



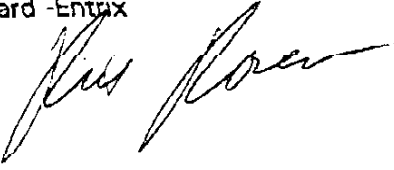
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TO: John Cubit - (562) 980-4084
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CC: Adrian del Nevo - Entrix (925) 935-5368
Gordon Robilliard -Entrix

FROM: Richard Rosen 

DATE: 11-17-98

FACSIMILE: Seal Assessment Progress Report and Proposal

Total Pages (including cover sheet):

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Message

Attached is Dr. Shaws progress report by facsimile and a cleaner copy that was sent later. Also attached is a proposal titled Island Wide Hawaiian Monk Seal Census, using helicopter for an extended period of time. Dr. Alison Kay will be joining us on Monday for the Opihi discussion. I will also be inviting Entrix representatives, Gordon Robilliard and Adrian del Nevo for their expertise.

Please note that I apologize for the delay. I look forward to the discussion on Monday at 1:00 p.m. Hawaii Time.

Thanks!!!

Richard Rosen

Fax Transmission

To: Rich Rosen No. of pages incl. this one: 9
DBA: Tesoro Hawaii

Fax number: 808-547-3041
cc: _____

From: Melissa Shaw
Date: 11/2/98

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Subject: Progress Report

Special Instructions: _____

Rich- Aloha. Heres the progress report
and "scope" report for helicopter + ground
surveys. The biologists I listed know how
its done too. I'm sending these by e-mail
to everyone as per John Cubit after your
conversation w/ him. If you have any
questions please feel free to call or e-mail.
Mahalo - Melissa

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KIPU KAI MONK SEAL MONITORING PROGRESS REPORT

On August 24, 1998 there was a Bunker C oil spill on the West Coast of Oahu. At some point within one and two weeks later oil began washing up on the beaches of Kauai. Kipu Kai, an area which covers 3.5 miles of coast on the southeastern shore of Kauai was one of the areas most impacted by this spill. Kipu Kai also happens to be one of the preferred haul-out sights for the Hawaiian monk seals (HMS) in the main Hawaiian Islands. Anecdotal reports indicate a population of 7 seals that have frequented Kipu Kai. As part of the natural resource damage assessment a study was proposed to look at the visually observable effects of this SPM hose spill on the HMS at Kipu Kai. This report includes information on phase 1 of that study. Also presented here are research findings and data from phase 2 and phase 3, respectively, to date.

During phase one daily observations were made for a period of seven days. Each day there were three observation periods. During each observation period the entire length of coast was surveyed for seals and any evidence of their recent presence. When seals were seen they were observed for a minimum of thirty minutes each. During that time data were collected on size, sex, condition, molt status, external markings, external oiling (when present), respiratory and cardiac rates (when possible via spotting scope or binoculars), behavior, body position, distance from water, and current weather conditions including sun strength, cloud cover, wind direction and strength, and precipitation. These data were collected instantaneously every five minutes over the thirty-minute period. In addition photos were taken and scar cards were drawn. Haul out areas were also visually inspected for the presence of oiled substrate. A total of three individuals were identified and observed during phase one and a total of two out of four sections of beach were used by the seals. The findings of this phase of observations follows here:

KK01: Adult male in medium condition

Molted between 9/23 and 10/5/98

No oil seen anywhere on body

All parameters available for assessment appear within normal limits

KK02: Adult male in medium condition, molted

Behavior was unusual and is best described as agitated

Usually found in ventral recumbency (on his belly)

Usually found to be fully alert and awake and constantly looking around

Possibly oiled: one dime size black mark seen under "chin" and one slightly larger spot on his back towards his hips on the right side

Observed to have a "blood like substance" coating the entire oral mucosa

All other parameters available for assessment appear within normal limits

KW01: Adult female in fat condition, molted

No oil seen on areas inspected, not all of body available for inspection, ventrum is clean

All parameters available for assessment appear within normal limits

My assessment of phase 1 observations is: KK01 appears relatively normal and at this time appears unaffected by the oil in any visually observable way. KK02 is possibly affected and follow up should be made in order to further assess his condition. There are many etiologies that can result in blood coating the oral mucosa. Oiling can cause damage to mucous membranes in the gastro-intestinal and respiratory tracts, both of which can present as did KK02. Although oiling is not the most likely explanation it can not be ruled out. Exposure to oil and the effects of such exposure can also cause behavioral changes and changes in mental status (such as agitation). Anecdotal reports of KK02 (affectionately known at Kipu Kai as "psycho") however, indicate the agitated behavior likely

existed pre-spill. KW01 appears relatively normal and at this time appears unaffected by the oil in any clinically apparent way.

Phase two of this study consisted of a review of current literature and consultation with oil-spill experts from around the world. Literature review was directed towards oil spills with similar types of oil in similar environments at the request of some members of the team. Many databases were searched (Fisheries and Aquatic Sciences, The Zoological Abstracts, The Record, The Biological Abstracts, Medline, and CAB) by both Sandra Abbott-Stout (the NMFS librarian) and myself and very few abstracts were found that fit within our limitations. Currently I have decided to expand the search to include any paper elucidating the effects of oil on pinnipeds. Using my understanding of the different oil types and the variation due to different temperature water, I can extrapolate where applicable to the situation here in Hawaii with the HMS. Experts from : Hubbs-Sea World Research Institute, Sea World of Florida, Sea World of San Diego, The Marine Mammal Center of California, Colorado State College of Veterinary Medicine, Pieterburen Rehabilitation and Research Facility of the Netherlands, The state of California's Oil Spill Response Network, The National Aquarium in Baltimore, and The Hellenic Society for the study and protection of the monk seal (MOrn) were consulted. The results of those consultations and the applicable literature reviews are presented here:

ACUTE EFFECTS OF OIL ON PINNIPEDS The effects vary based on type of exposure and type of oil, where relevant these distinctions are made.

Neurologic effects: intramyelinic edema, axonal degeneration, neuronal swelling and neuronal necrosis, in areas of the brain critical to sensory perception, behavior and performance of normal tasks (ie: swimming, feeding, and diving). It is important to note these effects are believed to be due to exposure via inhalation of lighter end fractions.

Respiratory effects: pulmonary changes include and are not limited to alveolar and bronchial damage (at the level of the linings) which can result in sequellae such as infection, bronchitis, pneumonia, and emphysema. These effects are also believed to be due to contact via inhalation although these same effects can be seen secondary to immune system supression, which is considered a chronic effect of exposure and is not limited to inhalation.

Gastro-Intestinal effects: ulceration is the primary effect reported and can occur anywhere along the tract but is usually found in the esophagus, stomach, and/or duodenum. Accompanying symptoms include but are not limited to: pain, nausea, inappetance, anorexia, and blood in the spewings, vomitus, or stool. Severe ulcerations of any etiology can perforate and lead to death. In addition hepatic changes have been reported acutely and chronically. These changes included hepatocellular swelling and hepatocellular necrosis and were considered mild and reversible. These changes are associated with ingestion and detoxification of toxins.

Superficial tissue effects: conjunctivitis, corneal ulceration, and dermal changes such as ulceration, irritation, rashes, and in warm climates, burns secondary to the heating of tarred areas. These effects are related to contact through external exposure.

CHRONIC EFFECTS OF OIL ON PINNIPEDS: These long-term effects are more difficult to assess and establish in a scientifically valid way. They include but are not limited to decreased immune function, decreased hepatic function, and decreased reproductive success.

Prior research directs the observer to look for loss in body condition (more chronic and can be due to decreased GI function/appetance or decreased ability to exchange gases or breathhold for example); dullness and lethargy; increased respiratory rates; abnormal discharges from eyes, nares, lungs, mouth, or anus; labored respirations; conjunctivitis; photophobia; or blood from mucous membranes.

Research also points to a more conservative approach as the HMS is an endangered species. It is possible to see clinical signs develop for up to four months from the immediate or short-term effects of oil. Long term effects may take much longer depending on the particular situation, type of oil, route of exposure, system under review, etc., and are much less tangible and therefore more difficult to characterize. Based on the literature available it is prudent to make observations of affected individuals for four to six months post-spill. The interval at which observations should be made however is not as clear. As a result of hauling patterns a minimum observation period of ten days is necessary. Based on extrapolations from other studies and knowledge of HMS, an interval of thirty to forty five days between observations is recommended. This interval allows for any undetected (subclinical) effects of oiling to potentially manifest in a visually observable way.

Phase three was designed to repeat phase one protocol over a longer period of time and with the added benefit of design change based on findings and recommendations from phase two. The initial observation period of phase three has been completed and was eleven days in length. What follows here is a summary of the phase three findings to date. Please refer to protocol description in phase one if description is desired. New animals are described in full, for animals resighted in phase three only new information is added below.

KK01: seen on twelve occasions in phase three
all parameters available for assessment appear within normal limits

KK02: NOT SEEN during this observation period.

KK03: Adult male in medium-fat condition, molted
seen twice, hauled up only once (stayed up for two observation periods)
appears to have oiled area on right side close to hip, distribution is sporadic and consists of points <5mm
seen in dorsal recumbency (lying on back) and moving his tongue and mouth in a motion that is best interpreted as gagging, this behavior was seen twice for a total of ~5minutes during 2hours of obs.
all other parameters available for assessment appear within normal limits

KW01: all parameters available for assessment appeared normal until 10/27/98
seen to have reddened conjunctivae, and increased frequency of sneezing 10/27/98 and morning of 10/28/98
seen to exhibit unusual behavior of jerking head out of water whenever tidal wash reached head same days
may have oil on muzzle and on right side of body closer to hips (both areas previously unseen), no oil seen on ventrum
all other parameters available for assessment appear within normal limits

KW02: Adult female in medium condition, molted
seen twice, hauled up only once (stayed up for two observation periods)
appears to have oil in sporadic distribution on left side of "chest" covering no more than 1% of body
may also have trace amounts on muzzle
all other parameters available for assessment appear within normal limits

My assessment of this observation period of phase three follows: KK01 appears relatively normal and at this time appears unaffected by the oil in any visually observable way. KK02 has not been resighted. There are many possibilities to explain this. Due to the recent change in "swell" the south shore of Kauai has been fairly calm. This has enabled many boaters, kayakers, sailors, and divers to use the coastal area of Kipu Kai for their recreational enjoyment. Knowing his behavior through experience and anecdotal reports, it is unlikely that he would choose to haul up amidst the bustle of the visitors. It is also possible that he has a normal variation in his hauling, using some of the beaches at Kipu Kai some of the time and using other beaches elsewhere on the island at other times. It also must be considered that he may be sick, injured, or dead. In order to determine (to the degree it is possible) which of these is most likely, it is important to resight and observe him for some reasonable period of time. KK03 appears relatively normal at this time. The "gagging" behavior exhibited while on his back needs to be noted, and considered. This type of behavior can be completely normal and has been seen by HMS

biologists in the field in non-oiled areas. It is important to note however as is mentioned above in phase two that exposure to oil can cause gastric, esophageal, and duodenal ulceration. Pain and nausea both can accompany these types of lesions and either may be manifested in an animal exhibiting the type of behavior demonstrated by KK03. Although this type of lesion is only one of the possible explanations, follow-up to assess his behavior and possible changes in body condition is recommended. KW01 appeared relatively normal until the 27th of October. At that time she was noted to have signs and behavioral changes consistent with an upper respiratory tract infection. It is possible that she has developed an upper respiratory infection secondary to some effect of the oil. Direct contact with the oil could damage the mucosal lining of the respiratory tract. This is unlikely however because the light end components are likely to have volatilized before seals on/around Kauai could have had contact with them. Another possibility is that exposure to toxins in the oil via ingestion or absorption may suppress immune function and make exposed seals more vulnerable. Of course there is always the possibility that these signs are completely coincidental and unrelated to oiling. This individual was recorded on videotape to document oiling on 9/21/98. Her haulout period on 10/27 was also ~3x as long as haulouts during other sightings in phases one and three. It is important to note that during this extended period she was accompanied by KK01 and this may have affected her behavior to some degree. Follow-up and further assessment is recommended. KW02 was seen for a brief time only. However, during that time she appeared relatively normal and unaffected by the oil in any visually observable way. Due to the short window of observation it would be helpful to resight her in order to support the conclusion drawn from such a limited observation period.

RECOMMENDATIONS: Based on justifications presented in phase two above and findings in phase three including pertinent negative finding such as the absence of KK02, a follow-up period is recommended. Due to the nature of the possible insult from the oil and the time it could take to see outward signs develop from such changes (ie: loss in body condition due to GI effects of exposure), an interval of thirty to forty five days is suggested between observation periods. The length of the observation period of initial phase three observations has proven to be more appropriate based on the hauling patterns of HMS seen in Kipu Kai. Therefore, a minimum of ten days is the recommended length of follow up observation periods.

Additionally, this survey has supported the initial recommendation of island wide census as appropriate and necessary. This island wide survey must be carried out in order to fully assess the impact of this spill on the HMS population. A separate proposal will be prepared to more fully explain the scope of that census, the justification, and the logistics.

ISLAND WIDE HAWAIIAN MONK SEAL CENSUS

Explanation, justification, and logistics

Explanation: Island wide census is the accepted method of surveying the population of Hawaiian monk seals (HMS) that inhabit a particular island or atoll. Based on activity budgets and individual variability it is known that in the N.W. Hawaiian islands, the number of animals seen during an island wide census represents only 1/3 to 1/2 of the population using that island. Therefore censuses can be used independently to establish population estimates or, by conducting repeated censuses, information can be acquired on individual survival and health status. In order to be thorough in assessing the effects of the SPM hose spill of August 24, 1998, it is necessary to perform these censuses of the entire Kauai/Niihau island area. Monk seals are known to move distances of five to twenty five miles in a single day around the island of Kauai. Normal variability, disturbance, seasonal changes, and possibly the effects of oiling (of either seal or substrate) may all result in seals moving to different haul-out sites.

Justification: Anecdotal reports from reliable sources (Bobby Feriarre and Don Heacock) indicate that a minimum of seven individual HMS have been known to haul out at Kipu Kai on a regular basis. Presently only five individuals have been seen in the recent past, post-spill. It is important to search for these two individuals to investigate whether or not they were in some way "injured" by the spill. Identities of seals seen in Kipu Kai post-spill will be matched with those individuals known to use Kipu Kai pre-spill and the two seals who have yet to be re-sighted will then be known and can possibly be identified during the census. In addition, the adult male KK02 was seen, as is described in the progress report, during phase one and not seen during the longer observation period of phase three. There are many possibilities that may explain his absence. For instance he may have a seasonal preference for beaches of the North shore once the south swell calms and the beaches along the south shore become more populated with tourists and other recreationalists. He may move for other behavioral reasons such as searching for other seals to attend, or for logistical reasons due to proximity of beaches to foraging locations. The possibility that he is sick must also be considered and this may have affected his ability to haul out at certain sites or his choice of the same. It would also be very useful to resight this individual in order to establish that he is still alive. Finally as justification for this island wide census it must be considered that HMS move to varying degrees and it is a reasonable possibility that seals were exposed to oil who don't use or seldom use Kipu Kai as a haul out site.

Logistics: Due to the short duration of haulouts as seen in Kipu Kai and the high degree of individual variability, the method with the highest probability of success would involve daily island-wide censuses performed at midday (the time of day when seals would be most visible at the shoreline) over a period of one month (standard minimum period to resight an entire island population in the Northwest Hawaiian Islands).

Considering the number of individuals and the frequency of haulout at Kipu Kai it is conceivable to sight 1/2 of the local individuals with daily censuses over a period of 10 days. This hypothesis is conditional upon the supposition that Kipu Kai is representative of haulout patterns at other locations. It is likely that Kipu Kai is just one of a number of haulout sites used by each seal and it is possible that seals haulout more regularly and frequently if all haulout sites are considered. Based on the most frequent haulout patterns observed in Kipu Kai of once every other day, a minimum of three days of sequential census is recommended to obtain sightings of ideally 20 % of the population.

The census intervals recommended above consider only experience with local sites and the Kipu Kai HMS population as reference. Responsible assessment includes evaluating the entire population. This is recommended. If it is not possible shorter intervals would at least provide additional information on individuals that may have been oiled at Kipu Kai or elsewhere. It is possible in either assessment schedule to resight KK02 or the two individuals (not resighted) discussed above.

It is recommended that census schemes described above are performed via helicopter to most efficiently locate seals hauled out on the entire island. It will then be necessary once seals are located to observe each individual for specific identification, presence of oiling, and any grossly abnormal physical or behavioral signs. Due to the potential distance between located seals and the importance of seeing every seal each day, observations should be as brief as possible. Some of the beaches may be accessible by car but other beaches may only be approached by boat.

The following list of available people are the most experienced and qualified for this work:

Don Heacock	(808)644-1775 pager
Thea Johanos-Kam	(808)983-5713 office
John Henderson	(808)983-5712 office
Brenda Becker	(808)983-5714 office
Chad Yoshinaga	(808)983-5717 office

Jack Carter Helicopters has agreed to do this work and can be reached at 245 3774 (ask for KC).