

# A HISTORICAL ACCOUNT OF OILED WILDLIFE CARE IN CALIFORNIA

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## SUMMARY

NEWMAN, S.H., ZICCARDI, M.H., BERKNER, A.B., HOLCOMB, J., CLUMPNER, C. & MAZET, J.A.K. A historical account of oiled wildlife care in California. *Marine Ornithology* 31: 59-64.

Oiled wildlife care in California has progressed since the 1937 San Francisco Bay Frank H. Buck oil spill when observations of oiled birds were the extent of documented spill responses. In the latter half of the 20th century, Californians responded to over 50 petroleum spills that affected wildlife. Major oil spill incidents such as the 1969 Santa Barbara/Union Platform A and 1971 San Francisco Bay Arizona & Oregon Standard killed tens of thousands of seabirds, but resulted in the establishment of International Bird Rescue Research Center focused on rehabilitating oil injured aquatic birds. At that point in time, oiled wildlife rehabilitation was conducted as a result of public demand and some industry and resource agency interest. Approximately 20 years later, the Exxon Valdez (1989) oil spill killed hundreds of thousands of seabirds in Alaska. This spill resulted in California legislation that legally mandated oiled wildlife care in California, established the Department of Fish and Game's Office of Spill Prevention and Response, and ultimately, California's Oiled Wildlife Care Network. Oiled wildlife care has unquestionably improved over the past 50 years with accelerated improvements since the OWCN was established. However, the conservation significance of oiled wildlife rehabilitation has yet to be fully demonstrated for California oil spill response efforts. Nonetheless, oil spill medicine is a new developing field and despite the costs, success rates, or biological importance of oiled wildlife care, it will continue to be conducted in California. Future improvements are likely from continued spill response experience and research.

Key words: oiled wildlife care, rehabilitation, oil spill, oil pollution, California, seabird

## INTRODUCTION

Oiled wildlife care and rehabilitation have been conducted by thousands of individuals worldwide over the past 50 years, and from its inception, this activity has been ridden with controversy. The debate stems from diverse reasons that motivate individuals, organizations, community groups, resource management agencies, and corporations to undertake these activities. Perspectives about caring for oil injured wildlife emanate from ethical beliefs, social values, humane responsibilities, economic interests, and the biological importance. Diametrically opposed perspectives range from the need to care for every single oil contaminated animal despite poor medical prognoses or likelihood of survival to a more pragmatic approach in which all oiled animals should be humanely euthanized. Despite being controversial, one clearly defined outcome that has evolved through discourse on this subject over the past 50 years in California; that is, despite the lack of evidence supporting the biological value of oiled wildlife care, society and the citizens of California expect oil injured wildlife to be rehabilitated. This undeniable fact has been a driving force that has led California to develop an oil spill response program that provides the best achievable care to oil injured wildlife. This

program includes collection of oiled wildlife from beaches or the ocean, intake and stabilization, biomedical care before and after birds are cleaned, pre-release evaluation, and occasionally, post-release survival studies. However, the foundation upon which California's current program is based stems back to the mid 1900's.

## HISTORICAL EFFORTS OF OILED WILDLIFE CARE IN CALIFORNIA

The history of oil spill responses in the state of California is poorly documented prior to the 1969 *Santa Barbara Spill*. However, historical efforts to understand and document the external effects of petroleum on plumage and waterproofing, as well as direct toxic effects from petroleum ingestion have been ongoing for at least 150 years. The debate about the mechanism by which birds maintain waterproofing can be traced back to Waterton (1832). At that time, ornithologists did not know whether uropygial oil or the alignment of microscopic feather structures facilitated waterproofing. On the other hand, bird biologists recognized that some mechanism was responsible for the ability of birds to remain dry while swimming and diving, or in rain. Lincoln (1936) suggested that oiled birds became sick from ingesting harmful amounts of oil, but at the same

time, he observed that the plumage of oil-contaminated birds needed to be cleaned as external petroleum exposure fouled waterproofing capabilities of birds. Lincoln attempted to clean birds using a “mild white soap” followed by drying regime in which compressed air was blown in the direction of the feathers and their alignment. Hence, these two different but equally damaging mechanisms of oil contamination were recognized to be at the core of detrimental effects caused by oil contamination of birds as far back as the 1930s.

The effects of tankers dumping waste oil on seabirds in California can be traced back as far as 1917 (Anonymous 1919, 1920; Palmer 1921) but the 1937 *Frank H. Buck* was the first record of an oil tanker spill in California that resulted in extensive seabird mortality in San Francisco Bay (Aldrich 1938, Carter 2003). Few details about rehabilitation are available from these events but observations by Ticehurst (1938) suggested that oiled birds appeared to be poisoned by something in the oil they swallowed while preening.

The earliest record of rehabilitation efforts in California date back to the early 1940's when private citizens tried to care for oiled birds (Williams 1942a, 1942b). Stedman (1952) attempted to clean oiled birds using a mixture of corn oil, neatsfoot oil, detergent, waxes, solvent, and water. After application, birds were observed preening the pasty cleaning mixture and oil from their feathers and Stedman reported success in producing clean birds although waterproofing was probably not restored and survival was not known. Other cleaning products used in the 1950's and 1960 included powdered chalk, mascara remover, butter, lard, castor oil, and mineral oil (Berkner 1977). None of these cleaning agents proved successful, but the interest in reestablishing non-oiled, waterproof birds served as a driving force in the development of the science of oil spill medicine which would be later adapted in California.

#### Rehabilitation of oiled wildlife in the 1960's and 1970's

As efforts were being made to understand waterproofing, Hartung (1963, 1964) conducted research that decisively established direct petroleum toxicosis after ingestion. Organs damaged from ingestion of petroleum including liver, kidney, pancreas, lungs and intestine and further reviews of the effects of oil on wildlife confirm these early findings (Aldrich 1970, Leighton 1991). This study was the first of many to evaluate organ targets associated with ingestion, inhalation, and dermal absorption of petroleum products which eventually provided the basis for developing oiled bird rehabilitation protocols in the state of California in the early 1970's. Just after Hartung completed his research, the first large-scale, broadly publicized, severely destructive and damaging oil spill occurred, the 1967 *Torrey Canyon* spill. In this spill, 119,000 tons of crude oil was released killing thousands of seabirds. Cleaning and rehabilitation efforts were ineffective. Worldwide attention and interest in the biological and ecological effects of oil spills was starting to subside when the 1969 *Santa Barbara/Union Platform A* petroleum spill occurred in California. This spill involved over 10,000 tons of oil and over 2,200 birds were recovered (Drinkwater *et al.* 1971, Straughan 1970, 1971; Nash *et al.* 1972, Carter *et al.* 1998). No cleaned birds were released despite rehabilitation attempts (Berkner 1977). Shortly after this large event, San Francisco Bay endured the *Arizona Standard & Oregon Standard* spill (1971) which released less petroleum (2,700 cubic tons) but resulted in the collection of large numbers of seabirds for rehabilitation (4,629)(Smail *et al.* 1972, Carter 1997). From these

two spills, it became apparent that the impacts of oil spills on wildlife were not necessarily determined by the volume of oil spilled, but more importantly, by the density of wildlife in the spill zone which is seasonally determined.

In both of these incidents, California's Department of Fish and Game documented seabird impacts based on the number of birds brought to rehabilitation centers, but no beached bird surveys were conducted and the resource agencies were not well prepared to respond (Smail *et al.* 1972). Rehabilitation efforts were not coordinated and animal care was provided by individuals, veterinary clinics, rehabilitators, zoos, and bird fanciers. There was no oversight of care and in many cases, rehabilitation techniques varied, and recommendations offered by biologists, ornithologists, and naturalists often contradicted each other. In many cases, the extent of care provided was dependent on which people or organization had recovered an individual animal. Specifically, bird housing facilities following the *Arizona Standard & Oregon Standard* spill included the basement of a lion pen at the San Francisco Zoo, a warehouse set up by the Ecology Center of Berkeley, or the bathroom and bedrooms of “The Family Dog”, a hippie commune in Berkeley (Holcomb pers. comm.). In addition, the lack of expertise and understanding of the natural history of marine birds affected by oil was evident in feeding protocols that were implemented. Tube feeding was discouraged because university veterinarians said it might result in high mortality to wild birds. Loons were fed grain, scoters were fed dog food, and grebes were fed bread soaked in milk. It was clear that no one had much experience with captive care techniques for these unique aquatic bird species. Bird washing attempts were made by applying liberal amounts of mineral oil followed by a lighter application of corn meal on the plumage (Berkner 1977, IBRRC unpublished data). After 9 months in captivity, only 3% of the live oiled birds recovered were released from the San Francisco spill compared to no birds being released from the 1969 Santa Barbara spill.

While the impacts of these first California petroleum spills resulted in mortality of an estimated 11,000 -24,000 birds (Carter *et al.* 1998, Carter 2003), several very important post-spill outcomes helped guide the future of oil spill response and rehabilitation in the state of California. First, International Bird Rescue Research Center (IBRRC) was established with the mission of rehabilitating oiled and injured aquatic birds. Concurrently, Standard Oil of California funded a research program at the National Wildlife Health Foundation that focused on determining the best cleaning agent for oil contaminated wildlife. Most products tested were organic solvents. Between 1973 -1976, IBRRC responded to 6 smaller California oil spills that affected approximately 1300 birds and tried cleaning birds with solvents and many other products sent to them by the petroleum industry. Unfortunately, many side effects (neurological symptoms, torpor, and death) were observed in oiled birds cleaned with solvents and rehabilitators also reported skin rashes and headaches (Berkner 1977). In 1976, with a grant from the American Petroleum Institute, IBRRC started testing detergents as cleaning products for oiled wildlife and determined that Lux Liquid Amber was the most effective. In ensuing spill response work, release rates jumped from 0-5% with solvents to between 10-30% with detergents. Eventually, additional research by Bryndza *et al.* (1995) determined Dawn™ (Proctor and Gamble) to be the best cleaning detergent for oiled wildlife. Dawn™ removed oil from plumage relatively easily, did not damage the plumage, irritate the animal's skin, or cause other health problems to wildlife or to

people cleaning the animals. This discovery was the first major breakthrough in providing better care to oil injured animals and use of Dawn was implemented in spill responses as far back as 1978 based on preliminary research results.

By the mid to late 1970's, U.S. Fish and Wildlife Service (USFWS) started taking a more active role in oil spill responses nationally. USFWS helped protect habitat during spills, hazed animals from the spill sites, and started to coordinate and supervise professional and volunteer organizations partaking in oiled bird rehabilitation. Regional and national USFWS oil spill contingency plans provided guidelines for the use of volunteers to care for oiled birds. The USFWS also sponsored six oiled bird rehabilitation workshops that involved hands-on bird treatment training, and educated industry, state and federal agency personnel on how an integrated spill response would optimize each agency's effort (Berkner 1977). In 1978, Williams published the first guidelines for rehabilitation of oiled birds, and what would be the foundation upon which future care protocols were developed. Many of the techniques described in this initial protocol were developed and utilized by IBRRC who pioneered oil spill response work in the state of California in the 1970's. Even at this early point in time, with little or no evidence that birds could be successfully rehabilitated, it was becoming clear that both the industry and resource agencies were supportive of oiled wildlife rehabilitation, as both made efforts to better organize response efforts and improve care provided to oil injured animals.

#### **Rehabilitation of oiled wildlife in the 1980's**

During the 1980's, there were 3 mystery spills and 5 documented petroleum spills in CA accounting for recovery of over 7,000 birds (Carter 2003). Most notable were the 1984 *Puerto Rican* and 1986 *Apex Houston* spills which were responsible for over 75% of the 7,000 oiled birds recovered in the 1980's (Carter *et al.* 1987, Carter *et al.* 1998, Ford *et al.* 1987, Page and Carter 1986). During these two spill responses, beached bird surveys, at-sea surveys, and oil spill trajectory modeling were implemented (Carter *et al.* 2003). These spill response activities contributed additional important information about where live oiled birds could be expected to wash ashore and where search and collection efforts should be focused. Unfortunately, the information provided was better than the organization of search and collection efforts leading to recovery of some additional birds, but a less than optimal effort. During the *Puerto Rican* spill, birds were housed on cement floors with overlying crumpled newspaper and they developed feather rot, pressure sores (similar to bed sores in humans), and foot or leg problems (IBRRC, unpubl. data). Rehabilitators realized that husbandry issues posed as much of a challenge to rehabilitating birds as the petroleum product toxicity. However, this spill was historically unique in that some oil contaminated birds were cleaned using Dawn™ dish detergent, rehabilitated, and released in 7 days, considerably faster than previous efforts. Of the 634 birds treated, approximately 50% were released, signifying the first "high" release rate for any oil spill worldwide. The *Apex Houston* (1986) spill response resulted in other significant advances in oiled wildlife rehabilitation. For the first time, diagnostic blood analyses were conducted to evaluate the health and level of toxicity of oiled birds. In this spill, 3,364 live birds were recovered, 2,512 birds rehabilitated, and 44% were released (Carter *et al.* 1987, Carter *et al.* 1998, IBRRC unpubl. data).

In summary, between 1971-1988 IBRRC cared for over 12,000 oil contaminated birds associated with 15 California oil spills and over

1,000 oiled birds for which no spill events were identified. IBRRC revised their oiled wildlife rehabilitation protocols (IBRRC 1985, Williams 1986) to reflect lessons learned during the 1970's and 1980's. Advances included employing better washing products, improving rinsing techniques, understanding how water hardness affects bird cleaning, utilizing net bottom pens for aquatic birds to prevent pressure sores, and using hematologic tests as part of the health evaluation for birds (Holcomb and Russel 2003).

In 1989, the *Exxon Valdez* spill in Alaska caused vast ecological damage, killed between 100,000-300,000 seabirds, 2800-4000 sea otters, over 300 harbor seals, and unknown numbers of other marine mammals, fish, and invertebrates (Dornoff and DeGange 1994, Frost *et al.* 1994, Garrot *et al.* 1993, Jessup and Leighton 1996, Piatt and Ford 1996). This spill was the largest in United States history and served as an example of the extensive damage that could take place from a single event. To date, environmentally oriented citizens in California, local rehabilitation organizations, and to some extent, the petroleum industry, had generated a more predictable oiled wildlife response focused on alleviating animal suffering and motivated by the inability of the public to stand by and do nothing. With the advent of the *Exxon Valdez*, a significant legislative response both at the federal and state level occurred starting with implementation of U.S. Oil Pollution Act (1990) that ensured that costs for oiled wildlife care and environmental clean-up would be covered. This was a significant law in that it provided the rehabilitation community with assurances of financial support to undertake wildlife care which had previously been conducted through inconsistent donations from the general public and financial support from agencies, the responsible party, and the oil industry.

#### **1990's: Before and after the Oiled Wildlife Care Network is established**

Between 1990 and 1994, IBRRC rehabilitated over 600 birds from 17 small California oil spills. Mean release rates were approximately 48% but pressure from outside the rehabilitation community started to shift the focus from judging success based on release rates to evaluating long-term post-release survival and behavior. To address the more biologically pertinent questions associated with oiled rehabilitation efforts, several post-release studies were undertaken. Anderson *et al.* (1996) found that oiled and rehabilitated California Brown Pelicans *Pelecanus occidentalis californicus* from the 1990 *American Trader* and the 1991 *Sammy Superstar* oil spills had lower survival than non-oiled, non-rehabilitated pelicans. Of the rehabilitated pelicans that survived, behavioral abnormalities were documented including lack of attendance at breeding colonies. Another study conducted in 1995 following the *Unocal Metrolink* spill found that oiled and rehabilitated American Coots *Fulica americana* were 2.1 times more likely to die (50% mortality rate) than non-oiled, non-rehabilitated coots (24% mortality rate). The increased mortality was associated with an inflammation and iron utilization or metabolism problems (Anderson *et al.* 2000, Newman *et al.* 2000). These studies demonstrated that oiled wildlife care was probably not contributing to the conservation of aquatic birds nor was it helping maintain or restore wild bird populations.

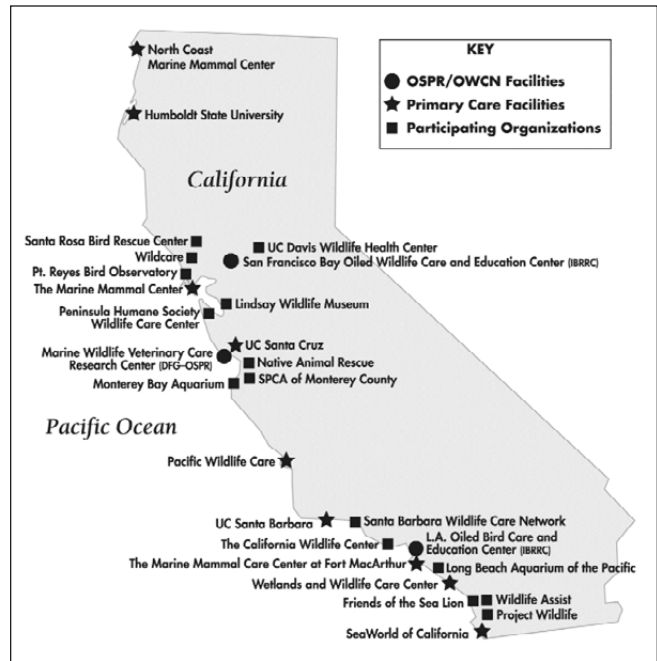
Meanwhile, concerns of an *Exxon Valdez* size spill in California led to legislation passed in 1990 (SB-2040) that established the California Department of Fish and Game's Office of Spill Prevention and Response (OSPR). Despite poor post-release

survival study results, subsequent California legislation in 1993 (SB-775), 1995 (AB-1549), and 1996 (AB-748) resulted in development of the Oiled Wildlife Care Network (OWCN; OWCN 2002) administered at the University of California School of Veterinary Medicine and construction or renovation of 26 rehabilitation centers ranging from Oregon to Mexico that could care for at least 3500 seabirds, 150 sea otters, and 30 seals (Fig. 1). OWCN facilities were designed and constructed to prevent disease transmission, minimize husbandry problems, and capitalize on lessons learned from previous spill responses in California and worldwide (Mazet *et al.* 2002, OWCN 2002). The OWCN also established several research programs focused on the effects of oil on wildlife and evaluating post-release survival. Since the inception of the OWCN in 1994, thousands of birds have been rehabilitated (Table 1) and release rates average from 60-75% (OWCN 2002). The OWCN has worked closely with many rehabilitation organizations statewide and IBRRC has been one of the main response organizations helping integrate previous experience with new facilities and response capabilities. The OWCN sponsored statewide training program for oiled wildlife response teams, rehabilitators, and volunteers has taught search and collection methods, wildlife care techniques, and demonstrated how oiled wildlife care is a small part of the larger overall spill response activities (Mazet *et al.* 2002).

In an effort to evaluate biomedical care provided to oiled wildlife in California, the OWCN has recently undertaken two studies to evaluate long-term survival, behavior, and breeding status of the oiled and rehabilitated birds. Following the 1997 *Platform Irene* crude oil spill, three test groups were established: 1) oiled and rehabilitated Western Gulls *Larus occidentalis* (hereafter gulls, OR); 2) non-oiled but rehabilitated gulls (RHB); and 3) non-oiled and not rehabilitated gulls (CON). There were no differences in long-term survival amongst study groups with all birds surviving a minimum of 7 months. One CON bird died 115 days after release. Behaviorally, there were no differences among study groups for

either the size of geographical areas used by gulls or shifts in centers of activity though time (Golightly *et al.* 2002). Most recently, following the *Stuyvesant* intermediate fuel oil spill in northern California, the OWCN evaluated the post-release survival of Common Murres *Uria aalge*; a much more difficult species to maintain in captivity and rehabilitate, but the species most frequently cared for by the OWCN. Band return studies on oiled and rehabilitated murres following the 1990 *American Trader* spill suggested that on average, murres survived approximately 10 days following release from rehabilitation (Sharp 1996). In contrast, the

**Fig. 1.** Map of the Oiled Wildlife Care Network facilities throughout California.



**TABLE 1**  
Oiled Wildlife Care Network spill responses in which greater than 25 live birds were recovered and rehabilitated.

Name And Location Of Major Spills*	Date of Spill	# Live
Clark Pipeline, Huntington Beach	Oct 1996 – Nov 1996	35
Cape Mohican, San Francisco Bay	Oct 1996 – Nov 1996	58
Ballona Creek, Long Beach	Jan 1997 – Feb 1997	160
Torch/Platform Irene, Lompoc	Sept 1997 – Oct 1997	53
Monterey Mystery, Santa Cruz	Oct 1997 – Nov 1997	505
Kure, Eureka	Nov 1997	484
Pt. Reyes Mystery #1, Pt. Reyes	Nov 1997 – Dec 1997	303
Carson, Carson	Jan 1998	153
Pt. Reyes Mystery #2, Pt. Reyes	Dec 1997 – Mar 1998	635
Command, San Mateo Cty.	Sept 1998 – Nov 1998	76
Wintersburg Channel, Huntington Beach	Dec 1998	50
Golden West, Huntington Beach	Jan 1999 – Feb 1999	35
Calloway Canal, Bakersfield	June 1999	25
Stuyvesant, Eureka	Sept 1999	644
Trona, Trona	June & Sept 2000	29
Stockdale, Bakersfield	Oct 1999	155
Luckenbach, Pt. Reyes to Monterey	Nov 2001 – Jan 2003	1,095

\* Overall, over 40 spill responses and more than 4,300 live birds collected for care.



OWCN study demonstrated higher survival rates and longer survival duration (Newman *et al.* 2003). Likely reasons for success with the gulls and improved survivorship for murrens can be attributed to improvements in oil spill response and care provided to oil injured wildlife since OSPR and the OWCN were established.

The Wildlife Response Plan for California, updated in 2000 (OSPR), facilitated rapid spill response and deployment of spill response personnel and equipment, outlined area contingency plans, and provided an incident command structure by which large numbers of people could be organized and directed. Additional advances have been made in health and safety training, volunteer coordination, field response capability, search and collection, coastal shoreline and natural resource mapping, archiving oil samples from previous California spills, natural resource damage assessments, data collection, and coordination of multiple resource agencies during spill responses. Collectively, these factors contribute to a rapid and effective oil spill response effort in California and have contributed to better oiled wildlife rehabilitation.

Oiled wildlife care in California has come a long way since the early 1900's when observations of live and dead oiled birds were the extent of documentation associated with a spill response. In California, what was previously an activity conducted because of public demand and some industry and resource agency interest, now has become legally mandated. Legislation has provided the financial and legal infrastructure necessary to conduct quality wildlife care which has unquestionably improved from an animal husbandry, biomedical care, and release rate perspective over the past 50 years. However, the population level effects and conservation significance of oiled wildlife rehabilitation have yet to be fully demonstrated for California oil spill response efforts beyond the limited data that currently exists from recent post-release survival studies. In light of the short history of oil spill medicine in California and worldwide, there is still room for considerable improvement.

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