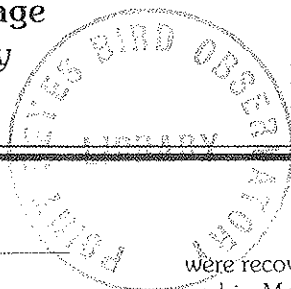


# The Importance of Rehabilitation Center Data in Determining the Impacts of the 1986 Oil Spill on Marine Birds in Central California

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## INTRODUCTION

During February 1986, a spill of *San Joaquin Valley Crude* (SJVC) oil injured wildlife along the central California coast. The California Regional Water Quality Control Board concluded that the oil was probably spilled by the tank barge *Apex Houston* while enroute from Martinez to Long Beach, California. An oil trajectory model indicated that if oil had been spilled along the route of the *Apex Houston* on 29 and 30 January 1986, it would have beached where it was observed during the incident (Fig. 1) (Ford et al. 1987). To assess the damage of this spill on seabird populations in central California, we used a method to estimate the total numbers of each species affected for three categories of impact (Page and Carter 1986, Ford et al. 1987). We estimated the numbers of live oiled birds that reached shore by tabulating records kept by rehabilitation, collection, and temporary-holding centers; we estimated the numbers of dead oiled birds that washed ashore from carcass counts on beaches; and we estimated the numbers of dead oiled birds that were lost at sea through the use of a computer model. Rehabilitation center data proved to be instrumental for determining the overall impact of the SJVC spill on seabird populations.

## LIVE OILED BIRDS ON BEACHES

Live oiled birds were recovered from beaches and sent to rehabilitation centers through a large-scale rescue effort by government agencies, private organizations and concerned individuals. From data recorded at eight rehabilitation and collection centers (Table 1), we determined that the peak occurrence of live oiled bird beachlings was between 1 and 8 February (Fig. 2) and the main areas were between Salmon Creek, Sonoma County, and Point Lobos, Monterey County. We divided the central coast into six segments to examine variation in timing of beachings between segments. Most birds

were recovered between the Golden Gate and Pigeon Point, and in Monterey Bay (Fig. 3). Peak numbers occurred on 3 February north of Pillar Point and on 4-6 February south of Pillar Point (Fig. 3).

## DEAD OILED BIRDS ON BEACHES

The staff and volunteers of Point Reyes Bird Observatory conducted 88 counts of carcasses on beaches during the peak eight-day period when live oiled birds came ashore. Most beaches were censused only once and counts were adjusted to estimate the cumulative total of dead birds washing in over the eight-day period. (Fig. 2). Totals were estimated using the live oiled bird daily beaching patterns in each coastal segment as an approximation of carcass deposition rates (Fig. 3) and a daily carcass persistence rate on beaches of 59.1% per day determined at the time of the spill (Page and Carter 1986). These counts were then extrapolated to areas not censused within the same coastal segment.

We estimated that 5880 dead oiled birds washed ashore during this period, compared to 3364 live birds sent to rehabilitation centers (Table 2; Page and Carter 1986). The two categories of impact indicated that species were affected differently by the spill. Ratios of dead to live oiled birds were near 1:1 for certain species like Common Murres and Western/Clarke's but were 40:1 for Rhinoceros Auklets and 19:1 for auklets/murrelets. These differences clearly demonstrated that both live and dead bird estimates of impact must be conducted to accurately assess the degree of impact on all species.

## DEAD OILED BIRDS LOST AT SEA

We used a computer model to estimate the numbers of birds killed that did not wash up on shore. The model used hypothetical oil trajectories from the route of the *Apex Houston* (Fig. 1), based on real-time weather data, to ap-

proximate the path of oil slicks at sea (Ford et al. 1987). The distribution of birds at sea was determined at the time of the spill from aerial counts made by David Lewis and Breck Tyler of the University of California at Santa Cruz. By passing oil trajectories across the distribution of birds at sea, we simulated the path and speed by which birds killed by oil moved at sea in different areas of the spill. We then applied an at-sea carcass loss rate to account for the numbers of carcasses that were lost at sea. The model estimated the proportion of three species (Common Murre, Rhinoceros Auklet, Cassin's Auklet) that were lost at sea (Table 2). The model helped explain several aspects in large numbers because slicks hit large concentrations off Pigeon Point and in the northern Gulf of the Farallones (Fig. 4). Fewer Cassin's Auklets were killed because they were concentrated primarily outside areas covered by slicks. Both Cassin's and Rhinoceros Auklets were usually dead when they reached shore because they were oiled farther away and took longer to come to ashore.

## OVERALL IMPACT

By adding up the three categories of impact, we estimated that 10,577 birds of at least 26 species were debilitated or killed by the spill (Table 2). Live oiled birds constituted 31.8%, dead oiled birds on beaches 55.6%, and dead oiled birds lost at sea 12.6% of the total affected. Common Murres comprised 70.8%, Rhinoceros Auklets 14.8%, Western/Clark's Grebes 4.4%, and the rest 10.0%. This estimate is conservative because it applies only to the peak area and peak timing of beachings. In fact, over 1000 live

and dead oiled birds were reported beyond these bounds. Also, at-sea loss estimates were derived for only three species whose at-sea distributions were well determined. Despite being conservative, the estimate of the number of birds impacted by the *SJVC* spill was about three times that of the 1984 *Puerto Rican* oil spill (PRBO 1985; Dobbin et al. 1986; Ford and Page, in prep.) More birds probably were affected during the 1971 San Francisco oil spill (Smail et al. 1972).

## REHABILITATION CENTER DATA

Many problems confront rehabilitation centers when attempting to maintain accurate records which can be used to estimate numbers of live oiled birds that reach shore. The main problems are the convoluted fashion through which birds are transported from beaches to rehabilitation centers and an overriding concern for caring for live birds in centers. In Fig. 5, the flow chart outlines a simplified version of how birds were transported to rehabilitation centers from beaches during the *SJVC* spill. The various routes by which birds traveled made it difficult to keep data for individual birds in the accession records at centers. It is clear that, to be more accurate, data must be gathered as birds are removed from beaches. Current methods of transferring and recording data in accession records must be modified so as to be more useful for assessing damages to seabird populations.

### Capture Date And Location

The date and location of live oiled birds captured on beaches are important data for determining the pattern and

Table 1

DATA SOURCE	CONTACT PERSON	COUNTIES FROM WHICH BIRDS WERE RECEIVED
Marin Wildlife Center, San Rafael	K. Thorne	Sonoma, Marin, San Francisco, San Mateo
Peninsula Humane Society San Mateo	S. Stadler	San Francisco, San Mateo, Santa Cruz
International Bird Rescue, Berkeley	A. Berkner	San Francisco, San Mateo
San Francisco SPCA, San Francisco	K. Karr-Warner	San Francisco
San Francisco Bay Bird Obs., Alviso	K. Hobson	San Francisco, San Mateo, Santa Cruz
Alexander Lindsay Jr. Mus., Walnut Creek	E. Anderson	San Mateo
Santa Cruz Native Animal Rescue, Santa Cruz	T. Wilson	San Mateo, Santa Cruz, Monterey
Monterey County SPCA, Monterey	L. Hoeffler	Santa Cruz, Monterey

Table 1. Data sources for numbers of live oiled birds received at rehabilitation centers.

peak timing of live birds coming ashore on beaches and the variation along different parts of the coast. When an oil spill occurs without warning (as in the case of the *SJVC* spill), live bird beaching patterns may be used to estimate the deposition patterns of carcasses washing ashore, as long as they appear to be similar (Page and Carter 1986). Rehabilitation centers were inconsistent in how "date" and "location" were recorded in their records. Date sometimes referred to the date a bird was found on a beach and sometimes to the date it was received at a center. Both of these dates should be recorded at a center, but if only one is known, it should be clearly stated which date was recorded. Similarly, location sometimes referred to the beach where the bird was captured, the general area of coast (or county), the location of the collection or temporary-holding center, or the address of an individual or another rehabilitation center. If the specific beach location is not known, the best general locality should be recorded. Dead birds should not be removed from beaches for enumeration at rehabilitation centers because this would cause underestimation of mortality using carcass counts on beaches and would result in less reliable estimates of the numbers of dead oiled birds that do not reach shore. It is also desirable to keep records on the route birds travel between rehabilitation centers to prevent double counting of records kept at different centers.

#### Numbers of Birds & Identification

The numbers of each species of live oiled birds that are captured and taken to rehabilitation centers are crucial for assessing damages to specific seabird species. In particular, oiled birds must be clearly separated from non-oiled birds in center records. Each bird should be banded with a numbered plastic wrap-around band as it enters a center and the band number cross-referenced in the accession records. This will greatly assist keeping track of the bird during its stay at the center. Once banded, the initial identification of species, age, and sex of a bird that was entered in the accession

records can be confirmed later by qualified personnel. All birds that arrive dead at centers also should be recorded individually in the accession records. These methods would prevent the use of approximate numbers for groups of birds brought in and prevent birds from not being recorded at all. These problems led to underestimation of the numbers of several species affected during the *SJVC* spill. Before release, the plastic band should be replaced with a stainless steel U.S. Fish and Wildlife Service (USFWS) band which lasts much longer than the standard aluminum bands that are presently issued by USFWS. Since seabirds are long lived, it is important to use bands that will not fall off before the birds die. Recoveries of such banded birds are useful for determining the long-term survival of rehabilitated birds.

#### FINAL COMMENTS

It is clear that records of live oiled birds sent to rehabilitation centers are an important part of the process of assessing the impact of oil spills on seabird populations. First, live oiled birds can constitute a large portion of the birds affected. Accurate records are required to determine the numbers of each species removed from beaches, especially for certain species which tend to reach beaches alive. Secondly, data on where and when live oiled birds are captured on beaches are essential for estimating how many dead birds wash ashore and how many are lost at sea. Rehabilitation centers must maintain accurate records so that an overall assessment of damage to seabird populations can be complete and reliable. This accounting role of rehabilitation center operations must be considered to be as important as the direct rehabilitation of oiled birds. As oil spill contingency plans develop in central California, both functions must be incorporated into the design of live oiled bird pickup and transportation, as well as the handling of birds within centers.

Table 2

SPECIES	ALIVE AND SENT TO REHABILITATION CENTERS	DEAD ON BEACHES	LOST AT SEA	TOTAL
Loons	128	148	—	276
Small Grebes	9	106	—	115
Western/Clark's grebes	155	313	—	468
Unidentified Grebe	19	—	—	19
Scoters	61	222	—	283
Common Murre	2924	3595	969	7488
Auklets/Murrelets	9	168	29	206
(Cassin's Auklet) <sup>1</sup>		(140)	(29)	(169)
Rhinoceros Auklet	30	1201	335	1566
Other Species/Unid. birds	29	127	—	156
Total	3364	5880	1333	10577

<sup>1</sup>The number of Cassin's Auklets within the Auklets/Murrelets category is in parentheses.

Table 2. Estimated numbers of birds debilitated or killed by oil between 1 and 8 February 1986 from Salmon Creek, Sonoma County, to Point Lobos, Monterey County.

## ACKNOWLEDGEMENTS

Our work was funded by grants from the San Francisco Foundation and the National Marine Sanctuaries Program (NOAA). We thank the staff of rehabilitation and collection centers cited in Table 1 for assisting with the compilation of data on birds received at centers and the many volunteers of the Point Reyes Bird Observatory that conducted carcass counts on beaches. This is Contribution No. 371 of the Point Reyes Bird Observatory.

## REFERENCES

DOBBIN, J.A., H.E. Robertson, G. Ford, K. Briggs, and E.H. Clark II. 1986. *Resource Damage Assessment of the T/V Puerto Rican Oil Spill Incident*. Alexandria, Virginia: James Dobbin Assoc. Inc. Unpublished report to the U.S. Dept. Comm., NOAA. Contract 50-DGNC-6-00102.

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SMALL, J., D.G. Ainley and H. Strong. 1972. "Notes on Birds Killed in the 1971 San Francisco Oil Spill". *Calif. Birds* 3:25-32

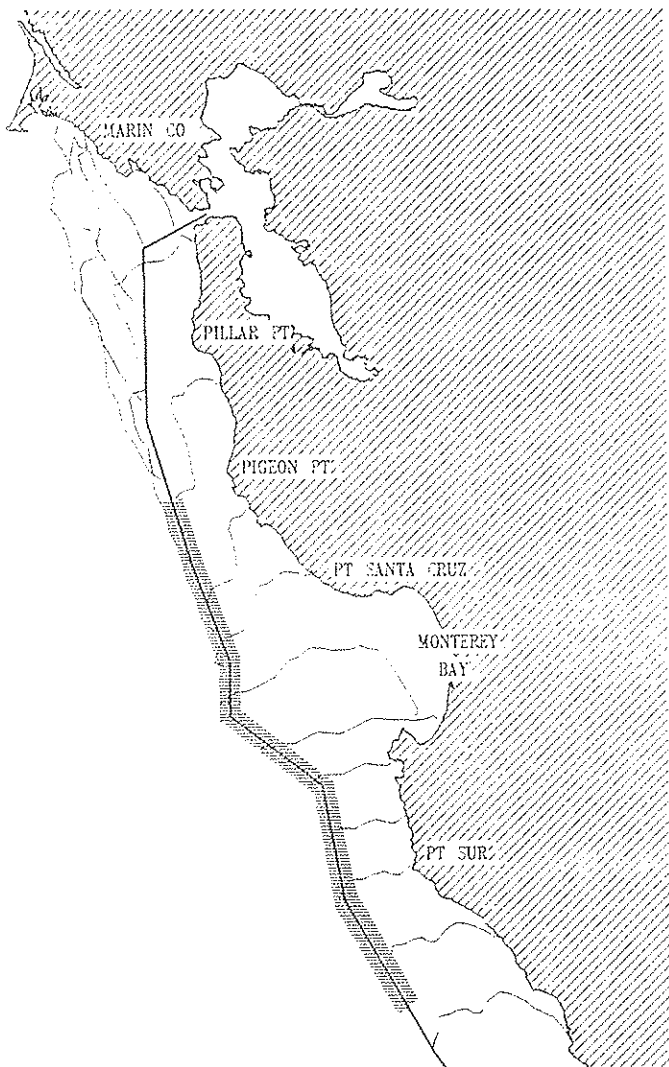


Fig. 1 Hypothetical trajectories of oil slicks launched at three-hour intervals from positions along the track of the *Apex Houston*. The shaded section of the track indicates the place where most oil was suspected of being spilled.

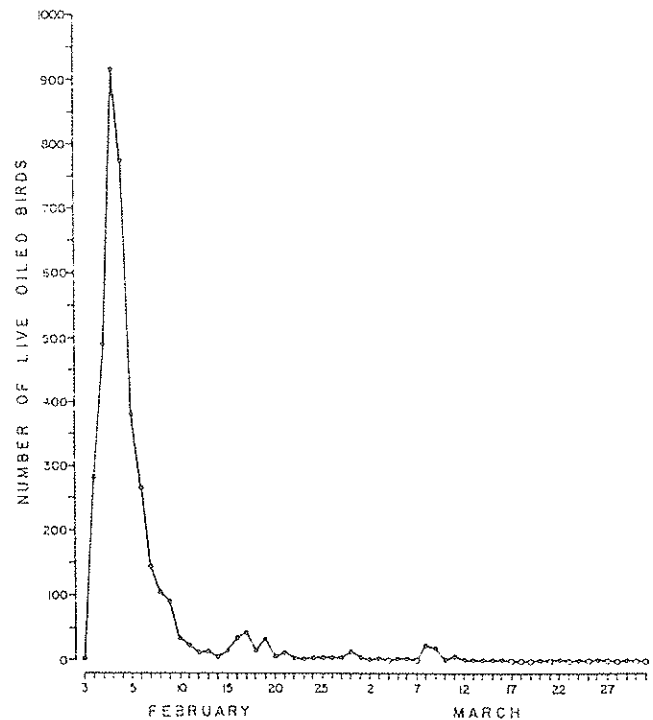


Fig. 2. Numbers of live oiled birds sent to rehabilitation centers between 1 February and 31 March 1986. Open dots refer to zero counts.

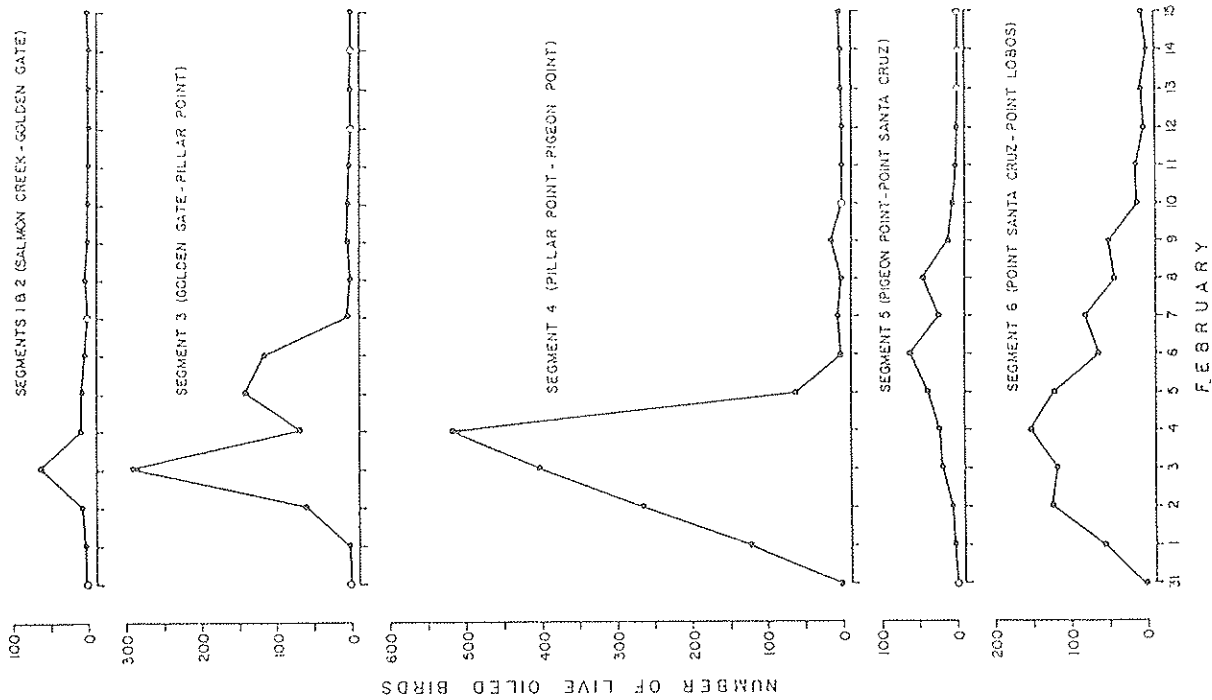


Fig. 3 Numbers of live oiled birds sent to rehabilitation centers from 6 coastal segments between 1 and 15 February 1986.

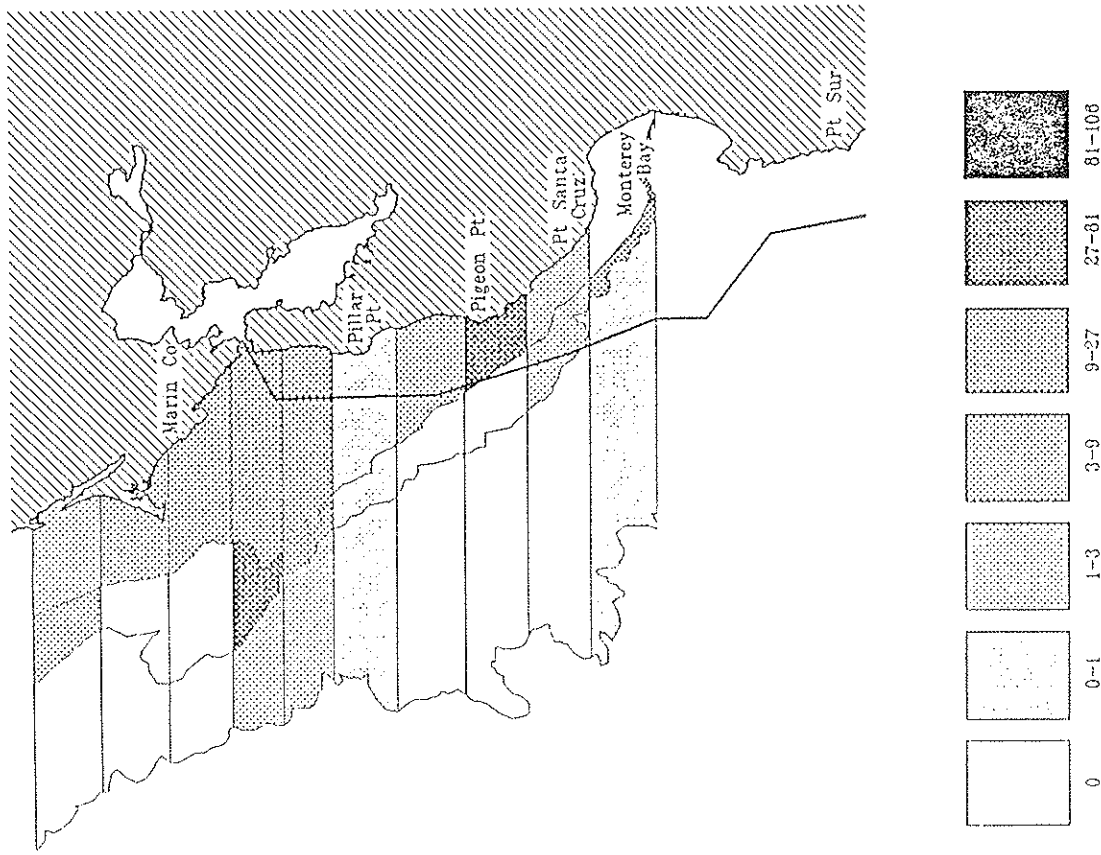


Fig. 4 At-sea densities of Common Murres on 5 February 1986. Intensity of stippling indicates bird density per km<sup>2</sup>, as shown in the key. The dark line starting at the Golden Gate is the track of the *Apex Houston*.

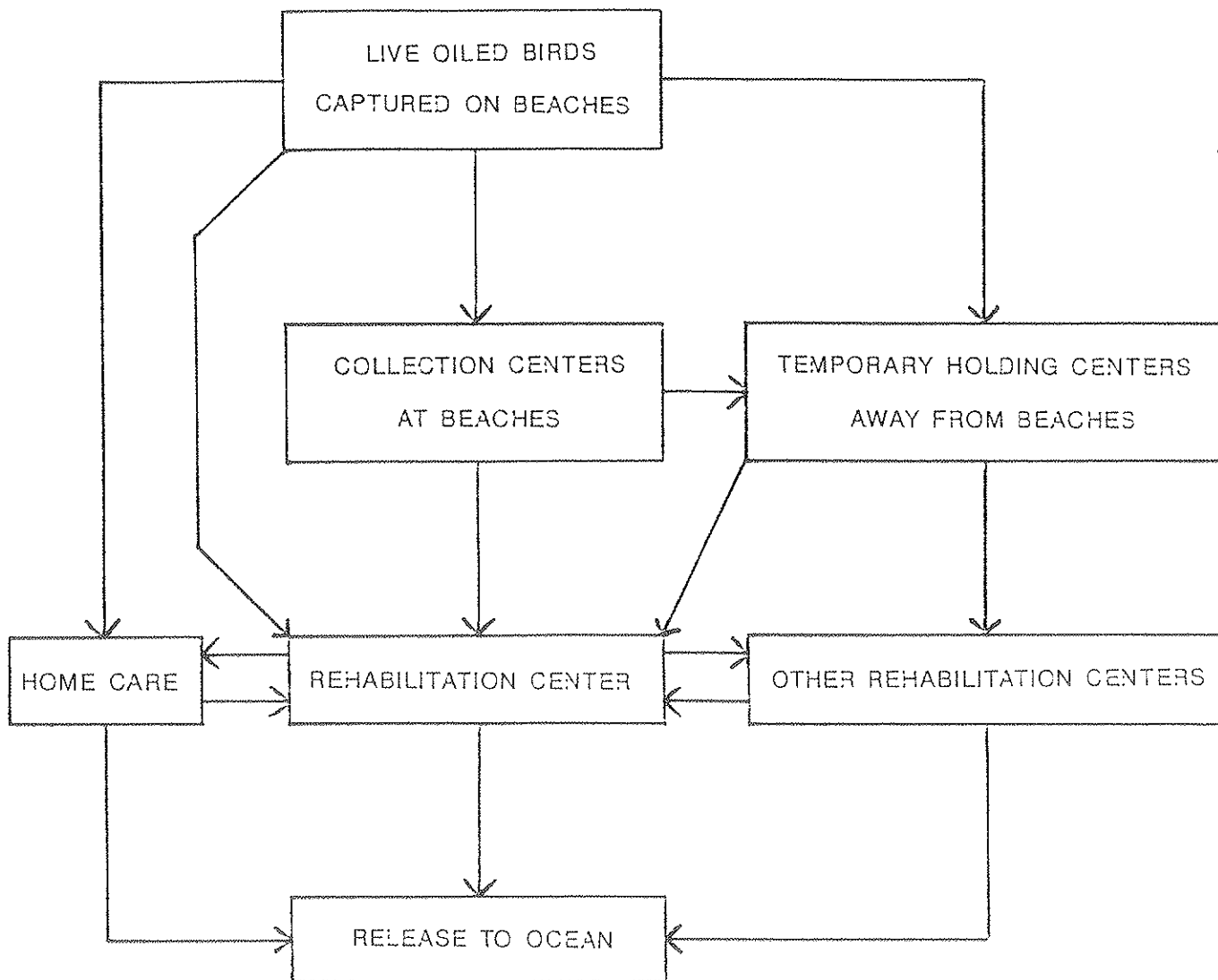


Fig. 5. Flow chart indicating how live oiled birds were transported from beaches to rehabilitation centers during the SJVC spill.

### Notes on Bird Bands with Increased Longevity

Information regarding the longevity of plastic color bands and aluminum versus monel/stainless steel metal bands can be found with the following references.

ANDERSON, Alexander. 1980. "Band Wear in the Fulmar." *J. Field Ornithol.* 51(2)101-109.

ANDERSON, Alexander. 1980. "The Effects of Age and Wear on Color Bands." *J. Field Ornithol.* 51(3)213-219.

SPEAR, Larry. 1980. "Band Loss from the Western Gull on Southeast Farallon Island." *Field Ornithol.* 51(4)319-328.

For information regarding products that are currently available or their cost rehabilitators can write the following suppliers:

#### Plastic PVC Bands:

J.E. Warner  
Observatory College  
Potter's Bank  
Durham City  
England DH1 3RR

#### Stainless Steel Bands:

Lambourne's (B'ham) Limited  
Colman House - Sales Office  
Station Road  
Knowle  
West Midlands  
England B93 0HL