Stabilization of Oiled Sea Otters on the Capture Vessel

IWR

Sea otters are subject to both external and internal petroleum hydrocarbon exposure during an oil spill. External oiling is the most obvious condition. Internal exposure to oil can occur by dermal absorption, inhalation of hydrocarbon vapors, and ingestion from food and grooming oiled fur.

Sea otters float at the surface where oil is most concentrated. In addition, their grooming behavior exacerbates the situation and increases the degree of oil exposure. In an effort to clean their fur, they often spread the area of contamination and may actively inhale or ingest oil.

This lecture focuses on the immediate actions required when oiled animals arrive on the capture vessel. We will review the methods for determining the degree of oil contamination and stabilizing oiled otters.

The composition and toxicity of crude oil changes as it degrades following a spill. The rate of degradation depends on ambient temperature and ocean conditions, with fresh crude oil often remaining toxic for approximately three to seven days.

For sea otters, the internal and external consequences of contamination are different for fresh and weathered oil. Consequently, the condition of oiled otters will vary over the course of an oil spill.

From the perspective of sea otters, we can divide catastrophic oil spills into two phases

Early Phase (first 1-2 weeks)

The oil contains the greatest concentration of aromatic petroleum compounds (volatiles) and is considered the most toxic. Animals captured during this period will show the highest incidence and severity of medical problems.

Late Phase (remainder of clean up effort or rehab program)

The number of animals requiring capture and rehabilitation will diminish. These animals also show less external oiling, have fewer medical problems, and have a higher survival rate.

External contamination: Assessing the degree of oiling

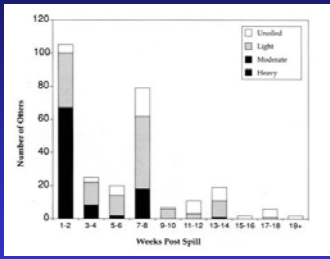
1) heavily oiled (>60% body coverage with saturation to the skin). Require capture or carcass recovery

2) moderately oiled (30-60% body coverage that includes areas of saturation). Require capture

3) lightly oiled <30% body coverage or light sheen on fur). May not require capture

4) unoiled (no visual or olfactory evidence of oiling). Should not be captured

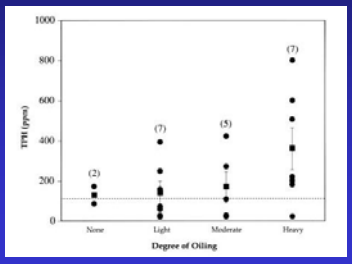
The contamination level exhibited by sea otters will change as the concentration and composition of the oil changes



During the Exxon Valdez oil spill, almost 60% of the otters arriving at rehabilitation center during the first two weeks of the spill were heavily oiled. By the fourth week, the majority of otters were lightly oiled.

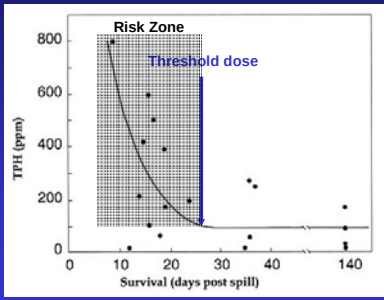
As the oil becomes more diffuse, detection on the fur becomes increasingly difficult. Sheen oil, in particular, is difficult to detect on sea otter fur. A noticeable petroleum odor or stickiness of the fur indicates contact with oil.

Internal exposure to petroleum hydrocarbons is more difficult to verify. Systemic exposure can be determined by measuring total paraffinic hydrocarbons (TPH) in blood samples taken at the rehabilitation facility.



TPH concentrations in the blood were variable for oiled sea otters during EVOS and did not consistently correlate with the degree of external oiling. Instead, the primary correlation appeared to be between TPH concentration and when the animal was exposed to the oil (i.e., during the Early or Late Phases of the spill).

The likelihood that a contaminated animal will survive increases as blood TPH concentration decreases



Otters surviving at least twenty days after contamination had an average blood TPH level of 112 ppm. The highest level of TPH measured for an oiled sea otter that survived to release was 171 ppm.

Establishing Physiological Stability in Oiled Sea Otters

The period of stabilization begins at the moment of capture and ends when the animal is ready for cleaning at the rehabilitation center.

The goal of stabilization on the capture vessel is to correct immediate life-threatening conditions (i.e., hypothermia, hyperthermia, dehydration, starvation and hypoglycemia) so that the otter can tolerate stresses associated with transport, handling, and cleaning.

All sea otters should receive a physical examination, preferably by a veterinarian or animal care specialist as soon as possible after capture

Primary Stabilization Goals

1. Body temperature: Treat hypothermia (core temp less than 35º C) or hyperthermia (core temp greater than 39º C)
2. Hydration: Restore normal hydration with fluids
3. Energy intake: Restore normal caloric intake and treat hypoglycemia

Medical problems that can not be treated easily on the capture vessel without a veterinarian:

- Pulmonary emphysema
- Trauma
- Gastro-intestinal disorders
- Renal dysfunction
- Oil toxicity
- Shock
- Stress

1. Body Temperature: Oiled sea otters may be hypothermic or hyperthermic

Hypothermia

Symptoms: shivering, cold hind flippers, locomotor incoordination, disorientation and lethargy. In severe cases, the animal may be unconscious.

Treatment: place the animal in a well-ventilated, warm (20 °C or 68 °F) area and dry the fur well with paper towels.

Hyperthermia

Symptoms: hot hind flippers, panting and agitated behavior. In severe cases, animal will be lethargic or unconscious.

Treatment: Place chipped ice in the bottom of the cage to cool the otter. This will also alleviate dehydration.

2. Hydration: Oiled otters may not eat in the wild. Since they obtain most of their water from food, they may become dehydrated if they stop feeding. Dehydration suppresses appetite, so it must be treated to get the captive otter to eat.

To avoid or mitigate dehydration, chipped ice should be placed in the cage.

If severe dehydration is suspected and an animal care specialist is aboard, normal saline or a 1-to-1 mixture of 5% dextrose solution and normal saline (20 ml/kg/ day SQ or IV) should be given.

Cage placed in well ventilated, warm (but not hot) area with ice for hydration. Cage properly labeled for shipment back to rehab center

3. Energy intake and hypoglycemia. Sea otters have no blubber to act as an energy reserve, and they have a high metabolic rate. If they stop feeding, hypoglycemia and starvation occurs rapidly. Otters must feed every three hours to remain in energy balance.

Oiled otters often exhibit symptoms of hypoglycemia, including depression, seizures, muscular weakness, hypothermia and unconsciousness.

If hypoglycemia is suspected and an animal care specialist is aboard, 5% dextrose (20 ml/kg SQ) or 10-20% dextrose (10-20 ml/kg IV to effect) should be given. For a more sustained effect, a 50% dextrose solution (1 ml/kg) should be given by stomach tube.

Food Preparation

- **High Metabolic Rate**
  Healthy otters eat 25% of their body weight per day in clams, crabs and other invertebrates
- **Food Preparation**
  - Cold thaw and store in zip lock bags on ice or in a refrigerator
  - Food must be discarded after 24 hours
  - Clean and sanitize all food prep area and equipment
- **Feeding Protocols**
  - Divide intake into 5-6 feeds daily
  - Use tongs when offering food
  - Estimate and record the amount eaten

Results from the stabilization should be entered on the capture form that will remain with the animal when it is transferred to the rehabilitation center. Data recorded on this form will be useful in rating each animal during triage and will provide the basis for subsequent treatments.