Pacific Seabird Group

BULLETIN

Volume 20 Number 1 1993

Dedicated To The Study And Conservation Of Pacific Seabirds And Their Environment

The Pacific Seabird Group (PSG) was formed in 1972 out of a need for better communication among Pacific seabird researchers. The Group coordinates and stimulates the field activities of members involved in research and informs its members and the general public of conservation issues relating to Pacific seabirds and the marine environment. Group meetings are held annually and the PSG *Bulletin* is issued biannually. Current activities include involvement in seabird sanctuaries, coastal surveys, seabird/fisheries interactions, and legislation. Policy statements are issued on conservation issues of critical importance. Although PSG's primary area of interest is the west coast of North America and adjacent areas of the Pacific Ocean, it is hoped that seabird enthusiasts in other parts of the world will join and participate in PSG. PSG is a member of the U. S. Section of the International Council for Bird Preservation. Annual dues for membership are $15 (individual and family); $10 (student, undergraduate and graduate); and $450 (Life Membership, payable in five $90 installments). Dues are payable to the Treasurer, whose address in on the back cover.

Pacific Seabird Group *Bulletin*

The Pacific Seabird Group *Bulletin* (ISSN 0740-3371) is published twice a year, in the spring and fall, and contains news of interest to PSG members, including regional seabird research and conservation news and abstracts of papers presented at the annual meeting. The Pacific Seabird Group *Bulletin* is not an outlet for the results of scientific research; however, articles and shorter items on seabird conservation, seabird research activities, and other topics related to the objectives of PSG are welcome. All materials should be submitted to the Editor. Back issues of the Bulletin may be ordered from the Treasurer; please remit $2.50 each for issues of Vols. 1-8 (1974-1981) and $5.00 each for issues of Vol. 9 and later.

Permanent Address

Pacific Seabird Group, c/o Point Reyes Bird Observatory
4990 Shoreline Highway, Stinson Beach, CA 94970

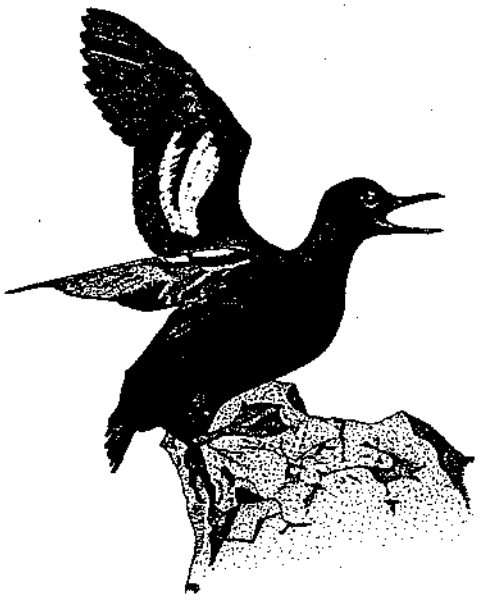
Donations

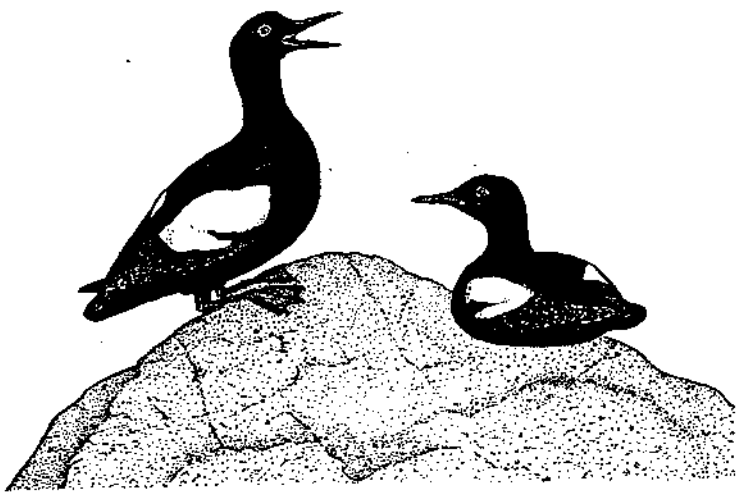
The Pacific Seabird Group is a nonprofit corporation organized under the laws of the State of California. Contributions to the Pacifife Seabird Group qualify for tax deductions under IRC Section 501(c)(3).

Pacific Seabird Group Bulletin

Dedicated to the study and conservation of Pacific seabirds and their environment

Volume 20 **1993** **Number 1**





THE CHAIR'S PAGE

This last February PSG celebrated its first twenty years with the largest annual meeting in the Group's history. Over 200 registrants gathered to listen to 75 papers and participate in a wide range of formal and informal workshops. The vitality of the meeting demonstrated the health of the Group as it enters its third decade. In addition to the papers whose abstracts are presented in this Bulletin, the meeting included workshops on data analysis. The meeting was the first since the position of Vice-Chair for Conservation was created. Craig Harrison has filled that position for the past year and has greatly increased PSG's involvement in seabird conservation issues. A session dedicated to the discussion of current seabird conservation issues, such as the one Craig chaired in Seattle, should be part of all future PSG meetings. PSG members should look on these sessions as important forums for the exchange of information and let Craig know of any issues they feel should be included in next year's conservation session.

PSG's long history of publishing symposia continues with the recently published *Status, Ecology and Conservation of Marine Birds of the North Pacific* and the plans to publish the Marbled Murrelet symposium held in Seattle. These will be the ninth and tenth symposia held at PSG meetings that have found their way to print. Typically the most recognition PSG receives from these publications is a mention on the title page. Should PSG foresee the publishing of a symposium approximately every two years and if it would like to receive more credit for its efforts, it might be good to consider a regular publishing outlet that would better allow PSG's involvement to be recognized.

I would like to acknowledge the job that Palmer Sekora did last year as Chair of PSG. He was an important catalyst in increasing PSG's involvement in conservation issues and in implementing other changes coming out of the PSG 2000 committee.

Plan now to attend the annual meeting in Sacramento, California next January. I hope that your field season is successful, regardless of its level of funding.

George Divoky

POPULATION TRENDS OF ALASKAN SEABIRDS[1]

Scott A. Hatch, U.S. Fish and Wildlife Service, Alaska Fish and Wildlife Research Center, 1011 East Tudor Road, Anchorage, Alaska 99503

Ornithology in Alaska formally began with the observations of Georg Wilhelm Steller during Vitus Bering's voyage of discovery in 1741. Steller's journal makes brief mention of various seabird species he encountered during his travels in the Gulf of Alaska and Aleutian Islands (Frost and Engel 1988). For more than 100 years following Steller, the Russian-American Company was active in commercial fur harvesting throughout southern coastal Alaska, but this period saw little contribution to a scientific understanding of the region's avifauna. With the purchase of Alaska by the United States in 1867, a period of American exploration began that included significant work by pioneering naturalists such as Dall (1873, 1874), Elliot (1881), Nelson (1883), and Turner (1885, 1886). While this activity established a comprehensive list and general knowledge of the distribution of seabird species occurring in Alaska, early observers provided no quantitative estimates of abundance for any colony or region.

The observations of Heath (1915) and Willett (1912, 1915, 1917) at two locations in southeastern Alaska are notable for including the first numerical estimates of any seabird populations for comparison with recent data. Willett's (1912, 1915) estimates of 13 species are given in Table 1 with results from a 1976 survey at Forrester Island (DeGange et al. 1977) and a 1981 survey at St. Lazaria Island (Nelson et al. 1982). In the aggregate, seabird numbers appeared to increase dramatically at both sites, but the differences may be largely artificial. Because Willett (1915) did not employ rigorous sampling methods, DeGange et al. (1977) surmised that he grossly underestimated the populations of burrowing species such as storm-petrels, Cassin's Auklets, and Rhinoceros Auklets. Nelson et al. (1982) offered a similar interpretation of total storm-petrel numbers at St. Lazaria, but felt that a shift in the species ratio of Leach's and Fork-tailed Storm-Petrels had likely occurred. It seems reasonably certain that real changes in some of the open-nesters like Common Murres (down at Forrester Island, up at St. Lazaria) and Glaucous-winged and Herring Gulls (absent or down at both sites) have occurred since Willett's time.

Murie (1959) conducted a biological reconnaisance of most of the Aleutian Islands and Alaska Peninsula in 1936 and 1937. His work was prompted by concerns about the effect of introduced foxes on native birds, and he was careful to report at least his subjective impressions and any pertinent information he could glean from local residents. Murie noted seabird presence and absence in many instances and gave numerical estimates for some species in a few sites. Military construction projects prompted other early investigations at Middleton Island in the north-central Gulf of Alaska (Rausch 1958) and Cape Thompson in the Chukchi Sea (Swartz 1966). These studies provided reliable estimates of murre numbers—marked changes have occurred since the late 1950's in both locations (see below).

A few student projects (e.g., Bedard 1969, Snarski 1971) and surveys by the Fish and Wildlife Service, notably in Prince William Sound (Dwyer et al. 1976) and the Aleutian Islands (Sekora et al. 1979) in the early 1970's, included seabird population estimates in the decade and a half after 1960. However, the major watershed for seabird monitoring in Alaska was the advent of the Outer Continental Shelf Environmental Assessment Program (OCSEAP) in 1975, a program for generating baseline information in advance of offshore leasing of Federal lands for oil and gas development. For the first time, in-depth studies were conducted at numerous sites in the Gulf of Alaska, Bering Sea, and Chukchi Sea, and permanent plots were established for documenting changes in seabird numbers. Plots have been worked with some regularity since the mid-1970's, providing time series spanning 15+ years for a few common and easily studied species, especially murres and kittiwakes. Agencies such as the Fish and Wildlife Service and Minerals Management Service continue to develop and implement a seabird monitoring scheme in Alaska, which is beginning to reveal significant trends in some areas. A danger now is the temptation to extrapolate recent findings too liberally—either from one or a few areas to all of Alaska or by assuming that recent trends are representative of the long term patterns that must be understood in assessing the welfare of long-lived species. Results of this modern, quantitative work are summarized below, by species or species group, together with anecdotal historical information as appropriate.

[1] *Editor's note: Portions of this article are incorporated in a paper by D.G. Ainley, W.J. Sydeman, S.A. Hatch, and U.W. Wilson in the symposium "A century of avifaunal change" to be published by the Cooper Ornithological Society.*

Northern Fulmar

Most fulmars in Alaska breed in one of four locations: the Semidi Islands, Chagulak Island, the Pribilof Islands and St. Matthew Island. An additional 13 breeding sites are known, but together they account for less than 1% of the population (Hatch 1993). Without clear evidence from one or more of the major colonies, it is impossible to assess the overall trend of this species. Attendance counts on fixed plots were made in several years between 1976 and 1991-92 at the Semidi Islands and on St. George Island in the Pribilofs (Hatch 1987; Dragoo et al. 1990, 1991, pers. comm.). These counts suggested increasing numbers of fulmars at both sites, although the apparent trends were possbily due to better environmental conditions and reproductive performance in the later years. Hatch (1993) concluded it is too early to say whether either of these large colonies is growing.

Unquestionably, some small colonies of fulmars are growing in Alaska (Buldir Island, Barren Islands), and several are known to have been recently established (Barren Islands, Bird Island, and Castle Rock). Other colonies, some with as few as 4-6 individuals, may also be new, and all small colonies bear watching. It is possible that Pacific fulmars are only just beginning a significant expansion, though certainly nothing comparable to the growth of this species in the boreal Atlantic is evident as yet (Cramp et al. 1974, Lloyd et al. 1991).

Fulmars were adversely impacted by foxes introduced to existing and former nesting islands in the late 1800's and early 1900's. Murie (1959) mentions three Aleutian islands (Gareloi, Unalga, and Agattu) on which fulmars were thought to have been greatly reduced or extirpated by foxes. One additional island (Segula) on which Murie found fulmars nesting in 1936 is now without a colony (Early et al. 1980), undoubtedly because of the introduced foxes that still persist there (Bailey 1993). Probably the largest colonies to be impacted were on the Semidi Islands, which were used for fox farming between 1885 and about 1914 (Bower and Aller 1917). Foxes apparently died out naturally at the Semidis, and the fact that fulmars now occupy much habitat that would have been easily accessible to foxes suggests they have largely recovered from what were probably much reduced levels while foxes were present. Whether Alaskan fulmars have made a full recovery range-wide is unknown, but their population now is stationary or possibly increasing.

Storm-Petrels

Fork-tailed and Leach's Storm-petrels are widely distributed and abundant breeders in Alaska, but there are no data with which to assess population trends. Mammalian predators, both natural and introduced, appear to be an important factor limiting the distribution and abundance of petrels throughout the Pacific (Boersma and Groom 1993). It is clear that storm petrels are easy prey for foxes and that populations were decimated on some Alaskan islands when these predators were introduced (Murie 1959).

Cormorants

Four cormorant species nest in Alaska (Pelagic, Red-faced, Double-crested, and Brandt's), although Brandt's Cormorant is but a rare, casual breeder (Isleib and Kessel 1973). A small colony of Brandt's Cormorants (4 nests, 13 adult plumaged birds) was present on Seal Rocks, Prince William Sound in 1972 (Isleib and Kessel 1973), but has since been abandoned (Nysewander 1986). Intermittent breeding of a few Brandt's Cormorants is also known from southeast Alaska (U.S. Fish and Wildlife Service, unpubl. data). Red-faced Cormorants are thought to have expanded their range eastward in the north-central Gulf of Alaska in recent decades (Sowl 1979), just as they have in the western portion of their range on the Commander and Kurile islands (Siegel-Causey and Litvinenko 1993).

Nest counts of Pelagic and Red-faced Cormorants were conducted on several Alaskan islands during OCSEAP (1975-1978) and more recently. On Middleton Island, a large colony of Pelagic Cormorants (2000-4500 pairs) has fluctuated widely since 1974, but on average is much larger now than in 1956 (Rausch 1958 and pers. comm). In Chiniak Bay (Kodiak Island), 13 mixed colonies of Pelagic and Red-faced Cormorants were censused in 10 years between 1975 and 1991—the data reveal no consistent trends in either species (D.R. Nysewander and D.B. Irons, unpubl. data). At the Semidi Islands, a population of 1650 pairs (mostly Red-faced) in 1979 was down 43% (to 930 nests) in 1986 (Hatch and Hatch 1983; unpubl. data). These few studies include examples of stable, increasing, and declining colonies in recent years; therefore, no overall trends can be identified. For reasons that are not understood, cormorants often shift their colony locations between years, which increases the difficulty of monitoring populations (Hatch and Hatch 1983, Siegel-Causey and Litvinenko 1993).

Gulls and Terns

Like cormorants, Arctic and Aleutian Terns have relatively low site fidelity, and little effort has been made to monitor their populations. However, boat surveys in Prince William Sound suggest a substantial decline (> 50%) of Arctic Terns in that area between the early 1970's and late

1980's (Laing and Klosiewski 1993).

Among *Larus* species, only the Glaucous-winged Gull has been studied to any significant degree. Circumstantial evidence suggests that populations since the turn of the century have responded to two main factors—the occurrence and waste management practices of seafood processors and the introduction of foxes to nesting islands. For example, a decline in Prince William Sound since the early 1970's (Vermeer and Irons 1991, Laing and Klosiewski 1993), reflects the closure of some canneries, regulations that require grinding of offal before release, and a shift toward freezing fish instead of canning (M.E. Isleib, pers. comm.).

Gulls often respond conspicuously when foxes are removed from islands (Bailey 1993); for example, on the Alaid-Nizki group in the western Aleutians, gulls increased from about 200 to 1300 pairs within a few years after foxes were eradicated in 1976 (C.F. Zeillemaker and J.L. Trapp, unpubl. data). Murie (1959) noted that if foxes inhabited an island, gulls confined their nesting to offshore rocks.

The greatest documented change in a gull population in Alaska has occurred on Middleton Island. No Glaucous-winged Gulls were breeding on Middleton in 1956 (Rausch 1958). By the mid 1970's there were 500-700 pairs, and by 1990 the population had grown exponentially to more than 7000 pairs (S.A. Hatch, unpubl. data). Since this colony is well offshore and has no artificial food sources, a change in the supply of natural foods in summer is indicated. The island was uplifted some 4.5 m in the Alaska earthquake of 1964, which certainly altered its nearshore habitats. A change in winter carrying capacity might also be a contributing factor. From limited band returns, Glaucous-winged Gulls from the Gulf of Alaska are known to winter near west coast cities such as Portland and San Francisco.

Black-legged Kittiwakes have been studied more intensively than other species in Alaska because they are widely distributed and easy to observe. Early reports of a very large colony (up to 100,000 birds) on Whale Island near Kodiak (Gabrielson 1940; C.J. Lensink in 1956, pers. comm.) are at odds with a recent estimate of 6000 kittiwakes for that island (Sowls et al. 1978). A marked change in the opposite direction occurred on Middleton Island between 1956 and the mid 1970's. Rausch (1958) reported "several thousand" kittiwakes on Middleton in 1956 (qualified in a personal communication to mean 10,000-15,000 pairs). From 1974 through 1980, this colony peaked at 75,000-80,000 pairs, but has since declined to half that level (Fig. 1). In another early study, Swartz (1966) recorded 3500 kittiwakes on a cliff face at Cape Thompson in 1960. Subsequently, this colony has shown much annual variation related to breeding performance, but was little changed in 1988 (3600 birds) from Swartz's count. Elsewhere in Alaska, observed trends are equivocal—linear regressions of the data collected since 1970 suggest three colonies have increased (Chiniak Bay, Buldir, Cape Thompson), and three colonies have declined (Middleton, St. George, and St. Paul). Four colonies have shown no significant trends since 1970 (Fig. 1). Widespread declines of Black-legged Kittiwakes may occur in the future, because recent levels of productivity and survival are inadequate for a balanced life table (Hatch et al. 1993a,b).

Where Red-legged Kittiwakes have been monitored, they show similar trends to Black-legged Kittiwakes (down at the Pribilofs, up at Buldir; Fig. 1). Since most of the population breeds on St. George Island, the overall trend of this species is down. Judging from Turner's (1885, 1886) accounts (partly discredited by Murie 1959), Red-legged Kittiwakes may have been more widespread and abundant in the late 1800's. Turner (1886) reported this species as breeding on Akutan and possibly Sanak in the eastern Aleutians and considered it common west of there. Today, Red-legged Kittiwakes breed in only four locations: Pribilof Islands, Bogoslof Island, Buldir Island, and Commander Islands.

Small Alcids

This group includes the crevice-nesting auklets (*Aethia* spp. and *Cyclorrhynchus*), two burrowing species (Ancient Murrelet and Cassin's Auklet) and the enigmatic *Brachyrhamphus* murrelets (solitary tree or ground nesters). The rarest of these species is the Whiskered Auklet—nothing is known of its population trend; its distribution and abundance are still being documented. As for the other crevice-nesters, anecdotal accounts suggest some formerly large colonies became much reduced between the turn of the century and 1930-1970, e.g., Crested Auklets on Big Koniuji in the Shumagin Islands (Townsend 1913, Springer et al. 1993), Least Auklets on the Pribilofs (Elliot 1881, Hickey and Craighead 1977), and Least Auklets on Bobrof Island, central Aleutians (Murie 1959). Such changes can probably be attributed to introduced foxes, except on the Pribilofs, where arctic foxes are indigenous. More recently, there is evidence of substantial increases of Crested and Least Auklets on the Pribilof Islands (Craighead and Oppenheim 1985) and on St. Lawrence Island (Bedard 1969, Piatt et al. 1990).

It is likely that Ancient Murrelets and Cassin's Auklets were among the seabirds most seriously affected by fox introductions. Both species formerly nested abundantly on Sanak Island (Bendire 1895), but they were scarce or absent

when Murie visited the area in 1937. Murie (1959) also learned of probable declines or extirpations of Cassin's Auklet on other Aleutian Islands including Keegaloo, Adugak, Amlia (nearby islets), and Ilak.

Techniques have only recently been developed to locate the nest sites and monitor populations of *Brachyrhamphus* murrelets, especially Marbled Murrelets. However, boat surveys conducted in Prince William Sound in 1972-73 and again in 1989-91 suggested a substantial decline (up to 65%) of Marbled and Kittlitz's murrelets over that period (Laing and Klosiewski 1993). The reasons for such a decline are obscure, because old growth logging, the principal threat to Marbled Murrelets (Mendenhall 1992, Ewins et al. 1993), has not been extensive in Prince William Sound.

Large Alcids - Guillemots, Puffins, and Murres

Black Guillemots have a limited distribution in arctic Alaska (Bering Strait and Beaufort Sea coast), where their numbers have increased noticeably in the past 20 years. In the Beaufort Sea, the size of their breeding population appears to be governed by the availability of artificial nest sites (oil drums, wooden pallets, and other debris) on barrier islands (Divoky et al. 1974, Divoky and Boekeleide 1978). The more common and widespread Pigeon Guillemot has not been monitored closely in any colony; however, boat surveys in Prince William Sound suggest this species has declined over the last 20 years in that area (Laing and Klosiewski 1993).

Tufted and Horned Puffins are widely distributed in Alaska; they differ in the important respect that Horned Puffins usually nest in crevices, whereas Tufted Puffins dig burrows. As a result, Tufted Puffins were relatively vulnerable to introduced foxes. The case of Kaligagan Island in the eastern Aleuatians gives an indication of the possible damage—and its reversibility. Murie (1937) recommended this island should continue to be managed as a fox farm because of the paucity of breeding seabirds he found there in 1936. Foxes died out, however, and today Kaligagan has one of the largest Tufted Puffin colonies in Alaska (>100,000 birds; Nysewander et al. 1982).

There are few colonies of Rhinoceros Auklets in Alaska; most of the population breeds on Forrester Island, where the large colony described by Willett (1915) persists today (Table 1). The only site where a definite change is known is Middleton Island, where one of four small colonies located in 1976-78 (Frazer and Howe 1977, Hatch et al. 1979) had increased dramatically from fewer than 50 to more than 900 burrows by 1992 (S.A. Hatch, unpubl data).

In recent years, Common and Thick-billed Murres have been extensively studied in Alaska (Byrd et al. 1993), often in the same locations as the kittiwakes with which they tend to breed in close proximity on sheer cliffs. Where murres use more accessible habitats, breeding can be severely disrupted by mammalian predators (e.g., Petersen 1982) as well as competition for living space. Elliot (1881) described a large colony ("hundreds of thousands") of Common and Thick-billed murres on Walrus Island in the Pribilof group. As recently as 1953, this colony was estimated to contain more than 1 million murres (Peterson and Fisher 1955), yet in 1976 it had all but vanished (Hunt 1976). Encroachment of Steller sea lions onto the island's plateau, formerly dominated by murres, was the apparent reason for the demise of this colony (Hunt 1976).

Possible changes since 1912-1914 in murre colonies on Forrester Island and St. Lazaria Island have already been noted (Table 1). Most other information on murre trends in Alaska dates from the OCSEAP (1975 and later), with a couple of notable exceptions: Rausch's (1958) observations on Middleton Island in 1956 and Swartz's (1966) work at Cape Thompson in 1959-61. Large changes have occurred at both sites, but in opposite directions. At Cape Thompson, a 50% decline of murres occurred between 1960 and the mid 1970's. The population has been fairly stable since 1979 (Fig. 2). On Middleton Island, Rausch (1958) counted only about 400 murres, mostly Thick-billed. Today the island supports a similar number of Thick-billed Murres but also has 6000-8000 Common Murres that were not present in 1956.

Among other sites where murres have been monitored since the 1970's, some colonies have declined (e.g., Common Murres at Chisik Island and St. Paul; possibly Thick-billed Murres at St. Matthew) while others have grown (Cape Lisburne and Buldir Island) (Fig. 2). Remaining colonies show no significant trends since 1970, although information from Bluff suggested a downward shift between 1975 and 1979 (Drury et al. 1981, Murphy et al. 1986). Clearly, the overall picture for murres in Alaska is complex, and colony changes must be considered on a case by case basis.

Murres are highly vulnerable to floating oil, and Common Murres contributed by far the greatest number of casualties to the toll of marine birds in the Exxon-Valdez oil spill (Piatt et al. 1990). It is estimated that up to 300,000 murres were killed in the spill, and there is evidence that some colonies in the affected area were reduced by half (Nysewander et al. 1992).

Evaluating Causes of Seabird Population Changes

From the above survey of information on seabird population trends in Alaska, it is clear not only that many local populations have undergone marked changes in the last 100 years, but also that we are presently in no position to say whether the whole population of any given species is increasing, declining, or stable. A notable exception is the Red-legged Kittiwake, because most of this species nests on one island, St. George, where its numbers are declining.

Alaskan seabirds are killed incidentally in high seas gill nets (DeGange et al. 1993), and oil at sea poses a significant threat, as demonstrated recently by the Exxon-Valdez spill (Piatt et al. 1990, Nysewander et al. 1992). There is little doubt, however, that the introduction of exotic animals to islands—especially foxes, but also rats, voles, ground squirrels, and rabbits—has been the most potent anthropogenic factor affecting Alaskan seabirds over the past 100 years. Russian colonists made the first introductions between 1750 and the early 1800's, but the heyday of fox farming was an American enterprise from about 1885 to 1930 (Bailey 1993). Some 450 islands from southeastern Alaska to the western Aleutians were used as release sites for arctic and/or red foxes. Fox trappers regarded seabirds as "feed", and not surprisingly, some of our richest seabird islands supported the most successful, if short-lived, fox farms (e.g., Middleton Island, Semidi Islands). For obvious reasons, the most severely affected species included open ground nesters such as gulls, terns, and fulmars, and easily excavated fossorial birds like storm-petrels, ancient murrelets, and Cassin's Auklets. It may never be possible to document adequately the impact of fox farming on these species, but anecdotal accounts leave no doubt that it was locally disastrous (Murie 1959, Bailey 1993). Fortunately, this era has passed, and the damage is in most instances reversible. Fox farming ceased during the Great Depression, and through a combination of natural die-offs and eradication efforts, foxes remain on only about 50 islands where they were introduced (Bailey 1993). Some of these remaining islands are large, however, and probably impossible to rid of foxes unless current restrictions on the use of toxicants are lifted.

Changes in food supply, whether natural or anthropogenic, are another important category of influences on marine bird populations. Middleton Island presents an interesting case, because several species increased dramatically there between 1956 and the mid 1970's. This island may have attracted immigrating seabirds because of changes wrought by the 1964 Alaska earthquake—bathymetry in the area was altered significantly, possibly in a manner favorable to forage fish or other seabird prey.

Scavenging species like gulls and fulmars have probably benefitted from by-products of the fishing industry, whether from shore-based plants or factory ships on the high seas. An emerging issue, however, is whether fish harvests are altering the marine ecosystem on a large scale, to the detriment of seabirds and other consumers like pinnipeds and whales. For example, production of northern fur seals and adult populations of harbor seals and Steller sea lions have recently declined in the Gulf of Alaska and Bering Sea (York and Kozloff 1987, Merrick et al. 1987, Pitcher 1990). Walleye pollock, which currently support the world's largest single-species fishery (Lloyd and Davis 1988), are also important in the diets of pinnipeds (Lowry et al. 1988) and piscivorous seabirds (Hunt et al. 1981, Dragoo 1991) in the southeastern Bering Sea. Declining abundance of juvenile pollock has been offered as an explanation for pinniped declines and seabird changes in the Bering Sea (Springer 1992). The hypothesis addresses both the apparent increase of planktivorous auklets in the region (Pribilof Islands and St. Lawrence Island) and the decline of murres and kittiwakes (Pribilof Islands, St. Matthew Island)—auklets presumably compete with juvenile pollock for euphausiids and other zooplankton, whereas murres and kittiwakes take juvenile pollock at the Pribilof Islands and St. Matthew (Springer and Byrd 1988). The role of fishing in this scenario is unclear, because the adult pollock (age 2+) taken in the fishery are important predators on juvenile pollock and other seabird prey such as herring, myctophids, capelin, and sandlance (Straty and Haight 1979, Livingston 1991). Seabirds consume young pollock (ages 0 and 1) which are not harvested. Thus, this fishery could theoretically benefit piscivorous birds by reducing competition for their principal foods. Without question, the wholesale removal of large quantities of fish biomass from the ocean could have major, unforeseeable effects on the marine ecosystem. However, the issue whether current fishing practices in Alaska are, on balance, detrimental or beneficial to seabirds has yet to be resolved.

Mark Your Calendar!

Deadlines for submittals to the PSG *Bulletin* are **15 April** for the spring issue and **15 October** for the fall issue. Please make a note of these dates and plan your regional reports and other articles accordingly.

Also, please submit all material to be published on 3.5-inch disks. No 5.25-inch floppies!

Table 1. Population estimates (pairs) of seabirds breeding on St. Lazaria and Forrester islands, southeastern Alaska.

	St. Lazaria Island		Forrester Island	
Species	1912a	1981b	1914c	1976d
Northern Fulmar	---	---	0e	150
Fork-tailed Storm-Petrel	2,000	139,935	10,000	44,351
Leach's Storm-Petrel	20,000	130,065	50,000	344,244
Pelagic Cormorant	150	0	150	75
Glaucous-winged Gull	300	48	8,000	400
Herring Gull	---	---	220	0
Common Murre	300	2,500	20,000	5,000
Pigeon Guillemot	150	50	300	200
Ancient Murrelet	---	1,500	20,000	30,000
Cassin's Auklet	---	---	12,000	31,481
Rhinoceros Auklet	75	1,000	20,000	>54,000
Horned Puffin	12	0	1,100	500
Tufted Puffin	2,000	5,513	35,000	36,700
Total	24,991	280,614	176,820	547,101

a Willett (1912).

b Nelson et al. (1982).

c Willett (1915) except Cassin's Auklet (Willet 1917).

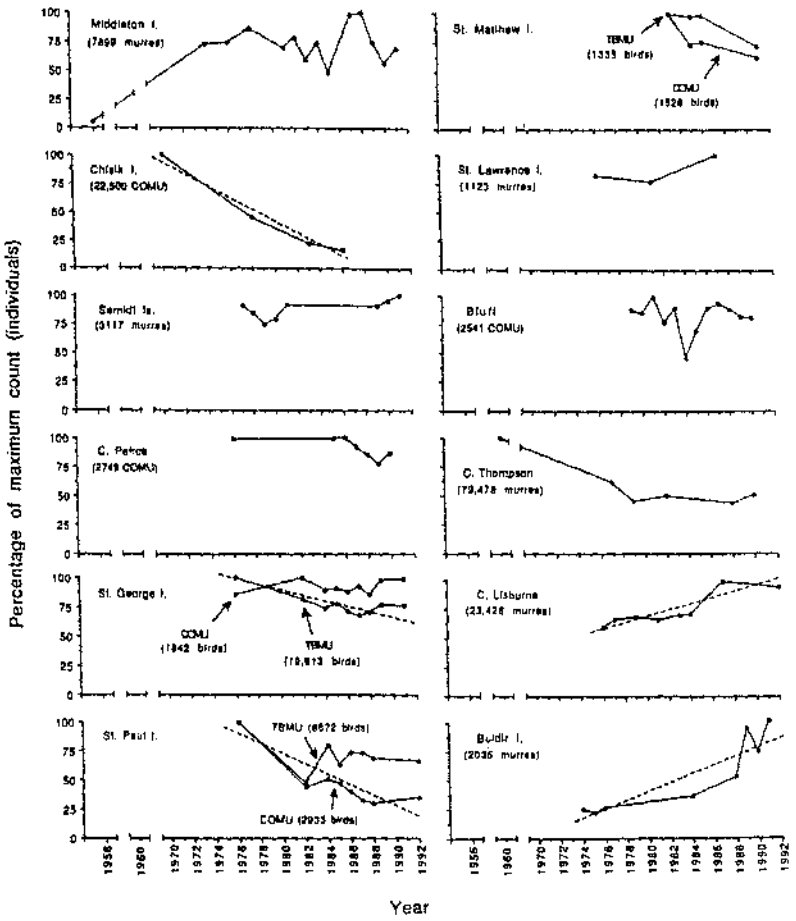


Figure 2. Population trends of Common Murres (COMU) and Thick-billed Murres (TBMU) at selected colonies in Alaska. Dashed lines indicate significant regressions ($P < 0.05$) of data collected since 1970. Sources: Middleton Island (Rausch 1958, Nysewander et al. 1986, S.A. Hatch unpubl. data); Chisik Island (Nishimoto et al. 1987); Semidi Islands (Hatch and Hatch 1989, Dragoo et al. 1991); Cape Peirce (Haggblom and Mendenhall 1993); St. George Island (Dragoo et al. 1990, unpubl. data); St. Paul Island (Dragoo et al. 1989, L. Climo pers. comm.); St. Matthew Island (Murphy et al. 1987, A.L. Sowls pers. comm.); St. Lawrence Island (Piatt et al. 1988); Bluff (Murphy et al. 1986, Murphy 1993); Cape Thompson (Fadely et al. 1989, Sharp 1993); Cape Lisburne (A.L. Sowls pers. comm.); Buldir Island (Williams and Byrd 1992).

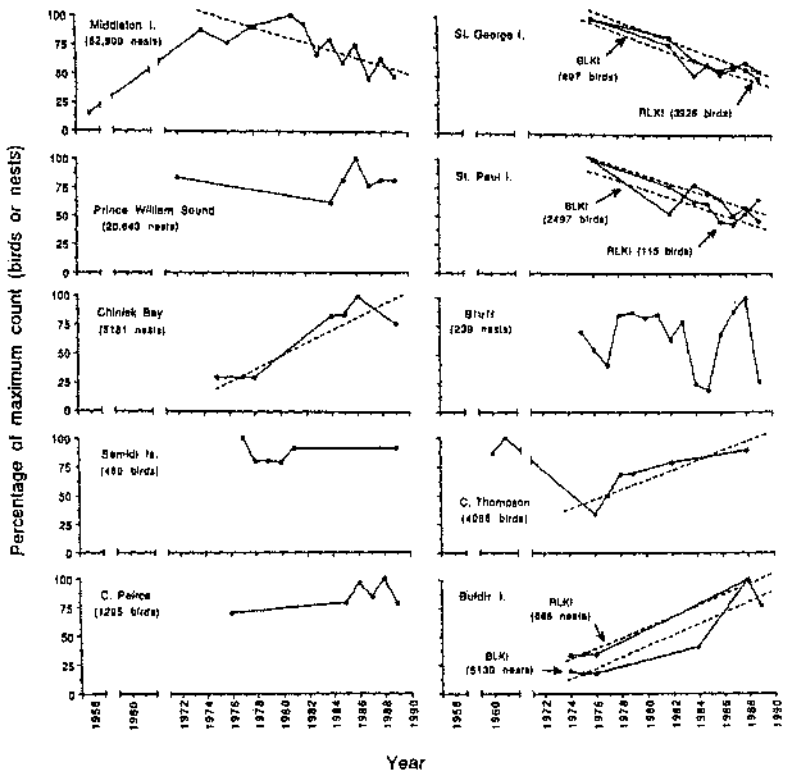


Figure 1. Population trends of Black-legged Kittiwakes (BLKI) and Red-legged Kittiwakes (RLKI) at selected colonies in Alaska (after Hatch et al. 1993 and references cited therein). Dashed lines indicate significant regressions ($P < 0.05$) of data collected since 1970.

Population Trends (Continued)

Literature Cited

Bailey, E.P. 1993. Fox introductions on Alaskan islands—history, impacts on avifauna, and eradication. U.S. Fish and Wildlife Service, Biol. Rep. (in press).

Bedard, J. 1969. The nesting of the Crested, Least, and Parakeet Auklets on St. Lawrence Island, Alaska. Condor 71:386-398.

Bendire, C. 1895. Notes on the Ancient Murrelet (*Synthliboramphus antiquus*) by Chase Littlejohn with annotations. Auk 12:270-278.

Boersma, P.D., and M.J. Groom. 1993. Conservation of storm petrels in the North Pacific. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Bower, W.T., and H.D. Aller. 1917. Alaska fisheries and fur industries in 1915. Dept. Commerce, Bureau of Commercial Fisheries, U.S. Gov't. Printing Office.

Byrd, G.V., E.C. Murphy, G.W. Kaiser, A.J. Kondratyev, and Y.V. Shibaev. 1993. Status and ecology of offshore fish-feeding alcids (murres and puffins) in the North Pacific. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Craighead, F.L., and J. Oppenheim. 1985. Population estimates and temporal trends of Pribilof Island seabirds. U.S. Dept. Commer., NOAA, OCSEAP Final Rep. 30:307-356.

Cramp, S., W.R.P. Bourne, and D. Saunders. 1974. The seabirds of Britain and Ireland. Taplinger Publ. Co., New York.

Dall, W.H. 1873. Notes on the avifauna of the Aleutian Islands, from Unalaska eastward. Proc. Calif. Acad. Sci. 5:25-35.

Dall, W.H. 1874. Notes on the avifauna of the Aleutian Islands, especially those west of Unalaska. Proc. Calif. Acad. Sci. 5:270-281.

DeGange, A.R., E.E. Possardt, and D.A. Frazer. 1977. The breeding biology of seabirds on the Forrester Island National Wildlife Refuge, 15 May to 1 September 1976. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK. 58 pp.

DeGange, A.R., R.H. Day, J.E. Takekawa, and V.M. Mendenhall. 1993. Losses of seabirds in gillnets in the North Pacific. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Divoky, G.J., G.E. Watson, and J.C. Bartonek. 1974. Breeding of the Black Guillemot in northern Alaska. Condor 76:339-343.

Divoky, G.J., and R.J. Boekelheide. 1978. The breeding biology and population dynamics of the Black Guillemot in northern Alaska. Pacific Seabird Group Bull. 5:80.

Dragoo, D.E. 1991. Food habits and productivity of kittiwakes and murres at St. George Island, Alaska. Unpubl. M.S. thesis, University of Alaska, Fairbanks. 104 pp.

Dragoo, D.E., B.E. Bain, A.L. Sowls, and R.F. Chaundy. 1989. The status of cliff nesting seabirds in the Pribilof Islands, Alaska, 1976-1988: a summary. Unpublished report, U.S. Fish and Wildlife Service, Homer, AK. 22 pp.

Dragoo, D.E., S.D. Schulmeister, and B.K. Bain. 1990. The status of Northern Fulmars, kittiwakes, and murres at St. George Island, Alaska in 1989. Unpublished report, U.S. Fish and Wildlife Service, Homer, AK. 47 pp.

Dragoo, D.E., B.K. Bain, M.J. Melendez, and C.M. Minch. 1991. Changes in colony size and reproductive success of seabirds at the Semidi Islands, Alaska, 1976-1991. Unpublished report, U.S. Fish and Wildlife Service, Homer, AK. 43 pp.

Drury, W.H., C. Ramsdell, and J.B. French, Jr. 1981. Ecological studies in the Bering Straits region. U.S. Dept. Commer., NOAA, OCSEAP Final Rep. 11:175-488.

Dwyer, T.J., M.E. Islieb, and J.L. Haddock. 1976. Marine bird populations in Prince William Sound, Alaska. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK. 20 pp.

Early, T., J. Beall, W. Henry, and A. Taber. 1980. Results of bird and mammal surveys of the western Aleutians. Unpublished report, U.S. Fish and Wildlife Service, Adak, AK. 140 pp.

Elliot, H.W. 1881. The seal-islands of Alaska. U.S. Dept. Interior, Washington, Gov't. Printing Office.

Ewins, P.J., H.R. Carter, and Y.V. Shibaev. 1993. The status, distribution and ecology of inshore fish-feeding alcids (*Cepphus* guillemots and *Brachyramphus* murrelets) in the North Pacific. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Fadely, B.S., J.F. Piatt, S.A. Hatch, and D.G. Roseneau. 1989. Populations, productivity, and feeding habits of seabirds at Cape Thompson, Alaska. U.S. Minerals Management Service, Final Report, OCS Study 89-0014. 429 pp.

Frazer, D.A., and M. Howe. 1977. Seabird investigations on Middleton Island during the summer of 1976. Unpublished report, U.S. Fish and Wildlife Service, Anchorge, AK. 34 pp.

Frost, O.W., and M.A. Engel. 1988. Georg Wilhelm Steller—Journal of a voyage with Bering, 1741-1742. Stanford University Press, Stanford, CA.

Gabrielson, I.N. 1940. Americas greatest bird concentrations, Part I. Bird-lore 42:497-506.

Haggblom, L., and V.M. Mendenhall. 1993. Cape Peirce, p. 15-60. *In* V.M. Mendenhall [ed.], Monitoring of populations and productivity of seabirds at Cape Peirce, Bluff, and Cape Thompson, Alaska, 1990. U.S. Mineral Management Service, Final Report, OCS Study. (*In press*).

Hatch, S.A. 1987. Annual survival and productivity of Northern Fulmars in Alaska. Condor 89:685-696.

Hatch, S.A. 1993. Ecology and population status of Pacific Northern Fulmars (*Fulmarus glacialis*). *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Hatch, S.A., and M.A. Hatch. 1983. Populations and habitat use of marine birds in the Semidi Islands, Alaska. Murrelet 64:39-46.

Hatch, S.A., and M.A. Hatch. 1989. Attendance patterns of murres at breeding sites: implications for monitoring. J. Wildl. Manage. 53:483-493.

Hatch, S.A., T.W. Pearson, and P.J. Gould. 1979. Reproductive ecology of seabirds at Middleton Island, Alaska. U.S. Dept. Commer., NOAA, OCSEAP Annual Rep. 2:233-308.

Hatch, S.A., G.V. Byrd, D.B. Irons, and G.L. Hunt, Jr. 1993. Status and ecology of kittiwakes (*Rissa tridactyla* and *R. brevirostris*) in the North Pacific. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Hatch, S.A., B.D. Roberts, and B.S. Fadely. 1993. Adult survival of kittiwakes *Rissa tridactyla* in a Pacific colony. Ibis. (*In press*).

Heath, H. 1915. Birds observed on Forrester Island, Alaska during the summer of 1913. Condor 17:20-41.

Hickey, J.J., and F.L. Craighead. 1977. A census of seabirds on the Pribilof Islands. U.S. Dept. Commer., NOAA, OCSEAP Final Rep. 2:96-195.

Hunt, G.L. Jr. 1976. Reproductive ecology, foods, and foraging areas of seabirds nesting on the Pribilof Islands. U.S. Dept. Commer., NOAA, OCSEAP Annual Rep. 2:155-269.

Hunt, G.L. Jr., B. Burgeson, and G.A. Sanger. 1981. Feeding ecology of seabirds in the eastern Bering Sea, p. 629-647. *In* D.W. Hood and J.A. Calder [eds.], The eastern Bering Sea shelf: oceanography and resources. University of Washington Press, Seattle.

Islieb, M.E., and B. Kessel. 1973. Birds of the North Gulf Coast - Prince William Sound region, Alaska. Biol. Pap. Univ. Alaska, 14. 149 pp.

Laing, K.K., and S.P. Klosiewski. 1993. Marine bird populations of Prince William Sound, Alaska, before and after the Exxon Valdez oil spill. Unpublished Rep., U.S. Fish and Wildlife Service, Anchorage, AK.

Livingston, P.A. 1991. Walleye pollock, p. 9-30. *In* P.A. Livingston [ed.], Groundfish food habits and predation on commercially important prey species in the eastern Bering Sea from 1984 to 1986. U.S. Dept. Commer., NOAA Tech. Mem. NMFS F/NWC-207. 240 pp.

Lloyd, C., M.L. Tasker, and K. Partridge. 1991. The status of seabirds in Britain and Ireland. T. & A.D. Poyser, Carlton, England.

Lloyd, D.S., and S.K. Davis. 1988. Biological information required for improved management of walleye pollock off Alaska, p. 9-31. *In* International Symposium on the biology and management of walleye pollock. Lowell Wakefield Fish. Symp. 7, Alaska Sea Grant Rep. 89-1.

Lowry, L.F., K.J. Frost, and T.R. Loughlin. 1988. Importance of walleye pollock in the diets of marine mammals in the Gulf of Alaska and Bering Sea, and implications for fishery management, p. 701-726. *In* International Symposium on the biology and management of walleye pollock. Lowell Wakefield Fish. Symp. 7, Alaska Sea Grant Rep. 89-1.

Mendenhall, V.M. 1992. Distribution, breeding records, and conservation problems of the Marbled Murrelet in Alaska. *In* H.R. Carter and M.L. Morrison [eds.], Status and conservation of the Marbled Murrelet in North America. Western Foundation of Vert. Zool., Camarillo, CA.

Merrick, R.L., T.R. Loughlin, and D.G. Calkins. 1987. Decline in abundance of the northern sea lion, *Eumetopius jubatus*, in Alaska, 1956-1986. Fish. Bull. 85:351-365.

Murie, O.J. 1937. Biological investigations of the Aleutians and southwestern Alaska. Unpublished field notes, U.S. Fish and Wildlife Service, Washington, D.C. 254 pp.

Murie, O.J. 1959. Fauna of the Aleutian Islands and Alaska Peninsula. No. Am. Fauna 61:1-406.

Murphy, E.C., A.M. Springer, and D.G. Roseneau. 1986. Population status of Common Guillemots *Uria aalge* at a colony in western Alaska: results and simulations. Ibis 128:348-363.

Murphy, E.C., B.A. Cooper, P.D. Martin, C.B. Johnson, B.E. Lawhead, A.M. Springer, and D.L. Thomas. 1987. The population status of seabirds on St. Matthew and Hall Islands, 1985 and 1986. U.S. Minerals Management Service, Final Rep. OCS Study MMS 87-0043. 154 pp.

Murphy, E.C. 1993. Population status of murres and kittiwakes at Bluff, Alaska, in 1990, p. 61-94. *In* V.M. Mendenhall [ed.], Monitoring of populations and productivity of seabirds at Cape Peirce, Bluff, and Cape Thompson, Alaska, 1990. U.S. Mineral Management Service, Final Report, OCS Study. (*In press*).

Nelson, E.W. 1883. Birds of the Bering Sea and Arctic Ocean, p. 54-120. *In* Cruise of the Revenue-steamer *Corwin* in Alaska and the N.W. Arctic Ocean. Treasury Dept. Doc. 429, Washington, D.C.

Nelson, J.W., D.R. Nysewander, J.L. Trapp, and A.L. Sowls. 1982. Summer observations of birds and mammals at St. Lazaria Island, Alaska. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK. 43 pp.

Nishimoto, M., K. Thounhurst, and T. Early. 1987. The status of seabirds at Chisik and Duck Islands during the summer of 1986. Unpublished report, U.S. Fish and Wildlife Service, Homer, AK. 17 pp.

Nysewander, D.R. 1986. Cormorants (*Phalacrocorax* spp.), p. 207-236. *In* P.A. Baird and P.J. Gould [eds.], The breeding biology and feeding ecology of marine birds in the Gulf of Alaska. U.S. Dept. Commer., NOAA, OCSEAP Final Rep. 45:121-504.

Nysewander, D.R., D.J. Forsell, P.A. Baird, D.J. Shields, G.J. Weiler, and J.H. Kogan. 1982. Marine bird and mammal survey of the eastern Aleutian Islands, summers of 1980-81. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK. 134 pp.

Nysewander, D.R., B. Roberts, and S. Bonfield. 1986. Reproductive ecology of seabirds at Middleton Island, Alaska—summer 1985. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK. 45 pp.

Nysewander, D.R., C. Dippel, G.V. Byrd, and E.P. Knudtson. 1992. Effects of the *T/V Exxon Valdez* oil spill on murres: a perspective from observations at breeding colonies. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, AK. 76 pp.

Petersen, M.R. 1982. Predation on seabirds by red foxes at Shaiak Island, Alaska. Can. Field-Nat. 96:41-45.

Peterson, R.T., and J. Fisher. 1955. Wild America. Weather Vane Books, New York.

Piatt, J.F., S.A. Hatch, B.D. Roberts, W.W. Lidster, J.L. Wells, and J.C. Haney. 1988. Populations, productivity, and feeding habits of seabirds on St. Lawrence Island, Alaska. U.S. Minerals Management Service, Final Report, OCS Study MMS 88-0022. 235 pp.

Piatt, J.F., B.D. Roberts, and S.A. Hatch. 1990. Colony attendance and population monitoring of Least and Crested Auklets on St. Lawrence Island, Alaska. Condor 92:97-106.

Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the 'Exxon Valdez' oil spill on marine birds. Auk 107:387-397.

Pitcher, K.W. 1990. Major decline in number of harbor seals, *Phoca vitulina richardsi*, on Tugidak Island, Gulf of Alaska. Mar. Mamm. Sci. 6:121-134.

Rausch, R. 1958. The occurrence and distribution of birds on Middleton Island, Alaska. Condor 60:227-242.

Sekora, P.C., G.V. Byrd, and D.D. Gibson. 1979. Breeding distribution and status of marine birds in the Aleutian Islands, Alaska, p. 33-46. *In* J.C. Bartonek and D.N. Nettleship [eds.], Conservation of marine birds of northern North America. U.S. Dept. Interior, Fish and Wildlife Service, Wildlife Research Rep. 11, Washington, D.C.

Siegel-Causey, D., and N.M Litvinenko. 1993. Status and ecology of cormorants and shags (Phalcrocoracidae) of the North Temperate Pacific. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Sharp, B. 1993. Populations and productivity of seabirds at Cape Thompson in 1990, p. 95-139. *In* V.M. Mendenhall [ed.], Monitoring of populations and productivity of seabirds at Cape Peirce, Bluff, and Cape Thompson, Alaska, 1990. U.S. Mineral Management Service, Final Report, OCS Study. (*In press*).

Snarski, D.A. 1971. Kittiwake colony, Tuxedni National Wildlife Refuge. U.S. Fish and Wildlife Service, Alaska Coop. Wildl. Res. Unit. Quarterly Report July-September 23(1): 6-8.

Sowl, L.W. 1979. The historical status of nesting seabirds of the northern and western Gulf of Alaska, p. 47-71. *In* J.C. Bartonek and D.N. Nettleship [eds.], Conservation of marine birds of northern North

America. U.S. Dept. Interior, Fish and Wildlife Service, Wildlife Research Rep. 11, Washington, D.C.

Sowls, A.L., S.A. Hatch, and C.J. Lensink. 1978. Catalog of Alaskan seabird colonies. U.S. Dept. Interior, Fish and Wildlife Service, FWS/OBS-78/78.

Springer, A.M. 1992. A review: walleye pollock in the North Pacific—how much difference do they really make? Fish. Oceanogr. 1:80-96.

Springer, A.M., and G.V. Byrd. 1988. Seabird dependence on walleye pollock in the southeastern Bering Sea, p. 667-677. *In* International Symposium on the biology and management of walleye pollock. Lowell Wakefield Fish. Symp. 7, Alaska Sea Grant Rep. 89-1.

Springer, A.M., A.Yu. Kondratyev, H. Ogi, Yu. Shibaev, and G.B. van Vliet. 1993. Status, ecology, and conservation of *Synthliboramphus* murrelets and auklets. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey [eds.], The status, ecology and conservation of marine birds of the North Pacific. Canadian Wildl. Serv. Spec. Pub., Ottawa. (*In press*).

Straty, R.R., and R.E. Haight. 1979. Interactions among marine birds and commercial fish in the eastern Bering Sea, p. 201-219. *In* J.C. Bartonek and D.N. Nettleship [eds.], Conservation of marine birds of northern North America. U.S. Dept. Interior, Fish and Wildlife Service, Wildlife Research Rep. 11, Washington, D.C.

Swartz, L.G. 1966. Sea-cliff birds, p. 611-678. *In* N.J. Wilimovsky and J.N. Wolfe [eds.], Environment of the Cape Thompson region, Alaska. U.S. Atomic Energy Comm., Oak Ridge, TN.

Townsend, C.H. 1913. The Crested Auklet. Bird-Lore 15:133-136.

Turner, L.M. 1885. Notes on the birds of the Near Islands, Alaska. Auk 2:154-159.

Turner, L.M. 1886. Contributions to the natural history of Alaska. Part V, Birds, p. 115-196. U.S. Army, Signal Corps, Washington, D.C.

Vermeer, K., and D.B. Irons. 1991. The Glaucous-winged Gull on the Pacific coast of North America. Proc. 20th Intl. Ornithol. Congr. 4:2378-2383.

Willett, G. 1912. Report of G. Willett, agent and warden stationed on St. Lazaria Bird Reservation, Alaska. Bird-Lore 14:419-426.

Willett, G. 1915. Summer birds of Forrester Island, Alaska. Auk 32:295-305.

Willett, G. 1917. Further notes on the birds of Forrester Island, Alaska. Condor 19:15-17.

Williams, J.C., and G.V. Byrd. 1992. The status of kittiwakes and murres at Agattu and Buldir Islands 1988-1991. Unpublished report, U.S. Fish and Wildlife Service, Adak, AK. 68 pp.

York, A.E., and P. Kozloff. 1987. On the estimation of the numbers of northern fur seal, *Callorhinus ursinus*, pups born on St. Paul Island, 1980-86. Fish. Bull. 85:367-375.

APPENDIX - Scientific names of species mentioned in the text

Birds

Northern Fulmar (*Fulmarus glacialis*)
Fork-tailed Storm-Petrel (*Oceanodroma furcata*)
Leach's Storm-Petrel (*Oceanodroma leucorhoa*)
Double-crested Cormorant (*Phalacrocorax auritus*)
Brandt's Cormorant (*Phalcrocorax penicillatus*)
Pelagic Cormorant (*Phalacrocorax pelagicus*)
Red-faced Cormorant (*Phalacrocorax urile*)
Glaucous-winged Gull (*Larus glaucescens*)
Herring Gull (*Larus argentatus*)
Black-legged Kittiwake (*Rissa tridactyla*)
Red-legged Kittiwake (*Rissa brevirostris*)
Arctic Tern (*Sterna paradisaea*)
Aleutian Tern (*Sterna aleutica*)
Common Murre (*Uria aalge*)
Thick-billed Murre (*Uria lomvia*)
Black Guillemot (*Cepphus grylle*)
Pigeon Guillemot (*Cepphus columba*)
Marbled Murrelt (*Brachyramphus marmoratus*)
Kittlitz's Murrelet (*Brachyramphus brevirostris*)
Ancient Murrelet (*Synthliboramphus antiquus*)
Cassin's Auklet (*Ptychoramphus aleuticus*)
Parakeet Auklet (*Cyclorrhynchus psittacula*)
Crested Auklet (*Aethia cristatella*)
Least Auklet (*Aethia pusilla*)
Whiskered Auklet (*Aethia pygmaea*)
Rhinoceros Auklet (*Cerorhinca monocerata*)
Horned Puffin (*Fratercula corniculata*)
Tufted Puffin (*Fratercula cirrhata*)

Mammals

Arctic fox (*Alopex lagopus*)
Red fox (*Vulpes vulpes*)
Steller Sea Lion (*Eumetopias jubatus*)
Northern fur seal (*Callorhinus ursinus*)
Harbor seal (*Phoca vitulina*)

Fish

Walleye pollock (*Theragra chalcogramma*)
Herring (*Clupea harengus*)
Capelin (*Mallotus villosus*)
Sandlance (*Ammodytes hexapterus*)

A "PSG 2000" PROPOSAL FOR SEABIRD DATABASES

Scott A. Hatch

Two observations: (1) In the forseeable future, two environmental threats will likely have a dominant influence on the welfare of seabirds and our professional efforts to protect them. These developments are global climate change and marine resource extraction (the removal of huge quantities of biomass from marine systems through commercial fishing). Both threats are global in scope, i.e., it is widely recognized that overfishing and its effects on marine ecosystems is a problem that has reached or is rapidly approaching a crisis stage the world over. (2) In the present age of ever more powerful and affordable microcomputers, it is possible for anyone to store and process vast amounts of data on a personal desktop system. Computing is rapidly becoming a fully distributed (decentralized) technology, which encourages and facilitates data-sharing as never before.

Both of these developments (computer technology and emerging global issues affecting seabirds) argue strongly for increased national and international cooperation in acquiring and processing information on seabird populations, not only because of concerns about the welfare of the birds themselves, but also because of the role that seabirds can serve as indicators of large-scale change in the marine environment. This was clearly the impetus for discussions of seabird databases at the annual meetings of the Pacific Seabird Group in Charleston and Seattle.

Discussion thus far has focused mainly on the feasibility of pooling information and creating a Pacific-wide or North American catalog of seabird colonies. To a lesser extent, the PSG has also addressed the issues as they pertain to pelagic surveys of seabirds. At the Charleston meeting, the Executive Council established a new standing committee on seabird monitoring, whose mission is to foster a third type of database to support analyses of time series and trends in seabird population parameters. In fact, there are four types of seabird databases that could be of enormous value in seabird research and conservation in the future. Briefly, these databases and some of their defining characteristics are as follows:

(1) Seabird colony catalog. This is basically a list of all known seabird colonies in a given region, with best available information on species composition and population sizes. It represents the state of knowledge of the distribution and abundance of breeding seabirds. This information is much in demand for land use planning, for damage assessment in the event of oil spills or similar events, and for the general information of everyone interested in seabirds. Estimates are of whole colony sizes and inevitably are crude in many instances.

(2) Pelagic seabird database. This includes all at-sea censuses of seabirds, whether from ships, airplanes, land-based seawatches, or small boats working the shoreline. Reasonably standardized techniques have been developed and used for most surveys conducted in the last 20 years or so. This database serves the same general purposes as the colony catalog, except it pertains to the pelagic distribution and abundance of seabirds, including the nonbreeding season.

(3) Seabird monitoring database. This incorporates observations on seabird population parameters that are replicated over time and measured with enough precision to permit the meaningful analysis of variability and trends. Generally, only a few of the colonies in a given region are represented, and data usually refer to sample plots rather than whole colonies. Any aspect of seabird distribution, abundance, demography, or behavior is a candidate for monitoring. The database works with information from colonies, as well as replicated pelagic surveys and miscellaneous techniques such as beached bird censuses. Finally, it incorporates time series of data on the physical and biological environment of seabirds as appropriate.

(4) Seabird bibliographic database. This database provides a cumulative index of all published and unpublished literature relevant to seabird research and management. For the published literature at least, it is possible to automate the process of creating such a database using various electronic library services already on line. The goal is to provide a system tailored specifically to the needs of seabird specialists, comprehensive and fully key word indexed by subject, species, and location. Waterfowl people have already done this for ducks and geese (or have made a passable effort at least)—seabird people should follow suit and do a first-rate job for seabirds.

While it is easy to see the potential benefits that each of these databases would have for seabirds and seabird professionals, achieving the necessary cooperation all around is easier said than done. Notwithstanding all the hours devoted thus far to technical matters (defining files, record formats, data fields, choosing IBM or Macintosh, choosing software, etc.), the main problems are not technical. Rather, the obstacles have mainly to do with professional competition—the reluctance of any work group to allow another's version of a database to emerge as the "standard", thus placing its originators in the position of being "in charge" of all the available data. There is also an understandable

reluctance on the part of many individuals to allow free access to their unpublished data. The Pacific Seabird Group can break the gridlock by assuming a leadership role in the development of the various seabird databases. As a relatively neutral forum with well-attended annual meetings, the PSG can sponsor multinational, multiagency working groups to address the problems of each of the four seabird databases. In this process, the PSG should assume both the primary responsibility and the credit for bringing these efforts to fruition. The Standing Committee on Seabird Monitoring was established with this philosophy in mind. A similar effort directed at each of the other possible databases is in order.

No single nation or government agency has responsibility for seabird research and conservation throughout the Pacific. However, members of the PSG represent all Pacific nations and all seabird interest groups, both public and private. As committee memberships change over time, the PSG can serve as the professional umbrella under which any individual with the time and interest can contribute on a "pro bono" basis toward the realization of comprehensive, international seabird databases. At least in the case of the U.S. Fish and Wildlife Service, there are specific provisions for employees to contribute such services to professional societies on company time, as long as the work is clearly relevant to the mission of the agency.

From its inception, the PSG has espoused the dual purposes of promoting scientific research and communication and actively supporting conservation measures for seabirds. The Group recently instituted a new position—the Vice-Chair for Conservation—to strengthen its effectiveness in that area. On the occassion of its 20th anniversary, the PSG should consider making the realization of comprehensive seabird databases its primary scientific mission through the year 2000. Seven years may seem like a long time, but we should be realistic about the amount of work required to get the job done. A counterpart to the Vice-Chair for Conservation—a Vice-Chair for Research and Technical Coordination, say—might help to ensure the success of the overall project. In any event, the necessary committees should be established and their roles and responsibilities spelled out as soon as possible.

Any professional society needs some core activities to maintain its vitality and keep the membership interested and motivated. For many societies, the publication of a journal provides an important source of pride and an ongoing call to action. In view of our recent decision not to go that route, why not substitute the development and "publication" of seabird databases as our main scientific mission? Besides, this would likely prove to be more influential in the long run than producing yet another ornithological journal, which many consider to be a glutted market anyway.

These ideas were considered and viewed favorably by the Executive Council in Seattle. The Chair has asked me to pursue the matter, and I will be grateful for any comments and suggestions received from interested PSG members in coming months. If you are interested in serving on one of the database committees, please let me know (keep in mind there is going to be real work involved). At next year's meeting in Sacramento, we will schedule a pre-conference workshop for setting up additional working groups (the Monitoring Committee is already on-line) and outlining the agenda for each activity.

Adiós, CEQ

The Clinton administration has proposed to abolish the 23-year old Council on Environmental Quality and replace it with Kathleen A. McGinty, a 29-year old former staffer to Vice President Gore. McGinty, whose title is director of the White House Office of Environmental Policy, earns $100,000 in her position. The CEQ oversees the implementation of the National Environmental Policy Act. Sometimes called the magna carta of environmental protection in the United States, NEPA requires all federal agencies to ensure that environmental values receive due consideration. NEPA dictates the preparation of environmental impact assessments of proposed federal actions that significantly affect the quality of the human environment. Eleven national environmental organizations, including the National Audubon Society and the Sierra Club, oppose the change. Long-time Washingtonians view this as a maneuver by the Vice President to eliminate potential dissent on environmental issues within the administration.

Mark Your Calendar!

Deadlines for submittals to the PSG *Bulletin* are **15 April** for the spring issue and **15 October** for the fall issue. Please make a note of these dates and plan your regional reports and other articles accordingly.

Also, please submit all material to be published on 3.5-inch disks. No 5.25-inch floppies!

STATUS CONCERNS FOR THE "GLOBAL" POPULATION OF KITTLITZ'S MURRELET: IS THE "GLACIER MURRELET" RECEDING?

Gus van Vliet, P.O. Box 210442, Auke Bay, AK 99821
USA, phone (907) 789-5624

Among the world's seabirds, Kittlitz's Murrelet (*Brachyramphus brevirostris*) is unique because much of its distribution and life-history, including its breeding biology and feeding ecology, is associated primarily with the Pleistocene-remnant coastal glaciers of the North Pacific. During the breeding season, isolated pairs of this cryptically plumaged species nest on the ground typically in the lichen/high-alpine zone in the vicinity of glaciers and/or cirques, and feed among glacially silted freshwater plumes that discharge directly into the marine environment.

Historically, very little information has been published on the status, abundance, and distribution of Kittlitz's Murrelet. Available information on abundance includes the results of United States Fish and Wildlife Service (USFWS) surveys in Prince William Sound from the early 1970s, which indicated the population in Prince William Sound alone was more than fifty thousand birds. However, this number of Kittlitz's Murrelet was an extrapolation based on a limited data set and may have substantially over-estimated the Prince William Sound population at that time.

Today fewer than 18,300 Kittlitz's Murrelets remain in the world, and concern mounts for the continuing maintenance of a viable breeding population of this species. The USFWS has recently proposed Kittlitz's Murrelet as a candidate species on the Category-2 list, which means that threats or declines exist or are likely in the near future, and that USFWS needs further status survey information and an evaluation of threats before listing can be determined.

The estimate of a total population of 18,300 is based on 1) GIS analysis of the OCSEAP pelagic seabird database for Kittlitz's Murrelet which provided an estimate of 15,600 - 19,800 birds, and 2) numerous discussions with biologists familiar with the species from each of the following regions:

Glacier Bay National Park and Preserve region	4,500
Wrangell-St. Elias National Park region including Yakutat Bay	3,000
College Fjord-Unakwik Inlet, Prince William Sound region	3,000
Kenai Fjords National Park region	800
Kachemak Bay region	1,500
Katmai National Park and Alaska Peninsula to Unimak Pass	3,200
Kodiak Archipelago	300
Aleutian Islands - Attu to Unimak Pass	1,000
Cape Newenham to Wales - Seward Peninsula region	450
Chukchi Sea coastline, including Wrangell Island	450
Sea of Okhotsk	100
World Total	18,300

From this analysis, it appears that:

1. Alaska is home to over 95% of all Kittlitz's Murrelets remaining in the world today.

2. The U.S. National Park Service - Alaska Regional Office is the steward for over 50% of the world's remaining breeding population of Kittlitz's Murrelets. In particular, resource managers of Glacier Bay National Park and Preserve are responsible for overseeing perhaps the largest single breeding concentration of Kittlitz's Murrelets anywhere, representing one-fourth of the species total population.

3. If Kittlitz's Murrelet is typical of other members of the Alcidae (Auks), then it can be reasonably assumed that one-fourth to one-third of the world's population of this species is composed of non-breeding subadults. All members of the Alcidae, as well as most other marine birds, display "deferred maturity", in which individuals do not breed until they are 2 - 6 years old. Hence, if the world's total population of Kittlitz's Murrelet is fewer than 18,300 birds based on the best available current data and knowledge, then it is likely that there are fewer than 7,000 breeding pairs extant.

4. The main short-term threats to maintaining a viable global population of Kittlitz's Murrelets appear to be marine oil pollution, gill-net bycatch mortality, and diminished stocks of forage fish resulting from natural and/or man-induced perturbations to the trophic web of the North Pacific marine ecosystem. The main long-term threat appears to be the possible effects of global warming.

A. Kittlitz's Murrelet (along with the Whiskered Auklet) is considered by USFWS biologists as the species most sensitive to and at the highest risk from oil pollution in the marine environment. The 1989 *Exxon Valdez* oil spill might have depleted this species more than any other. Although

the total mortality of Kittlitz's Murrelet caused by the spill was relatively small (i.e., over 500 individuals), the percentage of the total world population affected (3.0% estimated) was probably higher than for any other avian species.

B. During the past decade, evidence has accumulated that implicates coastal gill-net fisheries as a persistent and significant source of mortality of adult, subadult, and/or juvenile Kittlitz's Murrelets, particularly in Prince William Sound and off the Copper River delta. Current sightings of the species in these areas suggest a substantial reduction in the numbers of Kittlitz's Murrelets during the past 20 years.

C. Abrupt changes in the abundance and distribution of forage-fish (e.g., capelin, sand-lance, herring, and juvenile pollock) have been implicated in the decline of a number of marine vertebrates (e.g., Steller Sea Lion, Red-legged Kittiwake, Northern Fur Seal, Thick-billed and Common Murres, and Harbor Seals) in the Bering Sea and the Gulf of Alaska. These changes are thought to be the result of alterations in trophic linkages of the food web of the North Pacific ecosystem due to intensive fish-harvesting management strategies and/or natural multi-year oscillations in the physical and biological environment of the Bering Sea and the Gulf of Alaska. Since it is known that Kittlitz's Murrelet relies significantly on forage-fish availability during both the breeding and non-breeding season, it is possible that Kittlitz's Murrelet numbers are influenced by these ecosystem changes cascading through the North Pacific food web.

D. Over the long term, a potentially significant threat to the Kittlitz's Murrelet is the gradual disappearance of coastal glaciers due to global warming over much of the species' range. Since the last Ice Age and the consequent retreat of many of the large North Pacific tidewater glaciers, Kittlitz's Murrelet has probably experienced a relatively low total population size (mid to upper tens of thousands). However, as the 21st century approaches, the constant global increase in green-house gases in the earth's atmosphere may impact Kittlitz's Murrelet more directly in unique but detrimental ways than any other species because of its tight relationship with the North Pacific's remaining coastal glaciers.

Already, during the past few decades, the southernmost population of Kittlitz's Murrelet in the vicinity of the LeConte Glacier (the southernmost tidewater glacier in North America near Petersburg, Alaska), has apparently become extinct.

Acknowledgements: The following individuals provided numerous comments on the Kittlitz's Murrelet population estimates and various conservation concerns, but are not responsible for the outcome of the final draft: Mike McAllister, Spencer Sealy, Alan Springer, A. Kondratyev, Pete Isleib, Bob Day, Harry Carter, Peter Walsh, Richard Gordon, George West, Richard MacIntosh, Vern Byrd, Ed Bailey, Pat Gould, Kathy Kuletz, Nancy Naslund, and John Piatt.

People for the Ethical Treatment of Animals promotes "animal rights" and opposes human use of animals, including use in laboratories, as pets or for human food. PETA would probably oppose many management techniques that benefit seabirds. PETA held an Animals' Inaugural Ball at the posh Willard Hotel in Washington DC, a few blocks from the White House and raised $150,000 from Hollywood types. In a spoof reported by MTV and the New York Times, PETA was crashed by plants rights activists who featured signs such as "roots have rights," "fruit freedom," and "flower power." The plants rights activists chanted "stop the murder, stop the pain, stop the slaughter of innocent grain" and "animals should just eat one another and leave plants alone."

Apocalypse Now? In February 1992, astronomer Carl Sagan predicted that Kuwait's burning oil fields would release a black cloud that would trigger a "petroleum autumn," similar to a nuclear winter. Next time Sagan should focus on seabirds.

Forest Summiteers report that the discussion at the April 2 meeting in Portland was scripted. Participants provided organizers with written statements and proposed answers to potential questions. The organizers edited these statements. It is unclear whether invitees who refused to submit to editing were allowed to participate.

Hard Science in Time Magazine? Charles Alexander stated, "as science editor of Time, I would freely admit that on [environmental issues] we have crossed the boundary from news reporting to advocacy."

SEABIRD CONSERVATION

Craig S. Harrison
Vice Chair for Conservation

The Pacific Seabird Group has been active in conservation during the past year. The following summarizes the most important seabird conservation issues. Members who have information about issues that may benefit from PSG involvement should contact me.

Exxon Valdez Oil Spill (EVOS) Trust Funds

PSG is monitoring the expenditure of the billion dollar restoration fund from the *Exxon Valdez* oil spill. PSG's primary recommendations to the Trustee Council have been to purchase seabird habitat, remove predators from seabird colonies and establish endowed chairs at the University of Alaska for seabird research. In June 1992, PSG commented extensively on the proposed restoration framework, draft work plan for 1992 and the solicitation for suggestions for the 1993 work plan. In November, PSG commented on the draft work plan for 1993. In April 1993, PSG suggested the Trustee Council endow the following chairs at the University of Alaska:

- Seabird Breeding Biology
- Seabird Foraging Ecology and Pelagic Distributions
- Shorebirds
- Marine-Oriented Waterfowl
- Bald Eagle Ecology

Past chair Palmer Sekora nominated Jim King, one of PSG's founders, to the Trustee Council's 17-member Public Advisory Group. Jim's nomination was endorsed by the National Audubon Society and the National Wildlife Refuge Association. In October 1992, the Trustee Council selected Jim to represent conservation interests on the Public Advisory Group. Jim's appointment provides PSG with a rare opportunity to work with the Trustees to improve the restoration program.

The Trustees will circulate a draft restoration plan during spring 1993. Members who are willing to review the plan and wish to assist in the preparation of PSG's comments should FAX their suggestions to me at least two weeks before the public comment period closes.

PSG Testifies to Congress on EVOS Restoration

At the invitation of Chairman Gerry E. Studds of the House Committee on Merchant Marine and Fisheries, PSG provided written testimony at the March 24, 1993 oversight hearing on the restoration of Prince William Sound. Among other things, PSG encouraged the use of the very best science in decisionmaking, supported the purchase of appropriate seabird habitat and urged the restoration of the natural bio-diversity of seabird breeding islands by eliminating non-native predators. PSG also recommended that federal and state agencies use their existing authorities to protect species damaged by the spill (e.g., by curtailing logging or enforcing the Migratory Bird Treaty Act to protect marbled murrelets that drown in gillnets). Finally, PSG expressed concern that the restoration of seabirds has been limited to the geographic area of the oil slick, which ignores injury to migratory seabirds.

PSG's Pacific-Wide Predator Removal Program

Thanks to information provided by regional representatives and other members, PSG has compiled a tentative list of islands where introduced predators should be removed from seabird colonies. As is evident throughout this report, PSG is not waiting for a final list to begin advocating programs to restore seabird breeding islands.

Predator Removal Program in Alaska

During the past year, PSG has written numerous letters to FWS' regional director in Alaska and the refuge manager of the Alaska Maritime National Wildlife Refuge concerning the removal of foxes and rats on seabird islands. By raising the profile of this issue, PSG seems to be making some progress. PSG has been told that fox removal is now one of the highest priorities of FWS' regional director in Alaska. In March 1993, PSG chair George Divoky wrote to Secretary of the Interior Bruce Babbitt and asked Secretary Babbitt "to restore the natural bio-diversity of the seabird colonies in the Alaska Maritime National Wildlife Refuge by promoting an aggressive program to eliminate exotic rats, foxes and other creatures that have caused the local extinction of seabird colonies."

Protocol to United States - Canada Migratory Bird Treaty

The United States and Canada are considering a protocol (amendment) to the 1916 Migratory Bird Treaty with respect to subsistence hunting. FWS requested comments on such a protocol. On April 20 1992, former chair Palmer Sekora wrote to the director of FWS and asked that the Service fully implement the migratory bird treaties with Japan and Russia and that the Service ask Congress for authority to enforce the Migratory Bird Treaty Act in the 200-mile Exclusive Economic Zone. PSG worked with the International Council for Bird Preservation, an umbrella organization of over forty ornithological organizations, and the World Wildlife Fund, both of which wrote to the FWS director and raised similar issues.

Funds to Remove Predators from Mexican Seabird Islands

At the request of PSG, the International Council for Bird Preservation's testimony to the House Appropriations Committee on March 24, 1993 proposed that Congress appropriate funds to remove alien predators from Isla Clarión (Revilla Gigegdos) and North Coronado Island, Mexico. This action would allow Xantus' Murrelets, Townsend's shearwaters and ashy storm-petrels to resume normal breeding, hopefully avoiding the necessity to list them under the Endangered Species Act. The recent interest in Mexico's environment as a result of the North American Free Trade Agreement (NAFTA) may persuade Congress to fund this project.

Proposed AOU Resolution Concerning Seabird Islands in Mexico

PSG has asked the American Ornithologists' Union to adopt a resolution to ask FWS and Mexico's Departamento de la Fauna Silvestre to (1) take immediate steps to remove alien predators from North Coronado Island and Isla Clarión, Mexico; (2) take measures to restore the natural bio-diversity of other current and former seabird breeding colonies in Mexico, including Isla Salvatierra, Isla Alcatraz and Las Grandes Islas; and (3) establish a program to identify all seabird colonies in Mexico whose populations are limited by alien predators and remove the predators no later than the year 2000.

Endangered and Threatened Species

Under the leadership of Kim Nelson and the Marbled Murrelet Technical Committee, PSG followed closely the listing of the marbled murrelet as an threatened species in October 1992. PSG issued a press release in support of the listing soon after it was announced. Bill Everett has formed a working group to assess the status of the Xantus' Murrelet and to determine whether PSG should petition to list it as endangered under federal or State of California law. PSG is following FWS' activities with respect to the listing of the population of Harcourt's Storm Petrel (*O. castro*) in Hawaii. PSG is also considering whether to support the down listing of the endangered brown pelican, an action that has been recommended by numerous PSG members, including David Ainley, William Everett, George Hunt and Joseph Jehl. Anyone with strong views on this subject should contact me.

National Marine Sanctuary Site Evaluation List

NOAA is in the process of revising its site evaluation list for new marine sanctuaries. Members who have thoughts on possible marine sanctuaries in the Pacific, especially Alaska, should contact me. It may be possible for PSG to work with some of the native organizations to support a marine sanctuary in the Bering Sea. PSG recently endorsed the Bering Sea Coalition's proposal to close a zone around the Pribilof Islands to trawl fishing.

Hawaii National Marine Sanctuary

On April 14, 1993, PSG commented on a marine sanctuary in the main Hawaiian Islands that is being established by congressional directive. Unfortunately, the sanctuary represents a minimalist approach that is designed to improve the political image of its sponsors rather than protect marine resources. NOAA staffers want to enhance the legislation to ensure a multi-site and multi-resource sanctuary that would provide comprehensive and coordinated protection for a marine ecosystem. PSG has suggested that the sanctuary boundary be expanded to include (1) waters from Kilauea Point National Wildlife Refuge to Makaha Point, including the Na Pali coastline, on Kauai and (2) the waters adjacent to the Hawaiian Islands National Wildlife Refuge, including Midway Islands and Kure Atoll.

PSG has been attempting to persuade NOAA to establish a marine sanctuary in the waters adjacent to the Hawaiian Islands National Wildlife Refuge since 1983. Those islands provide breeding habitat for 18 species of seabirds, the total population of which is about 14 million birds as well as the only breeding habitat for the endangered Hawaiian monk seal and important nesting habitat for the threatened green sea turtle. Since 1991, PSG has been requesting that NOAA establish a marine sanctuary the waters offshore north Kauai. Kilauea Point has the largest colony of seabirds in the main islands, including a growing colony of Laysan Albatrosses, wedge-tailed shearwaters, red- and white-tailed tropicbirds and red-footed boobies. The cliffs along the Na Pali coast contain many small nesting colonies of black noddies, tropicbirds and possibly brown boobies.

Implementing the Migratory Bird Treaties

The House Merchant Marine Committee is interested in the status of the implementation of the migratory bird treaties with Japan (1972) and Russia (1976). The Committee is considering whether the Migratory Bird Treaty Act should be amended to be enforced throughout the 200-mile Exclusive Economic Zone. It is also may ask FWS and other federal and managers (National Park Service, Department of Defense) to identify any additional authority or funds that they may need to fully implement the treaties. The treaties require the United States to take measures "to control the introduction of live animals and plants which could disturb

the ecological balance of unique island ecosystems" and to prohibit the "disturbance of nesting colonies." They also require the United States to preserve and restore natural ecosystems. The treaty with Russia requires the United States to prevent and abate detrimental alteration of their environment. Twenty years after these treaties, FWS has not yet to restore many refuge islands in the Pacific to their natural predator-free condition.

NMFS-FWS Memorandum of Understanding for Seabird Management

By invitation, I spoke to NOAA's Marine Fisheries Advisory Committee on September 29, 1992 concerning seabird-fisheries problems in the Pacific. I reviewed the federal, state and international laws that protect seabirds, especially the Magnuson Fishery Conservation and Management Act, the Migratory Bird Treaty Act and the Endangered Species Act. After discussing the general policies and implementation of the statutes by FWS and NMFS, I reviewed specific seabird-fishery problems, both documented and perceived. Thanks to the PSG members who summarized the issues in their areas, I was able to provide the advisory committee with a current assessment of seabird-fisheries problems, including direct take (nets and hooks), indirect injury (food shortages) and general disturbance by fishing vessels. Several members of the committee questioned why the brown pelican remains listed as endangered in California.

The Marine Fisheries Advisory Committee and NMFS want to improve management of seabirds to avoid crisis situations. NMFS is interested in negotiating a memorandum of understanding with FWS to provide NMFS with more authority to manage seabirds during the portions of their life cycle when they are at sea. Currently federal regulations have such a management regime for sea turtles — FWS is responsible when turtles are on land and NMFS is responsible when the turtles are at sea. There is plenty of room for debate on this issue, and the successes and failures of sea turtle management are worth a critical review.

Marine Wildlife Rehabilitation Center.

The California Department of Fish and Game and the University of California, Santa Cruz, will build a marine wildlife rehabilitation center at the Long Marine Laboratory in Santa Cruz. The Center will treat marine animals harmed in oil spills in California. The $4 million facility is to be built by mid-1995. The center is required by California's Oil Spill Prevention and Response Act, enacted in 1990.

Interior Begins National Biological Survey

Interior Secretary Bruce Babbitt is asking Congress for funds to map the biological resources of the United States. As explained by the Secretary on April 26, the National Biological Survey will be a new agency within Interior. A month earlier Babbit had announced that it would be administered by FWS' research division, Region VIII, but apparently the National Park Service and the Bureau of Land Management prevailed in persuading the Secretary to establish a new agency entirely. The Smithsonian Institution's Thomas Lovejoy is on loan to Interior to design the unit. Secretary Babbitt says the new survey unit would eliminate jurisdictional boundaries within Interior. Research is to be gathered from universities, cooperative research units, private researchers, state and federal agencies and then coordinated into ecosystem-wide databases that anyone can access.

Quotable Quotes

"What started out as a love affair is starting to seem more like date rape." — National Wildlife Federation President Jay Hair, reacting to the President's reversal of a promise to end below-cost timber sales, mining and grazing fees.

"That is an absolute disaster. It breaks a campaign promise." Ralph DeGennaro, Friends of the Earth, reacting to the President's budget in which spending to purchase park and refuge lands was reduced.

Regional Reports

Alaska

David Irons, Greg Golet, and a team of biologists with the Marine and Coastal Bird Project, U.S. Fish and Wildlife Service (FWS), are continuing their study of populations, productivity, survivorship, and diets of **Black-legged Kittiwakes** in Prince William Sound (PWS). Greg is also completing his field work on a study concerning the cost of reproduction of kittiwakes at Shoup Bay in PWS. This long-term monitoring project began in 1984 and represents one of the longest continuous Black-legged Kittiwake studies in Alaska.

Beverly Agler is the new study leader for the Marine and Coastal Bird Project's (FWS) continuing population surveys of seabirds in PWS and Lower Cook Inlet (LCI). The surveys are being conducted under the guidance of **David Irons**. The PWS survey is being funded by the *Exxon Valdez* oil spill program and the LCI survey is being supported by the Minerals Management Service.

Gerry Sanger, back with the FWS after an absence of several years, is initiating a new survey of **Pigeon Guillemot** colonies in PWS. He is being assisted by **Mary Cody** and a team of biologists with the Marine and Coastal Bird Project. This project is being funded by the oil spill program.

Art Sowls, Leslie Slater, Jeff Williams, Dave Roseneau and other biologists of the Alaska Maritime Refuge will again be involved in several projects that monitor cliff-nesting seabirds such as Buldir, Bogoslof islands in the western Aleutians, the Barren Islands and Duck and Chisik islands in lower Cook Inlet, Cape Lisburne in the Chukchi Sea, St. George Island in the Bering Sea, and St. Lazaria and Forrester islands in Southeast Alaska.

Alexander Golovkin and a team of oceanographers will be on St. Paul Island for their second year of monitoring cliff-nesters. This study is being supported by a grant from the Department of State.

John Piatt (Alaska Fish and Wildlife Research Center) will continue (3rd yr) studies of **Tufted** and **Horned Puffin** feeding ecology in the eastern Aleutians and along the Alaska Peninsula (with **Jay Pitocchelli, Alexander Kitaiskiy, Tom van Pelt, Nancy Naslund, Scott Hatch,** and **Vern Byrd**). Stable isotope studies (with **Keith Hobsen** and **Dick Merrick**) of fish, seabird and marine mammal trophic interactions will continue for a third year. **Tom van Pelt** and **John Piatt** were busy this spring investigating a large–scale die–off of **Common Murres** in the Gulf of Alaska. With MMS funding, **John Piatt** will be working with **Glenn Ford** and many others to compile a database on the pelagic distribution of seabirds in the North Pacific.

Suzanne Speckman (University of Alaska, Fairbanks, under supervision of **Alan Springer**) will conduct her second year of study on daily and seasonal attendance patterns of **Marbled Murrelets** in Auke Bay with support of the USFWS.

Scott Hatch (Alaska Fish and Wildlife Research Center) will continue long term studies on **Black–legged Kittiwakes** on Middleton Island (with help from **Verena Day**), and re–initiate studies on the Semidi Islands (with **Lindsey Hayes**). Research will include population monitoring of kittiwakes, murres, puffins, etc., as well as assessing productivity, annual survival (banding), and food habits of these species. Similar studies were initiated last year on Talan Island in the Sea of Okhotsk in collaboration with **Alexander Kondratiev** (Magadan, Institute for Study of Biological Problems of the North).

University of Alaska professor **Ed Murphy** and graduate students **Dean Kildaw, Tara Curry**, and **Sharon Loy** are currently involved in several seabird studies on St. George Island, Pribilofs. Ed and Dean are studying the reproductive biology of **Red-legged** and **Black-legged kittiwakes**; Ed and Tara are attempting to measure the effects of aircraft disturbance on **Thick-billed Murres** nesting near the airstrip; and Ed and Sharon are studying the behavior of **Red-legged** and **Black-legged kittiwakes** on and around the new airstrip on St. George. Also from the University of Alaska at Fairbanks, **Dan Roby** and **Brian Lance** are doing comparative studies of **Red-legged** and **Black-legged kittiwake** chick feeding behavior and chick growth rates on St. George Island. **Alan Springer** of the Insitute of Marine Science at UAF is continuing his study of kittiwake and murre feeding ecology on the Pribilofs.

At Bluff on the Seward Peninsula. **Ed Murphy** and **Paul Rossow** are studying the caching of **murre eggs by ravens.**

Kent Wohl

ALASKA-RUSSIAN SEABIRD CONNECTION

Seabirds are important resources shared by the Russian Far East and Alaska in Beringia. Improved political relations between Russia and the U.S. have provided new opportunities for cooperating in the study and management of seabirds in Beringia. Several projects initiated recently deomonstrate this new spirit of cooperation and communication between Russian and American seabird specialists.

Beringian International Seabird Working Group (BISWG). The BISWG was conceived in November 1991 under the auspices of the "U.S. - U.S.S.R. Agreement on Cooperation in the Field of Environmental Protection (1972)". As stated in its Charter, the BISWG will ensure that Americans and Russians interested in northern seabird resources will have a common forum to promote, facilitate and coordinate research, management and conservation activities of mutual concern. Its specific objectives are to: identify current and emerging seabird research, management, and conservation problems, facilitate publishing and exchanging seabird information, and facilitate using standard field protocols and data analyses. In addition, the BISWG will help facilitate cooperative seabird projects and bilateral management of shared populations. The BISWG is comprised of the six members listed below. The six members represent the range of organizations and geographical areas important to seabird research, management and conservation in Beringia.

Kenton D. Wohl (U.S. Co-Chairperson), U.S. Fish and Wildlife Service, Anchorage, Alaska, U.S.A.

Alexander N. Golovkin (Russian Co-Chairperson), Ministry of Ecology, Institute of Nature Conservation and Reserves, Moscow, Russia.

Edward Murphy, University of Alaska Fairbanks, Fairbanks, Alaska, U.S.A.

David Cline, Alaska-Hawaii Regional Office, National Audubon Society, Anchorage, Alaska, U.S.A.

Alexander Ya. Kondratyev, Institute of Biological Problems of the North, Russian Academy of Sciences, Magadan, Russia.

Nicolai Gerasimov, Kamchatka Institute of Ecology and Nature Management, Russian Academy of Sciences, Petropavlovsk-Kamchatsky, Russia.

The BISWG conducted its first working meeting in Magadan in December 1992. The "Declaration of Participants" of the first meeting is available from Kent Wohl, U.S. Fish and Wildlife Service, Anchorage. The second meeting of the BISWG is scheduled for the fall of 1993 in Anchorage.

Alaska-Russian Far East Sister Refuges. A proposal to create "sister refuges" between Izembek National Wildlife Refuge on the Alaska Peninsula and Kronotskiy Nature Reserve on the Kamchatka Peninsula was presented in March 1993 at the U.S.- Russia Environmental Agreement (Area V) meeting. The sister refuges were part of a larger initiative to create an Aleutian Chain Biodiversity Region. The objectives of the initiative are to: 1) study the biological communities and species common to both refuges and to the island chain and 2) jointly preserve the biodiversity of the region.

Red-legged Kittiwake Project, Commander Islands. Several joint Alaskan-Russian projects involving red-legged kittiwakes have been initiated since 1992. A new study of populations, productivity, and food habitats of red-legged kittiwakes was initiated on the Commander islands in 1992 by Larissa Zelenskaya, IBPN, Magadan, and Peter Vyatkin, Kamchatka Institute of Ecology and Nature Management (KIENM), Petropavlovsk-Kamchatsky. Larissa's study will complement studies by the Alaska Maritime National Wildlife Refuge on St. Paul and St. George islands (Pribilof Islands) and on Buldir and Bogoslof islands (Aleutians). It will also complement the work of Alexander Golovkin, Institute of Nature Conservation and Reserves, Moscow, on St. Paul and St. George islands.

In addition, Vern Byrd, Golovkin, Zelenskaya, and Vyatkin have agreed to share their data and prepare a joint paper on the status of the red-legged kittiwake in the Bering Sea for publication in 1993.

Beringian Seabird Colony Catalog. An Alaska-Russian Far East seabird colony catalog database is continuing to be jointly developed through the cooperation of Vivian Mendenhall, U.S. Fish and Wildlife Service, Anchorage, and Alexander Kondratyev, IBPN, Magadan. The Alaska Seabird Colony Catalog database system will be adapted for the Russian Far East colony data. Russian colony data will start being entered in fall 1993; a joint catalog publication is planned for 1996.

Peter Vyatkin, KIENM, Petropavlorsk-Kamchatsky, will be completing a census of seabird colonies in the Commander Islands in 1993 as part of the joint colony catalog project.

Black-legged Kittiwake Project, Talon Island, Sea of Okhotsk. Scott Hatch, Alaska Fish and Wildlife Research Center, Anchorage, is collaborating with Alexander Kondratyev, IBPN, Magadan, on a study of the comparative aspects of black-legged kittiwake population structure and dynamics on Talon Island and selected colonies in Alaska. Scott will be travelling to Talon Island in May 1993 to begin the second year of this collaborative project.

Regional Reports

Inland

A symposium entitled "The Double-crested Cormorant: Biology, Conservation & Management" was held as part of the annual meeting of the Colonial Waterbird Society at the University of Mississippi in October. **David Nettleship** was the principle organizer. Invited and contributed papers are undergoing peer review and will be published as a supplemental issue of *Colonial Waterbirds*. This symposium was motivated by increasing concern over impacts of growing numbers of cormorants on sport fish and aquaculture operations. Hunting seasons on cormorants and/or anhingas have been proposed in several states. Abstracts of symposium papers were published in the December 1992 issue of the Colonial Waterbird Society Bulletin.

The Seattle meeting of the Pacific Seabird Group brought together workers interested in the population status of **Harlequin Ducks** nesting in inland areas of the Pacific Northwest and northern Rocky Mountains. Several participants were involved in a recent report on the "Status of Harlequin Ducks in North America," which reviews existing biological knowledge about the species and summarizes available data and ongoing work in individual states and provinces. One concern is continued hunting of Harlequin Ducks in the Pacific Flyway without adequate population data. The working group on Harlequin Ducks in Seattle asked the PSG Conservation Committee to send copies of the status report, which encompasses all North American populations of Harlequins, to the directors of the U.S. Fish and Wildlife Service and the Canadian Wildlife Service. A cover letter will request a status review for the eastern U.S. population and increased support for inventory, monitoring, and research in both the Atlantic and Pacific regions. **Ian Goudie** plans to organize a special session on seaducks at the next PSG meeting. This is an important initiative, as seaducks (especially scoters) are among the least studied of aquatic birds.

Bruce Pugesek of the National Wetlands Research Center of the U.S. Fish and Wildlife Service is continuing long-term demographic studies of **California Gulls** nesting at Bamforth Lake National Wildlife Refuge near Laramie, Wyoming. Both fledglings and adults have been banded here since 1958, and in the last decade Bruce has intensified this research. In cooperation with this long-term project, **Chris Nations** is doing his Master's research at the University of Wyoming on age-specific fecundity and survival of the gulls. Nests of known-age birds are monitored throughout the breeding season to determine fledging success. Chris will use the existing time series of data in model simulations to assess the sensitivity of population growth rate to survival and fecundity of this long-lived species.

Also at the University of Wyoming, **Scott Findholt** is making final revisions of his Ph.D. thesis on the foraging ecology of **White Pelicans** at Pathfinder Reservoir. As mentioned in earlier reports, a large colony of over 1,000 pairs of pelicans on an island in Pathfinder Reservoir was abandoned three years ago owing to low water levels from persistent drought. **Clayton Derby** is beginning his field work on **Double-crested Cormorants** nesting on Soda Lake near Casper. Clayton's Master's project under Jim Lovvorn will examine the impact of cormorant predation on trout stocked in the North Platte River. The initial focus will be on food habits, including comparison of the esophagus contents of adults collected at feeding sites with samples regurgitated by chicks at the colony. Data on time-activity budgets and reproductive parameters will be incorporated into a population energetics model to estimate the total consumption by cormorants of different species and size classes of fish.

At Utah State University, **Peter Paton** is beginning his fourth and final field season for his Ph.D. research on **Snowy Plovers** around Great Salt Lake. It appears that plovers using Great Salt Lake represent the largest concentration in North America. **Suzanne Fellows** is completing her Master's research on shorebird use of Great Salt Lake. **Pat White** of the Utah Division of Wildlife Resources is coordinating shorebird surveys of Great Salt Lake and other wetlands in northern Utah as part of efforts by the Point Reyes Bird Observatory to monitor shorebird use of wetlands throughout western North America. **Joe Banta**, Fish Springs National Wildlife Refuge, is constructing impoundments to create more shorebird foraging habitat. **Vickie Roy** of Bear River National Wildlife Refuge is conducting year-round monthly surveys of shorebirds and waterfowl on the refuge.

Jim Lovvorn

Washington D.C. Report

Daphne Gemmill

The environmental community is hopeful that a new Congress, President and Cabinet Secretaries will result in enactment by the 103rd Congress of the environmental work left from the 102nd Congress. The 102nd Congress produced a thin record of legislative achievement; its primary mark was in the foreign policy arena where Congress voted for war in the Persian Gulf and peace with Russia, along with foreign aid.

In the environmental arena, the 102nd Congress managed to pass seven bills of note. Lawmakers passed an energy bill that included provisions promoting energy conservation and development of alternative energy sources. Thankfully, the law does not permit oil drilling in the Arctic National Wildlife Refuge, an important breeding ground for waterfowl and shorebirds. They also passed a California water reform bill with far-ranging policy implications, one of which was diversion of water from the California Central Valley Project to wildlife habitats, as well as a transportation bill that included greater flexibility in use of funds by states for mass transit.

Four bills were of particular interest to people who care about birds—The Wild Bird Conservation Act; reauthorization of Title III of the Marine Protection, Research, and Sanctuaries Act, the National Maine Sanctuary Program; Partnerships for Wildlife Act; and the High Seas Driftnet Fisheries Enforcement Act.

1. The Wild Bird Conservation Act restricts trade in wild birds by immediately banning the import of 10 species most endangered by trade, all popular parrot species, and, after a year, all birds listed under the Convention on International Trade in Endangered Species (CITES) unless placed on an "approved list" established by the Secretary of Interior. Non-CITES birds could be imported unless the Interior Secretary determines a species is imperiled. Imports of wild-caught birds would still be allowed for scientific research, zoological display and cooperative captive-breeding programs.

2. The reauthorization of the National Marine Sanctuary Program included provisions designating the Stellwagen Bank Sanctuary off the coast of Massachusetts, creating a Humpback Whale Sanctuary in Hawaii off Kaho'olawe Island southwest of Maui, and banning oil and gas drilling in the future Olympic Coast Sanctuary, which would run from just north of Grays Harbor, Washington to the tip of the Olympic Peninsula. Under the existing law, the Executive Branch designated the following areas as National Marine Sanctuaries: Monterey Bay, the largest marine sanctuary to date and an important area for foraying and migratory seabirds; Florida Keys, the only complete tropical marine ecosystem in the United States; and Flower Gardens coral reefs off Galvaston, Texas. The responsible Federal agency, the National Oceanic and Atmospheric Administration, is reviewing the following for Sanctuary status: Kaho'olawe off Hawaii; Olympic Coast and Northern Puget Sound off the west coast, areas rich in seabirds including Leach's and Fork-tailed Storm-Petrels, Common Murre, Cassin's Auklet, Marbled and Ancient Murrelets, and Tufted Puffins; and Norfolk Canyon and Stellwagen Bank off the east coast that are prime feeding habitat for seabirds.

3. The Partners in Wildlife Act created a $19 million fund to augment state fish and wildlife conservation programs that benefit species not traditionally hunted or fished and not federally listed as threatened or endangered.

4. The High Seas Driftnet Fisheries Enforcement Act mandates sanctions against fish and fish products, and sport fishing equipment of those countries that refuse to stop driftnetting by December of 1992. If the sanctions are not successful, the President is authorized to impose additional sanctions on other exported goods from those countries, such as televisions, cars and clothing. In response to pressure from the U.S. Congress in conjunction with a United Nations resolution calling for an end to all driftnetting by the end of 1992, the three leading users, Japan, South Korea, and Taiwan, agreed to abide by the ban. France has agreed to shut down its Atlantic diftnet industry by the end of 1993. This is good news for seabirds! One 1990 estimate was that just 10% of Japan's driftnet fleet killed 30,464 seabirds and that the South Atlantic driftnet fisheries were threatening the Rockhopper Penguin colonies on Tristan de Cunha and Gough.

Top legislative issues affecting the well-being of seabirds and waders that were carried over from the last session are ancient forest protection; Endangered Species Act reauthorization; approval of international biodiversity, climate, and Antarctic treaties; coastal zone protection; wet-

lands and water usage; refuge reform; revisions to bird depredation program; and federal agency reorganization.

Ancient Forests

Legislation to protect ancient forest in Oregon, and Washington, critical for the Marbled Murrelet, came closer to reality in the 102nd Congress. Timely action in the 103rd Congress could provide permanent preservation of pockets of old-growth forests in Oregon, Washington, and northern California that will protect biodiversity, and funds for retraining timber workers and assisting communities. The environmental community is also pressing for a provision that would offer interim protection to the eastside forests that contain unique strands of ponderosa pine and are being logged at an even greater rate that the forests of the westside.

On April 2, 1993, a White House "forest" conference was held in Portland, Oregon to give scientists and representatives of various interests an opportunity to express their views and concerns regarding the management of the last 10% of the old growth forest. A team of government scientists and economists have been assigned to develop a strategy for managing the federal forest lands. their report, scheduled to be completed in June, is essential to form the basis for developing legislation. Conservationists throughout the country will be watching this process closely, as it is widely viewed as setting the precedent for how the new administration and the Congress will deal with reauthorization of the Endangered Species Act. Concern already is high that the administration's old growth scientific team has been instructed to limit their strategy to federal lands, yet the majority of habitat for the Marbled Murrelet along the coast of Washington and Oregon is on private or state-owned land.

Endangered Species Act Reauthorization

A major environmental debate in the 103rd Congress will center on the reauthorization of the Endangered Species Act. The continuing debate is on appropriate funding levels and speed in the listing process versus greater weight to certain economic considerations and compensation for impact on private lands.

The original Act, passed twenty years ago, has served as the cornerstone to preserve the unique biodiversity of the United States. Today the Act protects more than 700 species of plants and animals. The Act's many successes have been achieved with few major conflicts. In fact between 1979 and 1986, less than 1.0% of federal projects were cancelled due to endangered species.

In the last session, Congressmen Studds (D-MA) and Dingell (D- MI) cosponsored a bill that would have (i) established deadlines for developing and implementing recovery plans for threatened and endangered species, (ii) directed federal officials to list priorities for the development of recovery plans for entire ecosystems, instead of planning for single species, (iii) increased funding levels for chronically underfunded federal endangered species programs, and (iv) initiated a fund to help communities create plans to balance protection for endangered species with development. The introduction of an endangered species-related bill is expected early in the session.

A strong Endangered Species Act is essential for the protection of our unique heritage for future generations. Scientists estimate that some 9,000 plants and animals are currently at risk of becoming endangered. Much more remains to be accomplished.

International Treaties

The 1992 United Nations Conference on Environment and Development (UNCED) produced international biodiversity and climate treaties and linked protection of the environment with development and social issues. Congress is expected to ratify the climate change treaty that aims to stabilize or reduce worldwide output of carbon dioxide, the gas most responsible for global warming and the possible extinction of many species, if not whole ecosystems. The Clinton Administration is likely to sign the biodiversity pact, known as Agenda 21, a blueprint to help countries meet the challenges of environmental protection and sustainable economic development.

In 1991, the U.S.joined 38 other nations in signing an Antarctic Protocol that bans commercial mining, and creates measures to govern (i) waste disposal, (ii) marine pollution, (iii) protection of Antarctic plants and animals, and (iv) assessment of the environmental impacts of all activities in Antarctica. In October 1992, the Senate ratified the protocol. Legislation to implement the Protocol, the Antarctic Environmental Protection Protocol Act of 1992, was introduced late in the session by Representative Walter Jones (D-NC). In addition to the prohibition of dogs, the bill imposes a 50-year ban on mining in Antarctica; requires that all activities in Antarctic with more than minor impacts be preceded by an environmental impact assessment; requires proper disposal of all wastes; bans the discharge of oil, garbage, and other harmful substances from vessels operating in Antarctica; and provides additional protection for native plants and animals. This issue will be revisited in the 103rd Congress.

Coastal Protection

Hurricane Andrew and other natural disasters in 1992, strengthen the prospects for reform of National flood insurance and related programs that provide property insurance when private insurers will not. While some environmental groups would like to abolish flood insurance as a public subsidy supporting shorefront development, Congress is likely to take more modest steps to restrict coastal construction and limit federal government's exposure to insurance claims.

Senators John Kerry (D-MA) and Ben Erdeich (D-AL) will probably reintroduce their National Flood Insurance Reform Act. The bill strengthens the Flood Insurance Fund through improved lender compliance provisions, establishes programs for the reduction of flood losses and for the management of erosion-prone coastal areas, and recognizes and promotes the protection of natural floodplain areas, including wildlife habitat.

In the House of Representatives, Doug Bereuter (R-Neb) introduced a bill that is essentially a resubmission of legislation passed by the House in 1991 and 1992. His bill would increase the likelihood that property owners in flood- prone areas carried flood insurance and would not provide insurance to areas subject to erosion within the next ten years. This last provision alarms real estate interests and led to the bill's demise last year.

Wetlands and Water

This area requires careful watching for "economic stimulus" actions may translate to spending on waste water treatment plants, and reauthorization of the Clean Water Act may finally settle the definition of a wetland. The reauthorization of the Clean Water Act is important for maintaining swimmable, fishable, and drinkable waters that protect fish and wildlife and the health of vast ecosystems. A key section of this Act governs wetland protection. The debate over wetlands, a contentious issue during the Bush Administration with several efforts to open millions of acres to development, is expected to intensify in the coming year with a number of bills that would give greater protection as well as a number that would have the opposite effect.

Reintroduced from last session by Representative Don Edwards (D- CA) is the Wetlands Reform Act of 1993, H.R.350, supported by national environmental organizations. This bill would expand Section 404 governing the filling of wetlands to regulate the draining, flooding, and excavation of wetlands, and would create tax incentives to encourage protection of privately owned wetlands. It would make it tougher to develop wetlands, which are vital to waders and waterfowl. This bill will be debated in the context of the Clean Water Act reauthorization.

Refuge Reform

The 102nd Congress held hearings on Senator Bob Graham (D-FL) and Representative Gerry Studds' (D-MA) bill, the National Wildlife Refuge System Management and Policy Act, giving the Fish and Wildlife Service greater authority to exclude drilling, grazing, water skiing, and other incompatible uses from National Wildlife Refuges. A cited example of incompatible use is the Navy's sporadic bombing practice in the Copalis National Wildlife Refuge on the Washington coast in an area that includes small rocky islands used as resting areas by seabirds and haul- out areas by marine mammals, including the threatened Stellar's sea lion. Legislation on this topic is expected to be reintroduced in this session.

Bird Depredation Program

In 1990 approximately 18,645 herons, egrets cormorants, pelicans and other waterbirds were lawfully killed by fish farmers. Under a bird depredation program administered by the U.S. Fish and Wildlife Service, fish farmers can receive a permit to kill birds that are preying on fish in their ponds. With the phenomenal growth of the aquacultural industry, particularly in the Southeastern United States, shooting of birds has mushroomed. Efforts by Congress to phase out the permit program and fund a study of non-lethal means for excluding birds from aquaculture ponds were not successful but prospects look brighter in 1993.

Federal Agency Reorganization

President Bush's 1988 campaign promise to elevate the Environmental Protection Agency (EPA) to Cabinet status bogged done due to jurisdictional and substantive disputes. Renewed efforts are underway to elevate the EPA to Cabinet-level status. A new Department of the Environment would have equal standing with foreign environmental ministries and enhance environmental efforts within the United States. In addition, many esteemed think tanks and commissions recommended that other federal agencies, or subunits, be merged into this new Department. For example, the National Oceanic And Atmospheric Administration might be merged with the new Department. For the time being, the only bill introduced in the Senate, The Department of the Environment Act of 1993 (S.171), is for a simple elevation of EPA from an agency to a department. All other possible combinations are grist for inside-the-Beltway, power-lunch conversations.

1993 Annual Meeting

Seattle, Washington 9-13 February

The Twentieth Annual Meeting of the Pacific Seabird Group was held in Seattle from 9 - 13 February 1993 at the Westin Hotel in Seattle. The meeting was the largest the Group has ever held with 225 people registered and 75 papers presented. The meeting was preceded by a full day workshop of the Marbled Murrelet Technical Committee. The annual meeting included two symposia one on the Marbled Murrelet and one on the *Exxon Valdez* oil spill. The latter was followed by papers and discussions on the restoration options being considered for assisting with the recovery from the effects of the Exxon Valdez spill. At the time of the meeting the information on the effects of the spill was limited to that obtained by researchers working for the government. A mini-symposium on Harlequin Ducks was also held. Workshops on seabird data base management, monitoring, the Marbled Murrelet, Xantus' Murrelet, and Harlequin Duck were also held.

Two PSG members were honored at the banquet. Karl Kenyon was the recipient of the PSG's first LIfetime Achievement Award and Art Sowls received an Outstanding Achievement Award for his work on seabird colony catalogues over the past fifteen years. The next PSG Bulletin will contain articles on the two award recipients.

Social events included a reception at the Seattle Aquarium and an evening session with the Seattle Audubon Society that included slide presentations for the public on North Pacific seabirds. An auction of items contributed by P Two Russian ornithologists, Alexander Kondratyev and Lyubov Kondratyeva were able to attend the meeting due to generous assistance of Microsoft Corporation and private contributors. The local committee would like to thank the large number of people who volunteered their time and services to make the meeting a success.

1994 PSG Annual Meeting in Sacramento

The 1994 annual meeting of the Pacific Seabird Group will be held January 26 (Wednesday) through January 28 (Friday) at the Radisson Resort Hotel in Sacramento, California. Executive Council meetings will be held on Tuesday (25 Jan.) between 1000–1700 h. The Marbled Murrelet Technical Committee will probably meet on Tuesday also. As usual, registration and a welcoming reception will be held on Tuesday, general papers sessions will take place on Weds.–Fri., the banquet will be on Fri. night, and field trips will be arranged for Saturday.

With all the committees now active in PSG (a very healthy sign) meeting organization is getting rather complicated. There were some (good–natured) complaints about the 1993 meeting in Seattle going from Monday morning to Friday night and the large number of unscheduled (but important) committee group and subgroup meetings, etc., that frequently ran concurrently with each other or the paper sessions. We hope to streamline activities next year to avoid time conflicts. We recommend that those groups needing a large block of time for meetings (murrelets, seaducks?, monitoring?, etc.) **arrange in advance with members** to meet on Tuesday before the general sessions. We plan to devote all of Wednesday and Friday to paper sessions (0800–1700 h) and have poster presentations at night. Thursday morning will be for papers (0800–1200), while the afternoon (1300–1600) will be for committees to take care of unfinished business (or those that feel that a 3–hr session is adequate and do not need to meet on Tues.). After a break (1600–1800), the evening (1800–2200) will be devoted to a session for all members— to focus on conservation committee business, and include brief reports from all committees, closeout PSG business, member reports, etc.

Several symposia topics for the 1994 PSG meeting have been proposed. We throw them out now for feedback, and the final agenda will depend on response from members. Depending on the levels of interest, we could hold these symposia in 1994 or 1995. We use the term "symposia" loosely, and would be happy to see as few as 4–5 papers address a common theme. If you have any more suggestions, comments, or want to contribute to a particular symposia, let us know **relatively soon** by writing a note to, or phoning, John Piatt (1994 Program Chair, 907 786–3549) George Divoky (206 525–2131), or one of the contacts listed below. So far, suggested topics (in no particular order) include:

1) To commemorate the 150th Anniversary of the Extinction of the Great Auk, a symposium on "Behavior, Ecology, and Population Status of the Rare Alcids"

(Continued page 29)

Summary of Minutes of the Executive Council Meeting

The following is a summary of the proposed minutes of the Executive Council Meetings held on 9 and 11 February 1993 in Seattle Washington. Anyone interested in a complete transcript of the meetings should contact the secretary, Beth Flint. A quorum was present at both sessions with all council members present for at least one session except for Flint, Coulter, Siegel-Causey, Velarde, Ludwig, Tasker, and Clapp. Sekora held 5 proxy votes. The minutes of the 2 previous meetings of the council were approved.

Endowment Fund

Uncertainty about the rules governing allocation of money to and from the endowment fund and the role of the Liquid Assets Account prompted the Chair to ask the Treasurer to consult past minutes and treasurers and produce written guidelines. Divoky also requested that we formalize in written form, a statement of purpose for the Endowment Fund. Warheit consulted with Siegel-Causey and Chu and found that the Dean Witter U.S. Government Securities Fund is the Endowment Fund and the Dean Witter Liquid Assets is just a savings account. The total of our money in checking and in the Liquid Assets comes to approximately $13,000.00. Warheit moved that we move some of this money to the endowment fund. The motion was passed. The treasurer will decide how much to move based on what our expected operating costs for the coming year will be. Fry moved that we set up a committee to meet during the Seattle conference and present suggestions about the management of the Endowment Fund and set up guidelines for spending general donations for the membership to vote on at the business meeting. The motion was passed. Sekora charged Warheit with setting up the committee.

Hand passed out a summary of the Fund's performance and urged that we make strong fund-raising efforts for the next 3 years because money deposited earlier has a greater effect than that put in later. Hand proposed we start putting out our own publications using desk-top publishing techniques and the group briefly discussed the merits and disadvantages of this idea.

Membership

Warheit reported that some life members had not kept up with their payments and that he will calculate how long we can continue sending these people their Bulletin. He moved that a $3.00 increase in the regular annual dues rate be attached for payments that come in after 31 March each year. This motion was passed.

Editor's report and Bulletin business

Sekora read Springer's report to the council. Divoky reiterated his wish that we have a feature article of interest to seabird people in the beginning of each issue of the bulletin. Forsell suggested that we purchase a superdrive for the editor to allow her to handle alternate formats more easily. Divoky pointed out the need for a content editor to assist Springer. Leschner suggested that the chair-elect be given this associate editor's job. Warheit made the motion that the chair-elect be the chair of the bulletin committee and be associate editor for the time he is chair-elect. Motion passed.

Local Committee

Not as many people had registered thus far (185) as had been expected (250) so it was difficult to plan space and catering. Divoky suggested that we maintain a file with information from past meetings and a "checklist" to help local committees. Hand said there used to be such a thing. Sekora stated that until we have a permanent executive director it will continue to be a problem. There were 82 abstracts submitted but only 4 of them were student papers. Divoky raised the question of who will pay for excess room charges generated by pre-conference meetings. Fry was concerned about the length of the meeting and it was pointed out that the Colonial Waterbird Group had gone to concurrent sessions.

Bylaws

All those who returned ballots concerning the changes in the bylaws voted "yes" however only 33 people returned ballots. This is sufficient for passage according to the bylaws but additional voting will be allowed at the meeting until the business meeting. Warheit moved to bring the proposal to the membership that we change the bylaws so the chair elect, chair, and past chair on council each serve for 2 years instead of 1 year. Hand pointed out that the commitment would be increased by this change. Fry thinks the learning time involved for the job makes this a good idea. Divoky pointed out the difficulty in finding candidates and the loss of continuity when the chair changes so often. Leschner and Hand felt that the 3 past chairs should be following through and maintaining continuity. The motion passed 10 to 5. Warheit then moved to table the motion for the time being because 5 of the votes to pass the previous motion were proxies. This motion passed.

Elections

Forsell reported that there had been no contest for any of the positions. Warheit clarified that representatives

based on new regions will become effective at the 1994 meeting.

Marbled Murrelet Committee

Nelson reported that the main work of the committee for the year was the production of a survey protocol for land managers to conduct inland surveys prior to timer sales. The protocols were used by hundreds of people throughout the area last year. They are incorporating suggestions by users now. They also produced an educational video and a brochure about murrelets. The committee's structure is being revised to include land managers. Sekora asked that the council be allowed to review the new committee membership guidelines due to the sensitivity of the issues.

Carter commended Nelson for her work. She announced she had agreed to lead the committee for one more year. The 1987 Murrelet Symposium was published this year and the symposium being held at this meeting will also be published. Nelson proposed that PSG contribute $2000.00 plus $500.00 from the sale of the wine toward this publication. Fry suggested we try to publish this one by ourselves since it will be a big seller. Hand reminded the group that someone has to take the orders and mail out the publication. Warheit said that the treasurer cannot do that.

Seabird Monitoring Committee

Hatch pointed out report in Bulletin. The committee is still missing members from Mexico, Japan, and China. Good progress had been made on inventorying all seabird data for all past years in the Pacific from the equator north. This work should be done by the end of 1993. The ultimate focus will be on acquiring actual data which will help researchers detect patterns and provide a significant contribution.

PSG 2000 Committee

There was no activity of this committee this year. Warheit asked for and received permission to throw away the old survey forms from last year.

***Exxon Valdez* Restoration Advisory Group**

Sekora introduced Jim King who has been appointed to the advisory committee representing conservationists. King explained that there are 6 trustees that make all the decisions about the >900 million dollars that will be spent. Three members are appointed by the state of Alaska and 3 by the Federal government. There is also a public advisory committee that can submit recommendations and information to the trustees. Other interests represented on this 17 member committee are logging, commercial fishing, aquaculture, tour boat operators, native corporations, environmentalists, and the general public. It was proposed to spend $38 Million in the current year to fund continuing studies. A restoration plan is due out next month. There will be a 6 month public comment period in which it is important that PSG provides input. King reported that he had put forth the PSG's position that we place great importance on fox eradication. He provided a list of things that the PSG needs to do to help influence the process.

Fry brought up the problem of how things should be reviewed before they go out of the conservation committee as being the position of the PSG Further discussion of this issue was deferred until the meeting of the conservation committee.

Future Meetings

Nothing in Davis, California is available for the 1994 meeting so the Radisson in Sacramento was recommended. Tentative dates are 9 - 13 February. Sekora reported that the Colonial Waterbird Group would like to meet with the Pacific Seabird Group in 1995 and are willing to come to the west. San Diego has been suggested as a meeting site and it was agreed to proceed.

Victoria Symposium

The volume is due out in February of 1993. Warheit said he had not received any requests for mailing labels yet.

Ornithological Council

The Ornithological Council, a lobbying organization for ornithologists has invited PSG to become a member. Warheit moved that PSG join and pay up to $200.00 annually for dues. The motion was passed.

Marbled Murrelet Technical Committee Guidelines

The council reviewed the guidelines. Divoky moved that the guidelines by accepted and the motion was passed. Warheit asked that all officers be put on the murrelet mailing list. Everett mentioned that the same situation will apply for the Xantus Murrelet in the future. Harrison moved that we allocate $2500.00 to publishing the 1993 Murrelet Symposium and the motion was passed.

PSG Outreach

Hand reviewed the plan to develop a slide show for non-traditional audiences such as yacht clubs. Several years ago it almost came to fruition but the difficulties of finding people with enough time to carry these things through was made evident again. Divoky stated that past chairs should be responsible. Sekora thought a video format might be

more feasible and that it should be done by professionals. Several individuals were suggested and the need for PSG to be ready to fund if someone steps forward was discussed. Piatt suggested that members might be able to contribute good footage.

Financial Assistance to Foreign Members

Hatch called for a more formal method of sponsoring foreign members in developing countries because the loose structure of our attempt last year didn't work very well. He also proposed that we think about using money from the endowment fund when it matures to help people attend the meeting. Hand felt that this was appropriate. Interest from the endowment can be used even now as long as it hasn't been converted to capitol already. Fry pointed out that there might be other sources of money to tap as well.

PSG 2000, Seabird Monitoring

Hatch proposed creating a position complimentary to the Vice-chair for Conservation entitled Vice-chair for Research and Technical Coordination. It would require a change in the by-laws. Forsell thought the position should be appointed instead of elected. Harrison thought we should start it as a committee and then re-evaluate it in a year. Hatch accepted the chairs assignment to pursue the issue and see how far it can go.

Warheit asked to relieved of the job of by-laws chair after the new ones are finalized and put into effect in 1994.

Harrison moved to adjourn the meeting and the motion was passed.

Minutes respectfully submitted by Jim Lovvorn and Donna O'Daniel for Beth Flint, Secretary

1994 Meeting

(continued from page 26)

(*Synthliboramphus wumisuzume, S.*[*Endomychura*] *hypoleuca, S.*[*E.*] *craveri, Brachyramphus brevirostris, Cepphus carbo,* and *Aethia pygmaea*). There is already widespread interest and support for this symposium, which will hopefully include invited biologists from Japan, Russia, and Mexico. We are pursuing the possibility of publishing a selection of contributed papers in a refereed journal. Contact: John Piatt (907 786-3549) or Gus van Vliet (907 789-5624).

2) In light of apparent declines in the populations of a variety of seaducks in both the Pacific and Atlantic oceans, and a growing appreciation of their trophic importance in nearshore marine ecosystems, a symposium on "The Marine Ecology of Seaducks". Contact: Ian Goudie (604 946–8546) or Margaret Peterson (907 786-3530).

3) Considering the wealth of data available on some seabird species that are found in both the Pacific and Atlantic oceans, and which feed over a wide range of trophic levels (e.g., *Uria* spp., *Rissa tridactyla, Fulmarus glacialis, Oceanodroma leucorhoa*), a symposium on "The Comparative Marine Ecology of Pacific and Atlantic Seabirds". Contact: Tony Gaston (819 997–6121) or Scott Hatch (907 786-3529).

4) Are *Cepphus* guillemots overshadowed by their bigger *Uria* brothers, and overlooked because of our fascination with those frivolous *Fraterculids*? There's lots of great data on *Cepphus* so isn't it time for a symposium on "The Behavior and Ecology of *Cepphus* Guillemots". *Cepphus*oids assert yourselves, contact George Divoky.

5) With the recent profusion of molecular techniques for examining phylogenetic relationships and a vastly improved understanding of the paleo–ecology of marine ecosystems, it is probably a good time soon for a symposium on "The Paleo–Ecology and Evolution of Seabirds". (probably 1985) Contact: Ken Warheit (206 491–2046).

John Piatt, Chair Elect

Mark Your Calendar!

Deadlines for submittals to the PSG Bulletin are **15 April** for the spring issue and **15 October** for the fall issue. Please make a note of these dates and plan your regional reports and other articles accordingly.

Also, please submit all material to be published on 3.5-inch disks. No 5.25-inch floppies!

Treasurer's Report for 1991

Included in this report are two annotated tables detailing the financial activities of the Pacific Seabird Group during the 1992 calendar year. These tables summarize the 1992 cash flow activities of the group, as well as our total assets as of 31 December 1992. More detailed and additional financial information is discussed below.

Income

Our total gross income for 1992 was $18,403.49, forty-two percent of which was from membership dues ($7,756.35). The second greatest source of income for PSG during 1992 was interest generated from five accounts: Dean Witter U.S. Government Securities Trust Fund (Endowment) = $2,820.16; Dean Witter Liquid Assets Account (Savings Account) = $320.52; Puget Sound Savings Account (holding account for Author's page charges - North Pacific Symposium) = $194.54; PSG Bulletin Account = $35.03; and 1993 Local Committee Account = $4.51. Additional sources of income included $1,814 from Fund Raising ($852.00 from Art Sowls' Slide Exchange [see Footnote #2 in Cash Flow report for more details on slide exchange] and $962.00 from T-shirt and other sales, including those at the 1992 annual meeting) and $1,050.84 from donations (including one donation for $915.84 from a generous Life Member in Alaska).

Expenses

As with previous years, expenses associated with PSG publications were the primary expenses for the group. In 1992 PSG contributed $2,000.00 toward the Marbled Murrelet symposium volume, published through the Western Foundation of Vertebrate Zoology, $500.00 of which were Marbled Merlot profits donated to PSG (thanks again to Harry Carter). Pacific Seabird Group also contributed $1,815.00 for the publication of the North Pacific symposium. This volume was produced in April 1993 as a Special Publication of the Canadian Wildlife Service. Our total expenses during 1992 were $9,518.19, leaving us with a total income over expenses of $8,885.30.

Membership

Year-end calculations of membership totals are somewhat misleading in that membership for any given year is paid over a two year period. In other words, 1992 members paid their dues over a period from late 1991 (when dues notices were first mailed) to fall 1992. Likewise, 1993 members paid their dues from December 1992 through Spring 1993 (and payments are still trickling in). Therefore, the membership dues presented in the 1992 cash flow report reflect both 1992 and 1993 memberships. As of 15 May 1993 our total paid membership was 412, of which 43 are Life Members paid in full, 5 are Life Members not paid in full, 337 are Individual Members, and 28 are Family Members. Of these 337 Individual Members 82 joined as a result of the 1993 Annual Meeting in Seattle. We encourage these members, and all other new members to continue their participation in PSG in years to come. Finally, 53 institutions worldwide receive the *PSG Bulletin*, of which 24 are paid subscriptions, 19 are journal exchanges, and 10 are goodwill gifts.

Endowment Fund

There was much talk concerning the endowment fund at our last Annual Meeting. The discussions centered mostly on three issues: (1) the purpose of the endowment fund; (2) the portion of the fund available for spending; and (3) when the money can be spent. Thanks mostly to Judith Hand, who originally proposed the endowment fund in 1983, these issues were clearly settled. The stated purpose of the endowment fund, currently invested in Dean Witter's U.S. Government Securities, is to sponsor and publish "quality seabird symposia." That is the sole function and stated purpose of the fund. In addition, the only money that can be spent from the endowment fund is investment income (i.e., interest); principal will remain invested for the purpose of generating additional investment income. Any investment income not spent or moved to a "Symposia Savings Account" will be reinvested as principal.

There are two governing bodies associated with the endowment fund. The first is responsible for the financial management of the fund (i.e., where and how the fund money is invested) and consists of the PSG Treasurer and two Investing Trustees, who must be Life Members of the Group and are appointed by the Executive Council. Craig Harrison and Doug Siegel-Causey are our current Investing Trustees. The second governing body is the Executive Council itself, which decides how the investment income will be spent (within the guidelines that the money is spent on sponsoring and publishing seabird symposia).

At this time the only new money placed into the fund are Life Membership dues and donations that are specifically designated by the donator as endowment fund. Other moneys (e.g., general donations not earmarked for a specific fund; general funds in excess of that needed to operate the organization) may be placed into this endowment fund only after a majority of the Executive Council members vote in favor of such activity. If money is donated to PSG for a stated purpose other than symposia (e.g., funding research or student travel) it cannot be deposited into the "Symposia Endowment Fund." This money will be managed in an

existing PSG savings account or placed in a newly established "Research" or "Travel" endowment fund, for example.

On 31 December 1992 PSG owned 4,056.692 shares in the Dean Witter U.S. Government Securities Fund. At $9.30 per share, our year-end 1992 Endowment Fund principal equaled $37,727.23. This was an increase of $3,526.37 over year-end 1991 ($34,200.86: 3,592.527 shares at $9.52 per share). $2,820.16 of the $3,526.37 increase was income dividend, giving us a yield of over 8 percent on our investment (during a period when the interest rates for savings accounts and CD's were no more than 5 percent, and many close to 3 percent). At this yield and without any additional investment, we would reach our target principal of $100,000.00 by the year 2005 - only 13 more years!

Annual Meeting

Lee Robinson did a magnificent job with the books for the 1993 Annual Meeting (Seattle). Her skills as a treasurer were evident as her final accounting for the cash flow related to this annual meeting were submitted to me only weeks after the end of the meeting. Many thanks to her, George Divoky, and Lora Leschner for putting on an enjoyable, scholarly, and profitable meeting. Our total income over expenses resulting from the annual meeting was $2,344.82. However, this number is somewhat deceiving because it includes moneys received during the meeting as donations, profits from sale of glassware and T-shirts, and membership dues for people registering as non-members. A more detailed look at our income and expenses resulting from the annual meeting is as follows (income and expenses for this meeting occurred during fiscal years 1992 and 1993, and therefore will be reflected in both this and next year's Treasurer's report):

CATEGORY	AMOUNT
Income	
Annual Meeting Income (excluding membership dues, donations,and retail sales)	$17,535.50
Donations collected during meeting	$ 1,748.00
Membership Dues collected during meeting	$ 1,215.00
Retail Sales	
Glassware sold prior to meeting as mail order	$ 703.63
Glassware sold during meeting	$ 178.00
T-shirts sold during meeting	$ 2,109.00
Total Income	$23,489.13
Expenses	
Annual Meeting Expenses (hotel, catering, field trips, office supplies, etc.)	$18,621.14
Retail Sales	
Glassware	$ 515.02
T-shirts	$ 2,008.15
Total Expenses	$21,144.31
Income over Expenses	
Annual Meeting	($1,085.64)
Donations	$ 1,748.00
Membership Dues	$ 1,215.00
Retail Sales	
Glassware	$ 366.61
T-shirts	$ 100.85
TOTAL	**$ 2,344.82**

As you can see, although the meeting was indeed profitable, our expenses for the meeting itself were over $1,000.00 more than our income from registration, field trips, etc. In other words, the 1993 Annual Meeting was subsidized by donations and profits from retail sales.

PACIFIC SEABIRD GROUP BALANCE SHEET
31 December 1992

Account	Balance 1992	1991
Assets		
1993 Local Committee	$ 2,579.85	-
Bulletin Account	$ 1,501.73	$ 818.09
Checking Account	$ 4,493.33	$ 2,237.48
[1] Pacific Symposium Account	$15,229.07	-
[2] United Kingdom Savings Account	$ 330.55	$ 153.65
Dean Witter - Savings	$ 7,347.02	$10,291.50
[3] Dean Witter - Endowment	$38,521.85	$34,200.85
[4] **Total Assets**	**$70,003.40**	**$47,701.57**
Liabilities & Equity		
Liabilities	$ 0.00	$ 0.00
Equity	$70,003.40	$49,097.41
[4] **Total Liabilities & Equity**	**$70,003.40**	**$49,097.41**

[1] The Pacific Symposium account was a holding account for page charges issued by the Canadian Wildlife Service for publication of "The status, ecology, and conservation of marine birds of the North Pacific." Funds in this account do not represent income to Pacific Seabird Group. $13,402.00 (equal to CAN$17,000) was transferred 14 January 1993 to CWS for the publication, while the remainder ($1,827.07) was transferred to the PSG checking account.

[2] The United Kingdom account is managed by Mark Tasker and is used for deposits of membership dues paid in pounds. A conversion rate of US$1.00 = £0.65 was used to calculate amount in dollars. The 1991 and 1992 closing balances equaled £99.87 and £214.86, respectively.

[3] Total reflects actual dollar amount deposited or interest earned at the time of deposit. Deposits are made by purchasing shares, the dollar value of which fluctuates with the market. On 1 January 1992 we had 3,592.527 shares at $9.52 per share ($34,200.85). On 31 December 1992 we had 4,056.692 shares at $9.30 per share ($37,727.23). By 14 May 1993 the price per share had risen to $9.41 (4,056.692 at $9.41 equals $38,173.47).

[4] Because the Pacific Symposium account does not reflect actual income, total assets for PSG should be decreased by $13,402.00 (see Footnote #1). Therefore, a realistic estimate for our total assets and equity on 31 December 1992 would be $56,601.40, an increase of $7,503.99 over 31 December 1991 totals.

PACIFIC SEABIRD GROUP CASH FLOW REPORT

1 January - 31 December 1992

Income	
[1] 1993 Annual Meeting (as of 12/31/92)	$ 2,575.34
1992 Annual Meeting (Net)	$ 1,412.21
1991 Annual Meeting (remainder)	$ 250.00
Donations	$ 1,050.84
[2] Fund Raising	$ 1,814.00
[3] Gross Sales	$ 80.00
Interest Earned	$ 3,374.75
Membership Dues	$ 7,579.44
[4] Membership Dues (into UK account)	$ 176.91
Life Membership	$ 90.00
Total Income	**$18,403.49**
Expenses	
Awards	$ 130.00
Bank Charges	$ 132.08
Bulletin	$ 2,546.15
[5] Cost of Goods (Fund raising expenses)	$ 119.77
ICBP Dues	$ 200.00
Mailing-Stamps	$ 740.51
[1] 1993 Meeting Expense (as of 12/31/92)	$ 657.74
Officer's	$ 1,171.94
[6] Publication	$ 3,815.00
Taxes	$ 5.00
Total Expenses	**$ 9,518.19**
Total Income over Expenses	**$ 8,885.30**
Other "Income"	
[7] Page Charges Received (Symposium)	$15,034.53
[8] Transfer from Closed Accounts	$ 814.98
Total Other "Income"	$15,849.51
Overall Total	**$24,734.81**

[1] Includes only the 1992 income and expenses associated with the February 1993 Annual Meeting. See above for complete financial information about the 1993 Annual Meeting.

[2] Includes $852.00 from Art Sowls' Slide Exchange. According to Art Sowls' accounting, total 1992 sales of slides grossed $2,632.00, while expenses equaled $1,457.30. Therefore, the net profit for PSG resulting from the sale of slides in 1992 equaled $1,174.00. However, only $852.00 was received into PSG's accounts by 31 December 1992. The remaining $322.70 was received February 1993 and will appear in the 1993 accounting.

[3] Sales from back issues of bulletin

[4] See Balance Sheet Footnote #2.

[5] Fantasy Glass Works for etched glasses. Fund raising and 1993 Annual Meeting expenses.

[6] $2,000.00 to Western Foundation of Vertebrate Zoology for Marbled Murrelet symposium volume and $1,815.00 for North Pacific symposium volume (see Footnote #7 below and Balance Sheet Footnote #1).

[7] Page charges received by PSG for the North Pacific Symposium publication. Includes PSG's contribution of $1,815.00, transferred from checking account and Dean Witter Liquid Asset Fund. This money is not true income; $13,402.00 (equal to CAN$17,000) was transferred 14 January 1993 to CWS for symposium publication. Remainder ($1,827.07) was transferred back to PSG checking account (see Balance Sheet Footnote #1).

[8] Money transfer to PSG Treasurer's checking account from other PSG accounts (South Carolina Bulletin [Coulter] account [$382.80]; and Kansas Bulletin [Siegel-Causey] account [432.18]. Because this money was transferred from other PSG accounts, it is not income.

Report from the Marbled Murrelet Technical Committee

S. Kim Nelson, Chair and Janet G. Hardin

SUMMARY OF THE MARBLED MURRELET TECHNICAL COMMITTEE MEETINGS

Annual Meeting, Seattle, Washington

Subcommittee Reports and Protocols— February 8, 1993

Chair Duties — Kim Nelson reviewed the outline previously mailed to all MMTC members, and comments were offered for some minor additions, changes and re-wording. Kim has made the changes and the final draft has been approved by the PSG Executive Council.

Role of the MMTC — Kim also reviewed the earlier draft describing the role of this committee. C. J. Ralph was absent from this day's meeting but had provided Kim with his comments and feedback, which she shared with the committee at large. Further suggestions were offered, and Kim has produced a final draft, which has subsequently been approved by the Executive Council.

Membership of the MMTC — Draft guidelines outlining the structure of this committee were discussed. Lora Leschner was not present at this day's meeting, but had previously provided valuable input regarding the structure and function of the committee. The following people volunteered to meet later and refine the ideas presented: Tracy Fleming, Kathy Kuletz, Tom Hamer, Harry Carter, Steve Speich, and Sherri Miller.

Survey Protocol Revision — Sherri Miller reported on the need for revision of the protocol and the progress made thus far. Meg Shaughnessy has spent a good deal of time sifting through comments and suggestions from agency personnel. This subcommittee arranged to meet again later in the week in an effort to begin finalizing the changes so the amended protocol would be available for use by all parties concerned in the upcoming survey season.

Nest Site Sampling Protocol — Tom Hamer gave a brief report on the latest draft of this protocol. The protocol was nearly in its final form, but Tom invited further comment and those interested met with him later.

Nest Search Guidelines — Nancy Naslund presented an outline of the guidelines which was reviewed by the subcommittee. A draft manuscript was expected for the upcoming field season.

Records of Disturbance — Fred Sharpe had not arrived at the meeting, so Kim provided an overview of the data sheets being developed to document various types of disturbance at sites with murrelets present. She suggested that anyone interested running the data sheets through some field trials contact Fred or herself. The goal would be to develop a usable data form.

Educational Brochure — Kathy Kuletz reported that she and Fred had produced a mock-up of a brochure for anyone interested to examine and comment on. Fred brought the brochures and handed them out during the afternoon session. Any further comments should be sent to Fred.

Educational Video — Kim showed an 8-minute educational videotape she had produced on the status and biology of marbled murrelets. She has requested feedback from anyone who has suggestions for improvement in the final version. It is anticipated that this tape could be sold to interested parties to recoup the cost of its production.

New Protocols and Guidelines — There has been increasing interest in the development of additional guidelines for people encountering murrelets at times other than during surveys or deliberate searches. Guidelines or brochures might provide such information as: what chicks and fledglings look like; what eggshells look like; what to do with murrelets found dead or alive on the ground; who should be notified when birds or eggshells are found on the ground; where rehab centers are located; and proven methods of handling/rehabilitating murrelets. Kim has begun work on photographically documenting eggshell fragments in her collection.

It has also been suggested that a uniform set of guidelines be developed for conducting surveys of murrelets on the water, whether from shore, by boat, or from the air. Members interested in developing such guidelines were asked to sign up for working in a subgroup to meet at a later time during the week.

Training / Certification — Training and certification of murrelet surveyors has developed into a requirement for

anyone hoping to collect reliable data and/or adequately survey timber sales for marbled murrelets. Sherri Miller outlined the process her group has used successfully in northern California, and all those interested in the training and certification process were asked to sign up for a subcommittee to meet later in the week.

Central Database — Gary Miller gave a brief statement on the status of establishing a centralized repository for data gathered on marbled murrelets. As yet no such facility is available, but it is possible that use might be made of the same framework which was set up for the northern spotted owl.

Species Status — Gary Miller provided a brief overview of the current status of the murrelet listing and recovery process. The following people have been named to the Recovery Team: Steve Beissinger, Harry Carter, Blair Csuti, Tom Hamer, Gary Miller and Dave Perry. The first meeting of the Recovery Team will be February 17. The team will meet four or five times in the next year, for approximately two to four days at a time. Representatives from the Bureau of Indian Affairs, Bureau of Land Management, National Forest Service, and National Park Service will serve as consultants and attend Team meetings. Gary anticipates it will take about one year to develop a draft recovery plan, with a final plan completed in about two years' time.

State and Provincial Reports — these will be described in detail in the next PSG Bulletin.

Additional Subcommittee Meetings, 9-11 February 1993

Membership of the MMTC — After discussion of the original concepts presented earlier, Steve Speich presented an organizational flow chart of how he envisions the MMTC functioning in future. After fruitful discussion and modifications from the group, Steve agreed to write up a final draft of the organizational plan.

Inland Survey Protocol Revision — This group met and discussed the feedback and subsequent revisions made thus far. Meg Shaughnessy will continue work on the revisions so that the protocol will be complete and available for distribution to all concerned prior to the upcoming survey season.

Nest Site Sampling Protocol — Following some discussion, a few changes or additions were suggested, and Tom Hamer will produce a final draft of the sampling protocol.

Records of Disturbance — People interested in performing trial runs with the current version of the data form provided their names, and Kim and/or Fred will send them samples to use this summer. Those who volunteered include: Lee Foillard, Tom Hamer, Kathy Kuletz, Irene Manley, Ray Miller, Bill Ritchie, and Chuck Turley.

Training and Certification — After much discussion, including a debate over requiring potential surveyors to undergo hearing tests, Sherri Miller will collect methods used successfully by trainers of inland surveyors in other areas and will produce a second draft of the training protocol. Some questions remain unresolved, but at present decisions will be made state-by-state (or province) for establishing a pool of qualified evaluators and a central depository for evaluation sheets of trainees.

At-Sea Survey Protocols — Nineteen people attended the meeting of this new subcommittee. The purposes of doing at-sea surveys were outlined and it was decided the "protocol(s)" should be a representative compendium of methods previously used. C. J. Ralph and Sherri Miller volunteered to collate methods others have used and design a first draft of suggested guidelines. They request that everyone who has done surveys by air, boat, or from shore send them the information as to specific methods and equipment used, and the types of data collected some time in the next few weeks.

Education Subcommittee — Fred Sharpe offered to be the coordinator of this subcommittee and continue work on the educational brochure. Others who volunteered to help Fred include: Marilynn Sigman, Kathy Kuletz, and Bill Ritchie.

Rehabilitation Guidelines —x The new subcommittee began deve;opment of guidelines for the care and rehabilitation of, and data collection on, injured or orphaned murrelets. Those interested in participating should notify Nancy Naslund.

NEST SEARCH GUIDELINES

A draft of the nest search guidelines has been completed. Persons interested in obtaining a copy or in contributing to the final version should contact Nancy Naslund.

CHAIR GUIDELINES

1. Oversee and coordinate all activities of the MMTC. Lead all MMTC meetings.

2. Act as the official spokesperson for the MMTC and act for the Executive Council in the conduct of PSG on Marbled Murrelet matters when designated or so requested by the PSG Chair. Statements made by the MMTC Chair must reflect the views of PSG and the Executive Council, not the agency or group where the MMTC Chair is employed.

3. May attend hearings, meetings and other gatherings regarding murrelets, murrelet research and murrelet habitat management. Provide information and testimony as appropriate.

4. Communicate with all murrelet researchers throughout the year to keep informed of all research activities, ideas and problems. Promote communication among researchers. Maintain a current mailing list of MMTC members.

5. Respond to public requests for murrelet information.

6. Initiate necessary resolutions concerning murrelets. Final resolutions must be approved by the Executive Council.

7. Report all activities to the Executive Council of PSG. Send copies of all correspondence to the PSG Chair and seek advice and concurrence from the PSG Chair before being involved in issues thought to be controversial. All news releases, position statements must be approved by the PSG Chair and Vice-Chair for Conservation.

8. Seek advice and review from MMTC members on all issues. In cases of emergency or timely issues, review and concurrence of the PSG Chair and/or Vice-Chair for Conservation and at least two MMTC members (designated as emergency group) would be necessary.

9. Send all copies of important issues/information to all persons on the MMTC mailing list.

10. Include a summary of the groups activities in each of the PSG Bulletins. Entire texts of resolutions should also be submitted to the Bulletin.

ROLES OF THE TECHNICAL COMMITTEE

1. **Act as a Technical Authority about the Status, Distribution, and Life History of the Marbled Murrelet:** Serve as a source of information for the general public, agencies, industry, and the media about the Marbled Murrelet. Educate others regarding the involvement of PSG and the MMTC in Marbled Murrelet issues. Host and publish Symposia at the PSG Annual Meetings.

2. **Identify, Encourage,and Facilitate Research:** Assist development of research programs throughout the range of the Marbled Murrelet (including California, Oregon, Washington, British Columbia, Alaska, Russia and Japan). Assist and encourage the funding of research programs where possible.

3. **Work and communicate with MMTC members and Chair:** Implement a communication and cooperation network among MMTC members by (1) working together to develop research priorities and methods, (2) sharing research results, (3) responding in writing, or by fax or phone to all issues sent by the MMTC Chair for comment, (4) informing the MMTC Chair of any important issues and (5) writing reports for the PSG Bulletin twice a year (a hardcopy and disk should be mailed to the MMTC Chair). Core members should perform their assigned duties in a timely manner (see attached MMTC Guidelines).

4. **Address Conservation Problems:** When appropriate, bring scientific and technical expertise to bear on issues by assisting the PSG Chair and the Vice-Chair for Conservation in writing resolutions and letters to address specific conservation problems. Carry out the PSG Charter, by advocating for the conservation of Pacific seabirds wherever they occur (Bylaws: Article 1, Section 2).

5. **Liaison Between Research and Management:** Provide agencies and industry with research results and information on the biology of the murrelet. Work with agencies and industry in reviewing and providing technical assistance on management plans as requested. Agencies interested in Marbled Murrelet research will be placed on a mailing list (Interested Parties) to receive information on meetings or the species status.

(Continued on page 37)

MEMBERSHIP GUIDELINES

MEMBERSHIP OF THE MARBLED MURRELET TECHNICAL COMMITTEE:

The MMTC membership consists of the MMTC Chair and those engaged in the activities of one or more MMTC subcommittees. One must be an active member of PSG to be a member of the MMTC. One must also have the time and interest to participate in subcommittee activities to be a member of the MMTC.

CHAIR:

The Marbled Murrelet Technical Committee (MMTC) Chair is appointed by the Chair of the Pacific Seabird Group (PSG). The MMTC Chair reports to the PSG Executive Council and PSG Chair.

SUBCOMMITTEES:

Subcommittees of the MMTC are created or dissolved at the discretion of the MMTC Chair as needed and appropriate. Subcommittee Coordinators are appointed by the Chair. Working groups within a subcommittee are created or dissolved by the Subcommittee Coordinator and the MMTC Chair as needed and appropriate.

(1) Policy Subcommittee:

The Policy Subcommittee includes 3-4 individuals that are appointed by the MMTC Chair. Members of the Policy Subcommittee inform and consult with the MMTC Chair on issues and matters of policy when needed by the MMTC Chair, often on short notice. Members also alert the MMTC Chair of pertinent concerns when appropriate. Members must be knowledgeable of the biology and issues associated with the marbled murrelet. The first consideration of members of the Policy Subcommittee is the welfare of PSG.

(2) Research Subcommittee:

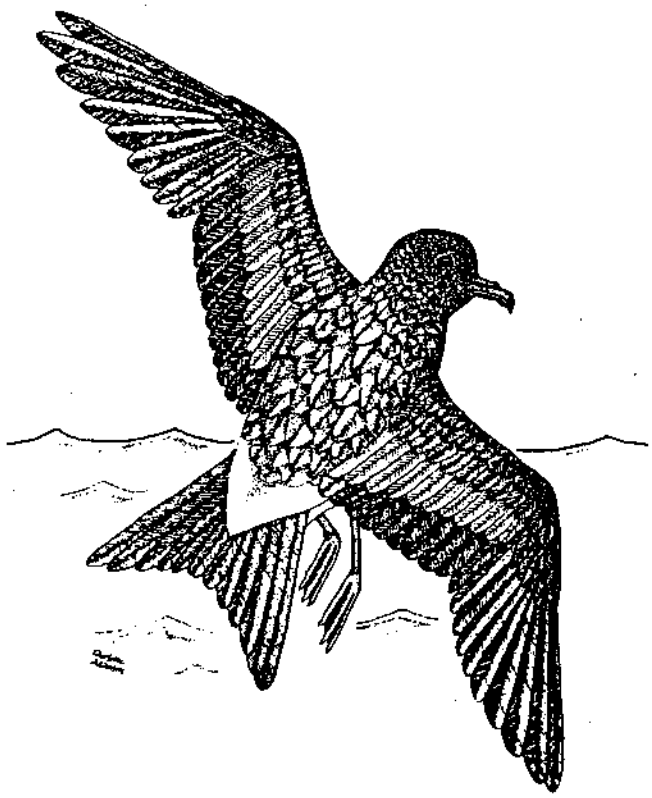
The Research Subcommittee includes three major subgroups: (a) At-Sea protocols and guidelines, (b) Inland protocols and guidelines, and (c) Research Needs and Priorities. The Inland Subgroup is currently working on the following protocols and guidelines: disturbance, dawn survey, training and evaluation, ground search technique, and nest searches. The At-sea Subgroup is developing a survey protocol. The Research Needs group is developing a protocol for collecting information from captive birds.

(3) Education Subcommittee:

The Education Subcommittee is currently developing an educational video and brochure to educate the public about the biology of the Marbled Murrelet.

ADVISORS TO THE PACIFIC SEABIRD GROUP MARBLED MURRELET TECHNICAL COMMITTEE:

Agencies and other parties interested in the activities of the MMTC (including USFS, USFWS, BLM, NPS, STATES, PROVINCES, BIA, Industry, Conservation Groups, etc.) may appoint representatives to the PSG MMTC, with the approval of the MMTC Chair. Representatives inform the MMTC of the concerns, needs, policies and actions of their employers, agencies or clients regarding activities associated with marbled murrelets. Representatives are not required to be members of the MMTC; as individuals they may be members of PSG and the MMTC.



(Continued from page 37)

6. **Communicate with PSG and the PSG Executive Council:** Inform the Executive Council of all activities. Provide updates on Marbled Murrelets and activities of the MMTC in the PSG Bulletin. Letters, resolutions, news releases should be approved by the PSG Chair, Vice-Chair for Conservation, and at least two members of the MMTC.

Demography of Thick-billed Murres at Coats Island, Northern Hudson Bay. *Tony Gaston, Canadian Wildlife Service, Ottawa, Canada K1A 0H3 and Leah de Forest and Garry Donaldson, Dept. of Biology, University of Ottawa, Ottawa, Canada K1N 5N6.*

About 18,000 chicks and adults have been banded at Coats Island since 1984. Most chicks return to the natal colony, allowing us to estimate age of first breeding (3-8, median 6), age-specific reproductive success (peaks at 8 years or older), the proportion surviving to age of first breeding (30-50%, varying with cohort), and age-specific survival (rising to 0.9 at age £ 8). Compared with Common Murres in Europe, the Thick-billed Murres at Coats Island have lower adult survival and lower reproductive success. However, survival to age of first breeding is higher, and overall, the population has been increasing at 3% annually, a rate similar to that seen at many European colonies studied.

Risk and Reward: Factors Affecting Glaucous Gull Foraging Behavior in a Thick-billed Murre Colony. *Grant Gilchrist, Dept. Zoology, Univ. of British Columbia, Vancouver, B.C., V6T 1Z4.*

In the eastern arctic, Glaucous Gulls (*Larus hyperboreus*) nest within Thick-billed Murre (*Uria lomvia*) colonies and are the primary predator of murre eggs and chicks. This study examined possible constraints on Glaucous Gull foraging within a Thick-billed Murre colony on Coats Island, N.W.T., Canada. Previous results suggested that ledge accessibility and high murre nesting density constrained gull foraging efficiency and that gull foraging activity was positively correlated to wind speed. Apparently, high wind speeds enabled Glaucous Gulls to access narrow-ledge, low-density murre nest sites. Despite these generalities, further study showed that individual gulls differed significantly in their use of attack techniques under the same environmental conditions. Further, the techniques used most frequently did not necessarily yield the greatest energetic gain as expected. I propose that gulls face a trade-off between energetic gain and risk of injury during attack.

The Effect of Breeding-Site Characteristics on Breeding Success of Known-Age Thick-billed Murres (Uria lomvia) on Coats Island, N.W.T. *Leah de Forest, Dept. of Biology, Univ. of Ottawa, Ottawa, Ontario, Canada, K1N 6N5.*

Breeding site characteristics of known age Thick-billed Murres on Coats Island were compared in both 1990 and 1991. Older (>7-year-old) birds had higher reproductive success than young (4 and 5 year-old) birds. Having neighbours breeding nearby improved the reproductive success of older birds in both years. Site characteristics did not affect the reproductive success of young birds in 1990, as very few were successful. In 1991, young birds on sites with neighbours and walls were more successful than young birds on other sites. Sites of older birds were more likely to have ≥2 neighbours and ≥1 walls than the sites of young birds, hence a disproportionate number of young birds bred on sites that were suboptimal. Older birds were more successful than young birds occupying the same type of site. Sites which failed were more likely to be vacant in the following year. Young birds changed their site more often than older birds. The differences in site quality between young and older birds explains part but not all of the difference in reproductive success between the two groups.

Winter Distribution of Known-Age Coats Island Thick-billed Murres in Newfoundland, Canada. *Garry Donaldson, Department of Biology, University of Ottawa, Ottawa, Ontario, Canada, K1N 6N5 and Tony Gaston, Canadian Wildlife Service, Ottawa, Canada, K1A 0H3.*

Hunting pressure on Thick-billed Murres is thought to reach upward of one million birds each year. This makes murres one of the most hunted birds in Canada and is therefore an excellent subject for recovery studies. Of the roughly 18,000 murres banded on Coats Island, 437 have been recovered. Most recoveries have occurred off the coast of Newfoundland in the late fall and winter during the annual "turr" hunt. Future management of the hunt will require accurate knowledge of the distribution of wintering birds. Spatial and temporal distribution distributions of recoveries of different cohorts and age classes from Coats Island will be presented.

Foraging Ecology of Breeding Thick-billed Murres in Southeast Spitsbergen. *Fridtjof Mehlum, Norwegian Polar Research Institute, P.O. Box 158, N-1330 Oslo Lufthavn, Norway; George L. Hunt, Jr., and Mary Beth Decker, Department of Ecology and Evolutionary Biology, University of California, Irvine, CA 92717.*

Foraging ecology of Thick-billed Murres (*Uria lomvia*) during breeding was studied in southeast Spitsbergen. At sea adjacent to two large, neighboring breeding colonies comprising a total of ca. 500,000 individuals, we mapped the flight directions and foraging areas of the birds. We also studied the spatial dispersion of foraging individuals and related their distribution along transects to measurements of the physical oceanography, hydroacoustics of prey, and plankton net tows. Specimens of murres were sampled for analysis of stomach contents.

The diet of birds foraging in waters within ca. 50 km of the colonies was predominated by pelagic crustaceans (*Thysanoessa* and *Parathemisto*), whereas individuals foraging farther south (ca. 100 km from the colonies) primarily preyed upon fish (capelin, *Mallotus villosus* and polar cod, *Boreogadus saida*). The higher spatial heterogeneity in the distribution of fish schoals compared to the pelagic crustaceans was reflected in the spatial distribution of seabirds along transects.

Ecological and Conservation Implications of Attendance by Marbled Murrelets at Old Growth Forest Nesting Areas during the Nonbreeding Season. *Nancy L. Naslund, Institute of Marine Sciences, University of California, Santa Cruz and U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

I studied Marbled Murrelet attendance at nesting areas in old-growth forest in central California, during 1989-91. Activity levels were quantified at five nesting areas (216 surveys). Presence/absence was determined during an additional 116 surveys. Murrelets were active year-round, though activity levels in fall and winter were about half those in spring and summer. Murrelets were absent, or activity was minimal and most variable, during August-October and March, coinciding with periods of molt. Murrelets attended nesting areas during the nonbreeding season more frequently than murrelets in other regions, and other members of the Alcidae. Circumstantial evidence suggests that wintering birds may be experienced, resident breeders. Fall and winter attendance may be important for maintenance of nest sites, nesting territories, and pair-bonds. I hypothesize that high quality nest sites in old-growth forests are limited. Winter attendance behavior has important implications for management and conservation. Nesting areas should be protected throughout the year. In some areas, winter may be an ideal time to conduct long-term monitoring studies, as variability in attendance is low, and winter populations probably consist of high-quality breeders.

Nesting Patterns and Competition among Breeding Terns and Black *Skimmers in Coastal Southern California.* *Esther E. Burkett, Calif. Dept. of Fish and Game, 1416 Ninth St., Sacramento, CA 95814, Charles T. Collins, Dept. of Biology, Calif. State Univ., Long Beach, CA., 90840, and William A. Schew, Dept. of Biology, Univ. of Pennsylvania, Philadelphia, PA 19104.*

The breeding biology of five tern species and Black Skimmers was studied between 1987 and 1990, the period of colony establishment. The colony consists of two man-made islands created for the endangered California Least Tern, which used both islands beginning in 1979. Skimmers followed in 1985, Caspian Terns in 1986, Elegant Terns and Forster's Terns in 1987, and Royal Terns in 1988. By 1990 Least Terns numbered about 200 pairs, and were displaced from North Island to South Island. The large tern species had synchronous nesting patterns, with egg-laying occurring in May, chick hatching in June, and chick fledging by the end of July. Least terns exhibited known bimodal nesting peaks in mid-May and mid-June, and chicks fledged by August. However, skimmers had a protracted egg-laying period extending from June through August, and hatching from July through September. Color-marked skimmers have been documented on other breeding sites and continued colony growth seems likely. Management of breeding habitat for these species is challenging given limited nesting habitat in coastal California, and the endangered status of the Least Tern.

Survival and Breeding Probability of Brandt's Cormorants on Southeast Farallon Island in Relation to Age and Environmental Conditions. *Nadav Nur, William J. Sydeman, and David G. Ainley, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970.*

Brandt's Cormorants (*Phalacrocorax penicillatus*) display a very flexible breeding strategy: under poor environmental conditions, few attempt to breed. This makes assessment of survival on the basis of re-sighting individu-

als more difficult (individuals may be missed because they did not breed that year) and it presents difficulties in monitoring population size, since breeding numbers in a given year are a function of breeding probability. We present results of analyses of 15 years of observations on a marked sub-population of Brandt's Cormorants breeding on Southeast Farallon Island. We estimated annual survival probability of adults, breeding probability, and sighting probability (irrespective of breeding status), using the statistical program SURGE, with respect to age and year. Neither survival nor breeding probability varied with age, but both fluctuated strongly between years, as a function of environmental conditions. For both sexes, survival and breeding probability declined in years of poor food availability. We incorporate these two demographic parameters, and their covariation with environmental conditons, into a demographic model of Brandt's Cormorant population dynamics. We present several applications of the demographic model, including the effect of a change in prey availability on future population growth.

Brown Pelican Roosting Behavior at Mugu Lagoon, California. *Deborah L. Jaques, Craig S. Strong, U.S. Fish and Wildlife Service, 6924 Tremont Rd, Dixon, CA 95531; Thomas W. Keeny, U.S. Navy, Pt. Mugu Naval Air Weapons Station, Env. Div. P7320, Point Mugu, CA 93042-5000.*

We report on Brown Pelican abundance, habitat use, and responses to disturbance at Mugu Lagoon in the first year of an ongoing study initiated by the U.S. Navy. Pelicans used the lagoon year-round, with peak numbers observed in June (1,404 birds). More birds were present in daytime than after dark, and night roost locations were very specific and limited in the lagoon. Aerial and ground surveys of roost sites in southern California showed Mugu Lagoon to be the largest natural roost site on the mainland coast which is regularly used. Other large roost sites occurred on breakwaters, barges, and other man-made structures. Suitable roost locations may be a proximal limiting resource for Brown Pelicans in southern California, and disturbance can affect the quality of roosts. To evaluate the relative impact of various disturbance sources to pelicans at Mugu Lagoon, we developed a disturbance index which incorporated frequency, number, and response of birds to each disturbance type. The disturbance index may be appropriate for other species and modified for different situations. The Navy seeks to enhance the Mugu Lagoon roost by minimizing disturbance, in compliance with the Brown Pelican Recovery Plan.

Status and Distribution of Four Storm-Petrels in California. *Gerard J. McChesney and Harry R. Carter, U.S. Fish and Wildlife Service (NPWRC), 6924 Tremont Rd., Dixon, CA 95620.*

Breeding populations of four storm-petrel species in California were surveyed in 1989-91 as part of an update of the Catalog of California Seabird Colonies (Sowls et al. 1980). Burrow nesting birds were surveyed by burrow counts; crevice nesting birds were surveyed primarily by mist netting and capture-recapture. Leach's Storm-Petrels (12,551 birds at 13 colonies) breed primarily in northern California with smaller populations in Central (S.E. Farallon Is., SEFI) and southern (Channel Islands National Park, CINP) California. Declines at two northern California colonies due to habitat degradation led to 31% lower numbers overall. The endemic Ashy Storm-Petrel (7,209 birds at 12 colonies) breeds primarily at SEFI and CINP. The 38% higher numbers were due to higher estimates in CINP and may not reflect a true increase. Black Storm-Petrels (274 birds at 2 colonies) reach their northern limit at Santa Barbara Is. in CINP. The 83% higher numbers likely reflected differences in census methodology. No new estimates were made for Fork-tailed Storm-Petrel (410 birds at 5 colonies), which reach their southern limit in northern California. However, populations have likely declined due to habitat changes.

Seabird Monitoring and Research Program at San Nicolas Island, California. *Harry R. Carter, U.S. Fish and Wildlife Service (NPWRC), 6924 Tremont Road, Dixon, California 95620; Thomas W. Keeney, Env. Div., Naval Air Weapons Station, Point Mugu, California 93042; Gerard J. McChesney, Tracy A. Miner, and Leigh K. Ochikubo, U.S. Fish and Wildlife Service.*

An annual seabird monitoring and research program has been developed cooperatively by USFWS and NAWS (with DOD Legacy Resource Management Program funding) at San Nicolas Island in the Southern Channel Islands, 65 miles offshore from Los Angeles, California. As an active naval installation, NAWS must manage for the welfare of seabirds on SNI by preventing human disturbance from military operations, fishermen and recreationists. This program will provide long-term data to assess all human impacts (including pollutants and changing prey resources), given much annual variability in seabird breeding effort at this location (especially due to El Niño conditions). Breeding population size and breeding success of Brandt's Cor-

morants and Western Gulls will be examined initially, although additional studies are planned in the future. Other DOD installations with similar seabird issues will benefit from the SNI program.

Tree and Habitat Characteristics and Behavior at Fourteen Marbled Murrelet Tree Nests in Alaska. *Nancy L. Naslund, Kathy J. Kuletz, Mary Cody, and Dennis Marks, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

In 1991-92 we located 14 tree nests of the Marbled Murrelet on Naked, Kodiak, and Afognak islands, Alaska. All nests were on moss-covered platforms in old-growth trees of western hemlock (n=2), mountain hemlock (n=7), or Sitka spruce (n=5). Nest trees were located in high stand size class (i.e., large trees) and volume class forests (the highest in the region). In addition, 18 trees were documented where murrelets landed but nests were not known to occur. The dbh of nest and landing trees ranged from 30 to 104 cm and 35 to 118 cm, respectively. Naked Island nest and landing trees were similar to each other. They were also larger, had more platforms, and had greater epiphyte cover than did the nine closest canopy trees adjacent to each. Nest trees had similar characteristics to those at more southern latitudes in that they were old-growth conifers containing large moss-covered platforms. All nests where reproductive success was known (n=7) failed because of nest abandonment, predation, or unknown causes. Preliminary analysis of murrelet behavior at dawn suggests that pairs were active, perhaps territorial, around a group of trees and that some of these localized areas of activity were consistently used in successive years.

A Comparison of Two Confirmed and Three Probable Marbled Murrelet Nest Sites on Private Commercial Timber Lands in Northern California. *Steven J. Kerns, Wildland Resource Managers, P.O. Box 102, Round Mountain, CA 96084 Ray A. Miller, Pacific Lumber Company, P.O. Box 37, Scotia, CA 95565.*

Two Marbled Murrelet (*Branchyrampus marmoratus)* nests, and three eggshell trees were found in Humboldt County, California. A juvenile bird was observed on one nest for two and one-half weeks. Information on nests, trees, and stand structure was collected and compared. All trees were coast redwood (*Sequoia sempervirens*) with 100% canopy closure at the nest site. Stand canopy closure was lower, averaging less than 50%. Three of the sites were within 100 m of human disturbances. Findings are compared with other available data, and implications for management and future research will be discussed.

Activity and Nesting Habitat of Marbled Murrelets on the Central Coast of British Columbia. *Rick Burns and Lynn Prestash, 12136 New McLellan Road, Surrey, B.C., V3X 2X9; Dale R. Seip, B.C. Ministry of Forests, 1011 Fourth Avenue, Prince George, B.C. V2L 3H9; Jean-Pierre L. Savard, Canadian Wildlife Service, 1141 Route de l' Eglise, St. Foy, Quebec, G1V 4H5.*

Counts of Marbled Murrelets (*Brachyramphus marmoratus*) flying out of Mussel Inlet, Kynoch Inlet, and Mathieson Channel on the central British Columbia coast during April, May, and June revealed that on some days, up to 1265 of these birds flew out of these areas. Counts were conducted using a stationary count technique that recorded birds moving by a fixed point over a three-hour time period. A deep-water floating mist net system was used to catch murrelets, and of 12 birds captured, 9 had brood patches. Seven were radio-tagged and 3 were tracked to suspected nest sites on the sides of Mussel Inlet. Nest site habitat varied considerably, and included a low-elevation cedar swamp; a forested subalpine bowl; and a steep, forested slope near the shore. It appears that large numbers of Marbled Murrelets use these mainland inlets during the breeding season, and that those nesting in this area are flexible in their choice of nest sites.

Marbled Murrelet Activity in Four Forest Types at Naked Island, Prince William Sound, Alaska. *Kathy J. Kuletz, Dennis K. Marks, Nancy L. Naslund, and Mary Cody, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

As part of the *Exxon Valdez* oil spill restoration effort, we studied the breeding activity of Marbled Murrelets to identify nesting habitat and guide timber acquisition within the spill zone. The study area was mixed hemlock-spruce old growth interspersed with muskeg meadows. We used U.S. Forest Service timber maps to identify four forest types, based on volume class and stand class. Sites were randomly selected in each habitat type on Naked, Storey and Peak islands in Prince William Sound. An intensive dawn survey and vegetation plots were done at 72 sites from 10 June to 11 August 1991. Only 26% of the detections (n=2246) were within 100 m of the observer and 5% of those were occupied behaviors, which occurred at 19% of the

sites. Occupied behaviors were most frequent in high stand class forests (larger trees), and were positively correlated with on-site measurements of canopy tree dbh. The total number of detections per site was not random among forest types; moderate volume, high stand class forests had the highest mean detection rate. We conclude that in this area, murrelets tend to use moderate to high volume forests with large trees. The effects of other factors on murrelet use, such as slope, aspect, and distance from water, are examined as well.

Results of a Ground Search Method for Location of Tree Nesting Evidence of the Marbled Murrelet. *Mark E. Freitas, S. J. Kerns, and D. A. Fortna, Wildland Resource Managers, P.O.Box 102, Round Mountain, CA 96084.*

To augment existing data (T. E. Hamer 1991, video) regarding Marbled Murrelet (*Brachyramphus marmoratus*) nest site selection in northwest California and to facilitate management for the species, nest search methodologies were developed and tested on the commercial timber lands of Pacific Lumber Company in Humboldt Co., California. From 20 July to 11 September 1992, nine study areas were surveyed for Marbled Murrelet eggshell fragments. Five separate sets of Marbled Murrelet eggshell fragments were found in three of the nine separate study areas. Of the five eggshell finds, two yielded tree nests—one containing a nestling and the other a fecal ring. No nests were discovered in the other three trees under which eggshells were found. All trees under which the eggshell fragments were located were coast redwood (*Sequoia sempervirens*). Survey methods, factors in search area selection, and succesful application of search techniques are discussed.

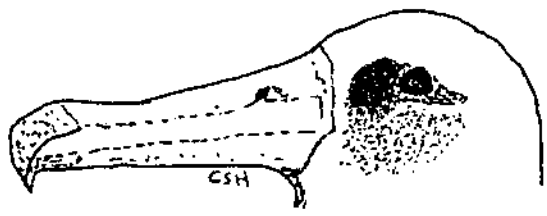
Marbled Murrelet Abundance Patterns at Sea in Relation to the Marine Environment. *Suzann G. Speckman, Alan M. Springer, Institute of Marine Science, Univ. of Alaska, Fairbanks, AK 99775, and John F. Piatt, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

Marbled Murrelets were surveyed daily for 14 weeks in the summer of 1992 by boat and from the shoreline in Auke Bay and Fritz Cove, near Juneau, Alaska. Abundance patterns and movements were analyzed in relation to physical variables including tide stage, amplitude of tidal oscillations, time of day, season, weather, and water temperature. Preliminary results indicate important effects of season, time of day, and tide cycle on Marbled Murrelet numbers at sea. Numbers were highest during the period before egg-laying, declined by half during incubation, and were highly variable after incubation. Numbers were highest on morning boat transects when water levels were highest, regardless of the direction of water movement. Numbers also peaked on days of minimum tidal oscillation, suggesting a preference for low current flow. Results from the land-based surveys at different tide stages indicated that numbers of murrelets peaked within a few hours after dawn, at a high or falling tide stage. These results have important implications for designing monitoring surveys to assess changes in Marbled Murrelet populations in Alaska and elsewhere.

Abundance and Distribution of Marbled Murrelets at Sea on the Oregon Coast. *Craig S. Strong, John R. Gilardi, Ian Gaffney, and Janice Cruz, Crescent Coastal Research, 7700 Bailey Rd., Crescent City, CA 95531.*

Vessel and aerial surveys for Marbled Murrelets (*Brachyramphus marmoratus*) were carried out between 1 June and 10 August 1992, in the first effort to measure marine abundance and distribution of the species along the entire Oregon coast. Statewide surveys were completed once by boat and once by air, but most effort was focused from 200 m to 500 m from shore off central Oregon. Repeated transects along selected coastal sections at 500 m increments offshore, up to 3.5 km out to sea, measured distribution in relation to distance from shore. Peak densities were always recorded less than 500 m offshore.

Murrelets were most abundant between Depoe Bay and Cape Arago and at some locations between Cape Arago and the California border. Low numbers were seen north of Lincoln City. After July 22, fewer were seen in central Oregon and more were counted along the north end of the state, possibly representing a post-breeding dispersal. Murrelets were distributed unevenly, occurring in dense "patches." High-density patches varied spatially and temporally throughout the season. Minimum population numbers are presented, and estimates based on strip transects and other methods are discussed.



Assessment of Change in Population Size for Marbled Murrelets in Clayoquot Sound, British Columbia: 1982 to 1992. *John Kelson, Irene Manley, Conservation International, Box 67, Tofino, B.C. Canada V0R 2Z0; Harry Carter, U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, 6924 Tremont Road Dixon, CA 95620.*

From June 17 until June 30, 1992, we repeated an at-sea survey originally conducted in June 1982 to examine the change in population size of Marbled Murrelets over the past 10 years in Clayoquot Sound, on the west coast of Vancouver Island, B.C. This was done by repeating the protocol used by Carter in 1982 to establish the total population of Marbled Murrelets. A grid of 1-km2 quadrats was surveyed by inflatable boat. The study covered the entire 335-km2 area of SE Clayoquot Sound, from waters up to 3-km offshore to the heads of the inlets. The total population counted was 2704 birds in 1992, a decrease of 40% from the 1982 total of 4524. Similarly to 1982, few birds were found in fiord habitat (density 0.25/km2), 42% in channel (density 9.1/km2), and 58% in inshore waters (density 11.1/km2). Factors affecting reproductive success of murrelets, such as loss of nesting habitat from clearcut logging and adult mortality from gillnet fishing, etc., are discussed as possible causes of this decline.

Use of Radar to Study Marbled Murrelets and Interpret Survey Results. *Thomas E. Hamer, 615 State St., SedroWoolley, WA 98284; C. John Ralph, Redwood Sciences Laboratory, U.S. Forest Service, Arcata, CA 95521; Brian A. Cooper, Alaska Biological Research, Fairbanks, AK 99708.*

A pilot project using a marine surveillance radar system modified for ornithological research was undertaken to study Marbled Murrelets (*Brachyramphus marmoratus*) in northern California. Monitoring sessions were conducted at both inland and coastal sites. The ability of the radar to discriminate murrelets from other targets and provide estimates of abundance was assessed by comparing radar data to simultaneous ground observer detections. Radar recorded the flight speed, direction, behavior, distance, and occasionally the altitude of murrelets. Murrelets were detected by radar at distances up to 1.3 km. The average flight speed for murrelets was 77 km/hr and ranged from 56 to 105 km/hr. On average, radar recorded 2.3 times more murrelets at inland sites than did ground observers. The overall error rate in identifying murrelets by radar was 61% for coastal sites and 2.2% for inland sites. The only inland bird species contributing to identification error was the Band-tailed Pigeon (*Columba fasciata*). Radar has advantages over observers because it can detect birds over a larger area, regardless of light conditions, fog, or background noise and does not rely on murrelets to vocalize for detection. Radar limitations with topography and vegetation are discussed.

Quantification of Habitats in Prince William Sound from Landsat Thematic Mapper Satellite Imagery. *Richard Podolsky, 235 West 56th Street #20N, New York, NY 10019-4330.*

The goal of this project was to identify and quantify habitats in Western Prince William Sound (PWS), Alaska from Landsat Thematic Mapper (TM) satellite imagery. Secondarily, the goal was to assess the feasibility of using satellite imagery and other remotely sensed products to measure the habitat of Marbled Murrelets and other species affected by the *Exxon Valdez* oil spill (EVOS). Here I present detailed habitat data on two million acres including acreage reports of 18 surface features for the mainland and the eleven principle islands in western PWS.

Forest lands were the most abundant habitat, covering 28 %; muskegs were the second most abundant habitat covering 20.4%, and snowfields and glaciers were third, totaling 13%. Rock, cloud, and alpine and shrub thickets were each under 10% of the study area. On islands, muskegs covered 25%, whereas on the mainland they covered only 14%. Forests covered 34% of the islands, compared with 19% on the mainland. Twenty nine percent of the mainland was covered by ice fields and glaciers, compared with less than 2% for this cover type on the islands. Sixty-one thousand acres of forested slopes (17%), a habitat possibly important to Marbled Murrelets and other EVOS damaged resources, were found on the islands, compared with 24,208 acres on the mainland (9%).

An assessment of the accuracy of the thematic map produced from the Landsat data when compared with random points on aerial photographs yielded an accuracy of 91%.

Abstracts. . .

Assessment of Seabird Mortality from the *Exxon Valdez* Oil Spill. *R. Glenn Ford, Ecological Consulting Inc., 2735 N.E. Weidler St., Portland, OR 97232 and John F. Piatt, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

Based on the recovery of about 30,000 oiled seabird carcasses, one carcass drift experiment (3% recovery) and direct observations at the time of the spill, and comparison with other studies, a preliminary conservative estimate of total seabird mortality from the *Exxon Valdez* oil spill was in the 100,000-300,000 range. Subsequent detailed experiments were conducted in the spill area to estimate more accurately a number of parameters that determined carcass recovery rates (loss at sea from sinking, persistence on beaches, scavenging, beach survey effort in different regions). A Monte Carlo analysis was conducted using a model that incorporated varying estimates of these parameters. The best estimate from this analysis suggests that 8% of carcasses were recovered, i.e., that about 375,000 seabirds died as a result of the *Exxon Valdez* oil spill. This represents the highest toll of marine birds from oil pollution ever documented. The taxa most affected were diving species: murres (74%), other alcids (7.0%), seaducks (5.3%), cormorants (3.0%), grebes (1.9%), and loons (1.5%).

Survival of Seabirds after Oiling, Cleaning, and Release. *Brian E. Sharp, 2234 NE 9th Ave., Portland, OR 97212.*

Banding data from oil spills on the Pacific coast were examined in an attempt to quantify post-release survival of oiled seabirds after cleaning. Of 1612 banded birds of 11 seabird species, 52 were recovered. Of 1140 banded Common Murres, 29 were recovered. Species recovered in smaller numbers included Red-necked and Western Grebes and Black, Surf, and White-winged Scoters. The mean and median number of days between release and recovery for murres were 21.1 and 8.0 days, respectively (n = 28); for all species mean and median were 22.1 and 6.0 (n = 49).

The probability of survival of Common Murres over five-day intervals, calculated by the maximum likelihood method, was 0.65, and their mean life span was 11.5 days. The probability of their surviving a year is 0.65^{73}, where 73 is the number of five-day periods in a year. Methodological problems that may bias the estimate are discussed, including the possibility that healthy birds do not have the same recovery rate as sick birds. The implication of these data is that the considerable effort that goes into capture and cleaning of oiled birds is for the most part ineffective and that oiled birds that are cleaned and released should be treated as dead birds for the purposes of assessing the damages of oil spills to seabirds.

Recovery of Shoreline Ecosystems Following the *Exxon Valdez* Oil Spill and Subsequent Treatment. *Alan J. Mearns, NOAA/Hazardous Materials Response and Assessments Division (HMRAD), 7600 Sand Point Way NE Seattle, WA 98115.*

In 1989, both oiling and high-energy treatment significantly altered the abundance and biodiversity of intertidal communities exposed to oil in Prince William Sound. Monitoring was conducted at least annually to document recovery and, in particular, to determine the extent to which high-pressure hot-water washing enhanced or delayed recovery of epibiota and infauna. Replicate samples were taken twice in 1990, three times in 1991 and once in 1992 at three elevations at up to 30 unoiled, oiled, and treated sites. By September 1991, the abundance and biodiversity of epibiota at oiled but untreated "set aside" sites was nearly restored to conditions at unoiled sites. On average, recovery of various species and measures of community structure at treated sites continues to lag and may take at least several more years to recover. Infauna (including clams) under both conditions are still far from recovered. Shorelines look remarkably clean, but oil in various stages of weathering remains below the surface at all previously oiled monitoring sites, regardless of treatment. This work is part of a larger HMRAD program to determine the efficacy and effects of various oil-spill clean-up methods, including bioremediation, dispersants, cleaners, and mechanical operations. These observations indicate a need for weighing in advance the net environmental benefits of oil-spill countermeasures.

Effects of the *Exxon Valdez* Oil Spill on Black Oystercatchers. *Brad A. Andres, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

Because Black Oystercatchers (*Haematopus bachmani*) are completely dependent on marine coastal habitats for their life's requirements, they are particularly susceptible to shoreline oiling problems. Damage assessment and restoration studies of Prince William Sound Black Oystercatchers were conducted briefly in 1989 and 1990 and more intensively in 1991 and 1992. Boat survey data from Prince William Sound generally indicated that pre- to postspill population changes were more negative in oiled areas than

in unoiled areas. On Kodiak Island Christmas bird counts, postspill counts of oystercatchers were significantly lower than prespill counts. Sublethal, negative effects of the *Exxon Valdez* oil spill were also evident in the oystercatcher population. Breeding oystercatchers were influenced directly by oil disturbance and indirectly through the ingestion of oiled prey. Cleanup activities caused lower productivity on disturbed shorelines than on undisturbed shorelines of Green Island. Oystercatchers nesting on oil-affected shorelines had lower egg volumes and lower chick growth rates than those nesting on oil-unaffected shorelines; however, biomass delivered to chicks on oiled shorelines was significantly greater. Although the number of breeding oystercatcher pairs increased on Green Island between 1989 and 1992, other oil-affected areas of Prince William Sound did not experience a similar increase in breeding pairs. Mixed sand-gravel beaches that are persistently oiled provide a possible source of chronic oil exposure for Black Oystercatchers. Ongoing work will attempt to provide a link between persistently contaminated mussel prey and physiological changes in the oystercatcher consumer.

Marine Bird Populations of Prince William Sound, Alaska, Before and After the *Exxon Valdez* Oil Spill. *Karen K. Laing, and Steven P. Klosiewski, U.S. Fish and Wildlife Service, Anchorage, AK 99503.*

We estimated marine bird abundances using boat-based surveys in Prince William Sound following the *Exxon Valdez* oil spill, and compared population trends in oiled zones to trends in unoiled areas. We counted approximately 100 bird species. Population estimates of 11 species or species groups declined between 1972-73 and 1989-90-91, including large declines for loons (*Gavia* spp.) (>36%), scoters (*Melanitta* spp.) (>54%), arctic tern (*Sterna paradisaea)* (>78%) and murrelets (*Brachyramphus* spp.) (>65%). No population estimates increased significantly. We detected net population losses (t-tests, $p<0.05$) in the oiled zone relative to unoiled zones for Pigeon Guillemot (*Cepphus columba*) in March and Northwestern Crow (*Corvus caurinus*) in July and marginally insignificant ($p<0.10$) losses for cormorants (*Phalacrocorax* spp.), Harlequin Duck (*Histrionicus histrionicus*) and black oystercatcher (*Haematopus bachmani*). Using a 1984 shoreline survey as a baseline, oiled-zone losses were detected for loons, Harlequin Duck, scoters, Black Oystercatcher, Arctic Tern, and Mew Gull (*Larus canus*). This study demonstrated the feasibility of statistically rigorous sampling design to estimate marine bird populations. However, identification of effects of perturbations such as the oil spill require repeated surveys over many years. This study should encourage scientists and managers to survey populations frequently using rigorous sampling design.

Effects of the *Exxon Valdez* Oil Spill on Pigeon Guillemots Breeding at Naked Island, Prince William Sound, Alaska. *Karen L. Oakley and Katherine J. Kuletz, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

We studied the effects of the 1989 *Exxon Valdez* oil spill on the population and reproduction of the Pigeon Guillemot (*Cepphus columba*) at Naked Island, Prince William Sound, Alaska. Oil surrounded Naked Island, located 30 km southwest of the grounding site, during the prebreeding season, and oil remained on the beaches at certain colony sites during 1989. The guillemot population was significantly lower in 1989 than in the early 1980s. By 1992, the population was roughly half its former size. The Prince William Sound population as a whole declined during this period. The extent to which the decline of the Naked Island population was due to the spill is unknown. However, declines were greater in the most heavily oiled portions of the study area. Reproduction in 1989 was similar to previous good weather years. However, the cryptic nature of guillemot nests decreased our ability to detect one of the more likely effects the spill could have had: an increased incidence of unhatched eggs. Reproduction in 1990 was poor with many nests failing due to low hatching success and predation, a decreased percentage of schooling fish in chick diets and slow chick growth.

Effects of the *Exxon Valdez* Oil Spill on Marbled Murrelets at Naked Island in Prince William Sound and Kachemak Bay. *Katherine J. Kuletz, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

The *Exxon Valdez* oil spill in Prince William Sound (PWS), Alaska, began on 24 March 1989 and spread 750 km in eight weeks. The Marbled Murrelet (*Brachyramphus marmoratus*) is common throughout the spill zone and is the most abundant seabird in PWS in summer. I studied the effects of the oil spill on the Marbled Murrelet at the Naked Island complex in central PWS and at Kachemak Bay on the Kenai Peninsula. The latter was only lightly oiled with weathered crude in mid-April. Prespill counts of murrelets at sea, compared with postspill counts showed that in 1989,

murrelet numbers and percentage of juveniles were significantly lower at Naked Island but not at Kachemak Bay. At both sites, there was a negative relationship between murrelet numbers and boat or plane activity. In 1989, 28 murrelets were collected in Prince William Sound and tested for internal contamination. Murrelets collected at oiled sites had petroleum hydrocarbon residues in liver tissues, whereas those collected at an un-oiled site did not. I conclude that at the Naked Island complex, murrelet numbers in 1989 were lower due to oil-induced mortality and disruption of breeding activity by human disturbance. The mean number of murrelets counted during shoreline surveys in 1990-92 at Naked Island was not significantly lower than the prespill mean of 1978-80.

Effects of the *Exxon Valdez* Oil Spill on Black-legged Kittiwakes in Prince William Sound. *David B. Irons, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99516.*

The numbers of nesting Black-legged Kittiwakes did not decline at colonies in the oiled area after the *Exxon Valdez* oil spill compared to pre-spill years. Reproductive success of kittiwakes in 1989 at the oiled colonies was about one half of what was expected based on previous years and the reproductive success of birds at the unoiled colonies ($P = 0.04$). Up to 37% of birds at oiled colonies were observed during June or July of 1989 with oil on their breast feathers, and no birds at unoiled colonies had oiled breast feathers.

Reproductive success of kittiwakes at all colonies in Prince William Sound declined in the postspill years (1990, 1991, and 1992), compared with the five previous years. The brood size of fledglings also decreased in the postspill years which suggests that there was less food available during these years.

Results from contaminant analysis demonstrated that in 1989, one of ten birds from oiled colonies had livers that were contaminated by petroleum hydrocarbons. In 1990 none of the five birds collected in the oiled area was contaminated, but two of the five had contaminated stomach contents. If this contamination resulted from the oil spill, it suggests that oil may have persisted at least a year in the food chain.

Effects of the *Exxon Valdez* Oil Spill on Murres: A Perspective from Observations at Breeding Colonies. *David R. Nysewander, Washington Dept. of Wildlife, 600 N. Capital Way, Olympia, WA 98501 and G. Vernon Byrd, Alaska Maritime National Wildlife Refuge, 2355 Kachemak Bay Dr., Homer, AK 99603.*

Following the *Exxon Valdez* oil spill in March 1989, murres (*Uria* spp.) were studied at breeding colonies within and just outside the path of the floating oil. At colonies within the path of the oil (but not those just outside it), numbers of murres were reduced, nesting phenology was delayed, and reproductive rates were below normal. These characteristics persisted at some locations, but not all, through 1992. Direct mortality from oiling was the most likely cause of declines in numbers of murres. Older adult murres usually arrive at colonies first; thus, because of the timing of the arrival of the oil slick, most birds killed were probably experienced breeders. Relative inexperience of the surviving breeding population likely caused abnormal breeding schedules and reduced success. Furthermore, reduced densities due to population declines likely resulted in increased predation of eggs and chicks by gulls. Restoration strategies include monitoring to evaluate recovery rates; a feasibility study to test the effectiveness of decoys, dummy eggs, and call playbacks in stimulating normal reproductive behavior; and a public information project designed to reduce disturbance near colonies.

Delayed Breeding Phenology and Resultant Productivity of Common and Thick-billed Murres at Puale Bay, Alaska, Following the *Exxon Valdez* Oil Spill. *Donna A. Dewhurst, U.S. Fish and Wildlife Service, Alaska Peninsula/Becharof National Wildlife Refuge Complex, P.O. Box 277, King Salmon, AK 99613 and James H. McCarthy, P.O. Box 909, Pictou, Nova Scotia B0K 1H0.*

During the summers of 1989-92, land-based productivity monitoring of common (*Uria aalge*) and Thick-billed (*U. lomvia*) Murres was conducted at Puale Bay, along the Pacific coast of the Alaska Peninsula. This four-year case study was one part of coordinated damage-assessment study on murres following the 1989 *Exxon Valdez* oil spill. Productivity steadily increased from negligible levels (5-10%) in 1989 and 1990 to 52-66% in 1992, testing significant using linear regression for both common ($r2=0.918$, $p<0.025$) and thick-billed ($r2=0.842$, $p<0.05$) murres. The mean age of fledging also increased significantly ($p<0.025$), from 16.2 ± 3.2 days in 1989 to 22.6 ± 3.8 days in 1992,

paralleling the increases in fledging success and productivity. Murre breeding phenology at Puale Bay was approximately one month later than for comparable colonies at the Semidi Islands and Cape Peirce, with chicks fledging in late September. This late phenology was very consistent between years during 1989-91 but shifted one to two weeks earlier during 1992. A possible relationship between the late breeding phenology, gradual lengthening of brooding periods, and increase in productivity is discussed. Additionally, the percentage of breeding murres on the productivity plots decreased significantly ($p<0.001$) from 1990 because more nonbreeders were present in 1992, possibly representing prespill young (fledged in 1988) returning to the ledges as four-year-olds.

Potential Restoration Options for Common Murres in the Aftermath of the Exxon Valdez Spill. *Daniel D. Roby, Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska, Fairbanks, AK 99775-0990.*

Common Murres (*Uria aalge*) suffered the greatest direct mortality from the *Exxon Valdez* spill of any bird species. Some spill-affected colonies have experienced low reproductive success during the four breeding seasons since the spill, presumably due to social factors. This indicates the potential need for restoration activities to encourage, enhance, and/or supplement natural recovery processes. The most feasible options for direct restoration of murres are various methods of enhancing social stimuli and nest site improvement. However, direct restoration activities may prove too costly and ineffective for appreciably enhancing recruitment at damaged colonies. The most promising potential method of indirect restoration is control of avian predators, but no control program should be initiated without prior studies to assess the severity of the problem. The best off-site restoration options appear to be eradication of introduced arctic foxes from islands in the Aleutians and acquisition/protection of seabird breeding colonies that are currently in private ownership. Enhancement of forage fish stocks and mitigation of incidental take of murres by commercial fisheries are both potentially effective restoration techniques, but current knowledge of these factors as they affect murre survival and reproduction are inadequate to judge potential efficacy. The efficacy of any and all restoration options is dependent on continued monitoring of spill-affected and control murre populations and the factors limiting those populations.

Strategies for Restoring Seabird Colonies. *Stephen W. Kress, Seabird Restoration Program, National Audubon Society, 159 Sapsucker Woods Road, Ithaca, NY 14850.*

Atlantic Puffins (*Fratercula arctica*), Common Murres (*Uria aalge*), Leach's Storm-Petrels (*Oceanodroma leucorhoa*), Common Terns (*Sterna hirundo*), Arctic Terns (*Sterna paradisaea*), and Roseate Terns (*Sterna dougallii*) are being restored on the Maine coast at former colony sites using active management strategies to encourage colonization. These strategies include habitat enhancements such as control of predatory gulls, artificial nesting structures, and control of vegetation using burns and landscape fabric; translocation of nestlings; and social attraction using models and sound recordings. Selection of appropriate strategies depends on life history parameters, history of extirpation and proximity of neighboring colonies. Combinations of these strategies have successfully restored puffins to two former nesting islands, terns to five islands and storm-petrels to four islands. Colonies that were restored more than ten years ago have continued to persist or grow without additional intensive management. Although protection of existing breeding colonies is usually the most cost-effective approach to seabird conservation, the active management strategies described in this paper offer additional opportunities for effective stewardship. Restoration of former colonies can benefit seabird populations by encouraging breeding at sites with lower predation rates and fewer risks from catastrophic events such as oil spills and disease.

Status of Harlequin Ducks in North America. *E. Frances Cassirer, Idaho Dept. of Fish and Game, 1540 Warner Ave., Lewiston, ID 83501.*

Although Harlequin Ducks (*Histrionicus histrionicus*) are locally common winter residents along northern Pacific coastlines, little is known of their numbers or population trends. Harlequins Ducks were listed as an endangered species in eastern Canada in 1990 and are a candidate for threatened or endangered status in the United States. This paper examines available data on the species' status throughout its range in North America and identifies areas of concern and information needs.

Abstracts. . .

Breeding Ecology of the Harlequin Duck (Histrionicus histrionicus) in the Rocky Mountains. *David L. Genter, Montana Natural Heritage Program, Helena, MT 59620; E. Frances Cassirer, Idaho Fish and Game, Lewiston, ID 83501; Pat Finnegan, Lewis and Clark National Forest, Choteau, MT 59422; and Rick Wallen, Grand Teton National Park, Moose, WY 83012.*

Harlequin ducks have been known to migrate inland to nest on mountain streams since the first naturalists explored the northern Rocky Mountain Region. Recent studies in Montana, Idaho and Wyoming have found this species to be rare and localized in distribution and abundance. Arrival dates from the coast vary with elevation, but most mated pairs and bachelor males arrive on breeding streams in late March and April. Selected waters are typically low gradient (<2%), second- to fourth-order streams with high water quality and little human disturbance. Harlequins were closely associated with riffle and run stream habitats with a cobble or boulder substrate. Marked birds have demonstrated high site fidelity; females exhibit natal fidelity. Breeding occurs over a four-week period; females construct a nest for 2-8 eggs and incubate for 28 days. Nests have been found in hollow snags, cliff sites, in-stream woody debris (jams), and on islands behind woody vegetation. Young are flightless for 56 days, initially using waters with lower velocity and later foraging in faster water. Brood weights at fledging varied, apparently with productivity of natal streams. Pair densities ranged from one pair per km of linear stream to less than one pair per 16 km. Nesting success and survival to fledging of known juveniles varied considerably (12-68% and 16-88%, respectively). Primary factors influencing productivity were timing and magnitude of spring runoff. Population estimates for the study area during the breeding season are: Montana, 260 (110 pr); Idaho, less than 100; Wyoming, less than 100.

A Preliminary Comparison of the Ecology of Harlequin Ducks Wintering in Eastern and Western North America. *R. Ian Goudie, Canadian Wildlife Service, Box 340, Delta, British Columbia, Canada, V4K 3Y3 and Holly A. Hogan, 2907-160th Street, Surrey, British Columbia, Canada, V4B 4Z5.*

Harlequin Ducks (*Histrionicus histrionicus*) are sea ducks that are relatively uncommon. The small and distinct populations occurring in Iceland, Greenland, and eastern North America each have special protection and designation. The Pacific population of Harlequin Ducks is relatively large, and the reasons for the relative "success" of this population are unknown. In a study of body size, diets, and activity budgets in Mergini, Goudie and Ankney (1986) concluded that the relatively small body size of Harlequin Ducks wintering in the northwest Atlantic incurred higher energetic costs. Greater energy requirements per unit of body mass were compensated by both increased proportions of time spent feeding and higher energy density in diets relative to larger species. This appeared to reduce options for the birds to adjust activity budgets to environmental conditions. In the southeastern Pacific, Harlequin Ducks selected diets of lower energy density than the Atlantic. Preliminary data for coastal British Columbia indicate that individuals spend less time feeding, possibly because of less harsh environmental conditions, a greater epibenthic diversity and abundance, and little hunting, which would result in reduced winter mortality compared to the Atlantic populations.

Seabird Interactions in Puget Sound Purse-Seine Fisheries. *Jon. D. Anderson, Washington Department of Fisheries, 1111 Washington Street SE, P.O. Box 43150, Olympia, WA 98504-3150.*

Observations of seabird interactions with commercial purse-seine fishing vessels were made during test fishing and commercial fisheries monitoring during the 1990-92 salmon seasons in Puget Sound. A total of 234 seine sets was observed during purse-seine test fisheries for coho salmon (*Oncorhynchus kisutch*) in the Kingston-Edmonds area in September and October, 1990-92. Four species of seabirds—Rhinoceros Auklet (*Cerorhinca monocerata*), Common Murre (*Uria aalge*), Pigeon Guillemot (*Cepphus columba*), and Western Grebe (*Aechmophorus occidentalis*)—were encountered in 52 sets. Of the 107 individuals encircled by seine nets, 88 escaped, 23 were entangled and released unharmed, and 6 were killed or injured. A total of 109 sets made by 82 individual commercial seine vessels was observed during coho and chum (*O. keta*) fisheries in the Seattle-Tacoma area in September and October, 1991-92. Seabirds (Rhinoceros Auklets, Common Murres, and Western Grebes) were observed encircled by 22 sets. Of the 62 individuals encountered, 45 escaped, 14 were captured and released, and 3 were killed. Seabirds were not encountered during 13 sets observed during the 1991 Skagit Bay pink salmon (*O. gorbuscha*) purse-seine fishery in August-September. Seabird behavior during interactions with those fisheries was discussed.

The Trophic Role of Dabbling Ducks in Intertidal Eelgrass Habitats of the Puget Trough. *John R. Baldwin and James R. Lovvorn, Dept. of Zoology, University of Wyoming, Laramie, WY 82071.*

Upon arrival at the Fraser River Delta in early October, dabbling ducks (mainly American Wigeon, Northern Pintails, and Mallards) feed almost entirely in intertidal habitats. Primary foods are the seeds, leaves, and rhizomes of the exotic eelgrass Zostera japonica and clams and amphipods inhabiting eelgrass beds. Since the late 1950s, Z. japonica has extensively colonized formerly bare mudflats; it grows from seeds in the spring and is uprooted by storm waves in early winter. The early winter shift of dabbling ducks from intertidal to farmland habitats appears to be motivated by disappearance of Z. japonica rather than by winter flooding of uplands as previously supposed. During fall and winter 1990-91, dabbling ducks in Boundary Bay consumed an estimated 125 tonnes of eelgrass, about 24% of standing stock. Eelgrass decomposes slowly, and growth of detrital bacteria and microalgae is limited by nitrogen availability. Thus, rapid regeneration of eelgrass nutrients in duck feces, bypassing decomposition, may accelerate nutrient and energy flow to the detrital food chain leading from bacteria to harpacticoid copepods to juvenile fish to piscivorous seabirds.

Changes in Pacific Northwest Marine Bird Breeding Populations Since the Last Ice Age—Possibilities? *Steve Speich, Dames & Moore, 1790 E. River Road, E-300, Tucson, AZ 85718 and Terence R. Wahl, 3041 Eldridge, Bellingham, WA 98225.*

During the last Ice Age many areas now occupied by marine bird breeding sites were probably unsuitable, and breeding distributions were different from the present. During the postglacial period, the present breeding distribution of many species was established. The presence of Native Americans, who hunted and gathered marine birds and their eggs, may have limited the abundance and distribution of species, some more than others. The end of the hunting-and-gathering period likely allowed species to colonize new nesting areas and increase in abundance. Colonial, surface-nesting species likely responded. Since World War II in western Washington, several resident species as well as recent colonists, increased in numbers.

Washington State's Simplified Approach to Natural Resource Damage Assessment. *Laura Geselbracht and Richard Logan, Washington State Department of Ecology, P.O. Box 7600, Olympia, WA 98504-7600.*

Assessing injury to natural resources resulting from oil spills and valuing the loss has never been an easy task. Traditional field-based damage assessment requires detailed knowledge of resource distribution and abundance and timely collection of evidence. Such information is not available for the majority of marine resources and evidence collection is hampered by visual obscurity, sinking, and scavenging. The Washington State Oil Spill Compensation Schedule provides resource trustees with a simplified tool for assessing natural resource damages resulting from oil spills into aquatic environments. To calculate resource damages using the Compensation Schedule, it is not necessary to know the exact nature, extent, and value of the injuries sustained. Rather, resource damages under the Compensation Schedule are based on the type and volume of oil spilled, the sensitivity of the resources affected by the spill, and actions taken by the responsible party that minimize spill effects. Resource sensitivity is determined through use of several preconstructed relative rankings that were developed using the best available resource information and expert judgement. Perhaps the greatest advantage of the this simplified approach is relatively quick recovery of damages, allowing restoration projects and studies to be initiated in a timely manner.

Factors Affecting Colony Attendance and Reproductive Success of Common Murres (*Uria aalge*) on Tatoosh Island, Washington. *Julia K. Parrish, Institute for Environmental Studies, FM-12, University of Washington, Seattle, WA 98195.*

On July 26, 1991, oil leaking from a sunken Japanese fishing vessel, the *Tenyo Maru*, washed past Tatoosh Island, at the northwest tip of the Olympic Peninsula, killing at least 2172 Common Murres (*Uria aalge*) in the vicinity. At the time of the spill, ten species of seabirds were breeding on Tatoosh. It seemed likely that the spill would have a dramatic, negative impact on the Tatoosh murre population (4500 in 1991). Field population-monitoring and sets of behavioral observations were used to determine the 1992 colony attendance and reproductive success relative to prespill figures gathered in 1991. In 23 crevasse colonies attendance was approximately 30% lower in 1992, indicating an island-wide downward trend. Although the oil spill

is the most likely culprit, there are several other potential forcing factors. During the 1992 breeding season the Pacific Northwest went through an ENSO event, an oceanographic phenomenon that can cause depression in colony attendance. Furthermore, phenology and breeding success of the murres on Tatoosh are significantly affected by colony location, and a related variable, predatory pressure. Therefore, the downturn in 1992 may be due to an interaction between two or more of these forces.

The Conservation of Oregon Seabirds. *Roy W. Lowe, U.S. Fish and Wildlife Service, Newport, OR 97365.*

More than 50% of the nesting seabirds on the Pacific coast of the continental United States occur in Oregon. The abundance and variety of protected breeding habitat, combined with a productive coastal upwelling ecosystem, supports an estimated 1.13 million nesting seabirds. The majority of the rocks, reefs, and islands in Oregon are included in Oregon Islands and Three Arch Rocks National Wildlife Refuges and are managed as wildlife sanctuaries by the U.S. Fish and Wildlife Service. The productive ecosystem and abundance of protected breeding habitat, combined with a lack of coastal gillnet fisheries, commercial depletion of prey resources or major oil spills, has resulted in stable or increasing seabird populations in Oregon. The greatest threat to Oregon seabirds today is harassment of nesting birds from human activities near colonies. Reproductive impacts and failure occur when shoreside users attempt to get too close to nesting birds or gain access to rocks during low tides, from boats and other watercraft approaching too close to colonies, and from low-flying aircraft. Current conservation efforts include acquisition of privately owned colony sites by fee title or conservation easement, attempts to establish buffer zones around major colonies, dissemination of information and educational materials to the public, and enforcement of federal law.

Foraging Efficiency of Freeliving Red-necked Phalaropes at Mono Lake: A Test of the Usefulness of Laboratory Measures of Feeding Performance. *Margaret Rubega, Department of Ecology & Evolutionary Biology, University of California, Irvine, CA 92717.*

Laboratory-based feeding experiments designed to examine the effects of changes in prey density on feeding performance have previously been conducted with Red-necked Phalaropes (*Phalaropus lobatus*). Experiments were designed to examine the potential effects of prey density changes resulting from declining water levels at Mono Lake. To validate the results of these laboratory tests, free-living Red-necked Phalaropes were videotaped while feeding and the resulting films scored at half speed to determine field feeding rates and foraging efficiencies. The data indicate that mean foraging efficiencies of birds feeding in the lab on brine fly (*Ephydra hians*) larvae at the lowest experimental density are one-and-a-half times greater than those of birds feeding in the field. This result implies that either laboratory experiments accurately predict decreasing foraging efficiency with decreasing prey density or values for feeding performance across changing prey densities from a laboratory situation are overestimates of how "well" phalaropes can do at a given prey density and that laboratory experiments are therefore likely to underestimate the negative effects of decreasing prey density in a field situation, or both.

Prey Choices and Foraging Efficiency of Juvenile California Gulls at Mono Lake. *Chris Elphick, Ecology Evolution & Conservation Biology, University of Nevada, 1000 Valley Rd., Reno, NV 89512 and Margaret Rubega, Department of Ecology & Evolutionary Biology, University of California, Irvine, CA 92717.*

Mono Lake supports the second largest California Gull (*Larus californicus*) colony in the world. Consequently, concerns have been raised over the likely effects on this species of declining lake levels. To date, however, attention has been focused on increases in predator access to the islands on which the birds nest. Little attention has been paid to the effects of water diversions on the gulls' food supply. We present evidence that the more vulnerable of two potential prey species, the brine fly (*Ephydra hians*), may be a more important food source than has previously been assumed. We videotaped feeding juvenile gulls and scored films at half speed to determine prey choices and foraging efficiency. Our results show that Ephydra constitute a major portion of the diet of the birds filmed, and that feeding efficiency is high. We suggest that the high nutritional value of the flies and the nonmotility of floating pupae and recently emerged adults make them a valuable food source to inexperienced juvenile gulls. Such factors should be considered in the management of the gull colony at Mono Lake.

Significance of Stomach Oils for Reproduction in Petrels. *Daniel D. Roby, Jan R. E. Taylor, and A. R. Place, Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska, Fairbanks, AK 99775-0990 and Center of Marine Biotechnology, Maryland Biotechnology Institute, Baltimore, MD 21202.*

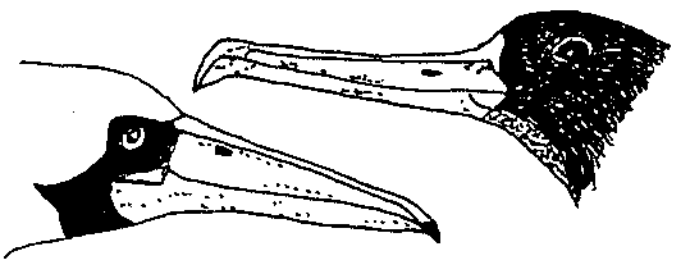
Stomach oils, a complex mixture of neutral dietary lipids, are typical of Procellariiform birds. We investigated the role of stomach oils in seabird reproductive energetics by comparing the Antarctic Prions (*Pachyptila desolata*), a species that feeds its young stomach oils, with the South Georgia Diving Petrels (*Pelecanoides georgicus*), a species that lacks stomach oils. We cross-fostered the two species in the field and raised the two species in the lab on low-oil and high-oil diets. Diving petrel parents deliver meals to their chicks about twice as frequently as prion parents, but diving petrel foster parents did not successfully raise prion chicks, presumably because of the absence of stomach oils in meals fed to chicks. Prion parents successfully raised diving petrel chicks to fledging, but growth rates were lower than in controls and fledging was delayed. Diving petrel chicks fed high-oil diets in the lab excreted considerable oil, and the development of these chicks was retarded. Diving petrels lack the digestive physiology and anatomy to efficiently digest and assimilate diets containing stomach oils. Prion chicks fed a high-oil diet developed at the same rate as prion chicks on a low-oil diet, but the rate of body mass increase was significantly greater. Adult prions feeding chicks had substantially lower field metabolic rates than diving petrel adults. The higher foraging efficiency of prion parents, together with the production of stomach oils in the proventriculus, allows prions to feed their young an energy-rich diet. Stomach oils appear to be an essential adaptation for enhancing the energy density of chick meals in petrel species that feed their chicks less frequently than diving petrels.

Nest Selection in Male and Female Magellanic Penguins. *David Stokes, Department of Zoology, NJ-15, University of Washington, Seattle, WA 98195.*

MagellanicPenguins exhibit high breeding-site fidelity. Yet although large-scale movements are rare, substantial numbers of birds change nest sites between breeding seasons. Patterns of nest selection differ between the sexes, reflecting different costs and benefits for males and females. Among males that change nests, subsequent nest choice is influenced by proximity to the old nest and nest quality. Besides being more likely to fledge chicks, males in high-quality nests are more likely to attract females than are males in low-quality nests. Females are more likely to change nests than males and to move greater distances. Arriving at the colony later than males, females may be able to base nest selection on information not available to males.

Air-Sea Heat Flux, Ocean Wind Fields, and Offshore Dispersal by Gulls during Winter. *J. Christopher Haney, Wildl. Technol. Program, School of Forest Resources, Pennsylvania State University College Place, Du Bois, PA 15801; David S. Lee and Mary J. Socci, North Carolina State Museum of Natural Science, P.O. Box 27647, Raleigh, NC 27611.*

Gulls delay dispersal to oceanic waters in the western North Atlantic until onset of winter meteorological conditions, several months after cessation of breeding. Off the southeastern U.S., gull presence in offshore habitats was inconsistently associated with seasonal variability in mean wind speed, but negatively associated with monthly and accumulated air-sea heat flux (surrogates for temperature inversions, i.e., prethermal conditions) and positively associated with windspeed variance (an energy source for flight as well as a thermal inducement). Meteorological variables explained as much as 59-81% of seasonal changes in gull abundance offshore. Our findings support Woodcock's (1940)"convective soaring" hypothesis, which attributed gull dispersal during winter to boundary-layer dynamics along eastern continental margins. We extend this model by linking gull wing morphology and flight to energy-efficient reliance on air-sea interactions and geographic patterns in seasonal wind fields. Summer meteorological conditions in much of the western North Atlantic facilitate coastal foraging by gulls, but preclude efficient foraging in offshore habitats. Coherent and synoptic processes in the aerial environment may select for (or maintain) divergent life-history strategies observed in gulls and certain other inshore feeders.



Abstracts. . .

Auklets, Eddies, and Zooplankton in Bering Strait. *John F. Piatt, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503; Alexei Pinchuk, Lab. Mar. Res., Zoology Inst. Acad. Sci., Universitetskyaya nab. 1, St. Petersburg, 199034 Russia; Alexander Kitaiskiy, Inst. Biolog. Problems North, Karl Marx St. 24, Magadan 685000 Russia.*

Millions of seabirds, mostly planktivorous Aethia auklets, breed on the Diomede Islands in the center of Bering Strait. We conducted ship-based surveys of seabirds, zooplankton (acoustic and net-tows), and oceanography (SST, SSS, and CTD profiles) in July 1991. Alaska coastal water sustained a low biomass of coastal zooplankton, few auklets, and moderate densities of fish-feeding seabirds. Least Auklets and oceanic copepods were abundant in stratified shelf water and near upwelled Anadyr water in western Bering Strait. A small (20-30 km) baroclinic eddy surrounded by upwelled Anadyr water contained the highest acoustically determined biomass of zooplankton in the study area. Crested Auklets, which feed mostly on euphausiids (*Thysanoessa* spp.), were associated with the eddy. Fish-feeding seabirds (e.g., murres, kittiwakes, puffins) foraged mostly in stratified Alaska and Siberian coastal waters. We conclude that physical processes (upwelling, stratification, and eddies) in Bering Strait determined zooplankton availability to planktivores. Auklets exhibited threshold responses to plankton density and appeared to forage only as far from their colonies as necessary to exploit dense, accessible plankton aggregations.

Stable-Isotopic Determinations of Seabird Trophic Relationships in the Northwest Pacific Ocean. *Keith A. Hobson, Canadian Wildlife Service, 115 Perimeter Road, Saskatoon, Saskatchewan S7N 0X4 and John F. Piatt, U.S. Fish and Wildlife Service, Anchorage, AK 99503.*

Twenty-five species of marine birds from two regions of coastal British Columbia and the western Gulf of Alaska were analyzed isotopically. Stable-nitrogen isotopic analysis of seabirds and their prey confirm that this isotope can be used to predict seabird trophic positions in each of these regions. Seabird trophic level inferences based on ∂15N analyses are in general agreement with those of conventional dietary studies but suggest that lower-trophic-level organisms are more important to the diet of several seabirds than was previously recognized. Stable-carbon isotope analysis may be more generally applicable to seabird dietary analyses as an indicator of benthic vs. pelagic feeding preference.

Endangered Japanese Murrelets: Incidental Catch in High-Seas Driftnets and Postbreeding Dispersal. *Patrick J. Gould and John F. Piatt, U.S. Fish and Wildlife Service, 1011 E Tudor Rd., Anchorage, AK 99503.*

The incidental catch of seabirds in high-seas driftnets was recorded in 1990-91 by scientific observers on commercial squid and large-mesh-fishery vessels operating in the North Pacific Transitional Zone. Twenty-six Synthliboramphus murrelet mortalities were recorded in the months of August through December. All but one were from the Korean squid fishery in an area bounded by 38-44°N and 142-157°E. Of ten specimens identified by observers as Japanese Murrelets (*S. wumizusume*), two were collected and later confirmed as such; another three *Synthliboramphus* spp. were also later identified as Japanese Murrelets. No Ancient Murrelet (*S. antiquus*) identifications were confirmed. The estimated total mortality of Japanese Murrelets in high seas driftnet fisheries represents a significant proportion of the total world population (ca. 1000-1500 individuals) of this rare and endangered species. As fishing effort was widely distributed over a large area east of Japan, catch data suggest that postbreeding Japanese Murrelets migrate north to winter in an area southeast of Hokkaido, where persistent eddies form at the confluence of the Oyashio and Kuroshio currents. Fronts between cold Oyashio water and Kuroshio warm-core eddies promote the aggregation of zooplankton and pelagic fishes, which in turn may sustain murrelets during the nonbreeding season.

Seabird Colony Studies on Talan Island, Northern Sea of Okhotsk. *A. Ya. Kondratyev, Institute of Biological Problems of the North, Far East Branch, Russian Academy of Sciences, Karl Marx St. 24, Magadan, Russia 685000.*

Talan is a small (2.5 km2) island situated in shallow coastal water of Tauj Bay in the northern Sea of Okhotsk. This island supports one of the largest and most diverse aggregations of breeding seabirds in the Russian Far East. The most numerous species is the Crested Auklet, with close to 1 million individuals. Also abundant (>10,000 individuals) are Parakeet Auklets, Ancient Murrelets, Tufted Puffins, Horned Puffins, Thick-billed Murres, Common Murres, and Black-legged Kittiwakes. Lesser numbers of Least Auklets, Spectacled Guillemots, Pelagic Cormorants, and Slaty-backed Gulls nest on Talan. Since the spring of 1987, a field station has been occupied annually by 5-10 persons to investigate: (1) population sizes, trends, and counting methods, (2) annual productivity of selected spe-

cies, (3) seabird feeding ecology and forage, and (4) incubation rhythms and chick development. In 1992, we began collaborative work with American colleagues to assess the adult survival and population dynamics of kittiwakes for comparison with information on this species in Alaska. Continued seabird monitoring on Talan Island is especially important because nearby portions of the continental shelf are now scheduled for oil exploration and development.

Seabird Population Changes on Middleton Island, Alaska. *Scott A. Hatch, Brian S. Fadely, and Bay D. Roberts, Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

Middleton Island, north-central Gulf of Alaska, was visited in 1956 by Robert Rausch, who provided some of the earliest estimates of seabird population sizes for any Alaskan colony. Censuses of several species have been conducted almost annually since 1974. Black-legged Kittiwakes increased from an estimated 10,000-15,000 pairs in 1956 to more than 80,000 pairs in 1981 but have since declined to about half that level. Rausch found only about 400 murres, mostly Thick-billed, during his visit. Today the island supports a similar number of Thick-billed Murres but also has 6000-8000 Common Murres that were not present in 1956. No Glaucous-winged Gulls were breeding on Middleton in 1956. By the mid 1970s there were 500-700 pairs, and by 1990 the population had grown exponentially to more than 7000 pairs. One of four small colonies of Rhinoceros Auklets increased from fewer than 50 to more than 900 burrows between 1978 and 1992. The reasons for these and other changes can only be guessed at. Middleton Island was uplifted about 4.5 m in the Alaska earthquake of 1964, significantly altering bathymetry in the area, possibly in a manner favorable to forage fish or other seabird prey.

Seabird Reproduction and Diets at the Pribilof Islands with Respect to Sea-Surface Temperature and the Abundance of Juvenile Pollock in the Eastern Bering Sea. *Mary Beth Decker, George L. Hunt, Jr., Department of Ecology and Evolutionary Biology, University of California, Irvine, CA, 92717; G. Vernon Byrd, Jr., U.S. Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge, Homer, AK 99603.*

Marine birds nesting on the Pribilof Islands, southeastern Bering Sea, exhibited decreases in reproductive performance (Black-legged Kittiwakes, *Rissa tridactyla*, and Red-legged Kittiwakes, *R. brevirostris*) and changes in food habits (Black-legged Kittiwakes, and Thick-billed Murres, *Uria lomvia*) beginning about 1978. These changes coincided with the appearance of the unusually large 1978 year class of walleye pollock (*Theragra chalcogramma*) and the beginning of a period of above average sea-surface temperatures that lasted until 1984. Seabird reproductive performance and diets did not return to pre-1979 values after 1984, suggesting that the changes in the marine ecosystem to which the birds responded lasted longer than the cycles of warm and cool surface temperatures observed between 1975 and 1990.

Growth-Rate Variation in Tufted Puffin Nestlings on East Amatuli Island. *Arthur Kettle, Institute for Environmental Studies, FM-12, University of Washington, Seattle, WA 98195.*

Growth rates of Tufted Puffin nestlings on East Amatuli Island, Alaska were measured during 1976-77, 1979-82, and 1990-92. Among years, mean rates of increase of both weight and wing chord differed significantly. Growth of nestlings may be regulated in part by the abundance of prey available to foraging parents. However, an experiment of supplementary feeding of chicks did not increase growth rates. The type of prey available may also affect growth. Chick diet samples show interyear differences in the species composition of prey parents fed nestlings. Prey availability may be related to physical and biological oceanographic factors. Analysis of the relationships among growth rates, chick diet, and oceanographic conditions may make the relatively easy measurement of nestling growth a valuable gauge of more difficult measurements of Tufted Puffin reproductive success and marine productivity. Fine-scale study of within-season growth changes may provide clues about the mechanisms of interyear observations.

Seabirds as Indicators of Marine Food Supplies: Fledging Weights Revisited. *William J. Sydeman and David G. Ainley, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970.*

Seabirds are abundant predators in the marine environment, feeding primarily on small crustaceans and juvenile fish. Reproductive performance of seabirds may vary as a function of local fish and crustacean availability. In particular, chick fledging weight has been suggested to be sensitive to variation in food availability and may therefore serve as a reliable indicator of the state of marine resources. Wil-

liams and Croxall (1990) have, however, recently challenged this idea by illustrating how the relationship between fledging weight and food supplies varies with chick age (at time of measurement) and brood size. We further evaluate Williams and Croxall's argument using a 22 year time-series of fledging weight and diet of Pigeon Guillemots at the Farallon Islands and a 10 year time-series of NMFS rockfish estimates from the Gulf of the Farallones. Fledging weights were significantly greater in years of high rockfish availability; approximately 50% of the variation in mean fledging weight could be explained by fish availability. Fledging weight was also correlated with average breeding success. However, results varied by brood size and other factors as found by Williams and Croxall. Implications of these results to oceanic monitoring programs in the north Pacific and elsewhere are discussed.

Booby Prey-capturing Behavior in the Eastern Tropical Pacific. *Robert L. Pitman and Lisa T. Ballance, SW Fisheries Science Center, P.O. Box 271, La Jolla, CA 92038.*

We studied methods of prey capture by Masked (*S. dactylatra*), Red-footed (*S. sula*), and Brown (*S. leucogaster*) Boobies in the pelagic eastern tropical Pacific from 1979-1990. Our observations suggest that these three species take similar sizes and species of prey (mainly flying fish) but specialize in different prey capture behaviors. Masked Boobies captured prey almost exclusively by vertical plunge diving (99% of 327 capture attempts) from a steep angle (> 75°) and a mean height of 8.9 m and remained submerged for a mean of 2.7 seconds. In contrast, Red-footed Boobies caught prey primarily in the air (83% of 328 capture attempts). They occasionally plunged but from lower heights (mean of 3.6 m), remaining submerged for shorter periods of time (mean of 1.2 seconds). Brown Boobies also caught prey using plunge dives (61% of 168 capture attempts) from low heights (mean of 4.0 m) remaining submerged for a mean of 1.4 seconds. In addition, they used a modified method that we have termed "skim plunging" (37% of attempts): plunge diving from a low angle (> 15°). We never observed skim plunging by Masked or Red-footed Boobies. Because the Red-footed Booby specializes on disturbed prey, it appears to depend more on subsurface predators for successful feeding than either of the other two boobies.

Phenology Analysis: When Do Tropical Seabirds Breed? *Elizabeth N. Flint, U.S. Fish and Wildlife Service, Pacific/Remote Refuges, P.O. Box 50167, Honolulu, HI 96850.*

Proximate factors related to the initiation of breeding in birds are least well understood in tropical species. I examined breeding population and phenology data collected year-round for the last 12 years at the Tern Island field station, French Frigate Shoals, Hawaii, to develop methods for quantifying variation in breeding attempts in terms of magnitude, timing, and synchrony. I also analyzed time series of breeding data for Black Noddies, Red-footed Boobies, and Red-tailed Tropicbirds using autocorrelation, spectral analysis, and cross-correlation to detect periodicities of other than 12 months and to search for relationships between initiation of breeding and oceanographic and physical fluctuations such as sea level and wind velocity. All eggs of nine species breeding at Tern Island were counted at intervals equivalent to their incubation periods. This allowed estimation of total eggs laid per year and description of their temporal distribution during the year. Measurements of egg-laying synchrony, weighted mean Julian date of laying, and total eggs laid showed striking parallels among species through the years, despite their ecological differences. Time series of these variables also showed patterns related to major oceanographic events such as the last three ENSOs (El Niño-Southern Oscillation).

Conservation of Seabirds on Christmas Island. *Mark J. Rauzon, Marine Endeavors, Box 4423, Berkeley, CA 94704 and Katino Teeb'aki, Wildlife Conservation Unit, Kiritimati (Christmas Island), Kiribati.*

The reasons for decline in seabirds at Christmas Island, Republic of Kiribati, Central Pacific Ocean, have been confounded by the El Niño phenomenon, but the decrease in Masked Boobies, Red-tailed Tropicbirds, and Sooty Terns can be attributed in part to feral cat predation and poaching. To fulfill the Christmas Island feral animal eradication plan, biological control via feline parvovirus was successfully applied through a coordinated effort between New Zealand, Kiribati, and North American public and private conservationists. The Kiribati islanders' concerns and the ecological consequences about feral cat eradication and poaching are discussed.

Breeding Biology of Bulwer's Petrel (*Bulweria bulwerii*) on Johnston Atoll, Pacific Ocean. *Donna L. O'Daniel, Johnston Atoll National Wildlife Refuge, P. O. Box 317, APO AP 96558.*

During 1991 and 1992, approximately 60 pairs of Bulwer's Petrels nested along the causeway of Sand Island, Johnston Atoll. The breeding season is well defined, adults arriving in early April and departing by mid-September. They construct crude nests in natural rock crevices and arrive and depart the nest sites only between dusk and dawn. During 1991 the entire colony was monitored twice monthly, and during the nesting season of 1992, one group was monitored intensively, and a second, control group was monitored twice monthly. Adults sat tightly on their eggs during incubation and most chicks hatched synchronously, between 24 and 30 June. Most chicks fledged between 21 August and 1 September. The overall rate of success for both groups for each stage of the nesting cycle was determined: hatching success was 73%, fledging success was 97%, reproductive success was 71%. Observed feeding of chicks just before fledging suggests that adults do not abandon chicks for a period before fledging. In addition, vocalizations of Bulwer's Petrels were counted along the entire causeway at different times of the night throughout the nesting season to determine, for management purposes, when they were most vocally active.

Posters...

Management and Breeding of Captive Alcids at the Seattle Aquarium. *Barbara K. Douma and Mary Carlson, Seattle Aquarium, Pier 59, Waterfront Park, Seattle, WA 98101.*

The Seattle Aquarium has exhibited four species of alcids since it opened in 1977: Tufted Puffins, Common Murres, Rhinoceros Auklets, and Pigeon Guillemots. Over the years, the alcid management program has evolved to include the development of a comprehensive diet and a successful breeding program. In 1991, a Tufted Puffin was hatched at the aquarium, and a breeding pair of Rhinoceros Auklets has laid an egg for two consecutive years. The staff has experimented with various artificial burrows and nest cavities, diets, and photoperiods to support captive breeding. In addition, the staff has conducted a few research projects with the alcid population and is interested in entertaining research proposals from Pacific Seabird Group members. This presentation introduces the exhibit, husbandry techniques, and the breeding program.

Radar Studies of Newell's Shearwaters on Kauai, Hawaii, During Fall 1992. *Brian A. Cooper and Robert H. Day, Alaska Biological Research, Inc., Fairbanks, AK 99708.*

We used an ornithological radar, night-vision scope, and forward-looking infrared (FLIR) system to monitor movements of Newell's Shearwaters at eight sites on Kauai during October 1992. Concurrent sampling with the radar and the night-vision scope and information on species flying at night indicated that the error rate for identifying targets on the radar was low. The FLIR and night-vision scope (with an additional light source) could detect shearwaters up to 500-1000 m away. Movement rates were highest in northern and eastern Kauai and lowest in southern Kauai. Mean nightly movement rates ranged from 9 to 85 targets/h, and the highest hourly movement rate was 355 targets/h. We observed substantial among-night variation in movement rates and a decline in numbers over the study period. The highest movement rates occurred when shearwaters moved inland just after dark (1830-1900 h) and moved seaward just before dawn (0500-0600 h). Steady, low-level movement both inland and seaward occurred during the remainder of the night. Radar measurements indicated that most birds flew between 76 and 275 m above ground level; head winds did not seem to decrease flight altitude.

Using Mist Nets to Capture Marbled Murrelets Over the Water. *Rick Burns, 12136 New McLellan Road, Surrey, B.C. V3X 2X9; Gary W. Kaiser, Canadian Wildlife Service, P.O. Box 340, Delta, B.C. V4K 3Y3; Lynn Prestash, 12136 New McLellan Road, Surrey, B.C. V3X 2X9.*

Radiotelemetry and other studies of Marbled Murrelets (*Brachyramphus marmoratus*) depend on the ability to capture samples of the birds. Here we present two systems for erecting mist nets over water. One system, suitable for use in shallow, sheltered water, is light and easily portable. The other system, suitable for use in deep water, is able to withstand strong winds and large tides but requires more effort to set up or move. These systems use standard mist nets and readily available commercial fishing supplies.

Both systems took advantage of the daily flights of Marbled Murrelets out of inlets on the British Columbia coast, and resulted in the capture of 33 murrelets.

Potential Impact of Introduced Raccoons on Native Burrow-Nesting Seabirds of the Queen Charlotte Islands. *Lisa Hartman and D. S. Eastman, Dept. of Biology, Univ. of Victoria, P.O. Box 1700, Victoria, B.C. V8W 2Y2.*

The introduction and spread of raccoons (*Procyon lotor*) on the Queen Charlotte Islands have raised concerns over their potential impact on native burrow-nesting seabirds. To evaluate this threat, we compared raccoon diet, home range, and habitat use in an area devoid of seabirds with those observed on an adjacent seabird colony island. Scat analysis indicated that raccoon diet consisted almost entirely of intertidal foods in the area devoid of seabirds (n=55), whereas on the colony island seabirds dominated the diet (n=12). Radio-tracking of nine animals indicated that home ranges were small (<1 km2), raccoons foraging nightly on the shoreline and denning daily within 750 m of the shore. Relatively small colony islands may therefore support raccoon populations if they contain sufficient intertidal foraging habitat. Predation was documented for one breeding season on seven transects covering 17% of the colony area. Preliminary analyses suggest that three raccoons were responsible for the loss of at least 218 adult Ancient Murrelets (7-9% of the breeding population) and 188 eggs and chicks. Documented over-water crossings of 600 m place at least 40% of the QCI seabird population at risk of colonization.

Seabirds at Fieberling Guyot, a Midocean Seamount in the North Pacific. *J. Christopher Haney, Wildlife Technology Program, School of Forest Research, Penn State Univ., College Place, DuBois, PA 15801; Loren R. Haury, Marine Life Research Group, A-018, Scripps Inst. Oceanography, La Jolla, CA 92093; Lauren S. Mullineaux, Biology Dept., Woods Hole Oceanographic Inst., Woods Hole, MA 02543.*

In June and September 1991, seabirds, neuston, and plankton were investigated at Fieberling Guyot in the eastern North Pacific Ocean, 1000 km west of San Diego, California. This midocean seamount (32o25'N, 127o45'W) is a truncated submerged volcano (summit area approximately 50 km2 at 600 m contour) rising from an abyssal plain at 4250 m to a summit depth of 438 m. Six seabirds were recorded in midocean; two species were observed only at the seamount (*Pterodroma externa* and *P. ultima).* Diomedea nigripes, *P. cookii, Oceanodroma leucorhoa,* and *Phaethon aethereus* occurred both at and adjacent to the seamount. Seabirds were 1.7-2.4 times more abundant within a 30-km radius of the seamount's summit than at adjacent control sites. Seamount densities (0.68 birds km-2) were considerably lower than comparable seasonal values recorded in offshore regions of the California Current, within the range of densities in the least productive subtropical waters of the Gulf Stream, and only slightly higher than seabird abundances recorded for the oligotrophic Sargasso Sea. We discuss (1) mesoscale circulation patterns (upwelling, Taylor columns and eddies, and trapped waves) associated with these geophysical features and (2) potential trophic interactions associated with the enhanced sound-scattering layer at the seamount.

Large-scale Driftnets and Marine Birds: Status of Data, Reports, and Research. *Patrick J. Gould, Kent Wohl, U.S. Fish and Wildlife Service, Anchorage, AK 99504; Gary W. Shugart, Chris S. Wood, Burke Museum, University of Washington, Seattle, WA 98195; Daniel Waldeck, National Marine Fisheries Service, Sand Point Way NE, Seattle WA 98115.*

Thirty-five species of marine birds and one land bird were reported entangled in squid and large-mesh driftnets set in the North Pacific during 1989-91 scientific observer programs conducted by Canada, Japan, the Republic of Korea, Taiwan, and the United States. Seven reports on these observations have been released, and two others are imminent. Assessments of the impacts of these fisheries on incidentally caught organisms have been presented in two international workshops. A total of 1532 bird specimens was salvaged from observed operations, including at least one specimen each of 31 species. These specimens are now in the collection of the Burke Museum, University of Washington, Seattle. Scientific information being obtained from this collection includes: sex identification; age estimation, including relationship between age and condition of the bursa in banded albatross; size and condition of bursa; fat condition; gonad size and condition; analyses of stomach contents (prey items and plastic particles); stable-isotope ratios of carbon and nitrogen in breast muscle tissue; and in albatrosses, flight-feather molt and endoparasites of the upper intestinal tract. Several studies are focusing on the distribution of species as shown by the bycatch records.

Nesting Marbled Murrelet—Fifteen Days of Behavioral Observation. *David A. Fortna, S.J. Kerns and M.E. Freitas, Wildland Resource Managers, P.O.Box 102, Round Mountain, CA 96084.*

On 7 August 1992, an active Marbled Murrelet (*Brachyramphus marmoratus*) nest was discovered northeast of the town of Fortuna, Humboldt Co., California. For the next 15 days, observation of behavioral activities at and around the nest site were noted and videotaped. Observations included the following: (1) Two prey items presented to the nestling by a single adult; (2) both adult birds at the nest at the same time with prey items; (3) visitations by adults lasting from a few seconds to more than an hour; (4) three visitations and feedings in less than 30 minutes; (5) adult posture and interactions with the nestling during feedings. Photographs, diagrams, and multimedia video portray material gathered at the first occupied Marbled Murrelet nest found between San Francisco and the Oregon border.

Assessing Potential Impacts on Seabirds by a Proposed Coastal Wind Generating Facility. *Kathy Keane, P&D Technologies, P.O. Box 5367, Orange, CA 92613.*

The increasing concerns for improving air quality and to reduce dependence on fossil fuels have generated interest during recent years in wind generation. Currently, notable wind generating facilities in the United States are limited to large wind farms of thousands of turbines located in foothills and mountain passes. However, proponents of wind generation have recently begun to turn their attention toward coastal areas, given their nearly continuous and reliable wind conditions. Although coastal wind facilities are common in northern Europe, few studies on the extent of impact on seabirds are available that would be applicable to Pacific Coast avifauna. To estimate the potential impact of a 20-turbine facility proposed on the San Pedro breakwater in the Los Angeles harbor, observations were made from 45 stations on the breakwater to monitor avian activity. Two endangered species, the California Least Tern and the California Brown Pelican, forage in the vicinity of the breakwater. Species, flock size, flight height, distance from breakwater, age, and eight classes of behavior were recorded for each observation. The data were analyzed and compared with existing information on avoidance behavior of wind turbines by related species to estimate the potential for collisions and other avian impacts.

Monitoring of Pigeon Guillemots in Puget Sound. *Mary Mahaffy, U.S. Fish and Wildlife Service, Olympia, WA 98503 and George Divoky, University of Alaska, Fairbanks, AK 99775.*

Pigeon Guillemots have been selected as a potential monitoring species for the interagency Puget Sound Ambient Monitoring Program. Puget Sound waterbirds are monitored to allow evaluation of spatial and temporal variation in distribution and abundance, reproductive parameters, and contaminant concentrations. In 1992, wooden nest boxes were placed under piers at Port Townsend and Olympia, Washington, to recruit Pigeon Guille-mots. Three boxes at Port Townsend were used by nesting guillemots, and six chicks were banded. None of the boxes at Olympia were occupied by guillemots. Nest boxes will be placed at additional locations in 1993. Further activities in 1993 will include banding chicks and adults with unique color-band combinations and determining colony size, nest productivity, and chick growth rates. Prey brought to Pigeon Guillemot chicks at locations with nest boxes will be identified to evaluate potential contaminant pathways. Assuming Pigeon Guillemots are selected as a monitoring species, every five years a limited number of eggs will be sampled from selected locations for contaminant analyses.

Predation on a Breeding Adult Marbled Murrelet at a Nest Site. *Dennis K. Marks, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage AK 99503.*

This paper documents the taking of a breeding adult Marbled Murrelet from a nest site and adds the Sharp-shinned Hawk to the list of murrelet predators. Observations were made during a dawn survey on Storey Island, Prince William Sound, Alaska, on July 11, 1991. The survey site, about 180 meters inland and 120 meters in elevation, had large Sitka spruce, western and mountain hemlock, 85% canopy closure, and thick moss on the trees and ground. Large moss platforms were common on trees more than 70 cm dbh. At 0444, during twilight 27 minutes before official sunrise, an adult Marbled Murrelet was taken to the ground and killed by a Sharp-shinned Hawk; I had observed two previous visits by the murrelet(s) beforehand. The murrelet was a 200-g male with a vascularized brood patch. Although I climbed three trees, I found no nest. Predation on eggs and chicks is well documented and may account for a significant percentage of nest failures. The loss of breeding adults has an even greater potential impact on murrelet populations. This observation documents adult

murrelet vulnerability at the nest site and may explain apparent predator-avoidance behaviors around the nest.

Report on the First Known Markham's Storm-Petrel Breeding Area. *Jaime Jahncke, APECO, Parque Jose de Acosta 187, Lima, Peru.*

A survey of the Parcas Peninsula was conducted to confirm previous observations of Markham's Storm-Petrel (*Oceanodroma markhami*) nesting areas. Nests were found in natural cavities or interstices under a saltpetre surface forming small colonies.

Seventy-four nesting sites were evaluated, and a total of 1144 nests was found. Fifty-four percent of the nesting sites were found at heights between 180 and 300 m above sea level.

No living birds were found at the nesting sites. Several skeletons, wings, and old eggs were present in the areas surveyed, however, strongly suggesting that the Parcas Peninsula is a Markham's Storm-Petrel breeding area—the first reported. This study was funded by the Peruvian Conservation Data Center (CDC-UNALM).

Marbled Murrelet Surveys in Prince William Sound, Alaska: Censusing Nesting Activity by Boat. *Dennis K. Marks, Kathy J. Kuletz, and Nancy L. Naslund, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503.*

To assist *Exxon Valdez* oil spill restoration efforts, dawn watch surveys for nesting activity of the Marbled Murrelet (*Brachyramphus marmoratus*) were conducted in western Prince William Sound, Alaska, in 1992. Intensive dawn surveys (12 June-3 August) were done from shore and anchored vessels at randomly selected sites. Upland habitat ranged from low and high volume forests to treeless areas. Numbers of detections per site ranged from 2 to 333 (n=85, x=58) and showed a strong seasonal trend; detections increased 3-fold after mid-July. About 30% of the boat watch detections were birds sitting on or flying over the water and may require separate analysis. This survey method is appropriate for determining general distribution and habitat association for a large geographic area primarily accessible by boat. At some sites, intensive surveys farther inland would be necessary to locate nesting areas. U.S. Forest Service Geographic Information System coverage of the area will enable us to analyze the relationship between habitat and murrelet activity within a buffer of 500 and 1000 meters of each site.

The Olympic Coast National Marine Sanctuary. *Linda Maxson, National Marine Sanctuary Program, NOAA, Sand Point Way NE, Seattle, WA 98115.*

The Olympic Coast National Marine Sanctuary will be designated in the waters off Washington's Olympic Peninsula. One of the last relatively undeveloped coastlines along the Pacific, the area is both spectacularly beautiful and rich in marine life. The proposed sanctuary is characterized by rocky headlands, pocket beaches of sand or cobbles, sea stacks, tidepools, offshore islands and reefs, and fishing grounds. These rocky headlands, offshore islands, and highly productive offshore and nearshore waters provide essential habitat for a wide variety of both migratory and resident marine birds. Speich et al. (1987) reported a total of 87 species of birds observed or known to occur in the area. Many species of birds are year-round residents; others may be summer or winter visitors, or migrants present only during spring and/or fall migrations. The seabird colonies in the area are among the largest of the contiguous United States.

Designation of the Olympic Coast National Marine Sanctuary will provide additional protection to the bird populations that reside within or move through the sanctuary. The National Marine Sanctuary Program provides for comprehensive management of all of the area's significant marine resources and promotes resource protection through research and education. The sanctuary will be managed to allow for compatible multiple use, balanced with measures to maintain the health and integrity of the ecosystem.

A Long-term Monitoring Program for Puget Sound Seabird Populations. *David Nysewander, Matt Nixon, and Janet Stein, Washington Department of Wildlife, Olympia, WA 98501-1091.*

The Washington Department of Wildlife has initiated a long-term monitoring program of the seabird and waterfowl populations that use Puget Sound. This work is being conducted as part of the Puget Sound Ambient Monitoring Program, which identified marine bird populations as one of the key environmental indicators for monitoring the health of Puget Sound. Aerial and boat surveys for marine birds are conducted during summer and winter covering the entire coastline and some open-water areas of the sound, the San Juan Islands, and the eastern Strait of Juan de Fuca. An onboard computer linked to a global positioning unit (GPS) records position and time every 5-10 seconds, providing a very precise description of the actual trackline of the aircraft or boat. Bird observations are initially recorded on audio

tape, later transcribed into a sightings database, and then merged with the GPS output by using a common time field. Several computer programs have been written for use in analyzing historical Washington seabird data and future observations. These programs are designed to assist in allocating survey effort and making statistically reliable population estimates. Survey results may be graphically displayed in various formats, such as density maps of species represented by latitude-longitude blocks or as contour surfaces, using CAMRIS.

Shore-based Surveys of Marbled Murrelets Along the Oregon Coast, 1988-1992. *S. Kim Nelson and Janet G. Hardin, Oregon Cooperative Wildlife Research Unit, Oregon State University, Nash 104, Corvallis, OR 97331-3803.*

Beginning in 1988, Marbled Murrelets (Brachyramphus marmoratus) were systematically counted from shore during the breeding season at 31 locations along the Oregon coast. Using spotting scopes and following a prescribed method, we counted murrelets out to approximately 500 m offshore. Bird behavior, plumage condition, age, and group configuration were recorded. The distribution and relative abundance of murrelets along the Oregon coast were mapped and compared with the distribution of suitable nesting habitat inland. Three sites on the central coast were chosen for intensive study. We monitored variation in numbers of murrelets on a daily and yearly basis among these sites. Murrelet abundance was highly variable, and their distribution along the coast was patchy.

Puffin Food Webs in the Northwestern Gulf of Alaska. *John F. Piatt and Scott A. Hatch, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503.*

We analyzed data collected over 15 years on the distribution and diets of Tufted Puffins and Horned Puffins in the northwestern Gulf of Alaska (18,163 prey at 20 colonies over 1300 km). On the continental shelf around Kodiak, Semidi, and Shumagin islands, the food web consists largely of resident bank species like capelin and sandlance. From the Shumagin Islands to the eastern Aleutians, advected juvenile walleye pollock form the basis of Tufted Puffins food webs. At oceanic islands in the eastern Aleutians (e.g., Bogoslof), pelagic prey like squid and lanternfish dominate the food web. Horned Puffins have a narrower diet than Tufted Puffins and feed largely on sandlance and capelin. Puffin colony and pelagic distribution maps reveal that Horned Puffins concentrate in the central Semidi-Shumagin bank area, whereas Tufted Puffins are most abundant to the northeast (Kodiak) and to the southwest (Aleutians) of the core area for Horned Puffins. Interpretation of variability in puffin diets and breeding success must account for the markedly different nature of each food web (resident vs. advected prey, local vs. distant oceanographic influences, differential recruitment and availability of age classes, etc.).

Estimating Seabird Populations in Alaska from Colony and Pelagic Databases. *John F. Piatt, Patrick J. Gould, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503; Arthur L. Sowls, Alaska Maritime NWR, U.S. Fish and Wildlife Service, Homer, AK 99603.*

The abundance of seabirds at sea and on colonies in Alaska has been well documented during the last two decades. At-sea censusing was usually conducted from large ships using 10-min line transects (300 m width). We used pelagic data collected in May-August (ca. 21,500 km of transects in a 2 million km2 area) to extrapolate seabird populations (east of 180o W) during the breeding season. Seabird colonies in Alaska were censused by counting or estimating the total numbers of all species present during visits to colonies in summer. We compiled census data on 25 species, comprising 23,149,000 seabirds from 1254 colonies located east of 180o W. Population estimates derived from both data sets for 13 well-studied, diurnal seabird species were strongly correlated (r2=0.94). Pelagic population estimates were higher than colony estimates, except for Leach's Storm-Petrel and Horned Puffin. Large discrepancies (>3¥) between pelagic and colony estimates were found for ship followers (fulmar, Larus gulls), and nocturnal species (Fork-tailed Storm-petrel, Ancient Murrelet, Rhinoceros Auklet, and Whiskered Auklet). Overall, concordance of these two data sets suggests that both censusing techniques provide reasonable order-of-magnitude estimates for most colonial seabird populations in Alaska.

Measuring Productivity of Murres by the Mayfield Method. *Brian E. Sharp, 2234 NE 9th Ave., Portland, OR 97212.*

Seabird productivity is usually measured by either the Type I or Type II methods. The former entails monitoring a sample of nests throughout the breeding season; the latter is a one-time check of the number of chicks near fledging age. At Cape Thompson, ice delays access until after the

start of incubation. The bias caused by failure to detect early nest failures results in an overestimate of productivity. The Mayfield method of estimating songbird nest success uses the intervals between observations of eggs and chicks and provides an estimate of mean survival rate over the interval. A daily survival rate is calculated that can then be used to calculate the mean survival of eggs or chicks over the incubation or nestling period, or the combined survival rate over the nesting period, i.e., productivity. The Mayfield method assumes survival is constant over the defined period. At Cape Thompson in 1990, there was an even pattern of egg and chick losses for murres. Losses of kittiwakes were unevenly distributed, mostly occurring at or near the time of hatching. Mayfield and Type I methods gave estimates of productivity for Thick-billed Murres that were 0.59 and 0.76; for Common Murres, 0.76 and 0.86; and for Black-legged Kittiwakes 0.33 and 1.0, respectively.

Surveying the Marbled Murrelet: Techno-Assistants. *Jonathon R. H. Storm and Phyllis Reed, USDA Forest Service, 1405 Emmens St., Darrington, WA 98241.*

Audio recording equipment was used in the Marbled Murrelet (*Brachyramphus marmoratus*) survey program on the Darrington Ranger District, Mount Baker-Snoqualmie National Forest. The objectives were to extend the survey effort, examine recording equipment suitability for murrelet surveying, and determine appropriate equipment systems and techniques for murrelet surveying. Sixty-three surveys were done on 37 mornings, using surveyors, surveyors with audio recording equipment, and recording equipment only. The results suggest recording equipment is suitable for recording murrelet presence and activity level and, in limited situations, location. Review of tapes provides additional data and accuracy by definition of call numbers, spacing of calls, and call patterns. Tapes may be used for verification of surveyor's accuracy and for documenting murrelet's presence.

Changes in Blood Parameters, Muscle Myoglobin, and Muscle Lactate Dehydrogenase of the Common Murre (*Uria aalge*) during Maturation. *Wendy A. Williams, 127 Ridgeway Dr. #2, Lolo, MT 59847.*

Blood oxygen-carrying capacity, myoglobin levels, and lactate dehydrogenase (LDH) isozyme compositions in the heart and gastrocnemius and pectoralis muscles were determined in adult Common Murres and maturing chicks at sea. Blood hemoglobin and hematocrit and muscle myoglobin in chicks increased significantly with growth. In the heart, adult levels of the aerobic isozyme, LDH 1, were found throughout chick maturation. When more anaerobic isozymes were present in the heart, they occurred more frequently in younger chicks and in newly fledged, independent chicks. In the gastrocnemius muscle, all five LDH isozymes were present at or near adult levels throughout chick maturation. The pectoralis muscle showed high levels, and hence high anaerobic capacity, of LDH 5 at all stages of maturation; LDH 1, LDH 2, LDH 3, and LDH 4 were lower in younger chicks and increased with maturation. When chicks leave the nesting colony, their aerobic and anaerobic capacities in the heart and gastrocnemius muscles are similar to those of adults, reflecting muscle metabolic requirements for maturation at sea. The chick pectoralis muscle has anaerobic capacities similar to those of adults; however, aerobic capacities in the chick pectoralis increase with maturation, concomitant with the needed proficiency for aerial and aquatic flight upon fledging.

Distribution and Abundance of Marbled Murrelets in Alaska. *John F. Piatt, U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503; R. Glenn Ford, Ecological Consulting Inc., 2735 N. E. Weidler St., Portland, OR 97232.*

Seabirds usually breed in colonies on offshore islands, but most Marbled Murrelets fly inland to nest on trees in ancient coniferous rain forests. Thus, while most seabirds may be counted conveniently at breeding colonies, murrelet population estimates must be extrapolated from densities at sea—an uncertain exercise at best. In Alaska, an enormous effort to census seabirds at sea and at colonies was undertaken in the 1970s and 1980s under the supervision of the Outer Continental Shelf Environmental Assessment Program (OCSEAP). Comparing these data, colony and pelagic population estimates for 13 colonial seabird species were strongly correlated (r^2=0.94). For non-colonial murrelets, we estimated conservatively from pelagic data that about 160,000 birds breed in Alaska. Actual numbers are probably higher because OCSEAP surveys were limited in the sheltered fiords and bays favored by murrelets. Most (97%) murrelets were concentrated during the breeding season in marine waters adjacent to large tracts of old-growth forest, i. e., in the Alexander Archipelago, Prince William Sound, and the Kodiak Archipelago. Murrelets appeared to disperse in winter from northern regions to offshore (>50 km) areas of the Gulf of Alaska and to the Aleutian Islands.

Other Seabird News

COMMON MURRE DIE-OFF IN ALASKA

Unusually large numbers of Common Murres feeding nearshore, and small numbers dying from apparent starvation, were reported from Sitka (SE Alaska) and Valdez (Prince William Sound) in early February. In early March, numerous reports of dead or dying murres were received from fishermen and biologists working along the Kenai Peninsula and Kodiak Island. The largest numbers of dying murres were observed around Resurrection Bay. Thousands of murres moved into the Seward Boat harbor at the same time as some large schools of juvenile herring. However, the herring left after less than two weeks while the murres, many of which were obviously moribund, remained. About a thousand dead murres were counted on beaches there and in adjacent bays throughout March and April. At the same time, reports of murres flying inland and landing on streets and parking lots were received from many populated areas, including Anchorage in upper Cook Inlet. To date (5–16–93) about 3100 dead murres have been tallied by U.S. Fish and Wildlife and National Park service biologists, and there were unconfirmed observations of "hundreds to thousands" dead at sea. Given a very limited beach survey effort (if only we'd had an oil spill!) and the wide geographic range of mortality (SE Alaska to the Alaska Peninsula), it seems likely that total mortality was in the 10–100 thousand range. The only species apparently affected was the Common Murre.

Necropsies revealed that most murres were extremely emaciated (about half their normal winter weight). Some had pulmonary edema, and unusual focal hemmoraging in the intestines. All birds were still in winter plumage, and a large proportion appeared to be sub–adults. A battery of detailed examinations for possible sources of mortality including bacteria, viruses, parasites, heavy metals, lead, organochlorines, and biotoxins, have largely been negative so far. Trace amounts of saxitoxin were found in gut contents of two murres, and in some euphausiids that had washed up on a Seward beach, but this could represent normal background levels. A working hypothesis is that the event simply represents a "murre wreck" resulting from wide–spread starvation. In turn, this might be related to recent oceanographic conditions. Sea surface temperatures in coastal areas of the Gulf of Alaska have been warmer (0.2-1.4 C) than average since November 1992. On the other hand, a few birds recovered early were of normal weight, and some of the pathological results remain unexplained. A variety of tests are still underway, and beach surveys continue in some areas. A few freshly-dead, emaciated murres continue to appear on beaches at Seward, and about 50 freshly-dead murres were observed last week on Middleton Island beaches. To date, Black–legged Kittiwakes have failed to begin nesting activities at Middleton Island— not unprecedented, but unusual at this late date.

Other oddities have occurred this winter and spring in the northeast Pacific. A projected bumper crop of herring for Prince William Sound failed to materialize in April, and about a third of herring caught had subdermal lesions diagnosed as being due to Viral Hemmoraghic Septicemia. Trace amounts (perhaps background levels) of domoic acid were also found in some herring. Further south, Common Murres and Rhinoceros Auklets were found in numbers 3–4 times higher than usual for winter beach surveys on Vancouver Island. In California, effects of a continuing ENSO appear to be strongly felt by seabirds at the Farallon Islands as breeding activities have been delayed markedly. An unusual large die–off of Cassin's Auklets was observed in central California in late December and January, and small numbers of moribund murres and cormorants have been coming in to rehabilitation centers throughout the spring. Some or all of these phenomena might be related to anomalous warm sea temperatures that have persisted off the west coast throughout winter. Given all these unusual observations, it will be interesting to see how seabirds fare at colonies from California to Alaska in summer, 1994.

Compiled by John F. Piatt and Thomas van Pelt, Alaska Fish and Wildlife Research Center (AFWRC). Information provided by David Ainley (PRBO), Jack Ames (Cal F&G), Ron Britton (USFWS), Alan Burger (U. Victoria), Vern Byrd (USFWS), Lynn Creekmore (USFWS–Madison Wildlife Health Lab), Scott Hatch (AFWRC), Bill Hughes (USFWS), Rich MacIntosh (NMFS), Vivian Mendenhall (USFWS), Mike Tetreau (NPS), John Wilcox (ADF&G), Chris Wood (NMFS), and Dennis Zwifflehoffer (USFWS).

The Alaska Maritime National Wildlife Refuge office has moved.

Please note the new address:

Alaska Maritime National Wildlife Refuge
2355 Kachemak Bay Dr., Suite 101
Homer, AK 99603

Critical Wildlife Resources at Risk in Oil Slick

Laysan Island, the crown jewel of the Hawaiian Island National Wildlife Refuge, has been hit with a mystery oil slick. The 913-acre island is located 700 miles northwest of Honolulu. Basketball-sized blobs of weathered oil began washing ashore on Friday, March 26, 1993 and continued of contaminate the shore until March 28. About two-thirds of the island's shoreline is flecked with oil and about 350 feet of the southeast corner is heavily oiled. Storm waves pushed the oil up the beach and into the vegetation, threatening the unique and abundant wildlife of Laysan Island. At the advent of the pupping season, at least 15 endangered Hawaiian monk seals are already oiled. Although few birds are yet oiled, most species have just returned from the ocean to begin breeding. Black-footed Albatrosses that nest on the upper beaches may be particularly vulnerable.

Laysan Island supports a colony of 2 million seabirds of 17 species, including albatrosses, frigatebirds, tropicbirds, boobies, shearwaters, petrels, terns, and noddies. In addition to monk seals and threatened green turtles, Laysan Island is critical habitat to endangered Laysan Ducks and Laysan Finches. Three land birds went extinct on Laysan Island early in the twentieth century when the vegetation was decimated by introduced rabbits.

The sensitive ecology of Laysan Island requires special considerations. The clean-up efforts used after the *Exxon Valdez* oil spill are not appropriate for this tiny island. Large teams of workers could damage the wildlife and possibly introduce rats, seeds of alien plants, or insects that might do long-term damage to the simple island ecology. Federal agencies are attempting to respond in a way that minimizes the cumulative impacts of the oil spill and the clean-up efforts. It is unclear whether additional slicks may was ashore.

For more information contact Mark Rauzon: Phone 510-531-3887 FAX 451-3208.

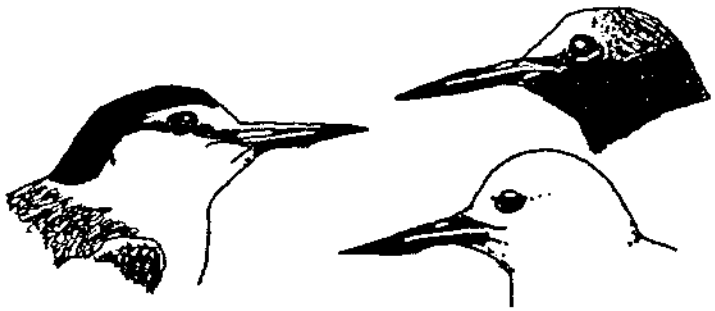
INFORMATION NEEDED ON CAPTIVE MARBLED MURRELETS

The MMTC subcommittee on captive murrelets requests information for guidelines on documentation, care, and release of grounded Marbled Murrelets. We would appreciate information on weights, measurements (unflattened, flattened, or maximum flattened wing chord; tarsus; culmen or exposed culmen; please specify which), fat, status (i.e. general health if live, body condition if dead), situation of captivity (if relevant), date, and location of nestling, fledgling, or juvenile Marbled Murrelets. We are also interested in the same information for adult murrelets that have been found at inland sites or have been in captivity. Please send any information you have to us at the address below. Be sure to include the appropriate citation as we would like to include a table of this information in the guidelines to be used as release criteria for captive murrelets. We would also appreciate any records of Marbled Murrelets in captivity and a contact person for obtaining details of each record (if possible), and names and addresses of any others who are interested (or who you think might be interested) in contributing to the guidelines. Thank you for your help.

Nancy L. Naslund
Migratory Bird Management
U.S. Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, AK 99503
(907) 786-3597
(907) 786-3641 FAX

New Address?

Please send all address changes to Ken Warheit, 8205-E Martin Way NE, Suite 238, Olympia, WA 98516-238.



Volunteer Directory Available

The American Birding Association devoted its December 1992 newsletter, **Winging It**, to 1993 volunteer opportunites for birders with the U. S. Forest Service, the Bureau of Land Mangement, the National Park Service, and the U. S. and Canadian Wildlife Services. The special issue lists approximately 285 projects, including raptor, waterfowl, neotropical migrant, and single-species surveys; checklist and interpretive display development; photographic file creation; and nest box building, repair, and replacement.

Given the diversity of the projects, anyone interested in applying their birding, photographic, or construction skills to worthwhile conservation efforts while gaining valuable field experience should be able to find a project that meets their interest, skill level, and availability. Not every project requires a super birder!

At a time of heightened awareness of the need to preserve our avifauna and of limited government funding for such projects, birders have an opportunity to contribute to very worthwhile and critical projects. Some projects do have some funds available to reimburse the volunteer for various out-of-pocket expenses, and perhaps, pay a small per diem.

This volunteer directory is part of a partnership between the American Birding Association and various government agencies. To obtain a copy of this directory, send $2.00 to cover printing and mailing costs to Volunteer Directory, American Birding Association, P. O. Box 6599, Colorado Springs, CO 80934. If you have any questions, call Virginia Maynard at 800-835-2473,

1992 Activities Report from the ICBP/SSC Seabird Specialist Group

With the publication of two technical volumes on the status of the world's seabirds (Croxall et al 1984; Croxall 1991) and the scheduled 1993 publication of a third volume on the management of seabird islands (Nettleship et al 1993), the ICBP/SSC Seabird Specialist Group has documented the major problems presently confronting approximately 288 species of seabirds throughout the world and has recommended actions needed to ameliorate such problems. These problems vary from region to region and range from pollution to habitat destruction to human predation and competition for fishery resources.

The past year has been one of transition and planning, and has left the Seabird Specialist Group with two goals clearly in mind: to implement programs designed to address seabird problems and to develop a means of identifying and dealing with future problems. However, it is not yet clear how the group will achieve these goals.

Implementing programs will require staff and financial resources, raised either by the Seabird Specialist Group itself, by ICBP and SSC, or by outside parties such as UNEP and the EEC, by other conservation organizations, or by individual nations. ICBP, while changing its overall structure, has focused most of its attention toward its new national affiliates, placing less emphasis on its network of specialist groups. A December meeting dealt frankly with the need for further support for the groups, but ICBP policies toward specialist groups remain in transition.

To identify future problems of seabirds and vulnerable species, two opposite scenarios exist. In the first, the Seabird Specialist Group would continue to be a loose-knit committee of correspondents that would meet perhaps once a decade to update the existing volumes on seabird status and that would conduct occasional letter-writing campaigns concerning threats to seabirds. In the second scenario, different committees within the group might seek to identify new threats and problems, serve as sources of technical expertise, and implement programs ranging from education to the erradication of feral pests to the development of international laws concerning seabirds.

1993 will be a year of transition for the Seabird Specialist Group. It can grow, divest some of its program responsibilites to other institutions, or remain primarily an information-gathering body with no institutional capabilities. Whatever its fate, the need remains for an international group to monitor seabirds and their problems and to ensure that necessary conservation actions are carried out.

David Cameron Duffy, Box 109 Shelter Island Heights, NY 19965

Croxall, J. P. (ed.). 1991. *Seabird Status and Conservation: A Supplement.* International Council for Bird Preservation Technical Report. Cambridge UK.

Croxall, J. P., G. H. Evans, and R. W. Schreiber (eds.). 1984. *Status and Conservation of the World's Seabirds.* International Council for Bird Preservation Technical Report. Cambridge UK.

Nettleship, D. N., J. Burger, and M. Gochfeld (eds.). 1993. *Seabirds on Islands; Threats, Case Studies and Action Plans.* International Council for Bird Preservation Technical Volume. Cambridge UK.

SILLY SEABIRD TRIVIA

Plumb the depths of your trivial knowledge by answering the following questions: (answers below).

Questions

1) T or F: The Marbled Murrelet is a Robin–sized seabird.

2) What seabird's scientific name means "a very small seabird" when literally translated?

3) What species of seabird is the spiritual symbol for a clan of Tlingit Indians from Southeast Alaska?

4) What is the most commonly eaten seabird?

5) T or F: Murrelets were named after the famed naturalist John Muir.

6) What seabird genus name aptly translates as "winged–runner?"

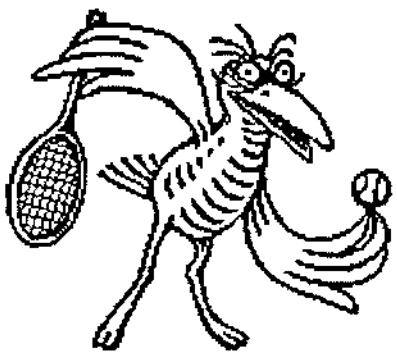
7) T or F: The Marbled Murrelet is the only seabird in the North Pacific Ocean.

8) How many seabird biologists does it take to change a lightbulb?

9) T or F: Tree–nesting by the Marbled Murrelet is aberrant behavior for an alcid.

10) T or F: The "Exxon Valdez" oil spill caused significant damage to seabird populations in Alaska.

11) What North American shorebird predates the eggs of tropical seabirds during winter?



Answers

1) False! Marbled Murrelets (ca. 220–240 g) are big brutes compared to American Robins, which weigh in at only 70–90 g.
2) The Least Auklet *Aethia* (Greek, a seabird), *pusilla* (Latin, very small).
3) What else... the Marbled Murrelet is immortalized in song and hat by the Tlingit "Murrelet Clan".
4) Very likely the Thick–billed Murre. About a million murres are hunted annually in Newfoundland alone, and they are also taken in Russia, Alaska, Iceland, and Greenland. Short–tailed Shearwater (Muttonbird) may run second. Recommend stir–fry murre with curry.
5) False! Murrelet is the diminutive of murre, a little murre.
6)*Pterodroma*. From the Greek. Just try to catch a good look at one.
7) Probably false, but suggestions to change the name of the Pacific Seabird Group to the Pacific Murrelet Group has confused some people.
8) If you have government biologists on one side and industry biologists on the other, it is doubtful whether there would even be agreement on whether the bulb needed to be changed. Government biologists would tell you that the light was damaged irreparably, or in the best case scenario, would come back on by itself in 50 years. The industry biologists might admit that the bulb had flickered for a few seconds, but claim that it was now burning brightly— if you just looked at it the right way. Several symposia and a billion dollars worth of research would be required to reach a consensus on how to best restore the bulb to its' original working order. In the meantime, we remain in the dark.
9) Probably False. Recent studies suggest that *Brachyramphus* may be the oldest alcid, and it probably evolved at a time when huge Metasequoia ranged from California to northern Alaska. Ground–nesting may be a "recent" aberration.
10) See 8 above. Recommend you form your own opinion.
11) This is a trick question. Because predate means to precede, almost all living birds predate any eggs they may encounter. Eggs that fail to hatch and remain unharmed for some time could actually predate many of the birds that would consider eating the eggs. This leads to a bizarre but true fact about seabirds— all parent birds predate their young. Try bringing this up in your comprehensives if you're looking to buy time and want to confuse your committee. By the way, the Bristle–Thighed Curlew (*Numenius tahitiensis*)—which migrates from breeding grounds in Alaska to winter on seabird islands in the Central Pacific— eats the eggs of seabirds.

RECENT PUBLICATIONS and REPORTS

If you would like to announce a report or publication in the next PSG Bulletin that would be of general interest to members, please drop a note to the editor, with appropriate details.

Vermeer, K., K.T. Briggs, K.H. Morgan, and D. Siegel–Causey [Eds.]. 1993. The Status, Ecology, and Conservation of Marine Birds of the North Pacific. Special Publication, Canadian Wildlife Service. [available from (AF): Publications, CWS, Environment Canada, Ottawa, Ontario K1A 0H3]

Croxall, J.P. [Ed.]. 1991. Seabird Status and Conservation: A supplement. ICBP Tech. Publ. No. 11. [AF: ICBP, 32 Cambridge Road, Girton, Cambridge, CB3 0PJ, U.K.]

Kawasaki, T., S. Tanaka, Y. Toba, and A. Taniguchi. [Eds.]. 1991. Long–term Variability of Pelagic Fish Populations and their Environment. Pergamon Press. [AF: Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, New York 10523, USA.]

Gaston, A.J. 1992. The Ancient Murrelet, A Natural History in the Queen Charlotte Islands. T & A D Poyser Ltd. [AF: in U.S., c/o Academic Press, San Diego CA 92101]

Carter, H.A. and M.L. Morrison [Eds.]. 1992. Status and Conservation of the Marbled Murrelet in North America. Proc. Western Foundation of Vertebrate Zoology 5(1). [AF: West. Fndn. Vert. Zool., 439 Calle San Pablo, Camarillo, CA 93010]

Nagel, P.A. [Ed.]. 1992. Results of the Third Joint US–USSR Bering and Chukchi Seas Expedition (BERPAC), Summer 1988. US Fish and Wildlife Service, Washington DC. [AF: Publications Unit, US Fish and Wildl. Serv., 1849 C Street, NW, Mail Stop 130–ARLSQ, Washington DC 20240]

Gaston, A.J. and R.D. Elliot [Eds.]. 1991. Studies of high–latitude seabirds. 2. Conservation biology of Thick–billed Murres in the Northwest Atlantic. Can. Wildl. Serv. Occ. Paper 69. [AF: Publications, CWS, Environment Canada, Ottawa, Ontario K1A 0H3]

Vermeer, K., R.W. Butler, and K.H. Morgan [Eds.]. 1992. The ecology, status, and conservation of marine and shoreline birds on the west coast of Vancouver Island. Can. Wildl. Serv. Occ. Paper 75. [AF: Publications, CWS, Environment Canada, Ottawa, Ontario K1A 0H3]

Piatt, J.F., S.A. Kitaiskiy, A. Pinchuk, and A. Springer. 1992. Foraging Distribution and Feeding Ecology of Seabirds at the Diomede Islands, Bering Strait. Final Report to Minerals Management Service. OCS Study MMS 92–0041. [AF: MMS, Alaska OCS Region, Library/Public Infor. Room, 949 East 36th Ave, Rm. 603, Anchorage, Alaska 99508–4302]

Mendenhall, V., L. Haggblom, E. Murphy, and B. Sharp. 1993. Monitoring of Populations and Productivity of Seabirds at Cape Pierce, Bluff, and Cape Thompson, Alaska. Final Report to Minerals Management Service. OCS Study MMS 92–0041. [AF: MMS, Alaska OCS Region, Library/Public Infor. Room, 949 East 36th Ave, Rm. 603, Anchorage, Alaska 99508–4302]

• • • • • • • • • • • • • • • • • • •

Beringian Seabird Bulletin (BSB)

The BSB is an outgrowth of the successful Russian bulletin "Information on Seabird Studies in the USSR" that was published between 1990 and 1992 by the Laboratory of Coastal Ecology and Resources, Institute of Biological Problems of the North (IBPN), Magadan. The BSB is a joint effort between the Laboratory and the Marine and Coastal Bird Project, U.S. Fish and Wildlife Service, Anchorage. This project is conducted under the auspices of the U.S.-U.S.S.R. Agreement on Cooperation in the Field of Environment Protection. The BSB was initiated to improve coordination, communication and the exchange of seabird information between Russian, American, and other scientists interested in northern seabirds. The objectives of the BSB are to summarize annually seabird investigations that occur primarily in Beringia and, secondarily, in other Arctic regions and the North Pacific. In addition, short articles about Beringian seabird management issues and conservation activities will also be included periodically.

The editors of the BSB are Alexander Kondratyev, IBPN, Magadan, and Kent Wohl, U.S. Fish and Wildlife Service, Anchorage.

The first edition of the BSB will be distributed in May 1993. If you would like to receive a copy please contact Kent Wohl at the U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska, 99503.

Other Seabird News

The following is an abstract that was left out of the original meeting program.

An Introduction to the Seabird Aviary at the Oregon Coast Aquarium. *Allen Monroe and Patty Shreve, Animal Husbandry Department, Oregon Coast Aquarium, 2820 S. E. Ferry Slip Road, Newport, Oregon 97365.*

The largest seabird aviary in North America has been built at the Oregon Coast Aquarium in Newport, Oregon. Opening in May 1992, this outdoor mesh-enclosed exhibit measures over 7000 square feet, with 30,000 gallons of sea water pools and 25-foot high naturalistic cliff faces. Currently on display are over 100 alcids, including *Cepphus columba, Lunda cirrhata, Uria aalge,* and *Cerorhinca monocerata.* Although most of the birds are not yet mature, this past breeding season saw successful courtship, nest burrow construction, copulation, and egg laying. The long-term goal for the exhibit is to establish a self-sustaining breeding population. A seabird rehabilitation program is underway with emphasis on returning viable birds to the wild and studying factors affecting strandings, such as malnutrition and Aspergillosis. Other research projects underway for 1993 include the use of biotelemetry to measure incubation parameter for Tufted Puffins and the development of nutritional supplements specific for Pigeon Guillemots. Public education is the primary goal of the Oregon Coast Aquarium, achieved not only through exhibit interpretation for visitors, but also through an active outreach and onsite education program reaching over 20,000 school children annually.

WANTED

Photos of foxes or rats eating seabirds

Contact:

Craig Harrison
4001 North Ninth Street #1801
Arlington, Virginia 22203

ALSO WANTED

Information on the occurrence of Dovekies in Alaska

Contact:

George Divoky
10535 Interlake Ave. N.
Seattle, Washington

Parakeet Auklet Information Needed

Spencer G. Sealy is preparing a species account of the Parakeet Auklet for the Birds of North American project and is looking for papers, reports, and/or unpublished manuscripts or other material. If you have any relevant information, please send copies to

Spencer Sealy
Department of Zoology
University of Manitoba
Winnipeg, MB, R3T 2N2

Mark Your Calendar!

Deadlines for submittals to the PSG Bulletin are **15 April** for the spring issue and **15 October** for the fall issue. Please make a note of these dates and plan your regional reports and other articles accordingly.

Also, please submit all material to be published on 3.5-inch disks. No 5.25-inch floppies!

SEABIRD GROUP SUBSCRIPTION

Subscription for Ordinary members is £10.00, due on 1st February each year. If you pay by Standing Order to the Bank of Scotland the cost is £9.00. Students and pensioners may pay a reduced rate of £5.00. We strongly encourage you to pay by Standing Order. Subscription may be paid by VISA or MasterCard.

Return this to Sheila Russell, Clober Farm, Milngavie, Glasgow. G62 7HW, Scotland.

This is my subscription for the year _____.

a) I have completed the Standing Order for subscription.

b) I enclose a cheque for £_____.

c) I enclose a completed VISA/MasterCard form for

£_____.

d) I wish to pay the student/pensioner rate of £5.00.

Name:_____

Address:_____

_____

_____

_____

VISA

I wish to pay by Visa/MasterCard; please charge to my account. My card number is (13 or 16 digits):

Signature

Expiry date

/

Name (on card)

Address

Postcode

THE SEABIRD GROUP

The Seabird Group was founded in 1966 to promote and better co-ordinate the study of seabirds. It is a registered charity run by an elected committee and maintains close links with national and international ornithological bodies.

Everybody with an interest in seabirds and their welfare can join the Seabird Group and receive 3 newsletters each year containing a variety of news items, including reports on seabird conservation issues and research projects, as well as the Group's annual journal *SEABIRD*, which contains papers on current research at home and abroad.

The Seabird Group initiates and encourages fieldwork and grant-aids specific research projects. The two national censuses of breeding seabirds in Britain and Ireland in 1969-70 and 1985-87 were to a considerable extent organised and carried out by our members. The results of these surveys were published in two books, *The Seabirds of Britain and Ireland* (1974) and *The Status of Seabirds in Britain and Ireland* (1991). The Seabird Group helped establish the Seabird Colony Register, begun in 1985, which collates all information on the numbers of seabirds breeding in Britain and Ireland.

PACIFIC SEABIRD GROUP EXECUTIVE COUNCIL 1993

OFFICERS

Chair	George Divoky, 10535 Interlake Ave. N., Seattle, WA 98133 Phone and FAX (206) 525-2131
Chair Elect	John Piatt, USFWS, 1011 E. Tudor Road, Anchorage, AK 99503 Phone (907) 786-3549
Vice-Chair for Conservation	Craig S. Harrison, 4001 North 9th Street, Arlington, VA 22203 (202) 778-2240 FAX (202) 778-2201
Treasurer	Ken Warheit, 8205-E Martin Way NE, Suite 238, Olympia, WA 98516-5769 (206) 664-8453 FAX (206) 586-0248
Secretary	Beth Flint, USFWS, 300 Ala Moana Blvd., Rm. 5302, P.O. Box 50167, Honolulu, HI 96850 (808) 541-1201 FAX (808) 541-1216
Editor	Martha Springer, 1708 Marmot Hill Road, Fairbanks, AK 99709 (907) 479-8006
Past Chairs	Palmer Sekora, USWFS, 2640 E. Wilshire, Eugene, OR 29802 (503) 757-7236 FAX (503) 757-4450
	Malcolm Coulter, P.O. Box 48, Chocorua, NH 03817 Phone and FAX (603) 323-7730
	Doug Siegel-Causey, Museum of Natural History, Univ. Kansas, Lawrence, KS 66045 ((913) 864-4540 FAX (913) 864-5335

REGIONAL REPRESENTATIVES

Alaska	Kent Wohl, USFWS, 1011 E. Tudor Road, Anchorage, AK 99503 (907) 261-4670 FAX (907) 561-4860
British Columbia and Washington	David Nyeswander, Washington Dept. of Wildlife, Olympia, WA 98501-1091 (206) 664-9348
Oregon and N. California	Roy Lowe, USFWS, 2030 S. Marine Science Dr., Newport, OR 97365 (503) 867-0270 FAX ((503) 867-0105
Central California	Jean Takekawa, San Francisco Bay NWR, Box 524, Newark, CA 94560 (415) 792-0222 FAX (415) 792-5828
S. California	Kathy Keane, 319 University #C, Costa Mesa, CA 92672 (714) 650-0654
Latin America	Enrique Velarde, Inst. de Biologia-Omitologia, UNAM, Apdo. Postal 70-153, 04510 Mexico, D.F.
Pacific Region	Ken McDermond, P.O. Box 50167, Honolulu, HI 96850 (808) 541-1201 FAX (808) 541-1216 FTS 551-1201
Inland	James Lovvorn, Dept. of Zoology and Physiology, University of Wyoming, Laramie, WY 82071 (307) 766-6100 FAX (307) 766-5625
Great Lakes	James Ludwig, 2395 Huron Parkway, Ann Arbor, MI 48104 (313) 677-0050 FAX (313) 677-0055
Northeast	Mark Tasker, Nature Conservancy Council, 17 Rubislaw Terrace, Aberdeen AB1 1XE, United Kingdom (UK) 0224-642863 FAX (UK) 0224-643347
Southeast	Roger Clapp, National Fish and Wildlife Laboratory, National Museum of Natural History, Washington, D. C. 20560 (202) 357-1972 FAX (202) 357-4770 FTS 357-1972

DELEGATES TO THE INTERNATIONAL COUNCIL FOR BIRD PRESERVATION

Malcolm Coulter, address above
Craig S. Harrison, address above