthermia. For their own well-being and safety, team members should use sunscreen and have drinking water readily available. A first aid kit, which includes wound disinfectant and bandaging materials, must be readily available to the rescue team. Be sure to carry your 24-hour HAZWOPR verification card when entering the “hot zone” at a spill site (Berliner, 1994). Consult with the site safety officer when entering the “hot zone” for special safety and clothing requirements.

Once an oiled bird is spotted, the first task is to prevent the bird from returning to the water. Place yourself between the bird and the water, then to net the bird, place the net in front of the fleeing bird rather than making a “swatting” motion. Gently remove the bird from the net while keeping it under control to avoid breaking feathers or ripping toe nails. Try to refrain from making eye contact with the bird. Carry birds at or below waist level and maintain control over the head at all times. “Wing holds” (lifting and holding by the wings only) are not recommended. Hold birds firmly wrapped in a towel or by hand to discourage struggling but do not restrict their breathing.

It is helpful to be aware of the special traits each species possesses that may affect the capture situation. For example, 1) scoters may “faint;” 2) loons, egrets, and herons all have dangerous, long beaks that can injure the handler’s eyes, therefore always wear eye protection when working with these species; 3) puffins, cormorants and gulls bite like parrots and will crush and twist flesh resulting in painful, bruising injuries to the handler; 4) cormorants and pelicans have no external nares (nostrils) and will not be able to breathe if their mouths are held tightly closed; 5) birds with long legs must be handled carefully so as not to twist or bend their fragile legs; and 6) loons should be provided with extra padding in their transport box to prevent hock abrasions and keel lesions during transport.

Birds may be captured and placed in pillowcases for short periods of time until they can be transferred into airline kennels, portapets or cardboard boxes with ventilation holes. Minimize the amount of time in the pillowcases as much as possible, especially when a volatile petroleum product, such as diesel or jet fuel, is involved. Be aware that animals in pillowcases may also be highly susceptible to hyperthermia.

Prior to transport, field stabilization techniques may be employed if it will be more than one or two hours until the bird reaches the rehabilitation facility. These techniques include assessing the bird for hypothermia or hyperthermia and treating accordingly (see section: “Physical Examination/ Intake Procedures”); gavage tubing the bird with an oral electrolyte solution (such as Pedialyte®) at approximately 30cc/kg body weight; and removing large amounts of oil from the eyes, nares, and glottis.

After the bird has been stabilized, it should be placed in a well padded and ventilated box, carrier, or airline kennel for transport. This container should be at least twice the size of the bird and well ventilated with holes of approximately 1 inch in diameter over at least two sides and near the top and bottom of the box. Pad the bottom of the container with sheets, towels or absorbent pads. Make sure boxes are properly closed to prevent unexpected escapes. Place this container in a quiet, sheltered area while awaiting transport. Record the exact location of the capture, the reason the animal was captured (e.g., oiled), species, date and time of capture, and the name of the person collecting the animal. Attach or write this information on the transport box. In the future, mobile Global Positioning Satellite (GPS) technology will allow accurate latitude and longitude coordinates of the collection site.

When long stretches of beaches are covered during a search and collection process, it is often useful to scan these areas in all terrain vehicles (ATVs). Permission for the use of these vehicles must be given by the proper authorities, and only personnel with OSPR-approved training and experience with these vehicles will be permitted to drive them.

If birds are being collected from a boat, special human safety precautions need to be taken. These include the use of Personal Flotation Devices (PFDs) and appropriate water repellent clothing and footwear. Knowledge of the diving habits of the birds that are being collected is necessary in order to efficiently accomplish boat capture. If the capture is not successful after a few attempts, then an informed decision must be made as to whether to continue the pursuit.

If the search and collection team is to collect oiled carcasses, there will be instruction given by wildlife trustee agency personnel as to which animals to collect, methods of collection, and recording procedures.

TRANSPORT PROCEDURES

Animals are generally transported in an enclosed van-type vehicle. When loading boxes that have side holes for ventilation, at least 1-1/2" must be left between boxes to allow air in and out of side vents (top vents are not by themselves adequate). Remember, freshly oiled animals are often emitting fumes; therefore always maintain adequate ventilation in the vehicle to protect both humans and animals from inhaling such fumes. Only one animal per transport box is acceptable except in the case of non-aggressive, colonial species (e.g. murre) which may be transported two or three to an appropriately sized box. Wet birds may require a temperature close to 80°F to be comfortable during transport; however, dry, oiled birds will require a cooler environment. Boxes in direct sunlight inside an air conditioned vehicle may still overheat. Please note that human comfort during transport may not necessarily be synonymous with or sufficient for the temperature and ventilation needs of the transported birds. No domestic animals are allowed in transport vehicles.

Animals should be monitored periodically on long transports (e.g. those taking longer than one hour), as directed by the responding veterinarian.

Leave room for ventilation between boxes

One animal per box except in the case of colonial species

Ambient temperature will depend on the birds' needs

Monitor birds during transport

It may be necessary to gavage an electrolyte solution periodically during transport. Critical cases (e.g. unstable, hypo- or hyperthermic animals) may require frequent monitoring. Therefore, good judgment is required. Take care to avoid excess stress to the birds when monitoring (e.g. do not talk to or around the bird). If the animal's condition deteriorates suddenly during transport, call for veterinary advice from either the veterinarian at the point of origin or at the receiving facility.

It is important that the person transporting animals between the field and the rehabilitation center maintain contact with their supervisor at all times so that departure and arrival times may be anticipated at these different locations.

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INTAKE

INITIAL INTAKE PROCEDURES

The person who is transporting animals from the field is responsible for establishing contact with the person(s) who is (are) in charge of intake at the rehabilitation center. The transporter must fill out appropriate chain of custody information to transfer the birds and must make sure that all capture information is present for each admitted bird. It is critical that the location of capture, and date and time of collection be recorded along with the name of the collector.

Appropriate chain of custody must be maintained

All birds are entered into the admission log

While awaiting the intake examination, all boxes containing birds should be placed in a warm, well ventilated area in such a manner that the order of admission is apparent. In this way, birds that have been waiting longer for intake will be examined prior to more recent admissions. Any birds that are designated in unstable condition from the field will be prioritized for examination and treatment.

All birds are entered into the “Live Bird/Mammal Log” (Appendix 3) in the order that they are admitted to the rehabilitation center. The log records information such as admission number, date of admission, species, capture site, temporary leg band number, final disposition, and date of final disposition. Codes for the log can be found at the end of the Appendix.

PHYSICAL EXAMINATION/INTAKE PROCEDURES

All personnel performing intake should wear appropriate PPE, e.g. safety goggles, protective clothing, and latex or nitrile gloves. It is best to work in teams or two (handler, examiner) or three (handler, examiner, recorder) in order to perform the intake in an efficient manner. Have all equipment needed for the intake procedure ready before beginning the examination.

Intake Procedure

- 1. Capture location, date and time*
- 2. ID species, age, sex*
- 3. Physical exam*
- 4. Feather sample*
- 5. Photograph*
- 6. Legband*
- 7. Fill out record form completely*

A brief physical examination at the receiving facility will be made upon arrival of each individual oiled bird. Following the form provided (Appendix 6), examine the bird for any abnormalities. Please fill out all information requested on the form as completely as possible. It is especially

important that information such as spill acquisition number, intake date, and capture site be recorded. Appendix 6C provides details regarding each item requested on this form.

Birds need to be identified to species and, when possible, general age (chick, subadult, or adult) and sex (male or female) should be recorded. For details on aging birds, the reader is referred to any good field guide, such as “A Field Guide to Western Birds” (Peterson, 1990) or “Field Guide to the Birds of North America” (Scott, 1989).

Temporary legbands will be placed on all birds for identification purposes. It is essential to make sure that there are no duplicate bands during a spill response. It is also important to ensure that bands fit well and are not too tight or so loose that they will fall off of the bird. Bands are usually identified by the first letter of the band's color, followed by the number. For example, a bird with a green band number 94 will be classified as “G94.” Federal bands replace the temporary leg bands at the time of release. Please refer to the Band Size Guide (Appendix 7) to ensure that appropriate sized bands are placed on birds.

All birds will have the following information recorded regarding oiling: type of oil (if known), percent oiled, depth of oiling, and area that is oiled. Excess oil, if present, should be removed from the eyes, mouth and nares with a cotton swab. If the bird has thick oil or tar on or around the cloaca, it should be wiped off so that the bird can defecate. Obtain an oiled feather sample by pulling or cutting a few small contour feathers that have oil on them (preferably from above the waterline) and place them in aluminum foil. Fold all the edges of the foil over to seal the contents. Label the wrapped sample with the following information: date of sample, species of bird, ID band number, spill name, and acquisition number. Enclose the sample in a “zip lock” type bag and place in a locked freezer for storage, in order to secure these samples as legal evidence. All samples should be shipped to the Wildlife Health Center at the end of the spill response.

The bird is weighed on a scale designated for oiled birds. All weights are recorded in grams. The temperature of the bird is taken with a digital thermometer gently inserted into the cloaca and is recorded in degrees Fahrenheit. Normal cloacal temperatures usually range between 102–105 °F or 39–41 °C (Walraven, 1992). If an animal is hypothermic or hyperthermic, the veterinarian may choose to postpone the examination until measures are taken to correct the problem. If the bird is hypothermic, warm the bird to normal body temperature as quickly as possible. Warming can be accomplished using water filled latex gloves, warm water bottles, warm air pet dryers, heat lamps, or incubators. Birds must be regularly monitored for overheating once they are dry. Birds that display open-mouth breathing are usually either hot or stressed. If being handled, give the bird a rest in a dark, cool environment. If the bird is hot, try misting the bird with water to cool it. In addition, alcohol pads can be applied to the feet, or the bird's body can be immersed in cool water to reduce hyperthermia. It is important to monitor the cloacal temperature closely during these procedures.

The percent dehydration will be estimated for all birds by using the chart provided (Appendix 8). Although recording heart rates is not absolutely required, it is valuable data to obtain. A table containing heart rates at rest and during restraint is provided in Appendix 9. Occasionally, a heart murmur may be ausculted in birds that are extremely anemic. It is important to carefully auscult the lungs, noting respiratory rate, difficulty breathing, or abnormal lung sounds.

The head of the bird should be examined to note any obstruction of or discharge from the eyes, nares, and mouth. Eyes that are sunken in their orbits are an indication of dehydration. Any abnormal head tilts or movements may be an indication of central nervous system (CNS) problems.

The wings and legs are carefully palpated for any fractures, wounds, or swelling. Abnormal wing droops or leg lamenesses are noted. The body of the bird is examined for any traumatic wounds, keel lesions, and the degree of muscle loss. The abdomen is gently palpated to detect any obvious masses, fluid accumulation, or vent abnormalities.

A photograph should be taken of each oiled bird on admission. An “instamatic” flash type camera or Polaroid® camera will be provided by OSPR for this purpose. The photograph should include the entire bird but highlight the area oiled and the leg band number of the bird. If the leg band cannot be read using this method, pertinent information, including the name of the spill, date of admission, species of bird, acquisition number, and leg band number can be written on a piece of paper or a dry erase board and placed behind the bird for the photo. Otherwise, this information can be written on the Polaroid® photo at the time the picture is taken. Cameras and photos should be considered as legal evidence and therefore kept in a secure place to be delivered to the Wildlife Health Center at the end of the spill response.

ROUTINE BLOOD SAMPLING

All birds will have blood drawn for a packed cell volume (PCV), total solids (TS) reading, blood glucose (BG), and two blood smears. This sampling requires approximately .10 -.15 ml of blood which is usually drawn from the leg (medial metatarsal vein) into microhematocrit tubes. Alternatively, blood can be drawn from the wing (brachial vein) or the jugular vein if necessary. A rule of thumb for *maximum* recommended amounts of blood to draw is 1 ml/100g body weight of bird. More commonly, no more than 0.6cc of blood/100 g body weight is taken (see Appendix 10). Small quantities of blood can be taken for PCV, TS and BG readings with a 25 gauge needle inserted into the medial metatarsal vein. Fill the hub about halfway full and then use this blood to fill three microhematocrit tubes. The two blood smears should be labeled with the in-house band number, species and date collected and then stored (at room temperature) in a slide box.

PCV, TP and BG concentrations are determined as soon as possible after intake. The results of these blood tests will be used to determine treatment protocols while in rehabilitation. If a bird is extremely anemic (has a PCV of

Blood will be taken for these tests:

1. *Packed cell volume (PCV)*
2. *Total Solids (TS)*
3. *Blood glucose (BG)*
4. *Blood smears*

15% or less) and/or extremely hypoproteinemic (TP < 1.0 g/dl), the veterinarian should be consulted. In many instances, it has been found that these birds are unlikely to survive the rehabilitation process or do not ever meet release criteria. A clinical judgement must be made by the veterinarian regarding euthanasia of these individuals.

Special Blood Sampling Protocols

Other samples may be taken for:

1. Complete blood counts (CBC)
2. Serum or plasma chemistries
3. Specialized tests

Various oils affect different species of birds in different ways. It is important to record these effects (altered behavior, physical exam findings) and catalog the effects through the collection of blood for hematology, serum chemistry, and other tests. At times, protocols may be used that require additional blood samples for other tests (e.g. complete blood counts, serum chemistries, plasma samples), depending on the discretion of the OWCN veterinarian. Minimize additional blood sampling (e.g., for serum chemistries) other than microhematocrit tubes once the PCV is known to be 15% or less as further blood loss can be life-threatening (Ritchie et al., 1994).

For larger quantities of blood, it is possible to use a 25 gauge needle or a 23 or 25 gauge butterfly catheter attached to a tuberculin or 3cc syringe. Do not use a needle that is smaller (has a higher gauge) than 25 gauge. Smaller sized needles may rupture blood cells as they pass through the small aperture. When using a 25 gauge needle, do not pull hard on the syringe plunger to increase the draw of blood or it may also cause some red cell damage. Once the sample is in the syringe, remove the needle and gently push the syringe plunger downward to transfer the sample from the syringe into the appropriate test tube.

Complete Blood Cell Counts (CBC). This series of tests includes: white blood cell count, red blood cell count, hemoglobin concentration, hematocrit, mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), mean corpuscular hemoglobin (MCH), a differential white blood cell count, a platelet count, and detection of any blood parasites or morphological abnormalities of any cell types. Lavender top microtainer or glass tubes contain EDTA to prevent clotting and are used to submit samples for complete blood counts. If multiple tubes are being used, the lavender top tubes should be filled with blood first, with microtainers requiring a minimum of 0.25 cc of blood. When taking a small sample (less than 0.5 ml) and using a 2 ml lavender top tube, remove the top and give one shake to removed excess EDTA. Gently invert the lavender top tube several times to evenly mix the blood sample with the EDTA.

Two blood smear slides are made, preferably with blood fresh from the syringe, and placed in a protective transport container which is labeled with the birds case or band number.

Plasma or Serum Chemistry Profile. This panel of serum chemistry tests usually includes: albumin, alkaline phosphatase, bicarbonate, bilirubin (total and direct), calcium, chloride, cholesterol, CPK, globulin, glucose, phosphorus, potassium, total protein, sodium, AST (SGOT), ALT (SGPT),

and uric acid. This profile requires *at least* 0.25 ml of serum but the lab prefers 0.50 ml. To get these volumes, draw 0.5-1.0 ml of blood. The sample should be placed in a red top or a green top tube with a gel serum separator if possible. If red top serum tubes are used, samples should be allowed to clot by leaving them at room temperature for 15–30 minutes. Check for a clot prior to centrifugation. Spin the tubes in a clinical centrifuge for 15 minutes to separate red blood cells from serum or plasma prior to sending to the laboratory. If using a green top plasma tube, it is preferable to spin the sample and then separate the plasma from the red cells and submit the plasma alone for the panel.

Other tests. Green top plasma separator microtainers or larger green top tubes may also be submitted for other specialized tests, such as detection of aspergillus antigens or antibodies. See Appendix 23 for instructions on blood sample submission.

POST EXAMINATION INTAKE PROCEDURES

Administer a mix of isotonic fluids and activated charcoal orally (75 mg/ml strength) at a rate of 50 ml/kg body weight once (see Appendices 11 and 14). This mixture is given to help adsorb toxins in ingested oil before they have a chance to be absorbed by the body. All gavage mixes should be warmed in pans filled with warm water before being administered.

Give activated charcoal slurry

House newly admitted birds together if possible

The rehabilitation supervisor will instruct the animal handler where the newly admitted bird is to be housed. In general, every attempt should be made to keep birds of the same species that arrive at approximately the same time housed together. This makes it easier to find groups of birds for certain procedures, such as weighing and bleeding. Cage or pen cards should be on all pens and must contain information such as species, leg band number and date of admission. These cards need to be kept as current as possible.

COMMON PROBLEMS SEEN DURING INTAKE

Regurgitation. If regurgitation occurs immediately after the bird has been tubed, make sure that the tube mix is not cold and take care to tube a smaller volume and more slowly the next time. If regurgitation reoccurs, take the bird's cloacal temperature and correct for hypothermia or hyperthermia, if necessary. Do not force feed. If the bird shows repeated episodes of regurgitation, consult the veterinarian as soon as possible. Regurgitating birds should be treated in the following manner: 1) temporarily discontinue oral feeding, 2) attempt to determine why the bird is regurgitating, e.g. gastrointestinal obstruction, hypothermia, infection etc., and treat accordingly, and 3) give isotonic 2.5% dextrose or Lactated Ringers solutions (LRS) subcutaneously (SQ) in normothermic birds at a rate of 5% of body weight divided over two bolus administrations. Do not give SQ fluids to pelicans due to large areas of subcutaneous air, they do not absorb fluids well from the subcutaneous space. Record episodes of regurgitation in individual animal records as soon as possible.

Make sure the tube mix is not cold and tube more slowly

If continues, see veterinarian

Check for mechanical obstruction, see veterinarian

Wheezing or showing signs of respiratory distress. Check glottis to see if there is a mechanical obstruction that can be dislodged. If not, isolate the bird and present it to a veterinarian for evaluation. Note: be careful when looking down the bills of birds who are aggressive (e.g. loons, herons). If the veterinarian is not immediately available, housing the bird in an oxygen cage is often beneficial in cases of respiratory distress.

Oral fluid replacement for minor dehydration, otherwise see veterinarian

Dehydrated. If the bird is mildly dehydrated (5% or less), oral fluid replacement will suffice for rehydration. If a bird is moderately dehydrated (5–8%), the veterinarian may decide to add parenteral (SQ, intravenous or intraosseous) fluids to the rehydration regimen. Severely dehydrated birds (8% or higher) will often require intravenous (IV) or intraosseous (IO) fluids under veterinary supervision to restore them to normal hydration status. In the case of pelicans or any bird that is suffering from severe dehydration, 2.5% dextrose or (LRS) is given IV or IO at a *minimum* rate of 50 ml/kg body weight in a 24 hour period by drip or divided into two or three boluses until rehydrated. The veterinarian will often rehydrate a hypothermic bird with IV or IO fluids because SQ fluids are not well absorbed under these circumstances due to peripheral vasoconstriction. Please see Appendix 12 for fluid therapy calculations.

Consult veterinarian prior to rehydration

Hypoproteinemic. If a bird has a total solids reading of less than 2.0 g/dl., fluid therapy will decrease this value further and may result in pulmonary edema and potentially, death. When birds have a reading less than 2.0 g/dl, a veterinarian should be consulted prior to hydration. Special fluid therapy solutions such as hetastarch (high molecular weight solutions) may be of assistance and prescribed by the veterinarian.

In cases involving moderately to severely anemic birds, care must be taken during the hydration procedures to offset the reduction potential of fluids on the PCV. Consult a veterinarian prior to hydration.

Common reasons:

1. Hypothermia/hyperthermia
2. Head trauma
3. Hypoglycemia

Lethargic or obtunded. Examine the bird carefully for any signs of head trauma, such as swelling, bruising, or bleeding. If these are detected, contact the veterinarian immediately. Take the bird's cloacal temperature and correct for hypothermia or hyperthermia, if necessary. Perform a blood glucose test using the glucometer and record results in record. Normal glucose concentrations for species commonly encountered during oil spills in California range between 200 - 365 mg/dl (Newman and Zinkl, 1996). Birds are likely to seizure if the glucose levels fall below 80 mg/dl. If a bird is severely hypoglycemic and no veterinarian is immediately available, administer an amount equivalent to 5% of body weight of 2.5% dextrose SQ or, if the bird is not regurgitating, give up to 10% dextrose orally using the gavage chart provided (Appendix 14) (Ritchie et al., 1994). Please be aware that administering these hypertonic fluids may exacerbate dehydration in affected birds.

Central nervous system (CNS) signs. Ataxia, seizures, obtundation: Find the veterinarian immediately for a consultation.

Wound or a suspected or obvious fracture of a long bone (wing/

leg). Consult a veterinarian as quickly as possible. If none is immediately available, remove any large pieces of debris and flush the wound with sterile saline or dilute chlorhexiderm solution (Nolvasan®). For more information on wound management the reader is referred to “Basic Wound Management for Wildlife Species” (Newman, 1994). For temporary stabilization of wing fractures, wrap the wing in a flexed position to the body with Vetrap®. If the leg is broken, it can quickly be wrapped to the body in a flexed position with tape that will not damage feathers (Micropore® tape). For specific information on how to immobilize fractures using these methods, see the Wildlife Rehabilitation 1AB manual, p. 43-47 (Nance, 1993). Place the bird in a well ventilated box and put the box in a darkened quiet area. Present the bird to a veterinarian immediately for continued care.

Clean and stabilize fractures ASAP

Consult veterinarian

5

PREWASH REHABILITATION

PREWASH REHABILITATION

The goal in rehabilitating animals during an oil spill response is the release of a healthy animal back into its natural environment. In order to achieve this goal, it is necessary to treat the presenting problem, as well as preventing any secondary infections or injuries while in captivity. The following sections will discuss different aspects of the rehabilitation protocols that are designed to minimize captivity related problems and maximize the chances of release.

FEEDING

All oil-exposed birds with normal PCV and TS values are initially gavage fed high-calorie slurries at least four times daily alternating with rehydrating solutions (Pedialyte®) four times daily, resulting in a total of eight gavage feedings per day per bird. See Appendix 13 for nutritional slurry recipes. For more information on oiled animal nutrition the reader is referred to a review by Donoghue (1991).

The amount of fluid or slurry given varies and is partially dependent upon the species, size, and health status of the bird. The initial volumes are about one-half the total that the bird will receive per gavage feeding once it acclimates to this procedure. In general, a bird can accommodate about 50 ml/kg body weight (Williams, 1985). It is safest to start at low volumes and increase to larger amounts over time. Appendix 14 lists recommended tube feeding quantities. For an example of a feeding schedule, please refer to Appendix 15.

Shallow pans with water and non-oily small fish (white bait or smelt) may be provided in daylight hours to each pen for free feeding in addition to gavage feedings. These pans should be small enough that the birds cannot climb into them, thus avoiding the problem of the feathers becoming further soiled and wet. If free feeding is offered, record the number of fish eaten/pen on the pen feeding record (Appendix 16). Gavage feedings are gradually reduced as birds gain weight and start to self feed. There are variations in feeding behavior among species, and regular observation and common sense

Most oiled birds are initially gaviged electrolytes 4x/day and nutritional slurries 4x/day

Smelt may be offered for free-feeding

If the TS is <2.0 g/dl, feed Ensure® instead of nutritional slurry

must be used along with regular weight determination to ensure that the birds are receiving adequate fluids and nutrition. A written entry must be made daily in the individual animal record regarding the amount of feed offered, food consumption and/or gavage feeding, especially if the feeding or treatment plan changes. It is also the role of the feeding team to routinely observe animals during feeding/handling for lesions, wounds, keel/hock sores, as well as noting any regurgitation during feeding. All abnormal findings should be reported to the veterinarian.

For some species, such as cormorants and pelicans, the usual 50 ml/kg body weight of fluids may not be adequate when fed simultaneously with grain-based diets or hyperosmolar human liquid diet products such as those labeled HCN (e.g. Isocal HCN®, Ensure Plus®) (Luccitti, 1993). For these species, additional fluids may be required.

Birds should have a total solids test performed and read prior to their first hypertonic high calorie feeding. Normal TS values range between 4.5 to 6.0 g/dl in most seabirds. If a bird has a TS less than 2.0 g/dl, typical gavage mixes, such as the nutritional slurries listed in Appendix 13, should not be given. Instead, a more easily digested diet, such as Ensure®, should be tube fed. It is often more efficient to house birds on similar diets together. Once the total solids in the serum are at least 2.0 g/dl and the bird shows no signs of regurgitation, then complex foods, such as the nutritional slurries, can be gradually mixed into the medium chain triglyceride diet. Birds with other medical problems may require other individual feeding regimens which will be supervised by the veterinarian.

Animal Food Preparation

Because large quantities of animal foods are being prepared daily by a number of people, it is essential that handling procedures be instituted to minimize contamination of these foods. All personnel should wash hands prior to starting work, at each rest break and again after finishing their shifts. Most food should be used the same day that it is prepared. Gavage mixes can be held overnight if they are refrigerated. Write the date and time on gavage mix containers so that those older than 24 hours can be thrown away if unused. Monitor temperatures of refrigerators, freezers, thawing tubs and food handling areas to ensure food quality. All food for human consumption must be stored in another refrigerator separate from animal food.

Food preparation utensils, food containers, and all gavage materials should be thoroughly disinfected between each use. Gross contaminants are washed off with warm soapy water, then all materials are soaked at least 20 minutes in a dilute disinfectant solution, such as chlorhexiderm (Nolvasan®) or a quaternary ammonia (Roccal®). Once disinfected, rinse all materials with water before use again.

Discard unused gavage mixes after 24 hours

WEIGHING BIRDS

All birds are weighed on a regular basis during the rehabilitation process. Weights should be recorded daily and, at a minimum, every two to three days before birds are washed. Ideally, weights should be obtained at approximately the same time every day, in order to make valid comparisons. Weights are taken on birds in outdoor pools every two to four days as part of the evaluation for release. Two different scales are employed in the rehabilitation center—one for oiled birds, and one for cleaned birds—to prevent soiling of clean feathers. For additional information on normal weights of birds, see Appendix 17 or “Weights of 686 North American Birds” (Dunning, 1984).

Weights should be recorded daily on oiled birds

HOUSING

Facility Design

The physical facility should be designed in such a way as to maximize the efficient flow of people and animals and minimize the possibility of the spread of disease. Birds should be admitted to an intake area directly from the outside, then go immediately to appropriate animal holding areas.

Maximize the efficient flow of people, minimize the spread of disease

Because oiled birds are usually immune compromised, both from exposure to petroleum products and from stress, they are especially prone to developing infectious diseases. Therefore, any birds suspected of harboring any potential pathogens should be brought to the attention of the veterinarian. A decision will be made concerning the feasibility of treating any individual animal with an infectious disease versus the risk of spreading this disease to the general population. If the animal is to be treated, then it will be necessary to quarantine that animal in an isolation area with separate air ventilation from the rest of the facility. When entering this quarantine area, masks and protective gloves are worn and a footbath is used on entering and exiting this room.

Good ventilation is needed to reduce irritating petroleum fumes and may reduce the potential of developing aspergillosis, a fungal respiratory disease. Ten to fifteen air changes per hour has been recommended as adequate for animal holding spaces (NIH, 1985) and has also been recommended in oil spill rehabilitation. If multiple cases of aspergillosis are diagnosed, ventilation and sanitation should be investigated. Contact the Wildlife Health Center for further information.

Ideally, the hospital and laboratory will be easily accessed from animal housing but will also have separate ventilation systems to minimize pathogen spread. Washing/rinsing/drying areas should be close to indoor animal housing, while the drying/clean bird indoor caging should also be accessible to outdoor pool areas. Oftentimes, necropsy and morgue facilities are entirely separate from any other parts of the rehabilitation center, again to decrease the possibility of infectious disease spread.

Avoid pressure sores with the use of net bottom cages, "donuts" and proper flooring material

Inside Cage Designs

Pelagic species, such as loons, grebes, murres, and sea ducks shall be housed on "net-bottomed" caging (Holcomb, 1988). "Donuts" should be placed on any thin or emaciated birds that are not standing well to protect the keel from pressure sores (Goodfriend, in press). Veterinary cages can be adapted with netting attached to insertable plastic frames or solid-sided pens (preferably of nonporous material) of various sizes can be used. Most gulls, ducks, geese, wading birds and pelicans can be kept in large veterinary caging or solid-sided housing with regular flooring or on rubber matting prior to washing. The ambient air temperature in indoor housing for oiled birds should be closely monitored and maintained at approximately 80°F. Floors of solid-sided pens must be cleaned at least twice daily. Shorebirds and rails do best in solid-sided enclosures and will escape through the bars of traditional veterinary caging. They also will injure their heads on ceiling netting if it is too low. Raptors should be housed in solid-sided mew enclosures or veterinary caging. Consideration should be given to the bird's housing relative to its natural habitat to ensure healthy feathers and feet prior to release. Avoid the use of wire cages to decrease the possibility of feather damage. Information regarding minimum standards for indoor caging sizes are extracted from the "Minimum Standards for Wildlife Rehabilitators" by the National Wildlife Rehabilitators Association and the International Wildlife Rehabilitation Council and is presented in Appendix 18.

Perch Designs

Perching surfaces should be based on species natural history

Pelagic species should be moved into water as quickly as possible

Preferred surfaces for perching vary based on the natural history of the species. Perches should be provided to birds that will use them, such as raptors, marshbirds and shore birds. The diameter of the perch should be large enough to prevent the hallux from injuring the metatarsal pad (Redig, 1993) and the surface should be uneven. Suggested perching materials include large curl-shaped bristled astroturf (Monsanto Daisy Mat®), sisal rope or natural branches. Perches wrapped with astroturf should be provided for pelicans. They may also have stumps or branches, provided the surfaces are varied and include padded perches and no foot problems are observed. Unless oiled or otherwise not waterproof, pelagic species such as murres, grebes and loons should be in water all of the time. Warm water pools are recommended for birds that are not yet ready for cold water pools, but should be in water to avoid captivity related problems (Goodfriend, in press). If it is unclear whether or not the bird is totally waterproof, a haul-out area can be provided. However, these should be removed as soon as possible when the bird is determined to be waterproof. For alcids, irregularly shaped rocks are recommended as haulout areas (Heaphy and White, 1990). For ducks, geese, cormorants and grebe species, a net platform slanted from the water level upward is suitable (Holcomb, 1988). For species utilizing marshes (e.g., herons, egrets, rails, coots), pools should be surrounded with a suitable walking substrate such as pea gravel or pea gravel mixed with sand.

Outdoor Cage Designs

The type of outdoor housing also varies by species and spill conditions. Principal concerns are safety of the species housed, predator and escape-proofing, and shelter from inclement weather. Double-door entries are highly recommended for all enclosures, except those that encompass pools and are a continuation of the pool wall upward. Pelagic birds must live in pools with impeccable water quality to prevent them from losing their ability to repel water. This is accomplished by having clean water flowing over the pool surface at all times, skimming debris from this surface. Pools must be siphoned as often as needed, but at least once a day, to remove dead fish and feces from the bottom of the pool. Pool size and depth requirements will vary by species. While shore birds need shallow water, loons, murre and Western grebes should have a water depth of at least 36 inches to assure waterproofing. Small shorebirds can be housed with access to “kiddie pools” but the larger pelagic species will need pools at least 10 - 12 feet in diameter. It is important to place pools in areas with limited human access. Construction of pens with visual barriers is encouraged. Walk-by traffic causes unnecessary stress on the birds and should be controlled. Again, minimum standards for outdoor housing of some of these species is presented in Appendix 18.

It is extremely important to have enough surface overflow to remove all debris from outdoor pools

Animal Cage Cleaning

Effective disinfection of all animal housing is necessary to minimize disease transmission and ensure the maintenance of good feather quality in captive birds. All transport cages and restraint equipment should be cleaned after each use and soaked or sprayed down with disinfectant solutions, as listed above. Solid-sided animal holding cages should have all dirty newspapers and towels on flooring surfaces removed from the cages twice daily and all surfaces should be sprayed down with disinfectant solutions. Newspapers underneath net bottom cages should be removed twice daily or as often as needed. Removable net bottoms from individual animal cages should be changed at least once daily and large net bottoms from group housing cages should be changed at least every other day. Individual net bottoms can be cleaned in the laundry while larger net bottoms can be effectively cleaned with steam cleaners.

MEDICAL PROCEDURES

While it is often not possible to provide individual medical treatments for birds during an oil spill response, there are several commonly-encountered medical problems and procedures that can and should be followed.

Hypothermia or hyperthermia are not only seen when birds are admitted, but can also be encountered during the rehabilitation process. Whenever birds are handled, it is important to observe for these problems.

The most common infectious disease seen in captive aquatic birds during an oil spill response is *aspergillosis*. To try to decrease the incidence of this disease in a spill response, all susceptible species are dosed with itraconazole (Sporanox®), an antifungal medication, on a prophylactic basis.

The most common infectious disease seen is aspergillosis
Itraconazole is dosed at 15 mg/kg PO SID

The dosage for this drug is 15 mg/kg orally once a day. Because itraconazole commonly comes in time-release capsules, the easiest way to administer this medication is to place the capsule beads into a mildly acidic liquid (flat cola works well), soak for several hours, then mix it using a 1cc or 3cc syringe. Make sure to record the concentration of your slurry (in mg/ml).

PCV, TP and BG concentrations are determined at intake and are followed on an every other day schedule in all birds prior to the wash in order to objectively determine their physiologic status. All anemic birds (birds with PCVs below 30%) are dosed with iron dextran at 10 mg/kg intramuscularly (IM) at least once. Additional doses of iron dextran may be given by the veterinarian every 5 to 7 days. Iron dextran should not be given in birds with suspected or confirmed bacterial diseases, as the iron can serve as a growth medium for these organisms. It is important to attempt to determine the cause of the anemia, e.g. blood loss, destruction of red blood cells, or decreased production of red blood cells by the bone marrow. All birds with total solids readings less than 2.0 g/dl are given an intramuscular injection of vitamin B complex at 20 mg/kg body weight (based on the thiamine concentration) every 5 to 7 days (Johnson-Delaney, 1996).

Groups of birds on similar medication schedules may be housed together to make treatment easier. Any birds being treated for individual medical problems are usually housed in the hospital area and are closely observed and treated by the veterinary staff. When medications are given, they must be recorded into the chart of the animal to which they have been administered. The veterinary medical order shall include the generic name of the drug, the dosage, the strength of the solution used, the route of administration (oral, SQ, IM, etc.) and the length of time it is so ordered. When recording a previously ordered drug, the name, amount of the drug, the time and date, and the initials of the person who gave the drug shall be written in the actual record.

ANIMAL RECORDS

The importance of recording information cannot be over-emphasized in its value to the individual animal, response evaluations and research efforts to better characterize adequate care. In-house records will be maintained at the rehabilitation facility. In small oil spill events or for the occasional animal, the individual animal record may be the only record. However, during an oil spill response, it is difficult to record each feeding or blood test result in individual records at the time of feeding or blood sampling. Use the pen feeding charts to record group gavage feedings (Appendix 16). A form to record in-house blood values (Appendix 19) can be used to record group results as they are run. The data on these forms is then transferred into the individual animal records on a daily basis. The batch forms become the backup method to retrieve this information, so please save them. If you require additional personnel for recordkeeping, please notify your supervisor in the Unified Command System.

All information recorded on "batch" records should be transferred to individual animal records ASAP

6

WASHING AND POSTWASH REHABILITATION

WASHING/RINSING

In general, birds will not be washed unless they meet the following criteria: 1) they must be bright, alert, and responsive; 2) they must have been “in-house” at least 48 hours; and 3) they must have a PCV \geq 30% and a TS \geq 2.5 g/dl on a nonintake blood sample taken within 24 hours of the proposed wash. The exception arises when highly toxic products (e.g., diesel or jet fuel) are removed through a “quick wash” procedure soon after admission; the need for this procedure will be determined by the OWCN director, response coordinator, and veterinary staff. Birds with PCV of less than 30% or total solids values of less than 2.5 g/dl may be sent to wash only after an individual examination and referral by a veterinarian. Note: The process will be taught in network classes. This is a procedural description only.

Birds are generally not washed until they have had at least one Pedialyte® and one nutritional tubing the morning prior to the wash. This procedure is important because the washing is stressful and can induce hypoglycemia in birds that are already low in body fat reserves.

All wash and rinse personnel must wear appropriate personal protective equipment. This includes safety goggles, waterproof covering over clothing, wash gloves, and rubber boots. Remember to stay adequately hydrated while working and take frequent breaks to prevent exhaustion.

If the oil is tarry, pretreatment will often be necessary. Several different pretreatment solutions are currently available, including canola oil, methylolate, or Rescue®. Coat the affected areas with the solution that has been heated to 95–100 °F. Manually work the warmed oil into the tarry areas and let the oil sit on the feathers for about 30 minutes prior to washing (Williams, 1985).

Birds are always washed by a two person team—never alone. One person is designated the holder and the other person is the washer. Large birds, such as brown pelicans, should be washed by a three person team. Dawn® dish washing soap is preferred for washing birds. For a review of the efficacy of other detergents, the reader is referred to Bryndza, et al. (1991). Birds are washed in 1-2% Dawn® solution in water that is heated to 104 °F. In no case should the water be allowed to fall below 99 °F. Birds are moved

Birds must meet the following criteria before washing:

1. BAR
2. Inhouse at least 48 hours
3. PCV \geq 30%,
TS \geq 2.5 g/dl

Pretreatment of tarry substances may be necessary

It is important to wash and rinse with water of 2–3 grains hardness

from one bath to another, as each tub becomes oily, until the bird no longer has oil on it. This process can involve several tubs depending on how heavily oiled the bird is. The procedure takes about 10–30 minutes depending on the extent and type of oil, the species of the bird, and the proficiency of the washer and handler(s).

Remember that this is a very stressful procedure for the birds. Practice safe animal handling techniques, such as keeping the head of the animal pointed slightly downwards to keep water from getting into the nares. The person holding the animal is responsible for constantly assessing the physiologic status of the animal and letting your supervisor know if there are any problems. Try to keep the noise level down during the washing and rinsing.

Birds are then rinsed with 104–106 °F water using a Spa 2000® spray nozzle until water beads up and rolls off of their feathers. The time involved in this process varies among birds, but is often 15–30 minutes. It is important to use water of 2–3 grains hardness for the rinse. If the water is softer, it is not effective in rinsing the detergent. If the water is harder, the minerals in the water will bind with microscopic amounts of detergent and cause calcium carbonate crystals to form in the feathers, causing problems with waterproofing (Clumpner, 1991). For this same reason, it is recommended that birds be placed into outdoor pools of similar hardness when initially moved outside (at least the first 24 to 48 hours).

DRYING

Monitor drying birds frequently for overheating

The birds are placed in a clean drying pen in which the ambient air is heated with a pet dryer to about 90–95 °F. These are often net bottom pens for species such as loons, grebes, or murres but may be floor pens for birds such as pelicans. Heat is retained in the pen by placing a light colored sheet over the top. Heat can be reduced as necessary by partially rolling the sheet back or by adjusting the pet dryer. Birds in drying pens must be frequently checked for overheating as they dry. Overheating can present as open mouth breathing, an increased respiratory rate, and splaying out over the cage floor. The drying time will vary by species, with small birds drying in as little as 30 minutes and larger birds, such as loons, taking as long as three hours. Birds stay in the pen until they are dry.

WATERPROOFING

Test for waterproofing ASAP when completely dry

When completely dry, the birds can be tested for waterproofing by placement into a clean, fresh water swimming pool with water of 2–3 grains hardness while under close observation. They are checked regularly to determine whether water is reaching their skin which will result in chilling. Behaviors such as shivering, agitation, excessive preening and attempts to haul out are to be watched for. If waterproof, the birds remain in outside housing. If not, they are brought inside for reevaluation or into warm water pools, as appropriate.

COMMON PROBLEMS ENCOUNTERED IN WASHING BIRDS

Oil is not coming off with Dawn®: Pretreatment with substances such as canola oil, methylolate, or Rescue® is required. See pretreatment section above.

The bird is not waterproof in the pool: First, check the bird for damaged, stripped or missing feathers (especially around the vent). There may also be burns or wounds that are seeping serous exudate onto the feathers, thus affecting waterproofing. If these problems are not seen, other explanations include: the bird was not cleaned or rinsed thoroughly, the water is too soft or too hard or the pool is not clean. Water hardness should be checked before the birds are washed and before placing into outdoor pools. Check the pool to see if there are food oils or debris floating on the surface that are re-oiling the bird. Review the filtration and surface skimming capability of the pool to see if it is adequate. If these processes do not identify the problem, the bird may not have been washed or rinsed adequately. Any wet birds are brought inside, dried, and tried again in the pools. If no improvement is seen in waterproofing over 24–48 hours, and the bird is physiologically stable, it may need another washing/rinsing session. For further information on washing oiled birds, the reader is referred to *Rehabilitating Oiled Seabirds: A Field Manual* (Williams, 1985).

It is important to identify the reason a bird is not waterproof

POSTWASH REHABILITATION PROCEDURES

When birds reach the outdoor pools or caging areas, the extent that these birds are handled rapidly decreases. Hydration tubings are no longer necessary as the birds drink water from the pools. Birds are tossed fish, preferably smelt, and observed for self-feeding. Birds that are not adequately self-feeding may still be gavage-fed while outdoors but this usually becomes unnecessary after the first few days in the pools. Antifungal medications are discontinued after the birds are outdoors, as ventilation is no longer an issue and there is a decrease in exposure to fungal spores. Blood samples and weights are obtained on a schedule determined by the veterinary staff but are commonly taken every 4 to 6 days.

7

DISPOSITION

RELEASE

Oil-rehabilitated birds need to be fully recovered prior to release back into the wild. While much remains to be learned regarding the criteria for determining that recovery has occurred, current guidelines have been established to help release appropriate birds. As more research is done, these criteria are likely to change. Network participants will be involved in the process and kept apprised of new criteria.

Current criteria are as follows: 1) Birds should behave normally (feeding, swimming, and diving); 2) Their weights should be within 10% of the normal for that species (see Appendix 17); 3) They should be waterproof; 4) Those pelagic species, such as alcids, cormorants, and kittiwakes, who have been maintained on fresh water for over 14 days should be “salted” (i.e. acclimated to salt water) prior to release (Holcomb, 1987). Although brown pelicans are pelagic, they have been rehabilitated and released without being salted and have not shown ill effects (Holcomb, 1987); 5) Birds should have hematological and, if known, serum chemistry values within normal ranges (Newman et al. 1996). Of particular concern is anemia which can result from the ingestion of petroleum products or from malnutrition, chronic disease, or prolonged periods in captivity which can result in a precipitous drop in PCV values. Since many of these birds dive to obtain food, having enough red blood cells to carry oxygen is critical. Anemic birds will usually lack the stamina to carry on normal foraging activities; 6) All problems noted on physical examinations should be resolved; and 7) Clean, nonoiled release sites should be chosen after consulting appropriate wildlife trustee agencies.

All birds that are released are banded with a permanent USFWS metal leg band. The release information is recorded on the individual animal record and on the admission log form.

Postrelease Monitoring

In order to determine the long-term effectiveness of oil spill rehabilitation on birds, post-release monitoring of animals released after a spill event is a very necessary aspect to the rehabilitation effort. Through

Current release criteria:

1. Normal behavior
2. Normal body weight
3. Waterproof
4. +/- salted
5. Normal blood values
6. Normal physical exam
7. Suitable clean habitat available

follow-up on these animals, we can better determine and modify release criteria and better understand the role that exposure to oil can have on both medical and behavioral aspects to seabird ecology, such as short-term and long-term survival and breeding status.

There are several different methods currently used to follow birds after rehabilitation. The most commonly used technique is to acquire federal band return data (collected by hunters, beach walk programs, or individuals discovering banded animals in the wild) to determine mortality levels in released birds. While this method is relatively simple to undertake, due to the very small proportion of band returns that do occur (typically less than 1% of all released birds), it is difficult to appropriately test hypotheses with any confidence. Also, behavioral information (except perhaps dispersal trends) cannot be collected using this technique. Another method which can allow for more behavioral information to be collected is color banding and visual observation of released animals. This method can be used effectively for animals that do not migrate and remain close to land but, overall, due to these limitations and the large amount of observation effort required, it is not an effective means to determine long-term information.

Currently, the most effective means to acquire information on released oil rehabilitated animals is through the use of radiotelemetry. This method involves the placement of a transmitter onto birds prior to release. These devices, some of which are the size of a dime, can be either surgically attached to (or inserted into) birds or attached to larger-bodied birds using a sling. These transmitters, once activated, emit a very specific signal and are then detected by receivers set to that frequency either on land (by hand or at receiving stations), in the air (through the use of fixed-wing aircraft or helicopters) or, more recently, through satellite detection. In this way, animals may be followed for months to years after attachment.

These methods have been successfully accomplished in the past for a number of species in California, including brown pelicans and Xantus' murrelets. Currently, several OSPR-sponsored oil spill post-release studies are underway involving telemetry in seabirds. By continued observation, it is hoped that these studies can help to shed light on the long-term survivability and behavioral changes that may occur to animals involved in spill (and rehabilitation) events. Therefore, these studies may and will be incorporated into many oil spill incidents in the future in California in order to better understand the true effects of oil on wildlife.

MORTALITY AND EUTHANISIA

During a spill event, a morgue will be established. Dead animals will be logged into the morgue using "Dead Bird/Mammal Log" form (Appendix 20). Log codes are located at the end of the Appendix. This function is usually performed by PRBO or OWCN personnel. The person delivering the animal to the morgue will be required to sign for it. No birds should be put into the morgue refrigerator or freezer unless they have been entered into this log.

All dead animals will be logged into the morgue

Wrap dead animals in aluminum foil and identify appropriately

When a bird dies or is euthanized during rehabilitation, it should be wrapped in aluminum foil. It should be refrigerated, not frozen, until it is clear whether a necropsy will be performed. The carcass should have a piece of masking tape wrapped around the midline outside the foil with the name of the species, date of death, whether it died or was euthanized, the spill name and band ID number clearly written with a permanent ink marker on the tape. If a necropsy cannot be performed within 72 hours by a veterinarian, the bird carcass should be frozen.

All animals that die or are euthanized during rehabilitation must have this disposition information recorded on their individual animal records as well as on the admission log.

Necropsy

Prior to performing a necropsy, specific permission must be obtained from OSPR. Contact the OWCN Director for permission (Appendix 21). If a necropsy is performed by a facility's veterinarian, use the form provided with the protocols (Appendix 22) and save the indicated tissues in buffered formalin unless directed to do otherwise by an OWCN veterinarian. All tissue samples must be thinner than the width of a pencil. Histopathology samples will be sent for analysis to a laboratory designated by the OWCN veterinarian. See Appendix 23 for current information on sample submissions.

A necropsy should be performed only by the OSPR veterinarian or with proper authorization

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