OIL AND CALIFORNIA'S SEABIRDS: AN OVERVIEW

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SUMMARY

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From the 1890s to the late 1960s, much traffic by oil tankers and other ships and various forms of oil extraction from the ocean floor occurred in California. Large-scale seabird mortality was relatively well documented only for tanker dumping of waste oil in 1917-1925 and the 1937 *Frank H. Buck* oil spill, both off San Francisco. Following significant spills in 1969 (Santa Barbara) and 1971 (San Francisco), greater effort was spent on mortality documentation, beached bird surveys, and rehabilitation. With the experiences of the 1984 *Puerto Rican* and 1986 *Apex Houston* oil spills and passage of federal and state oil pollution acts in 1990, efforts to document seabird mortality have been standardized, estimates of total mortality refined, rehabilitation programs improved, and restoration programs implemented. Forty-four oil spills with recorded mortality of greater than 10 seabirds have occurred on the California coast from 1969-2001. Only 3 of these spills were from offshore oil platforms or pipelines and most were from oil tankers, other ships, and sunken vessels. Continuing efforts are needed to improve techniques for mortality quantification, to improve post-release survival of rehabilitated birds, to develop new methods of effective restoration and to determine the long-term population value of restoration actions. These efforts should alleviate some of the impacts of oil pollution on certain seabird populations in California over time. However, the best remedy for protecting seabirds from oiling remains the prevention of oil pollution.

Keywords: California, oil platform, oil pollution, oil spill, oil tanker, seabird mortality, seabird rehabilitation, seabird restoration

INTRODUCTION

A special symposium "Oil and California's Seabirds" was held at the annual meeting of the Pacific Seabird Group in Santa Barbara, California, in February 2002. The need for this symposium was clear: efforts to address seabird mortality from oil pollution have received great attention in California (more so that other areas of western North America) over the past three decades, yet relatively little has been reported in the scientific literature (see summaries in Burger & Fry 1993, Carter *et al.* 1998, Ohlendorf *et al.*. 1978). Several papers from this symposium are published in this issue of *Marine Ornithology*. This paper is intended to help introduce the topics covered in these papers and to fill gaps created by non-submitted manuscripts.

HISTORY – THE EARLY DAYS

Development of inland and coastal oil fields in southern California began in the late 19th century, with pipelines to major ports for transport by ships in the 1890's. San Francisco Bay and Long Beach Harbor (Los Angeles) developed into the largest oil ports in western North America with smaller oil ports in San Diego Bay, Avila Beach, Santa Barbara and Ventura counties, and Humboldt Bay (USFWS 1997). Oil transport through California ports increased rapidly during and after World War II, as the California economy and population grew more rapidly than in other areas of western North America. Oil drilling on the ocean floor from offshore piers began in 1896 near Santa Barbara (Summerland) and from artificial oil islands off Long Beach in the 1950's (McCrary *et al.*, 2003). For many years, oil piped ashore from offshore piers near Summerland was transported to larger ports by tanker but eventually pipelines extended directly to major ports. In 1958, the

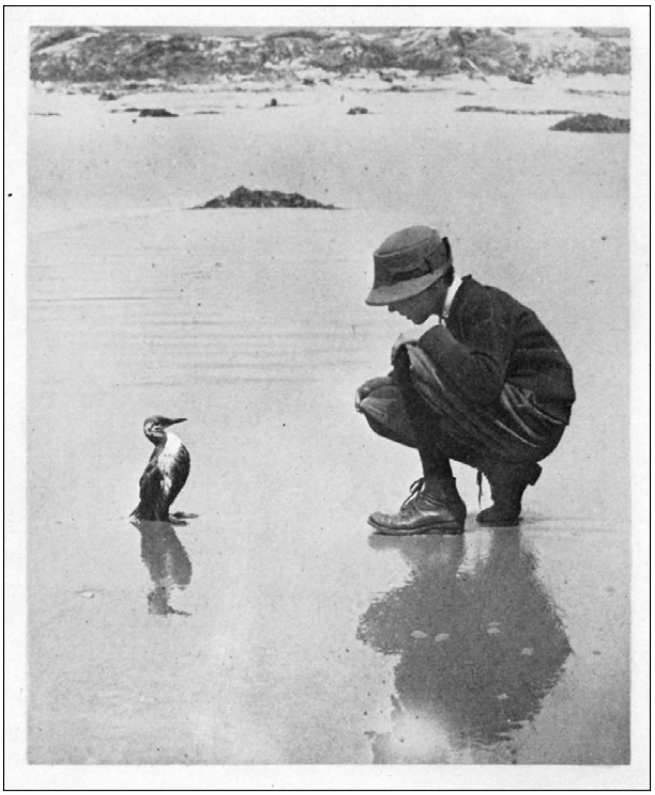

Fig. 1. Oiled Common Murre on a beach at Santa Barbara, California (from Dawson 1923).

first offshore platform was installed in Santa Barbara Channel. In the early 1960s, production surged and additional offshore platforms were installed at greater distances from shore.

Prior to the 1970's, oiling of seabirds was recorded sporadically in California but estimates of the total numbers killed from spill events were not attempted. While documentation prior to the 1970's was poor, oiled seabirds on beaches were common, at times seen in large numbers (Baldridge & Chandik 1969, Linsdale 1952, Munro 1957, Streator 1947; Fig. 1). Early attempts by concerned bird watchers to clean oil off plumage also occurred (Williams 1942). Seabird mortality from two major oiling events were reasonably well documented: a) tens of thousands of seabirds, especially Common Murres *Uria aalge*, were oiled by the dumping of waste oil (from tank cleaning and bilges) off San Francisco in 1917-1925 (Ainley & Lewis 1974; Anonymous 1919, 1920, 1925; Lastreto 1924, 1930; Palmer 1921; White 1995); and b) many thousands of oiled seabirds, including many Common Murres and relatively large numbers of Marbled Murrelets *Brachyramphus marmoratus*, were killed near San Francisco from an oil spill that resulted from the collision of the Associated Oil Company tanker *Frank H. Buck* and the liner *President Coolidge* in the Golden Gate in March 1937 (Aldrich 1938, Anonymous 1937, Linsdale 1937, Moffitt & Orr 1938). Various efforts to reduce marine oil pollution occurred prior to the 1970's, including the 1954 International Convention to Prevent Oil Pollution of the World's Seas (Anonymous 1924a,b, 1930; Barclay-Smith 1930). Heavy oil pollution due to dumping of waste oil off San Francisco was reduced in the 1920's when, through the cooperation of several oil companies, port facilities were first built for disposal of waste oil. However, this was only a partial solution and oil spills and associated seabird mortality continued (Lastreto 1930, Smith 1934).

EVENTS SINCE 1969

From 1969 to present, oiling of seabirds has been recorded regularly in California and estimates of total mortality have been attempted for several spills (Table 1). Major factors that increased interest in the impacts of oil pollution on seabirds in California in the late 1960's and early 1970's were: a) greater world-wide attention to the effects of oil spills from tanker accidents in Europe, especially after the 1967 *Torrey Canyon* oil spill; b) the 1969 Santa Barbara oil spill; and c) the 1971 San Francisco oil spill. On 28 January 1969, a blow out of an oil well being drilled from Platform A (Union Oil Company) caused the Santa Barbara oil spill (Table 1; Fig. 2). A total estimated mortality of 3,686 seabirds was reported for February-May 1969, predominantly Western Grebes *Aechomophorus occidentalis* and loons *Gavia* sp. (CDFG 1969a,b, Straughan 1970, 1971). This estimate was undoubtedly low, given incomplete coverage, poorly-developed estimation techniques, and oil spillage continuing beyond May (Carter *et al.* 2000; McCrary *et al.* 2003). One reason that mortality was not much greater was that few alcids occur in Santa Barbara Channel in winter whereas alcids often form the bulk of the seabird biomass and oil-spill mortalities in central and northern California. Although none were recovered, this spill likely affected small populations of Xantus's Murrelet *Synthliboramphus hypoleucus* (Carter *et al.* 2000).

Fig. 2. Aerial view of oil leaking from Platform A off Santa Barbara County, California, in February 1969 (California Department of Fish and Game file photo).

On 18 January 1971, two Standard Oil Company tankers (*Arizona Standard* and *Oregon Standard*) collided in the Golden Gate and caused the San Francisco oil spill. Over 6,000 birds passed through make-shift rehabilitation centers and as many as 20,000 birds may have been affected, mainly Western Grebes, Surf and White-winged Scoters *Melanitta prespicillata*, *M. deglandi*, and Common Murres. No beached bird surveys were conducted and the extrapolation techniques used were not reported (Smail *et al.* 1972; Table 1). Efforts to monitor seabird mortality from chronic oil pollution throughout California with beached bird surveys were spurred after these spills (Lewis & Hunt 1978, Nur *et al.* 1997, Roletto *et al.* 2003, Stenzel *et al.* 1988). Low rehabilitation success in both spills (Anonymous 1971, Ohlendorf *et al.* 1978, Smith 1975) led to the creation of permanent rehabilitation programs which provided the only available documentation of oiled seabirds for many spills in the 1970's and 1980's (Table 1; Newman *et al.* 2003). Additional U.S. and state laws to reduce oil pollution were instituted in the 1970s (e.g., 1972 U.S. Clean Water Act; 1972 U.S. Marine Protection, Research and Sanctuaries Act; California Water, Fish and Game, and Harbors and Navigation codes; Carter *et al.* 2003), in part due high public concern and media reporting of these spills.

Improved techniques for estimating total mortality during oil spills did not develop until the 1984 *Puerto Rican* and 1986 *Apex Houston* oil spills when large numbers of Common Murres and Rhinoceros Auklets *Cerorhinca monocerata* were killed (Carter *et al.* 2001, 2003, Ford *et al.* 1987, Page *et al.* 1990, Takekawa *et al.* 1990). Models that used information from beached bird surveys, at-sea surveys, rehabilitation centers, and oil spill trajectories were developed in order to estimate total mortality (Table 1). These methods, with modifications, were applied for many spills in California, the massive 1989 *Exxon Valdez* oil spill in Alaska, and certain spills in Oregon and Washington (Ford *et al.* 1991, 1996, 2001). After the passage of the 1990 Oil Pollution Act (U.S.) and 1990 Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (California), state and federal agencies developed programs to gather data on seabird mortality during oil spills for litigations, expanded and improved programs for oiled seabird rehabilitation and beached bird surveys, and developed large-scale seabird restoration programs (e.g., Common Murre Restoration Project, Anacapa Island Restoration Program; ATTC 2001, Carter *et al.* 2003; Newman *et al.* 2003; Parker *et al.* 2002, Roletto *et al.* 2003).

Over the past decade, documenting seabird mortality after oil spills has become increasingly systematic. In many cases, accessible beaches are searched daily and each carcass found is collected, sampled for oil, and frozen as potential evidence. Similarly, each live oiled bird found is captured for rehabilitation as soon as possible after beaching, or sometimes at sea. Protocols are used for cleaning and captive care, health criteria must be met before

release, periodic post-release survival studies using radio telemetry are conducted for months after release, but return of more than a few rehabilitated oiled birds to breeding populations has yet to be demonstrated in California (Anderson *et al.* 1996, Golightly *et al.* 2002, Newman *et al.* 2003). Background beaching and chronic oiling patterns have been determined on many beaches through long-term monitoring (Himes Boor *et al.* 2003; Roletto *et al.* 2003; Stenzel *et al.* 1988). Efforts to improve estimates of total mortality have included development of correction factors for search effort, searcher efficiency, scavenging, unsearched beaches, sinking of carcasses at sea, and background mortality. Modeling of the population effects of oil spills is aided by information on the age and sex of birds derived from careful examinations of frozen carcasses (Carter et al, 2003, Nevins & Carter 2003).

Efforts to prevent oil pollution from existing offshore oil platforms in southern California have been fairly successful and some platforms have been removed (McCrary *et al.* 2003). Plans for more extensive offshore oil development in California in the 1970's and 1980's did not materialize due to public opposition and the creation of four National Marine Sanctuaries (Channel Islands, Gulf of the Farallones, Cordell Bank, and Monterey Bay) which prohibit oil development within sanctuary boundaries. At present, a moratorium prevents further offshore oil leasing, but development of leases approved earlier in southern California may yet occur (McCrary *et al.* 2003). The transport of oil by tanker from Alaska to California has increased dramatically since the 1970's with completion of the Trans-Alaska Pipeline (USFWS 1997). Regardless of improved regulations for tanker and ship operations, much oil is still released by vessels into the marine environment, mainly by non-tank vessels (Hampton *et al.* 2003 a; Fig. 3). Currently available technologies for oil spill response include containment booms, hazing, dispersants, and various other methods to reduce the spread of oil but response options remain limited when weather conditions are unfavorable. Oil pollution from sunken vessels also presents a serious threat to seabirds in California that will require greater future attention. Releases of oil and substantial seabird mortality, especially Common Murres, from the 1997-1998 Point Reyes Tarball Incidents, 2001-2002 San Mateo Mystery spill, and some other mystery spills in the 1990's (Table 1) have been attributed to the vessel *S.S. Jacob Luckenbach* which sank after collision in the Gulf of the Farallones in 1953 (Hampton *et al.* 2003 b; Nevins & Carter 2003).

CONCLUSIONS

Seabird mortality from oil pollution remains a significant problem and threat in California for resident alcid populations, especially Common Murres, Marbled Murrelets, Xantus's Murrelets, and Cassin's Auklets *Ptychoramphus aleuticus* (Carter & Erickson 1992, Carter & Golightly 2003, Carter *et al.* 1992, 2000, 2001, 2003, USFWS 1997). While significant numbers of loons, grebes, seaducks, and many other seabird species are killed by oil, source populations usually are not identified to assess potential impacts for these species. Such work is sorely needed. A major spill off Monterey Bay in the fall also could affect relatively large numbers of the rare and declining Ashy Storm-Petrel *Oceanodroma homochroa* which concentrate there (Sydeman *et al.* 1998). However, continuing efforts to reduce oil pollution, improve documentation and estimation of numbers of birds killed, improve post-release survival of and determine breeding by rehabilitated birds, restore seabird populations, and otherwise protect seabirds promise to help alleviate the impact of continuing oiling mortality on seabirds in California.

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Fig. 3. Aerial view of oil leaking from the vessel *American Trader* off Huntingdon Beach, California, in February 1990 (California Department of Fish and Game file photo).

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TABLE 1
Forty-four oil spills in California with greater than 10 oiled seabirds recovered, 1969-2001

No.	Mo.	Year	Name	Volume[1]	No. Birds Recovered	Estimated Mortality	Sources[2]
1	Jan	1969	Santa Barbara/Platform A	3,000+	2,259	3,686+	1-6
2	Apr	1969	Monterey Harbor	Unk	23	Unk	7
3	Dec	1969	Santa Barbara/Platform A	Unk	Unk	600+	8
4	Jan	1971	San Francisco/Arizona Standard & Oregon Standard	810	7000+	7,000-20,000	9-12
5	Jan	1973	Oakland Estuary	Unk	308	Unk	12,13
6	Dec	1973	San Francisco	Unk	100	Unk	14,15
7	Feb	1974	San Francisco	Unk	77	Unk	14
8	Sep	1975	San Mateo Coast/Phillips California	Unk	635	1,000+	14-16
9	Jan	1976	Crockett/Matson Lines	Unk	140	Unk	14
10	Feb	1977	San Francisco/Bethlehem Shipyard	Unk	330	Unk	14
11	Dec	1977	Martinez	Unk	44	Unk	14
12	Jan	1978	Farallon Islands	Unk	34	Unk	17
13	Jan	1980	Farallon Islands	Unk	55	Unk	17
14	Jul	1980	San Francisco/Yoko Maru	Unk	395	Unk	14
15	Dec-Jan	1981-1982	Farallon Islands	Unk	218	Unk	17
16	Aug	1983	Marin Coast	Unk	500+	Unk	15
17	Nov	1984	Puerto Rican	1,250	1,368	4,815	10,18-20
18	Feb	1986	Apex Houston	25.9	4,198	9,856/10,577	10,19-22
19	Apr	1988	Martinez/Shell	400	414	Unk	14
20	Feb	1990	American Trader	416.6	914	3,400	14,20,23
21	Feb	1990	San Mateo Coast/Farallon Islands	Unk	500+	Unk	14,15,17
22	Jun	1990	San Mateo Coast/Western Transport	Unk	67	Unk	25
23	Dec-Mar	1990-1991	San Mateo Coast/Farallon Islands	Unk	322	Unk	14,24
24	Jan	1991	Sammy Superstar/Long Beach	13	56	Unk	14,24
25	Dec	1991	San Diego Harbor/U.S. Navy	Unk	26	Unk	14
26	Aug	1992	Avila Beach/Unocal	36.1	84	Unk	14,24
27	Dec	1992	Farallon Islands	Unk	46	Unk	17
28	Apr-May	1993	Farallon Islands	Unk	71	Unk	17
29	Dec	1993	McGrath Beach/Berry Petroleum	84	206	Unk	24
30	Jun	1994	Long Beach/Tidelands Oil	<0.1	15	Unk	14
31	Dec	1994	Long Beach/McDonell Douglas	13.5	20	Unk	14
32	Feb	1995	Long Beach/Metrolink	4.2	100	Unk	14,24
33	Oct-Nov	1996	Cape Mohican/San Francisco Drydock	92.4	257	593	14,24
34	Jan	1997	Ballona Creek	Unk	166	Unk	24
35	Sep	1997	Platform Irene/Torch Oil pipeline	1.7	140-185	600-800	24
36	Nov	1997	Kure/Humboldt Bay	4.5	951	5,206	26
37	Nov-Feb	1997-1998	Point Reyes Tarball Incidents	Unk	2,959	18,281	27,28
38	Aug	1998	Command	3.0	171	1,900	29
39	Dec	1998	Winterburg Channel/Huntingdon Beach	Unk	50	Unk	14,24
40	Jan-Feb	1999	College Park/Huntingdon Beach	Unk	15	Unk	14,24
41	Jan-Feb	1999	Golden West/Huntingdon Beach	Unk	35	Unk	14,24
42	Sep	1999	Stuyvesant	~2.0	1,274	Pending	14,24
43	Jan	2001	Equilon/Long Beach	Unk	12	Unk	14,24
44	Nov-Mar	2001-2002	San Mateo Mystery/Jacob Luckenbach	Unk	1,910	Pending	24,28

[1] Volume in thousands of U.S. gallons; Unk = unknown.

[2] Sources: 1 (CDFG 1969a); 2 (CDFG 1969b); 3 (Nash et al. 1972); 4 (Steinhart & Steinhart 1972); 5 (Straughan 1970); 6 (Straughan 1971); 7 (A. Baldridge, American Birds Files); 8 (Sanders 1970); 9 (Anonymous 1971); 10 (Burger & Fry 1993); 11 (Covel 1971); 12 (Smail et al. 1972); 13 (Covel 1973); 14 (International Bird Rescue and Research Center, Unpublished data); 15 (Carter 1997); 16 (Anonymous 1975); 17 (Nur *et al.* 1997); 18 (PRBO 1985); 19 (Ford *et al.* 1987); 20 (MMC 1993); 21 (Page *et al.* 1990); 22 (Carter *et al.*, 2003); 23 (Oceanor 1990); 24 (California Department of Fish and Game – Office of Spill Prevention and Response, Unpublished data); 25 (White & Sharp 1994); 26 (Ford *et al.* 2001); 27 (Himes Boor *et al.* 2003); 28 (Hampton *et al.*, 2003 b); 29 (Boyce & Hampton 2002).