

# Pacific Seabird Group



## BULLETIN

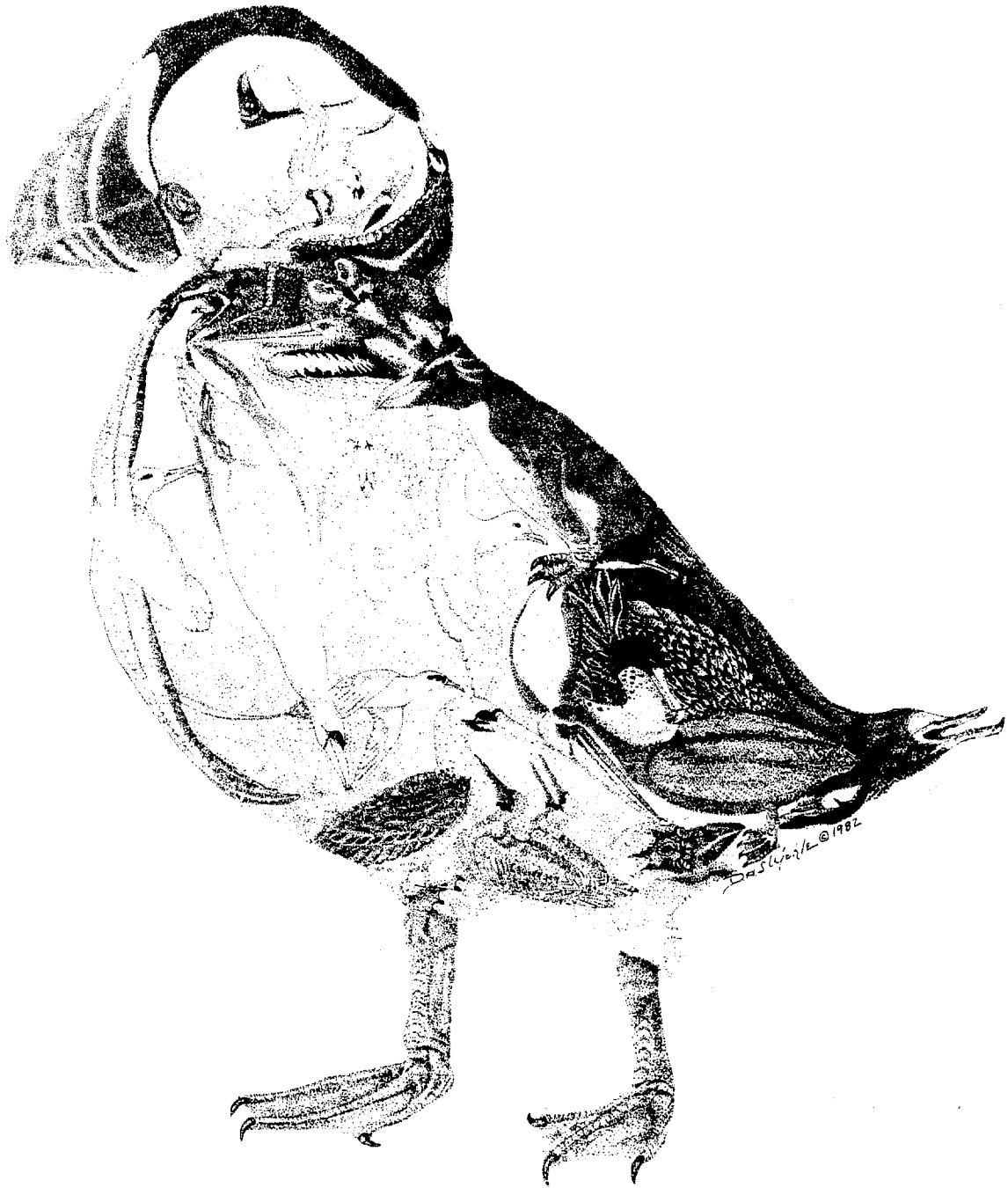
Volume 15 Number 1

1988

**PACIFIC SEABIRD GROUP  
BULLETIN**

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## THE CHAIR'S PAGE

I would first like to express my appreciation for the chance to serve this year as Chair of the Pacific Seabird Group. It represents for me a pleasant extension of the kind of positive reinforcement among colleagues that operates so conspicuously throughout our organization. I think all who have contributed in any way to the annual meetings and other activities of the PSG have experienced this sense of kinship and professional support. It is one benefit of professional societies in general--this one in particular--that should never be underestimated. It makes us happier and more productive as researchers and conservationists.

On both of those two main fronts of PSG activity--conservation and research--the organization, it seems to me, has never been stronger. Standing committees for conservation and seabird-fisheries interactions are more active than ever, and two recent workshops on management strategies for Marbled Murrelets exemplify the kind of activity that steadily increases the credibility and influence of the PSG.

On the scientific side, there seems to be an ever-increasing number of innovative and sophisticated researchers presenting their work at the annual meetings. In part, this reflects a gradual process of maturation in Pacific seabird research. With a few notable exceptions, this area does not enjoy the same tradition and history of in-depth population studies as exists, for instance, in the maritime countries of the northeastern Atlantic. If I may be a bit provincial for the moment, I might point out that in Alaska we were still at the stage of locating previously unknown colonies containing hundreds of thousands of seabirds as recently as 8-10 years ago. Now we are beginning to see the results of some longer term studies, and the mosaic of ongoing research--everything from physiology to population dynamics--is revealing some unanticipated contrasts with earlier work from other regions. I consider these new opportunities for ecological comparisons of the same or closely similar species in different ocean systems, such as the North Atlantic and North Pacific, to be one of the more exciting prospects for marine ornithology. The PSG continues to play a significant role in promoting such developments through its published symposia and the regular communication of ideas among members from the Pacific region and elsewhere.

In respect to our scientific mission, the recent establishment and growth of an endowment fund for the PSG is a most important organizational step. The fund now contains nearly \$15,000, a substantial sum but well short of the eventual goal of \$100,000. The earnings from such an endowment will better enable the PSG to sponsor high quality symposia with published proceedings. Judith Hand and Doug Siegel-Causey, in particular, are to be commended for their efforts to date in this area, and I join them in encouraging all members to give serious thought to fund-raising strategies. The potential is there to greatly benefit PSG with a good idea.

The annual meetings scheduled for the next two years look very attractive. Everyone should try to attend the October meeting in Washington, D.C., which will reprise the highly successful joint meeting in 1985 of PSG and the Colonial Waterbird Society. The 1989 meeting will be held in Victoria, and those who attended the 1978 meeting there will recall what a delightful venue that was. Kees Vermeer is beginning to organize a major symposium on the ecology and conservation of north temperate Pacific seabirds for the Victoria meeting.

For all these reasons, I am confident the PSG has a bright future. Members can be assured they have made a wise choice of professional societies.

Scott A. Hatch

## PACIFIC SEABIRD GROUP NEWS

### Proposed minutes of the Executive Council Meeting 16 December 1987, Asilomar, Pacific Grove, California

Ken Briggs opened the meeting of the Executive Council at 16:15. A quorum was present, consisting of Ken Briggs, Scott Hatch, Lora Leschner, Dan Anderson, Judith Hand, Malcolm Coulter, Mark Tasker, Joel Hubbard, Roy Lowe, Michael Fry and Zoe Eppley. Ken Briggs held proxies for Doug Siegel-Causey, Kees Vermeer, Hans Blokpoel, Paul James and Ron Naveen. Doug Forsell held proxy for Dan Moriarty, and Art Sowls held proxy for Tony DeGange.

1. Art Sowls read the minutes of the 1986 Executive Council Meeting held in Baja California, Mexico. Mark Tasker MOVED that the minutes be accepted as read. The motion was SECONDED and PASSED unanimously.

#### 2. Reports of Standing committees

Conservation Committee: Art Sowls read the report of the Conservation Committee and presented a draft of a disturbance brochure for Alaskan seabird colonies. Topics included in the Conservation Committee report were proposed legislation on plastic pollution and driftnets, hunting in Elkhorn Slough, the jurisdiction and status of seabird nesting islands in Olympic National Park and off the California coast, land exchange in Alaska to protect seabird nesting habitat and phosphate mining on Christmas Island. A detailed summary of that report is provided in this issue of the Bulletin.

Seabird-fisheries Interaction Committee: Vivian Mendenhall read the report of the Seabird-fisheries Interaction Committee for Alec MacCall who could not attend. Topics covered in the report also included legislation on plastic pollution in the sea and on driftnets and the need to amend the Migratory Bird Treaty to provide protection to seabirds beyond three miles from land. Such an amendment would give the federal government some ability to regulate the incidental take of seabirds in high seas gillnets. Concern was again expressed that a crash of the sardine population in the Gulf of California may be imminent due to overfishing. A report from the Seabird-fisheries Interaction Committee is included in this issue of the Bulletin.

Fund-raising Committee: Judith Hand reported on the efforts of the Fund-raising Committee during 1987. The current value of the Endowment fund is \$14,792, up \$3,600 from last year. Life memberships have contributed substantially to the Endowment. Hand reminded the Executive Council that the goal for the Endowment Fund is \$100,000, which would allow \$10,000 per year to be spent on symposia, publishing costs, honorariums and travel. Hand noted that, with compound interest, once we reach \$50,000 it will take only seven years to reach the goal. Fund-raising ideas discussed included T-shirts, note cards, photographs, slide shows, calendars, and even PSG producing a book for sale. Lora Leschner and Judith Hand made a big effort to get foundation money but without success. Hand said fund-raising was not as easy as they had expected because foundations were looking for specific projects to support rather than contributing to a general fund. Hand said that nobody was sent to a fund-raising seminar as was suggested last year. There was a discussion of including a dues notice in the Bulletin and, along with it, an appeal for contributions to the Endowment Fund. Art Sowls brought with him 100 seabird posters commissioned by the U.S. Fish and Wildlife Service for potential sale as a fund-raiser. The cost of each poster

was \$5.00, of which half of that was profit for PSG. Thirty-six posters were sold, resulting in a profit of \$90.00.

3. Editor's Report: Malcolm Coulter summarized his activities for 1987. Two issues of the Bulletin were produced and mailed on time. Bulletins sent to Hawaiian and Alaskan members were sent first class. Coulter reported that he has set up a journal exchange program with other seabird groups and is now receiving their publications. Items of interest to PSG members will be summarized in the Bulletin.
4. Treasurer's Report: Ken Briggs read the Treasurer's report from Doug Siegel-Causey who was unable to attend because of a snowstorm in Colorado. That report also is included in this issue of the Bulletin.

A motion was MADE to adjourn the meeting of the Executive Council and reconvene on December 19 at 12:30 p.m. The motion was SECONDED and PASSED unanimously. The meeting was adjourned at 18:00.

#### **Proposed minutes of the Executive Council Meeting, 19 December 1987, Asilomar, Pacific Grove, California**

Ken Briggs called the meeting to order at 12:30 p.m. Executive Council members or those holding proxies included Ken Briggs, Scott Hatch, Lora Leschner, Dan Anderson, Judith Hand, Malcolm Coulter, Mark Tasker, Joel Hubbard, Roy Lowe, Michael Fry, Zoe Eppley and Doug Forsell.

#### **New Business**

1. Election Results: Ken Briggs presented the results of the latest election as follows:

Chair-elect -- Michael Fry  
Treasurer -- Doug Siegel-Causey  
Secretary -- Tony DeGange  
Regional Representatives  
    Northeast -- Mark Tasker  
    Southeast -- Roger Clapp  
    Inland -- Paul James  
    Central California -- Jean Takekawa  
    Southern California -- Zoe Eppley

Briggs reported the Doug Siegel-Causey plans on stepping down as Treasurer after a long tenure in that position. Nominations are needed to fill this position which traditionally lasts for three years. A discussion followed on the effectiveness of the regional representative system as those from distant regions have difficulty in participating in annual meetings and may not be able to represent those larger areas fairly. Lora Leschner stated that one function of the representatives, the regional reports, is handled centrally by the Colonial Waterbird Society (CWBS) through direct contact with the members by questionnaire. Malcolm noted that this system would greatly increase the workload of the editor and make it more difficult to produce an issue of the Bulletin in a timely manner.

2. Future Meetings: Briggs reported that PSG has received an invitation to hold a joint meeting with the Colonial Waterbird Society in Washington, D.C. on October 13-16, 1988 at the National 4H Center. A discussion followed concerning the timing of the meeting as it is not the usual time of year for PSG to meet. Michael Fry MOVED that PSG hold its annual meeting in conjunction with the CWBS in Washington, D.C. in October 1988. The motion was SECONDED and PASSED unanimously. Dan Anderson urged that we all make a special effort to attend the meeting. It was noted that any profits from the 1988 meeting would go to the CWBS.

No decisions have been made beyond the 1988 meeting. PSG has received an invitation from Kees Vermeer to hold the 1989 meeting in British Columbia and, to date, British Columbia is the leading candidate. In 1990, the IOC and ICBP meetings will be in New Zealand. It was suggested that PSG meet there as well in conjunction with the international meetings. Suggested locations for the 1991 meeting were Davis, California and Ensenada, Mexico.

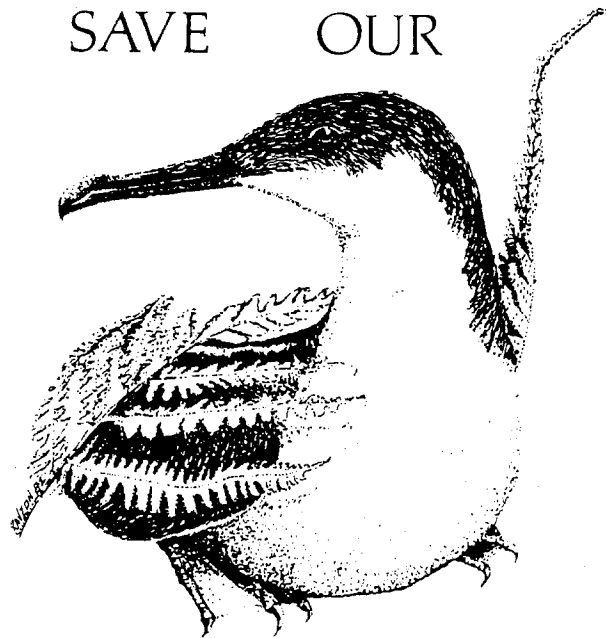
3. Dues: Several potential financial problems were discussed. Most importantly was the high rate of delinquency on payment of dues. It was noted that it is essential that the Treasurer send out dues notices as it is clear that there is considerable confusion over when they are due and whether or not members are in arrears. In addition, at future meetings, there will have to be a mechanism to insure that members will be able to pay dues regardless of whether the treasurer is present or not. It was suggested that a dues notice be included in the Bulletin as a reminder to members. There was a discussion on whether or not PSG should raise its dues. A motion was MADE that, effective January 1, 1988, dues be raised to: Student -- \$10.00, Regular -- \$15.00, Institution -- \$20.00, and Overseas Institutions -- \$25.00. The motion was SECONDED and PASSED by a vote of 11:1. A second motion was MADE that, effective January 1, 1989, the cost of a Life Membership be raised to \$450.00. The motions were SECONDED and PASSED by a vote of 11:0. Note that, until 1989, Life Memberships are still available at the bargain price of \$350.00.
4. Projected expenses for 1988 were discussed. A motion was MADE that the following expenditures should be made in 1988:
  - Publishing the Alcid Symposium -- \$1,500.00
  - Latin American Newsletter -- \$100.00
  - Bulletin publication -- \$2,000.00
  - ICBP dues -- \$200.00
  - Subscriptions -- \$50.00The motion was SECONDED and PASSED unanimously.
5. Ron Naveen and Malcolm Coulter were selected to be PSG's representatives to the ICBP for the next two years. Ralph Schreiber has stepped down as Chair of the ICBP's Seabird Committee.
6. A discussion regarding getting the Adopt-a-member program off the ground. Leopoldo Moreno agreed to coordinate the program.
7. A thank you letter will be sent to Fred Sharpe for the donation of the books that were raffled at the meeting.
8. A provision for printing more PSG information brochures will have to be made sometime in the near future. Since the need is not immediate, the issue was tabled.

9. The treasurer and Craig Harrison were appointed to see if PSG would be able and willing to serve as an umbrella organization for grants.

At 13:30, a motion was MADE to adjourn the Executive Council Meeting. It was SECONDED and PASSED.

I thank Art Sowls and Joel Hubbard for taking notes at the Executive Council Meetings.

Respectfully submitted  
Anthony R. DeGange, Secretary



SHEARWATERS



**TREASURER'S REPORT - 1987**

**CARRYOVER FROM 1986**

(Checking: \$167.70; Savings: \$2,505.52) \$ 2,673.22

**INCOME**

Dues, back issues	\$3,380.75	
Income from La Paz meeting	0.00	
Interest on savings	186.02	
Miscellaneous	728.13	4,194.93

**EXPENSES**

Bulletin and related costs	945.00	
Officers' expenses	266.71	
Annual meeting		
La Paz (1986)	400.00	
Asilomar (1987)	150.00	
ICBP dues	100.00	
Promotion, fund-raising	1,050.00	
Gull symposium, printing	2,000.00	
Account expenses	27.37	(4,911.71)

**INCOME OVER EXPENSES** (716.78)

**ACCOUNTING BALANCES (as of 30 November 1987)**

(Checking: \$614.90; Savings: \$1,341.54) \$ 1,956.44

**ENDOWMENT ACCOUNT (Dean Witter Government Securities)**

1 January 1987: 1,055.101 shares  
market value = \$10.52 per share \$11,099.66

Life Member payments paid in: \$2,430.00

30 November 1987: 1,406.147 shares  
market value = \$9.76 per share 13,723.99

Increase over investment (1.6% p.a.) 164.33

[Portfolio worth at par (\$10.52 per share) (7.2% p.a.) \$14,792.67]

*Income*

Almost all of the income for 1987 was derived from membership dues and sale of back issues. As of 30 November, 25% of our members have not yet paid. Most of the dues in arrears (\$1,060) have traditionally been paid by February or March of the next year, and few members are dropped from the rolls because of nonpayment. However, this delay in dues payments causes some cash-flow problems in our accounts.

### *Expenses*

The amounts in recurring categories (officers' expenses, printing) remain about the same from 1987. Three items are noteworthy:

a. The bulletin costs (\$945): This amount reflects only direct payments to the editor and typesetters. We will have a substantial bill (about \$2,000) from SREL for printing to come due at the end of this year.

b. Gull Symposium printing (\$2,000): I recently paid this amount to the Cooper Ornithological Society in partial subsidy of the costs of publishing the proceedings as an issue of *Studies in Avian Biology* 10. The amount paid represents 43% of the total disbursement in 1987.

c. The Fund-raising Committee decided earlier to raise funds for the Endowment through the sale of PSG T-shirts. The amount paid for this promotion (\$1,050) represents costs of artwork, materials and printing, and was paid directly to Judith Hand. This amount represents 22% of the total disbursement in 1987.

### *Membership*

PSG currently has 391 members (excluding 52 institutional subscribers), and 106 of these are in arrears. Twenty-one members are new, and about two-thirds of these used the brochure as a source of information and addresses. Ten members were dropped either for nonpayment of dues for more than 12 months or by resignation. The net change is 11 more members than in 1986. There are 32 Life Members. Institutional subscriptions were reduced in number by two in 1987.

### *Endowment*

Since our funds are invested in Government Securities, the market value of our shares dropped substantially (\$1 per share) in the aftermath of the Ivan Bolsky affair. The good news is that this allowed me to purchase proportionately more shares per Life Membership and that the market value of our shares were not only unaffected by the "adjustment" on Wall Street but are increasing in value. Our return from investment in 1987 is low (1.6% p.a.), but it appears that this rate is increasing steadily. The current net worth of the Endowment is \$13,723 on 1,406 shares at a market value of \$9.76 per share.

### 1988 ANNUAL MEETING

The 1988 annual meeting of the Pacific Seabird Group will be held October 12-16 1988 in Washington, D.C. as the second combined meeting with the Colonial Water Bird Society. Following our successful first joint meeting in San Francisco in December 1985, the PSG agreed to meet with the CWBS at their normal autumn meeting date in 1988. The 1988 meeting will be held at the National 4-H Center in suburban Washington. Arrangements for the meeting will be coordinated by Michael Fry (PSG) and Herb Kale (CWBS). Mike Erwin will serve as Local Committee Chairman. Washington in autumn offers pleasant weather, fantastic museums, sightseeing and the opportunity to visit government officials. This promises to be an excellent meeting. Meeting announcements will be mailed to all PSG members in late spring.

## PSG COMMITTEE ON SEABIRDS AND FISHERIES

DECEMBER 1987 MEETING

### *Plastic pollution and gillnets*

Two problems affecting seabirds in Alaska were discussed at the December 1987 meeting of the Seabirds and Fisheries Committee: ingestion of plastic litter at sea by foraging birds and incidental mortality of seabirds in high-seas driftnet fisheries for salmon and squid in the Pacific. Bills on both issues were passed by Congress on December 18 (practically during our discussions) and have been signed by President Reagan.

The problem of plastic litter at sea has been described by Bob Day, Mike Frye, and others. Procellariiformes and Parakeet Auklets are among the groups that ingest large amounts of debris, probably because it resembles their food items. Effects on the birds may not be as severe as have been feared (L. Sileo, paper given at this PSG meeting), but this has only been studied for albatross chicks. Other marine animals are killed by swallowing debris or becoming entangled in it, and aesthetic effects on beaches can be revolting.

Congress passed an act in December that covers several unrelated topics. The whole act is designated PL 100-220; the part that deals with plastics is Title II, also designated the "Marine Plastic Pollution Research and Control Act of 1987." It seems to provide extremely good controls on some kinds of pollution but to leave other problems unregulated. The act ratifies an amendment to the treaty which prohibits oil pollution at sea (the International Convention for the Prevention of Pollution from Ships of 1973); the amendment says that nations also agree not to dump plastics in the sea. The actual wording of the act prohibits dumping of all "garbage," presumably meaning metal, glass, paper, and leftover food as well. Military ships are excluded for five years but must comply thereafter. Important provisions include a requirement that shipping ports must provide disposal facilities for garbage, that ships may be inspected at sea by the Coast Guard, and that some must keep records on the fate of their garbage. Education is to be instituted for industries, fishermen, and recreational boaters of the effects of plastics and other debris in the water. These provisions sound comprehensive and likely to improve marine littering.

The Plastic Pollution Act has at least one serious omission: it does not address the problems created by plastic pollution from sources other than garbage. These include discarded fishing nets (the main type that causes mortality in marine mammals) and ropes; personal equipment such as cigarette lighters (which are ingested by albatrosses), sandals, and helmets, which are abundant on beaches even in the subarctic; and commercial trash such as strapping bands and raw plastic pellets. These will hopefully be addressed by two reports to Congress that are called for by the act, one by the Department of Commerce on plastics at sea and the other by the Environmental Protection Agency on plastics on land and on beaches.

Mortality of seabirds in gillnets has become an issue throughout the Northern Hemisphere. In Alaska, the greatest problem is the high-seas driftnet fishery for salmon, which is carried out by Japan in the Bering Sea and North Pacific Ocean, primarily just south of the western Aleutian Islands. Other nations fish for salmon and squid in other parts of the Pacific, but almost no information is available on them. The Japanese fishery off Alaska was studied by Tony DeGange in 1982 through 1984 (a final report is in preparation). He estimated that 130,000 seabirds on average were being caught each year by the entire Japanese fishery. Slightly over half of these birds were Short-tailed Shearwaters; others included Tufted and Horned Puffins, Ancient

Murrelets, Northern Fulmars, and a variety of other procellariiformes and alcid. No significant adverse impact was found for the North Pacific population as a whole in any species. However, populations breeding in colonies on the outer Aleutian Islands were suffering disproportionate impact because these birds travel less than 100 km from the colony to feed and were concentrated at the same prey patches as the salmon. The most serious effect was suspected for the Tufted Puffin, whose losses to gillnets each year were estimated at 7 to 9% of the breeding population; this exceeds the only yearly mortality estimates available (4-6%, for the Atlantic Puffin), and declines in populations in western Aleutian colonies were predicted. There were (and are) no data on actual population trends in any of the potentially affected areas. Dall's porpoises have also been killed incidentally in the nets. Most study of seabird mortality ended in 1984, but basic data continued to be collected by National Marine Fisheries Service observers.

Bills were submitted by Alaskan congressmen into both houses this session that would have established a protection zone 60 nautical miles wide around the Aleutian Islands where no gillnet fishing would be allowed, thus alleviating the worst impacts on birds. Impacts of gillnets on marine birds and other vertebrates were to be studied. Other provisions included a bounty to be given for retrieval of lost ("ghost") driftnets, study of better ways to mark nets and boats, and study of biodegradable net materials. Most provisions of these bills were noncontroversial, but the protection zone ran into opposition from the Departments of Commerce and State. The reason is the complex web of diplomacy, constant negotiations, and shifting agreements by which management of international fisheries is conducted. There was concern that a unilateral declaration by one party (the U.S.) might be disadvantageous in the long run. A modified version of the bill was passed as Title IV of PL 100-220, designated the "Driftnet Impact Monitoring, Assessment, and Control Act of 1987." It does not make any mention of a protection zone around the Aleutians, and no bounty for ghost nets is implemented. The studies in the earlier bills are retained, and studies are also specific. The act does contain some improvements over earlier versions, including a requirement that impacts on seabird populations will be studied by the U.S. Fish and Wildlife Service. Although the bill did not contain everything hoped for by conservationists, it does recognize that there is an issue.

The U.S. Fish and Wildlife Service is continuing to work on several aspects of the gillnet problem. We will explore opportunities to attend meetings of the International North Pacific Fisheries Commission to inform the delegates of issues concerning seabirds. Tony DeGange's report is nearing final form, as mentioned, and we are also analyzing the data collected since his study. And it is expected that monitoring of Aleutian seabird colonies will begin this year.

A few final comments are in order. (1) The Japanese high-seas fishery within the U.S. Exclusive Economic Zone is currently halted by an injunction obtained by marine mammal advocates. Negotiations are underway that may result in resumption of the fishery, but it is not known yet whether it will occur in 1988. (2) The U.S. Department of Interior has decided that it has no authority to protect birds beyond three miles from shore under the Migratory Bird Treaty Act, although marine mammals are protected out to 200 miles under the Marine Mammal Protection Act. Changing this may require an amendment to the Migratory Bird Treaty Act; the problem was discussed by the Seabird and Fisheries Committee, and it was agreed that PSG will consider some action in the future.

Vivian M. Mendenhall

## RECENT ANALYSES OF LONG-TERM FISHERY-SEABIRD INTERACTIONS IN PERU AND SOUTH AFRICA

Nearly every nation which has significant industrial (as opposed to artisanal) fisheries has a government agency which is responsible for monitoring those fisheries and for making management recommendations. In most cases, these agencies are restricted to studies of harvested species. Formal governmental support (if any) of seabird studies usually is relegated to agencies with little or no linkage to fishery management. Two important exceptions to this pattern are Peru and South Africa, where seabird studies are conducted by the fishery agencies. Notably, both of these countries have histories of commercial guano harvests; in effect, seabirds have provided an exploitable resource, and this relationship is reflected in the mandates of the corresponding government fishery agencies. As in the case for fishery monitoring, long-time series of seabird observations result from government-sponsored monitoring. These time series present unusual opportunities for analysis of seabird and fishery interactions.

Several progressive studies of fishery-seabird relationships have recently come out of these two countries. Some of these additions to the literature are abstracted here.

MONTHLY POPULATION SIZE OF THREE GUANO BIRD SPECIES OFF PERU, 1953 TO 1982. By H. Tovar, V. Guillen and M. E. Nakama, 1987. p. 208-18 *In*: D. Pauly and I. Tsukayama (eds.). The Peruvian anchoveta and its upwelling ecosystem: three decades of change. ICLARM Studies and Reviews 15, 351 p. Instituto del Mar del Peru (IMARPE), Callao, Peru; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), GmbH, Eschborn, Federal Republic of Germany; and International Center for Living Aquatic Resources Management (ICLARM) Manila, Philippines.

ABSTRACT: Monthly population size estimates of three species of fish-eating, guano-producing birds (cormorant: *Phalacrocorax bougainvilli*; booby: *Sula variegata* and pelican: *Pelecanus thagus*) were obtained, based on planimetric analysis of over 10,000 maps of their distribution on guano islands and points along the coast of Peru for the years 1953 to 1982. These data allow for a much more detailed description of the interactions between the bird populations and their environment than had hitherto been the case, and a preliminary discussion of such interactions is given with emphasis on the combined effects of the anchoveta fishery off Peru and successive El Niño events.

MONTHLY ANCHOVETA CONSUMPTION OF GUANO BIRDS, 1953 TO 1982. By P. Muck and D. Pauly, 1987. p. 219-33 *In*: D. Pauly and I. Tsukayama (eds.). The Peruvian anchoveta and its upwelling ecosystem: three decades of change. ICLARM Studies and Reviews 15, 351 p. Instituto del Mar del Peru (IMARPE), Callao, Peru; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), GmbH, Eschborn, Federal Republic of Germany; and International Center for Living Aquatic Resources Management (ICLARM), Manila, Philippines.

ABSTRACT: Anchoveta consumption by Peruvian guano birds (*Phalacrocorax bougainvilli*, *Sula variegata*, *Pelecanus thagus*) was estimated for the period 1953 to 1982 for the area 4-14°S latitude using an analytical consumption model and monthly seabird population estimates based on field counts. Highest estimates were obtained for 1955-6 with about two million metric tons (t) per year of anchoveta being consumed by the guano birds. Due to the continuous decline of the guano bird populations, their anchoveta consumption dropped to values of less than 20,000 t at the beginning of the 1970s and an average of around 30,000 t between 1970 and 1982. Population decline of guano birds is most probably caused by reduced anchovy availability, a consequence of the combined effects of the heavy anchovy fishery and El Niño-related periods of low food vulnerability.

USE OF CAPE GANNETS *MORUS CAPENSIS* IN MANAGEMENT OF THE PURSE-SEINE FISHERY OF THE WESTERN CAPE. By A. Berruti, 1987. PhD Dissertation, University of Natal (Pietermaritzburg). 304 p.

ABSTRACT: The diet of the Cape gannett (*Sula capensis*) was monitored monthly at Lambert's Bay and Malgas Island in the western Cape from 1977 to 1986. Comparison with purse-seine fishery catches and the distributional ecology of the fishes suggested that the contributions of epipelagic fishes to the diet of the Cape Gannet were related to their availability and abundance but that the occurrence of mesopelagic fishes was not related to their availability and abundance. Differences in the diets of breeding and nonbreeding gannets were small. Extensive at-sea observations showed that gannets from the colony at Lambert's Bay fed primarily north of Cape Columbine in cool inshore waters, where they took juvenile Cape anchovy. Gannets from the colony at Malgas Island fed primarily south of Cape Columbine both inshore, where they took juvenile Cape anchovy, and offshore, where they took saury and adult pilchards. Significant correlations between the percentage of pilchard in gannet diet and purse-seine fishery catches suggested that gannets were reliable monitors of the trend in South African pilchard stocks at low biomass levels.

THE VALUE OF CATCH STATISTICS AND RECORDS OF GUANO HARVESTS FOR MANAGING CERTAIN SOUTH AFRICAN FISHERIES. By M. O. Bergh, 1986. PhD Dissertation, University of Cape Town. 335 p.

ABSTRACT: (Much of the dissertation investigates properties of Virtual Population Analysis, a method of estimating fish abundances from catch information. Portions relating to seabirds are abstracted here.) The damping out of fluctuations in guano production following the inception of pilchard fishing appears not to be due to a direct diminution of forage to the seabirds, but to an increased stability in forage abundance itself, albeit at a lower level. The guano record has strong two-to three-year components of variability. Detailed stability analysis of seabird population dynamics shows that those populations should not exhibit limit cycles or, in the case of the Cape cormorant, only low frequency cycles. However, analysis of the dynamics of the pilchard population shows a tendency toward cycles of two to three years, as well as a geographic recruitment pattern consistent with observed time lags in guano variability among islands. Evidence suggests that the guano harvest at Lambert's Bay is approximately linearly related to pilchard recruitment. Accordingly, information on guano harvest is included in the Virtual Population Analysis of South African pilchard.

Alec D. MacCall, Committee Chairman

## CONSERVATION COMMITTEE

The committee met formally for three hours during the December 1987 PSG annual meeting. A total of 18 people, including non-committee members, were present. Major issues discussed and actions taken were:

- 1) Disturbance brochure - PSG's highest priority for the conservation committee has been to develop a brochure for tourists on disturbance. Various versions would be made for use in different areas of the west coast, including a Spanish version for Baja. The Alaska committee presented a draft Alaska version at the meeting. It was discussed and decided that finalization and printing should proceed for distribution this summer, if possible. Most appropriate sources of publishing were thought to be the Alaska Natural History Association and the Fish and Wildlife Service.
- 2) Drift net legislation - Senate bill S.62 and similar House bills were discussed. The committee decided to send a letter written jointly with the PSG seabird-fisheries interaction committee supporting the best elements of each bill. They will be sent to the appropriate congressmen.
- 3) Plastic dumping in the Oceans: Congress should soon pass legislation restricting ocean dumping of plastics by all ships in U.S. waters and in all waters by U.S. ships. Questions of if U.S. Navy ships were exempt were raised. PSG is sending letters in support of this legislation.
- 4) Elkhorn Slough, California: California Department of Fish and Game lack of a management plan is a concern by PSG. Elkhorn Slough is the largest pelican roost north of Anacapa Island and is used extensively by other birds. The CDF&G has opened the area to duck hunting and disturbance to roosting birds may be occurring. PSG will send a letter to CDF&G expressing our concern.
- 5) Gill-net regularions, California: Decline of common murre and complete elimination of some small colonies promoted gill-net fisheries to be curtailed along the California coast. PSG and environmental groups have pushed for such action in the past. A letter commending CDF&G on this action will be sent.
- 6) California coastal islands and rocks: While California has spectacular coastal seabird colonies, most are not in a wildlife refuge system such as is the case of Oregon, Washington, Hawaii, and Alaska. BLM, the primary landowner, has an agreement with CDF&G to do annual surveys and reports on the islands. No reports have been done and survey data is "sorta notes inside peoples heads." PSG feels many of these islands deserve better protection and will send appropriate letters.
- 7) Kilauea Point, Hawaii is a National Wildlife Refuge. PSG requested in April 1987 of Senator Robert Byrd, the chairman of the Interior Appropriations, that the 138 adjacent acres that was in danger of being subdivided and developed be bought. Unfortunately, no funds were appropriated.
- 8) Marion Island is an important seabird colony in the southern Indian Ocean under the possession of South Africa. It has about 10% of the world's wandering albatross and hundreds of thousands of penquins. South Africa is planning to build a major runway, and there are rumors of military uses including testing missiles. PSG will write a letter to the South African government expressing our conservation concerns.

## MARBLED MURRELET MANAGEMENT WORKSHOP

The Pacific Seabird Group (PSG) has sponsored two workshops on the Status and the Management of Marbled Murrelets. Seabird biologists met for the first workshop at the 1986 PSG meeting in La Paz, Mexico, and discussed the Status of the Marbled Murrelet. Participants agreed that the population could be threatened by destruction of old-growth forest habitat, entanglement in gillnets and pollution or shoreline development within marine foraging areas.

The conclusions of the 1986 workshop were (1) a report from each Pacific state and province on the status of the Marbled Murrelet should be included in the professional paper session of the 1987 PSG meeting and (2) land and wildlife management agency representatives should be involved in a second workshop at the 1987 meeting where habitat protection and interagency cooperation could be discussed.

The 1987 Management of Marbled Murrelets workshop was announced in the PSG Meeting Announcement plus letters of invitation were sent to federal, state and provincial agencies and organizations. Thirty-nine people participated in the workshop. The agencies represented included:

United States Fish and Wildlife Service - 7, United States Forest Service - 3, Mineral Management Service - 2, Canadian Wildlife Service - 2

Oregon Department of Fish and Wildlife - 1, California Fish and Game - 2, Washington Department of Wildlife - 1, Washington Department of Ecology - 1, California State Parks - 1

Universities - 4, Bamfield Marine Station - 2, Savannah River Ecology Lab - 1, Point Reyes Bird Observatory - 1, Portland Audubon - 1, National Council of the Paper Industry for Air and Stream Improvement - 1, Private - 9

The National Park Service, Bureau of Land Management, Alaska Department of Game and British Columbia Ministry of Forestry were invited but did not send representatives to the meeting.

The focus of the workshop was to discuss means to accomplish tasks that were identified at the 1986 PSG meeting in the first workshop on the Status of Marbled Murrelets. Those tasks were:

Interim protection of old-growth habitat until the nesting habitat requirements of Marbled Murrelets are documented.

Interagency cooperation and the formation of an Interagency Task Force to insure that habitat is protected and research is funded.

Inventory of old-growth stands for the occurrence/absence of Marbled Murrelets.

Research. The highest priority topics are:

Studies relating to the effect of old-growth forest removal.

Information on habitat requirements.



- B. Survey inland areas for presence and degree of use by Murrelets during both the breeding and nonbreeding season.
  - 1. Establish standard survey method which would be used in coastal old-growth and second-growth stands by investigators.
    - a. This will be especially important if testing the importance of old-growth habitat.
    - b. P. Paton and K. Nelson will develop sampling protocol.
  - 2. Train volunteers/seasonal workers emphasizing the proper use of the standard method to, at a minimum, insure the reliability of a Murrelet present/absent assessment.
- II. Population Estimate
  - A. Conduct at-sea abundance surveys to establish: (1) a more precise, baseline population estimate and (2) areas of aggregation.
    - 1. Abundance surveys to be conducted from a vessel should, when appropriate, use the method established by H. Carter and S. Sealy.
    - 2. Explore the use of helicopters for aerial surveys, since several investigators have found that Murrelets cannot be effectively surveyed from fixed-winged aircraft.
- III. Dissemination of information
  - A. Develop and send by 1 April each year a Newsletter listing the Murrelet research in progress or that is to be conducted during that field season.
    - 1. PSG regional representatives will supply the information for the Newsletter, including the names, addresses, and phone numbers of the principal investigators.
    - 2. A mailing list for the Newsletter needs to be developed.
    - 3. The PSG Bulletin cannot be used because the spring issue deadline is 15 January.
  - B. Form a central repository for research findings; the Nature Conservancy Heritage Data Base program may be the appropriate repository.
  - C. Develop a bibliography of Marbled Murrelet literature.
    - 1. S. Sealy, S. Speich, and D. Marshall will pool their bibliographies.
    - 2. The Nature Conservancy Heritage program may print and distribute the completed bibliography.
- IV. Monitoring Marbled Murrelet Populations
  - A. Development of a monitoring program for old-growth stands will depend on the immediate findings of the inland survey program and, hence, cannot be carried out at this time.
  - B. Murrelet populations cannot be monitored through documenting changes in at-sea abundances until baseline information has been collected. At-sea monitoring may not immediately reflect loss of nesting habitat and it would be impractical to census the population every year.

The Research Subcommittee did not rank the tasks identified. However, there was general agreement that all of the tasks under Nesting Habitat (I) and Population Estimate (II) were high priorities. The Newsletter (III.A.) was also considered an important task. Medium priority tasks included the central repository for research findings (III.B.), the bibliography (III.C.), and development of a monitoring program for old-growth stands (IV.A.). Monitoring populations via at-sea inventories was considered a low priority until baseline population estimates are completed (IV.B.).

## INTERIM PROTECTION AND INTERAGENCY COOPERATION SUBCOMMITTEE

The participants discussed suggestions made during the brainstorming session. The following activities were recommended for action:

1. Publish the proceedings of the symposium on the Marbled Murrelet. This contains the best summary of current data and ongoing work.
2. Publicize research results by:
  - a. Writing and publishing papers
  - b. Informing colleagues in other agencies of issues and data on Murrelets during informal "networking" exchanges.
  - c. Information exchange through an Interagency Committee.
3. Send a letter to agencies regarding the formation of an Interagency Committee or Task Force. B. Sharp drafted a letter addressed to appropriate resource management agencies. Each agency would be asked to appoint a representative to the Committee. An existing Committee, the Oregon-Washington Interagency Committee may be an appropriate starting point. Agencies from California, British Columbia and Alaska could then be included.

The goals of the Interagency Committee would be (1) insure that management efforts are initiated, (2) insure that there is interim protection of old-growth habitat until research is completed, (3) obtain adequate funding for research, (4) establish research and inventory priorities for different regions, (5) insure that inventories are initiated and techniques are comparable, and (6) education of land managers and the public.

4. Send a letter to agencies that manage forests and coastlines, urging interim management procedures. The letter should arrive two to four weeks after the one concerning the Interagency Committee. V. Mendenhall drafted the letter. Subcommittee members listed the appropriate agencies as:

Regional Foresters of U.S. Forest Service--Regions 5 and 6, Canadian Forest Service, Bureau of Land Management, Washington Department of Natural Resources, Washington State Parks, Oregon Department of Forestry, Oregon State Parks and Recreation, California Department of Forestry, Alaska Department of Natural Resources, B.C. Ministry of Forestry.

Copies of the letter should be sent to:

*Supervisors of National Forests:* Chugach, Tongass, Olympic, Mt. Baker-Snoqualmie, Siuslaw, Siskiyou, and Six Rivers.

*State wildlife agencies:* Alaska Department of Fish and Game, Washington Department of Wildlife, California Department of Fish and Game, Oregon Department of Fish and Wildlife

*Federal agencies:* Regional Directors of U.S. Fish and Service--Regions 1 and 7, Coastal Zone Management agencies, Alaska Department of Environmental Conservation.

*Possible Additions:* Native Corporations of coastal Alaska and Washington, Industry.

## Letter to the Portland Audubon Society

Following the 1987 Annual meeting, Scott Hatch wrote a supportive letter to the Portland Audubon society:

22 December 1987

Mr. John Biewener, President  
Audubon Society of Portland  
5151 NW Cornell Road  
Portland, OR 97210

Dear Mr. Biewener:

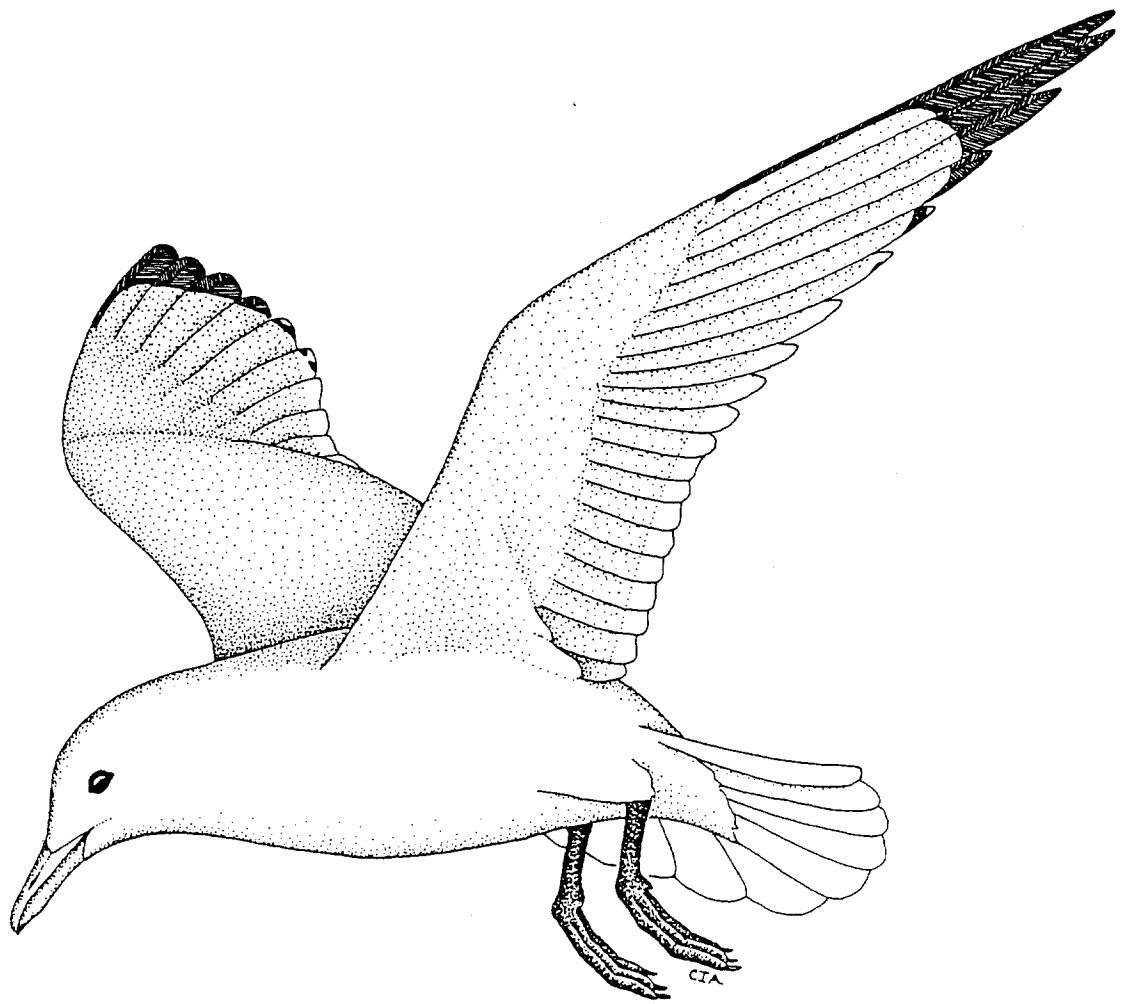
At the annual meeting of the Pacific Seabird Group just held, we learned through David B. Marshall that the Audubon Society of Portland, joined by other chapters of the National Audubon Society, plans next month to petition the U.S. Fish and Wildlife Service to list the Marbled Murrelet as a threatened species in Washington, Oregon, and California. Copies of the draft status report were circulated at our meeting and were read widely by our membership. Mr. Marshall, the author of the status report, has been in close contact with those most knowledgeable of the species, most of whom were present at a special Marbled Murrelet workshop held during our meeting. He has received their input and endorsement of the report. Reviews by several of our members found this report to be a relatively complete and accurate summary of our knowledge of Marbled Murrelets.

The Pacific Seabird Group passed resolutions in 1982 and 1986, directed to appropriate agencies, which addressed the precarious status of this species. These resolutions pointed out the critical need for more research while information is still readily obtainable. Our resolutions have been largely ignored. The gaps in knowledge about the species represents a threat in itself.

The Pacific Seabird Group commends you for preparing the status report, and for your efforts to list the Marbled Murrelet as a threatened species in the above three states, particularly in view of the lack of action by responsible agencies to date.

Sincerely,

Scott A. Hatch  
Chair



**THE PROGRAM CHAIR'S COMMENTS  
FOURTEENTH ANNUAL MEETING**

Asilomar Conference Center  
Pacific Grove, California  
16-20 December 1987  
Scott A. Hatch

The turnout at Asilomar in December proved again that PSG meetings are a "must" in the annual cycles of a lot of people with otherwise busy schedules. Over 150 people attended this year, including members and friends from the United States, Canada, Mexico, Peru, Scotland, Norway, and Iceland. Some 63 lectures and posters were presented--a record number, not counting the joint PSG/CWG meeting in San Francisco two years ago--and the program would have been even a bit larger had a Canadian airline strike and winter storms in the midwest not taken their toll on travelers. In addition to the large number of contributions, I was impressed by the wide variety of topics, indicated by the abstracts on the following pages, and by the consistently high quality of the presentations.

Highlights of the scientific program included a 16-paper symposium on alcids at sea that roundly succeeded in fulfilling its purpose of bringing together a number of solid contributions in this less-traveled area of seabird biology. Spencer Sealy, who convened the symposium, will be editing the proceedings for publication in *Studies in Avian Biology*.

Another focus was a series of status reports for Marbled Murrelets from Alaska to California, organized by Harry Carter. Collectively, these reports constitute an impressive body of information on this enigmatic species, for which Harry is now considering a number of possible publication outlets. Complementing the research reports was a productive workshop on management strategies for Marbled Murrelets led by Lora Leschner. I believe that a few years from now, this workshop and its fallout will be seen to have made a substantial contribution toward the welfare of this species in the northeastern Pacific.

I found two papers on the program particularly noteworthy because they provide textbook examples of the kinds of interactions between seabirds and commercial fisheries over which the PSG has continuing concerns: see abstracts by Takekawa et al. on the decline of Common Murres in central California due to drowning in gill nets and Vader et al. on the decline of Common Murres in northern Norway after the crash of their main prey species (capelin) due to overfishing.

The local committee for this year's meeting, consisting of Dave Lewis, Breck Tyler, Linda Martin, and Alan Baldrige, did a superb job of accommodating the scientific program and providing a variety of pleasant diversions during the week. Particularly memorable was our evening visit to the Monterey Bay Aquarium. There we were captivated by a truly remarkable array of exquisite, if behaviorally subdued, marine life--plus one exhibitionist murre. The annual banquet was another high point, as Professor Charles Sibley delivered a lively talk on seabird relationships indicated by his extensive DNA hybridization studies.

All in all, it was an excellent meeting, and I am satisfied that the scientific health of the PSG has never been better. The annual meeting continues to serve as an important forum for personal contacts and brainstorming on seabird matters in Pacific waters and around the world.

## ABSTRACTS

### DEMOGRAPHIC ANALYSIS OF A SOUTH POLAR SKUA POPULATION

Ainley, D. G., R. C. Wood (Point Reyes Bird Observatory, Stinson Beach, CA) and C. A. Ribic (Center for Quantitative Studies, University of Washington, Seattle, WA)

Demographic parameters and the population growth rate were estimated for South Polar Skuas (*Catharacta maccormicki*) nesting at Cape Crozier, Ross Island, Antarctica. Data were based on observations made during 15 nesting seasons over a 23-year period (1961-83) of nine cohorts of fledglings banded during the first part of the study, 1961-9. Band loss and wear were determined to be negligible. Youngest breeders were four years of age; average age of first breeding was seven-nine years, depending on sex; after age of nine years, 91-100% of birds attempted breeding. Crozier skuas were much more philopatric than those from certain other skuaries. Nesting success was exceedingly low; the population average was attained by about the age of nine years. Survivorship of birds aged two-ten years averaged 0.89, and that of older individuals averaged 0.96. Fecundity was a function of an abiotic factor, independent of density; recruitment and a low, constant mortality drove the population age structure. Emigration compensated negative growth.

### CENSUS OF MAGELLANIC PENGUINS AT PUNTA TOMBO, ARGENTINA

Boersma, P. D. (Institute for Environmental Studies and Department of Zoology, University of Washington, FM-12, Seattle, WA 98195)

Three independent estimates taken of the Magellanic penguin colony at Punta Tombo were 446,000 pairs and 600,000 (Boswall and Prytherch 1972) and 376,655 pairs (Scoloro 1979). In February 1987, over seven hectares were sampled and all nests; active, inactive or some use; and all adults, juveniles and chicks in the 100m<sup>2</sup> sample circles were counted. In October 1987, during egg laying, one of the same transects was resampled and additional areas of the colony counted. The number of pairs for the Punta Tombo colony is lower than previously believed and is less than 250,000 pairs. Nest density within the colony is highly variable but generally is densest closer to the sea.

### SUMMER DIET OF THICK-BILLED MURRES IN THE EASTERN CANADIAN ARCTIC

Bradstreet, M. S. W. (LGL Ltd., P. O. Box 280, King City, ON, Canada L0G 1K0) and A. J. Gaston (Canadian Wildlife Service, Ottawa, On, Canada, K1A 0E7)

Thick-billed Murres of known age and sex (n = 604) were collected at sea during the incubation, chick rearing, and postfledging periods of seven years for food habits studies. In birds taken near four colonies in the High Arctic marine zone, two colonies in the Low Arctic and one colony near the High Arctic/Low Arctic boundary, we found no differences in the presence/absence of prey between male and female birds. We also compared the diets of birds collected in different breeding periods, in different years, at different colonies and in different marine zones. Birds collected at adjacent colonies had more similar diets than those taken farther away. Diet diversity increased from the High Arctic to the Low Arctic.

## DIET OF DOVEKIE CHICKS IN NORTHWEST GREENLAND

Bradstreet, M. S. W. (LGL Ltd., P. O. Box 280, King City, ON, Canada L0G 1K0), D. N. Nettle-ship (Canadian Wildlife Service, P. O. Box 1006, Dartmouth, N.S. B2Y 4A2), D. D. Roby and K. L. Brink (Dept. of Biology, University of Pennsylvania, Philadelphia, PA 19104)

Food items carried to Dovekie chicks were studied in northwest Greenland in 1978 (two colonies in 1979 - one pelagic site). Calanoid copepods occurred widely and in large numbers, but amphipods were most important in terms of dry weight. Pelagic decapod larvae were third in importance by dry weight. Diet composition and numbers and sizes of various food taxa differed considerably among collections, probably due to adults foraging in different areas or to seasonal or yearly differences in sizes of zooplankters eaten. Chick diets at Novaya Zemlya, Svalbard, and west Greenland were dominated by food taxa typical of low arctic waters. Although small numbers of low arctic taxa were found in samples from northwest Greenland, chick diet there was dominated by zooplankters typical of high arctic waters. Since most Dovekies breed adjacent to high arctic waters, the chick diets reported here are probably more characteristic of the species as a whole than previous detailed studies from low arctic regions.

## PARENT-OFFSPRING CONFLICT OVER SIBLICIDAL BROOD REDUCTION IN BLACK-LEGGED KITTIWAKES - DOES IT OCCUR?

Braun, B. M. (Dept. of Ecol./Evol. Biology, University of California, Irvine, CA 92717)

I examined parenting behavior for evidence of conflict between parents and their offspring over siblicidal brood reduction. I have classified 10 types of parental behavior (e.g., calling to submissive chick) as possible indicators of conflict, and monitored their frequency in nine nests during 163 hours of observation. These behaviors occurred in all nests and were most frequent during periods of chick fighting. Parents performed the 10 behaviors more frequently in nests in which siblicide occurred. This alone could lead to the conclusion that parent/senior chick conflict exists over the decision to eliminate the junior chick. Other data collected, however, strongly indicate that parents and senior chicks cooperate in the elimination of junior chicks. Parents fed senior chicks more frequently when senior chicks begged for food than they fed junior chicks when junior chicks begged for food. Parents also fed senior chicks more frequently when neither chick was begging. Because parental feeding behavior always favors the senior chick, my data suggest that parents and senior chicks cooperate in the decision of senior chick elimination of junior chicks, even though behaviors indicative of conflict are seen.

## DEPTH GAUGES TO DETERMINE UNDERWATER FORAGING NICHES OF DIVING SEABIRDS

Burger, A. E. (Bamfield Marine Station, Bamfield, British Columbia, Canada V0R 1B0)

The use of two cheap, reliable depth gauges, suitable for use on seabirds, is reviewed. A capillary-tube maximum depth gauge can be made for several cents. In several studies of alcids, penguins and cormorants, these gauges have provided startling new data on the birds' diving abilities. A new time-at-depth device, which uses simple electronics and weighs less than 10 g, has been developed at Bamfield Marine Station. Preliminary results from this device, deployed on several species of alcids, are presented to demonstrate its value in studying foraging in free-living seabirds. In Rhinoceros Auklets, most of the time underwater was spent at shallower depths than the maximum depth attained. Advantages and limitations of both types of depth gauge are discussed.

## FLEXIBLE TIME BUDGETS IN BREEDING COMMON MURRES: BUFFERS AGAINST VARIABLE PREY AVAILABILITY

Burger, A. E. (Bamfield Marine Station, Bamfield, British Columbia, Canada V0R 1B0) and J. F. Piatt (Newfoundland Institute of Cold Ocean Science, Memorial University, St. John's, Newfoundland, Canada, A1B 3X5)

We report on a four-year study of the relationships between parental behavior of Common Murres (*Uria aalge*) and the abundance of their principal prey, capelin (*Mallotus villosus*), at Witless Bay, Newfoundland. The abundance of fish and density of their schools, measured with hydroacoustic surveys, varied significantly within each of the murre's breeding seasons. Annual means of fish abundance also varied by up to 10-fold. These variations were associated with changes in the diets of chicks, but the rates or provisioning the chicks were not significantly altered. Time spent by parents resting at colonies varied significantly and tracked prey abundance. Flexibility in the parental time budgets thus buffered the effects of variable prey availability. The implications of these results are discussed with reference to the potential use of seabirds to monitor stocks of commercially important fish species.

## VOCAL COMMUNICATION OF THE LITTLE PENGUIN (*EUDYPTULA MINOR*) ON PHILLIP ISLAND, AUSTRALIA

Burger, J. L. (Moss Landing Marine Laboratories, P. O. Box 450, Moss Landing, CA 95039)

Vocalizations of the Little Penguin (*Eudyptula minor*) were recorded during the breeding season on Phillip Island, Australia. This species is of particular interest in the study of vocal communication as visual signals are primitive and social interactions occur primarily at night. I have divided the vocal repertoire into three basic call types: (1) the display song, (2) the agonistic call, and (3) the contact call. This display song is an alternating repetition of inhalent and exhalent phrases. Call structure changes with excitation level such that frequency increases and period decreases with increasing levels of excitation. Syllable length, however, appears to remain stable and therefore may characterize the individual in this species. The agonistic call is a sharp exhalent phrase with variable structure, which is used in aggressive interactions. Structure of the contact call varies little between individuals. It is characterized by a short rise and fall in frequency and is used by the penguins to form and maintain groups.

## FEEDING HABITAT SELECTION BY THICK-BILLED MURRES

Cairns, D. K. (Biology Dept., Carleton University, Ottawa, Ontario, Canada K1S 5B6; present address: Science Branch, Dept. of Fisheries and Oceans, Box 5030, Moncton, New Brunswick, Canada E1C 9B6) and D. C. Schneider (Newfoundland Institute for Cold Ocean Science, Memorial University of Newfoundland, St. John's, Newfoundland, Canada A1B 3X7)

We used repeated transects to examine the relation between habitat variability and the feeding distribution of Thick-billed Murres (*Uria lomvia*) at spatial scales ranging from 50 m to about 5 km. Murres preferred waters between 40 and 120 m in depth and were rarely sighted in shallow water. Murre abundance was correlated with degree of bottom relief, and the strength of correlation increased with the frame size at which abundance was measured. Murre distributions were highly aggregated in space and time and were strongly correlated with densities of shoaling prey. This study suggests that Thick-billed Murre feeding distributions are strongly influenced by coarse-scale flow gradients and that birds track preferred feeding conditions at the scale of several kilometers.



## ENERGY EXPENDITURE, ACTIVITY BUDGETS, AND PREY HARVEST OF BREEDING COMMON MURRES

Cairns, D. K., W. A. Montevecchi, V. L. Birt, and S. A. Macko (Newfoundland Institute for Cold Ocean Science, Memorial University of Newfoundland, St. John's, Newfoundland, Canada A1B 3X7; present address of D. K. Cairns: Science Branch, Dept. of Fisheries and Oceans, Box 5030, Moncton, New Brunswick, Canada E1C 9B6)

We used doubly labeled water and electronic timers to measure field metabolic rate (FMR) and activity budgets of common murres (*Uria aalga*) breeding in eastern Newfoundland. Mean ( $\pm$ ) FMR of four birds ( $1789 \pm 265$  kJ per day) was approximately 50% higher than allometric predictions for seabirds, whereas mean basal metabolic rate (BMR) was similar to allometric predictions. The high ratio of FMR to BMR ( $x \pm SD = 5.16 \pm 0.85$ ) may be related to high locomotion costs associated with a wing design that is a compromise between flying and diving needs and to thermal costs of living in a cold ocean environment. While absent from the colony, birds spent most (70.2 - 84.9%) of their time on the sea surface. Foraging range was greater during incubation than during chick rearing in two study years. Murres associated with the Witless Bay colony consume an estimated 6,889 tons of food annually.

## DAILY FORAGING BEHAVIOR OF MARBLED MURRELETS DURING THE NESTLING PERIOD

Carter, H. R., and S. G. Sealy (Dept. of Zoology, University of Manitoba, Winnipeg, Manitoba R3T 2N2; present address H. R. Carter: Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

A descriptive model of daily foraging behavior of Marbled Murrelets (*Brachyramphus marmoratus*) in Barkley Sound, British Columbia, was synthesized from patterns of at-sea dispersion, flocking, densities, flights, and fish-holding behavior during the nestling period. (Means (SD) of 265.8 118.3 birds, 11.3 5.0 birds/km<sup>2</sup>, and 2.9 5.8 birds/quadrat were determined from 37 censuses at four times of day of a contiguous grid of 0.25-km<sup>2</sup> quadrats, covering 23.7 km<sup>2</sup> of Trevor Channel. Murrelets occurred singly or in pairs (82.7%, N = 4,880 flocks) even in high-density quadrats (51-161 birds/quadrat). When loafing, larger flocks (3-55 birds) formed on the water. Using the  $\underline{m}^* - \underline{m}$  dispersion index, murrelets were clumped within the channel ( $\underline{m}^* = 4.85 + 5.79 \underline{m}$ ) and used the same feeding sites each day, although many birds (38.7%, N = 9,626 birds) occurred in low-density quadrats (1-10 birds/quadrat). Adults rearing nestlings aggregated at sites at or before dawn, fed themselves and remained there early in the day (before 1230 h), searched for nestling prey in other areas of Barkley Sound later in the day and visited nest sites at or after dusk. Daily foraging behavior resembles that of a "time minimizer" where birds specialize on abundant and easily-found prey for themselves in Trevor Channel, thereby maximizing time available to obtain prey for nestlings which apparently are less abundant and more difficult to locate in Barkley Sound.

## STATUS OF THE MARBLED MURRELET IN CALIFORNIA

Carter, H. R., R. A. Erickson, and T. G. Sander (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

A small population of about 2,000 Marbled Murrelets breed in California between the Oregon border and northern Monterey Bay. All evidence suggests that murrelets nest there only in

old-growth forests: the first tree nest in North America was found in Big Basin St. Park in 1974; 17 juveniles were found in old-growth stands; and murrelets were concentrated at-sea, off coasts, with substantial old-growth stands. Murrelets are threatened by the continuing removal (over 90% to date) of old-growth tree-nesting habitat due to large-scale logging operations. Large numbers of murrelets were killed in a gill net fishery in Monterey Bay but this problem has been curtailed. Small numbers of murrelets have been killed in several oil spills from 1937-86 in central California. Proposed OCS development off northern California (Lease Sale 91, February 1989) will jeopardize the main concentration of murrelets between Eureka and the Oregon border.

#### INTRA-COLONY DISTRIBUTIONAL DYNAMICS

Chase, C. A. III (Denver Museum of Natural History, City Park, Denver, CO 80205)

California Gulls (*Larus californicus*) have been banded at Antero Res., Park Co., CO since 1970 and intensively studied on two islands since 1981. Nest location, chronology, clutch size, fledging success and mortality factors were recorded each year. From 20-80% of the birds in each 10 x 10 m plot were of known age and sex. Human disturbance, predation and environmental changes were quantified each year. Demographic fluctuations within the colony reflected effects of disturbance, predation, age and breeding success in previous years. Intensity and/or frequency of disturbance were the best predictors of change in the following breeding season. Adults moved within and between island colonies in predictable patterns. These movement patterns can drastically bias sample study areas typical of Larid studies where individual birds are not known.

#### HYBRIDIZATION OF HERRING AND CALIFORNIA GULLS

Chase, C. A. III (Denver Museum of Natural History, City Park, Denver, CO 80205)

A male Herring Gull (*Larus argentatus*) bred with the same female California Gull (*L. californicus*) at Antero Res., Park Co., CO from 1982 to 1987. Egg size, clutch size, weight of chicks at hatch, and at fledging, as well as pre-fledging measurements of tarsus, culmen, 9th primary, and tail were within the range of this population of *L. californicus*, while mensural data were well below normal for *L. argentatus*. It is likely that this pair was mated since 1979. A breeding adult-plumaged hybrid was located in 1983; it had been banded as a *L. californicus* chick in 1979. The hybrid was intermediate in plumage, leg color, size and voice. Eye color and culmen pattern was typical *L. argentatus*. Dimensions were beyond *L. californicus* and less than male *L. argentatus*. Breeding behaviors were limited. Testis size was equivalent to a 2-3 year old *L. californicus* at this stage of the breeding season.

#### VARIATION IN GROWTH OF THE WESTERN GULL (*LARUS OCCIDENTALIS*), ON SOUTH-EAST FARALLON ISLAND, CALIFORNIA

Coulter, M. C. (Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29802)

The weight increase of Western Gull chicks, like the growth of chicks of most avian species, follows a sigmoidal growth pattern. This pattern includes the growth of the feathers and the body parts which follow different patterns. During the first 20 days, body size increases. Thereafter, the major feather growth occurs. Although the growth of body parts is generally sigmoidal, growth of feathers is linear. While all the birds follow the same sequence of development, the rate of development varies. For instance, feather growth in some birds may begin at an earlier age than for other birds. Variation in the development rate among birds can explain a large part of the variation in size among chicks.

## DIET AND DISTRIBUTION OF THE COMMON MURRE IN MONTEREY BAY, CALIFORNIA

Croll, D. A. (Scripps Institute of Oceanography, A-004, La Jolla, CA 92093)

Physical and biological factors affecting the diet, distribution, and abundance of the Common Murre (*Uria aalge*) in Monterey Bay, California were investigated. Murre diet was found to shift both seasonally and annually, indicating an opportunistic feeding strategy. Highest abundance was found during the summer period of late upwelling when murre exploit a dependable peak in prey (juvenile rockfish, *Sebastes* spp.) availability resulting from an earlier upwelling episode. Murre probably use this peak in food availability to feed dependent chicks, replenish fat stores, and molt. During fall and winter, productivity in Monterey is low, and its importance to Common Murre is reduced. Murre distribution during the summer period of high murre (peak = 169.2 birds/km<sup>2</sup>) abundance is probably determined by small scale physical and biological processes. Murre densities were highest in the northern region of Monterey Bay (mean summer density = 102.4 birds/km<sup>2</sup>), probably due to higher food availability. As water is advected from the southern to the northern portions of the bay, the effects of increased productivity due to offshore upwelling to the south results in increased productivity in the higher trophic levels as the water mass moves to the northern portion of the bay. This results in higher prey availability in the north, and thus higher Common Murre density. The primary effect of the 1982-3 El Nino phenomenon was a decrease in primary productivity leading to a reduced availability of the normally dependable summer prey resources. As a consequence, murre which came into the bay in large numbers (87.9 birds/km<sup>2</sup>) quickly dispersed resulting in low densities in July (2.6 birds/km<sup>2</sup>) and August 1983 (7.4 birds/km<sup>2</sup>). Murre that were found in Monterey Bay at this time were thin and fed on a very different array of prey items.

## HORNED PUFFIN RANGE EXPANSION AND INTERSPECIFIC COMPETITION FOR MAN-MADE NEST-SITES IN NORTHERN ALASKA

DIVOKY, G. J. (Institute of Arctic Biology, University of Alaska, Fairbanks, AK 99775)

In Alaska, Horned Puffins and Black Guillemots both breed in natural rock cavities as far north as Cape Lisburne in the central Chukchi Sea. Approximately 20 years ago, Black Guillemots extended their breeding range to northern Alaska by nesting in man-made debris on barrier islands. In the past 10 years, Horned Puffins have become increasingly common at these man-made guillemot colonies. At Cooper Island, where observations have been made annually since 1975, unpaired puffins were first observed prospecting nest sites in 1976 and paired puffins showing nest-site fidelity first observed in 1982. A single pair of puffins bred in 1986 and two pairs in 1987. Prospecting puffins displaced the eggs and killed the chicks of guillemots. In subcolonies regularly occupied by nonbreeding puffins, breeding productivity of guillemots was drastically reduced. Similar activities could be expected to occur at natural colonies where Horned Puffins and Pigeon or Black Guillemots were nest-site limited.

## BARN OWL PREDATION ON SEABIRDS ON SANTA BARBARA ISLAND, CALIFORNIA

Drost, C. (Dept. of Zoology, University of California, Davis, CA 95616)

Resident Barn Owls (*Tyto alba*) on Santa Barbara Island, off the southern California coast, prey primarily on native deer mice (*Peromyscus maniculatus*). During periods of low mouse abundance, the owls switch to preying on some of the 10 species of seabirds which nest on the island. The owls prey most heavily on Xantus' Murrelets (*Synthliboramphus hypoleucus*) and

Cassin's Auklets (*Ptychoramphus aleuticus*), taking only minor numbers of other species. The effect of this predation varies with the different species taken, from little or no effect in Western Gulls (*Larus occidentalis*), (chicks only), to reduced nest success in the murrelets, to possible limitation of total population size in the auklets.

#### MOVEMENTS OF NEWLY HATCHED ANCIENT MURRELET BROODS FROM THEIR BREEDING COLONY

Duncan, D. C. (Bamfield Marine Station, Bamfield, B.C., Canada V04 1B0) and A. J. Gaston (Canadian Wildlife Service, Ottawa, ONT., Canada K1A 0E7)

The movements of Ancient Murrelet (*Synthliboramphus antiquus*) family groups away from their breeding colony on Reef Island, Queen Charlotte Islands, was studied using radio telemetry. Transmitters were attached to the back feathers of brooding adults and departing chicks by gluing with epoxy. Radio tracking was conducted from fixed-wing aircraft. In the first 24 hours after colony departure, broods traveled in a north-to-northeast direction at 2-3 km/hour. Family groups initially headed out into Hecate Strait (between the Queen Charlotte Islands and the British Columbia mainland), appeared to be dispersed in distribution, and the destination of at least some broods appeared to be central Hecate Strait. The lipid reserves of chicks at hatching is compared to those of chicks departing from the colony.

#### ALCID RESEARCH AND RESEARCH OPPORTUNITIES AT SEA WORLD IN SAN DIEGO, CALIFORNIA

Everett, W. I. (Dept. of Birds and Mammals, San Diego Natural History Museum, P. O. Box 1390, San Diego, CA 92112) and F. S. Todd (Sea World, 1720 South Shores Road, San Diego, CA 92109)

Sea World in San Diego maintains a 19,000-gallon facility which currently houses seven species of alcids. The exhibit features simulated natural rock cliffs, numerous accessible artificial nesting burrows, and a 20-meter glass viewing area with above and below waterline visibility. Studies conducted to date include comparative underwater propulsion techniques and foraging strategies, sequence of molts and plumages, growth rates, and testing of instrumentation hardware (i.e., depth and duration of dive recorders). These types of studies are difficult to conduct in the wild due to remoteness of breeding locales, pelagic habits of non-breeders, and the inherent difficulty of extended underwater observation. The facility and birds are available to qualified researchers whose proposals meet the following criteria: (1) studies must be non-injurious to the birds, (2) must be non-disruptive to normal facility operations, and (3) must not compromise husbandry and/or propagation efforts. Persons interested in conducting studies should contact Frank S. Todd at the above address before submitting proposals.

#### COLONY FORMATION IN BRANDT'S CORMORANTS

Feldman, J. P. (Dept. of Biology, San Francisco State University, San Francisco, CA 94132)

I studied colony formation at a large known-age Brandt's Cormorant colony on southeast Farallon Island, CA in 1986. Six distinct subcolonies were monitored daily for breeder arrivals, site occupancy, pairing, clutch initiation and breeding success; nearest neighbor distances were measured. Older males arrived first and tended to occupy nest sites in the center of the subcolony. A greater proportion of early arriving males eventually paired. A higher frequency of males in central nest sites acquired mates. Breeding success will be compared for central and peripheral nests. Results will be discussed in relation to spatial and temporal colony growth.

## TIME AND ENERGY LIMITS TO THE FORAGING RADIUS OF SOOTY TERNS (*STERNA FUSCATA*)

Flint, E. N. (Dept. of Ecology and Evolutionary Biology, University of California, Irvine, CA 92717)

Sooty Terns forage over wide areas in tropical oceans. During the breeding season, they are tied to a central place and constrained in the distance they can travel to forage by the energetic requirements of their mate and offspring. I calculated estimates of maximum foraging radius in Hawaiian Sooty Terns using two methods. Using measured flight cost (17.2 kJ/hour for a 187 g bird), average mass of food loads (14.7 ± 2.2 g/day, n = 10 birds), and average length of incubation shifts (50.9 ± 4.4 hours, n = 166), I calculated that incubating birds have energy reserves to fly 460 miles at the end of their shift before eating again. I also calculated maximum foraging radius based on flight velocity and the average amount of time between returns to the colony by brooding birds (360 miles) and birds feeding older chicks (325 miles). These predictions are supported by the pattern of sightings of color-marked Sooty Terns around Johnston Atoll, observed by members of the Pacific Ocean Biological Survey Program from 1964 to 1967.

## THE USE OF TIME BUDGETS AND SPECIES RATIOS AT BREEDING COLONIES IN ESTIMATING NUMBERS OF MURRES AND RAZORBILL

Gardarsson, A., and A. T. Sigfusson (Dept. of Biology, University of Iceland, Grensasvegur 12, 108 Reykjavik, Iceland)

Aspects of the time budgets of *Uria aalge*, *U. lomvia*, and *Alca torda* were studied in order to improve interpretation of censuses. All three species had similar diurnal and annual rhythms but in the breeding season, *U. lomvia* spent less time loafing on the sea at the colony. Species ratios of auks on the sea below breeding cliffs and flying from or to offshore feeding areas were used in combination with oblique aerial photography to estimate number of each of these species on very large and inaccessible cliffs. The ratio Razorbill/Common Murre loafing on the sea at breeding cliffs provided a useful estimate of Razorbill numbers.

## MORTALITY FACTORS OF THE HEERMANN'S GULL (*LARUS HEERMANNI*) CHICKS DURING THE PREFLEDGING PERIOD IN RASA ISLAND, BAJA CALIFORNIA

Gonzalez-Peralta, L., G. Lozano, and E. Velarde (Instituto de Biología, U.N.A.M., Apartado Postal 70-153, 05410, Mexico, D.F., Mexico)

Social factors and nesting density have been observed to affect breeding success in seabird species. In this study, we analyze the effect of these factors in the breeding success of the Heermann's Gull. Two plots of 100 m square with different nesting densities were established. Periodic censuses were made registering number of nests, clutch size, egg weight, egg and chick survival and birthdates. Continuous daylight observations were carried out during the first month of the chick-rearing period, registering presence of parents in the territory and causes of chick loss. These were respectively: attacks by neighbors 25.0 and 30.97%, attacks by parents 16.66 and 7.07%, parental neglect 4.16 and 2.65%, and chicks getting lost 0.0 and 0.88%.

## SEABIRD FORAGING TACTICS AND WATER CLARITY: ARE PLUNGE-DIVERS REALLY IN THE CLEAR?

Haney, J. C. (Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503) and A. E. Stone (Institute of Marine Science, University of Alaska, Fairbanks, AK 99775)

Using a steep turbidity gradient in ocean waters off the coast of the southeastern United States, we tested a hypothesis originally proposed by Ainley (1977): (plummeting from the air to subsequently capture prey underwater using the momentum of the fall) is more prevalent over clear, as opposed to turbid, surface waters. Although 12 species of seabirds regularly used plunge diving to obtain prey in the study area, only the White-tailed Tropicbird (*Phaethon lepturus*) was more common in clear water. Significant decreases in the total number of plunge-diving individuals, and in the proportions of individuals within the assemblage using plunge diving, occurred over waters with increasing transparency. We conclude that even though some seabird prey may be more detectable in clear water, water clarity has not been unequivocally linked to the allocation of foraging tactics in assemblages of aerial seabirds.

## FORAGING BEHAVIOR OF THE PARAKEET AUKLET: COMPARISONS WITH OTHER AUKLETS

Harrison, N. M. (Dept. of Ecology and Evolutionary Biology, University of California, Irvine, CA 92717)

I studied the foraging habits of the Parakeet Auklet (*Cyclorhynchus psittacula*) in the northern Bering Sea from 1983 to 1986. I determined the diets of Parakeet Auklets, Least Auklets (*Aethia pusilla*) and Crested Auklets (*A. cristatella*) by collecting birds for stomach analysis while they were foraging at sea. Dietary overlap was calculated for the three auklet species. The Parakeet Auklet commonly fed on gelatinous zooplankton such as jellyfish and ctenophores. Jellyfish with their symbiotic hyperiid amphipods and fish larvae were frequently found in the Parakeet Auklets' stomachs. I determined the distributions of Parakeet Auklets were more often randomly dispersed at sea than were Least Auklets, which were usually aggregated. The dispersed foraging distribution of the Parakeet Auklet is linked to its unusual habit of feeding on jellyfish.

## ATTENDANCE OF COMMON AND THICK-BILLED MURRES AT BREEDING SITES: IMPLICATIONS FOR POPULATION MONITORING

Hatch, S. A. (Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503)

Attendance at breeding sites by Common Murres (*Uria aalge*) and Thick-billed Murres (*U. lomvia*) was studied in six years at a colony in Alaska. Based on seasonal patterns of variation among counts, a census period extending from mid-laying through hatching is recommended. Neither time of day nor weather had a large effect on the counts, but spatial differences in the colony and the possibility of serial dependence in the data are factors that should be considered in the analysis of census results. Counts made on 40 consecutive days were needed to detect a 6-8% change in numbers between years, whereas five counts were adequate to detect a 20-26% change. Mean counts differed by up to 23% between years, but it was unclear whether that reflected real population change or differences in behavior. Time budgets alone were inadequate to explain the annual variation in plot counts as the time allocated to site attendance was relatively constant both within and among years.

## CORRELATION BETWEEN THE ABUNDANCES OF MACARONI PENGUINS AND KRILL

Heinemann, D., G. Hunt (Dept. of Ecology and Evolutionary Biology, University of California, Irvine, CA 92717) E. Murphy and I. Everson (British Antarctic Survey, Cambridge, England)

We estimated the abundances of Macaroni Penguins (*Eudyptes chrysolophus*) and their only prey, krill (*Euphausia superba*), in February 1986 during two two-week surveys along 38 radial transects extending up to 65 miles out from Bird Island, South Georgia Island. We determined the degree of spatial association between penguins and krill at the scale of one-mile intervals of transect lines and their degree of numerical correlation in intervals with both present. In addition, we assessed the ability of mathematical models to adjust the observed distribution of penguins for the proportion expecting to be commuting to and from foraging sites and thereby improve the fit to the observed krill distribution. The effect of distance from the island on these relationships was determined.

## IN VIVO ESTIMATION OF LIPID RESERVES IN VERTEBRATES USING CYCLOPROPANE GAS

Henen, B. T., and P. J. Mock (Biology Dept., University of California, Los Angeles, CA 90024)

Validation studies of the cyclopropane method of estimating lipid reserves of vertebrates demonstrate that this technique is highly accurate. This method is suitable for use in field studies of animal energetics where serial measurements of an individual's lipid reserves and utilization over time is required. Details of the technique, results of validation studies, and an analysis of sources of error in the method will be discussed.

## THE IMPORTANCE OF HYDROGRAPHIC STRUCTURE FOR FORAGING LEAST AUKLETS (*AETHIA PUSILLA*)

Hunt, G. L., Jr., N. M. Harrison (Dept. of Ecology and Evolutionary Biology, University of California, Irvine, CA 92717) and T. Cooney (Institute of Marine Science, University of Alaska, Fairbanks, AK 99701)

Least Auklets (*Aethia pusilla*) eat a variety of large calanoid copepods which they capture while pursuit diving. The preferred prey species are typically found in water of oceanic origin and may be concentrated by hydrographic structures such as haloclines and fronts with strong salinity gradients. Auklets selectively forage at hydrographic structures where prey accumulate near the surface. We document these relationships with a combination of counts of birds, bird stomach analyses, bioacoustic surveys of plankton, and vertical plankton tows.

## CHANGES IN COLONY SIZES AND REPRODUCTIVE SUCCESS IN BLACK-LEGGED KITTIWAKES IN PRINCE WILLIAM SOUND, ALASKA, 1972-86

Irons, D. B. (U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503)

Twenty-eight Black-legged Kittiwake colonies in Prince William Sound (PWS) were monitored from 1984-6. The number of nests, number of birds at the colonies, and the number of fledglings per nest were recorded. Overall, the number of breeding pairs in PWS decreased from 1972-84 then increased from 1984-6. However, there was great variation among colonies, seven lost 7-80 percent of their nests and five grew from 200-1600 percent. The mean colony size in

1986 was 765 nesting pairs and ranged from 20-4,163. The number of chicks fledged per nest for all colonies was consistently about 0.30 for 1984-6. However, the reproductive success was also extremely variable among colonies; 15 colonies produced fewer than 0.1 young per nest, while 11 colonies varied from 0.17 to 0.92 young per nest. Some of the variation can be accounted for by dividing the colonies into two groups, glacier and island colonies. Glacier colonies were larger, fledged more young, and grew more than island colonies.

#### BEHAVIOR OF LEAST AUKLETS DURING THE BREEDING SEASON

Jones, I. L. (Dept. of Biology, Queen's University, Kingston, Ontario, Canada K7L 3N6)

I studied the behavior of Least Auklets (*Aethia pusilla*) at St. Paul Island, Pribilof Islands, Alaska during May, June, and July 1987. Three hundred ninety-one birds were color-marked, including 216 that were later observed delivering food (mostly breeders) and 35 "second summer" immatures. Early in the season, all birds present on the plot were breeders. Beginning in late May, adult-plumaged non-breeders and immatures began attending the colony and, by late June, up to 40% of birds present were immatures. Several color-marked immatures were observed at least once with food, although none bred. About 25% of the breeders did not deliver food for the period required to raise a chick (c. 28 days) and thus were likely failed breeders. Male Least Auklets spent a considerable portion of their time vocalizing, often near their nest crevice. This "advertising" may have both territorial and mate attracting functions. Immatures generally did not vocalize and were subordinate to adults, which probably recognize them by their appearance.

#### A REPORT ON THE STATUS OF MARBLED MURRELETS IN WASHINGTON

Leschner, L., E. Cummins, K. Dzinbal (Washington Dept. of Wildlife, 16018 Mill Creek Blvd., Mill Creek, WA 98012) and S. Speich (4817 Sucia Dr., Ferndale, WA 98248)

Records of Marbled Murrelet eggs and chicks are reviewed, and their distribution is discussed. Inland observations during the breeding season are summarized. Surveys by Mike McAllister of potential habitat on the Olympic Peninsula are described. The relationship between distribution of Marbled Murrelets in northern Puget Sound and marine and terrestrial habitat is discussed. The possible application of LANDSAT imagery to identify potential habitat is evaluated. Potential impacts to the Marbled Murrelet population in Washington include timber harvest, land development, gillnet fishing, aquaculture, and pollution. The extent of these activities in Marbled Murrelet habitat and any documentation of impact is discussed.

#### STATUS OF MARBLED MURRELETS IN OREGON

McAllister, M. C. (P. O. Box 691, LaGrande, OR 97850), S. K. Nelson (Oregon Cooperative Wildlife Research Unit, Oregon State University, Corvallis, OR 97331), D. H. Varoujean (Marzet, Marine and Estuarine Research Co., 2269 Broadway, North Bend, OR 97459) and M. A. Stern (Oregon Natural Heritage Program, 1234 NW 25th, Portland, OR 97210)

In Oregon, sightings of Marbled Murrelets (MMs) indicate a patchy distribution along the coast and in the adjacent coast range. No nests of MMs have ever been located here. There are, however, four records of downy or just fledged young MMs (1918, 1933, 1940, 1987). Recently (1985-7), MMs were identified at 11 inland sites. Since 1975, recorded densities of MMs at sea have been highest at the mouths of rivers and creeks along the central Oregon coast. Information is needed on the distribution, breeding status, population size and habitat requirements of this species. Data presented here are maintained at the Oregon Natural Heritage Data Base.



## CURRENT STATUS AND POTENTIAL THREATS OF THE MARBLED MURRELET IN ALASKA

Mendenhall, V. M. (U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503) and M. McAllister (P. O. Box 691, LaGrande, OR 97850)

In Alaska, Marbled Murrelets nest both in old-growth coastal forests and on alpine slopes near the coast. At least seven confirmed nests and three probable ones have been found in Alaska. These include two tree nests in Southeastern, one tree nest on Kodiak Island, and seven ground nests on tundra from Southeastern to Kodiak. Circumstantial evidence of breeding extends the probable range halfway down the Aleutian chain. Distributions offshore will be discussed, largely based on unpublished data. The principal threat to the Marbled Murrelet in Alaska is probably clear-cutting of old-growth forest; oil pollution is a potential local threat. Urgent needs include monitoring of populations, documentation of activity ranges during the breeding season, location of more nests, and description of nesting habitat in terms that can provide goals for forestry plans.

## THE DISPERSAL OF *FREGATA MAGNIFICENS* FROM SANTA MARGARITA ISLAND, B.C.S., MEXICO

Moreno, L. A., R. Carmona, and J. Guzman (Universidad Autonoma de Baja California Sur, Apartado Postal 219-B, La Paz, B.C.S., Mexico)

From April 1985 to May 1986, a total of 118 frigate birds (*Fregata magnificens*) were tagged in a breeding colony for this species. The colony is located at Santa Margarita Island (Lat. 24/30'N, Long. 111/50'W) in the Pacific coast of Baja California Sur. After two years of study, eight tagged individuals have been sighted. Their dispersal radius from the colony and some ecological aspects related to their breeding biology are discussed.

## BEHAVIOR OF PRE-BREEDING THICK-BILLED MURRES AT THE COLONY

Noble, D. G. (Dept. of Biology, Queen's University, Kingston, Ont., Canada K7L 3N6) and A. J. Gaston (Canadian Wildlife Service, Ottawa, Ont., Canada K1A 0E7)

The behavior and attendance of known-age pre-breeders were studied at a colony of Thick-billed Murres at Coats Island in northern Hudson Bay. No one-year-old birds were seen. Comparison of a number of parameters showed that three-year-olds were seen closer to their natal ledge than two-year-olds, made longer visits at each site where they landed, and were more likely to be seen repeatedly in the same site. Behavioral and site characteristics of the different age cohorts are discussed in terms of their implications for deferred maturity.

## THE NORWEGIAN SEABIRD DATA BASE AND MAPPING PROGRAM

Nygaard, T. (The Directorate for Nature, Research Division, Tungasletta 2, N-7004, Trondheim, Norway)

The Norwegian continental shelf was opened for oil prospecting in 1965, and oil was first discovered in 1969. The potential threat to seabirds urged the environmental authorities to initiate seabird research and census schemes in 1979. As a part of this effort, work on a national seabird and waterfowl database was started. It is now operative and integrated with mapping programs,

allowing maps of seabird distribution and numbers to be sent to a printer or plotter or graphic terminal. Data on breeding, wintering, molting, and open sea distribution are continuously updated, at present totaling more than 100,000 observations. The main computer is a Micro-Vax II. The main mapping program is SUPERMAP, a program system for plotting thematic maps developed at the University of Trondheim, while interpolating and 3-D plots are produced by means of UNIRAS-subroutines. Statistics, listing, selection, and aggregation of data prior to mapping are facilitated by SPSSX. The unit serves as a data bank accessible to the State Pollution Board in case of oil spills, as well as other central and local management authorities. The database has been intensively employed in environmental impact assessment studies prior to opening of new blocks for prospective drilling.

#### THE SUCCESSFUL BREEDING OF CAPTIVE-REARED SNOWY PLOVERS IN THE WILD

Page, G. W. (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970) and P. Quinn (Husbandry Dept., Monterey Bay Aquarium, 886 Cannery Row, Monterey, CA 93940)

Captive rearing projects are being used to restore populations of a number of endangered species and could be useful for augmenting shorebird populations in the future. We raised 22 Snowy Plovers from eggs to fledglings at Monterey Bay Aquarium and released the juveniles shortly after fledging at a traditional breeding and wintering area. At least 10 birds survived the winter. Four males bred within 25 km of the release site, one migrated, and one failed to nest. Two males lost two to three clutches to predators and two hatched clutches; only one fledged young. Four females nested, one 180 km from the release site, the others within 25 km. One female lost two clutches to predators, one hatched one of two clutches, and two were double brooded. The success of the captive-reared females exceeded that of juvenile, wild-reared females, whereas the success of captive-reared males was poorer than that of wild-reared males in the release site vicinity.

#### NUMBERS OF LIVE AND DEAD OILED BIRDS ON BEACHES AFTER THE FEBRUARY 1986 OIL SPILL IN CENTRAL CALIFORNIA

Page, G. W., H. R. Carter, L. Stenzel, R. G. Ford, and J. Hodges (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

During February 1986, a spill of San Joaquin Valley crude oil (probably from the tanker barge *Apex Houston*) occurred off the central California coast. From February 1-8 between Salmon Creek, Sonoma Co., and Point Lobos, Monterey Co., we estimated that 10,577 birds of at least 26 species were oiled. About 87% reached shore: 3,364 live oiled birds were sent to rehabilitation centers and 5,880 dead oiled birds were estimated from carcass counts on beaches. Common Murres, Rhinoceros Auklets, and Western/Clark's Grebes comprised 70.5, 13.3 and 5.1% of the beached birds. Dead:live ratios varied between 1.16-40.03 for different species. We further discuss methods used to estimate numbers of beached birds after oil spills.

#### POPULATION STATUS OF THE CALIFORNIA LEAST TERN

Palacios, E., and J. R. Guzman (Universidad Autonoma de Baja California Sur, Apartado Postal 219-B, La Paz, B.C.S., Mexico)

The California Least Tern has been considered an endangered species since 1973. The distribution of the breeding colonies of this species goes from San Francisco Bay, CA to Cabo San

Lucas, B.S.C., Mexico. Nevertheless, there are no published records of their breeding in the Gulf of California. This work presents a review of the population status of this species, including their entire breeding range. Their breeding and population biology has been only studied in the northern half of the mentioned breeding range. A total of seven nesting sites in the Gulf of California are reported, which have been occupied at least once in the last four years; two in the upper Gulf near San Felipe, B.C. (Carvacho et al., in press), and five in the Ensenada of La Paz, B.C.S. This population represents, by itself, 20% of the total estimated numbers. On the other hand, we found that the productivity of the colonies is not affected by their size and, in turn, the colony size is not affected by latitude although we found a positive linear relationship between latitude and productivity of the colony.

#### MARBLED MURRELET USE OF AN INLAND SITE IN NORTHWESTERN CALIFORNIA

Paton, P. W. C., and C. J. Ralph (U.S. Forest Service, Redwood Sciences Laboratory, 1700 Bayview Drive, Arcata, CA 95521)

Marbled Murrelets are thought to nest only in old-growth forested stands in California although the habitat use patterns of this species are poorly understood. From April 1985 to May 1986, we censused two-three plots monthly, with plots ranging from a stand with sparsely scattered older trees and a dense understory to an old-growth plot with dense canopy closure. In contrast, murrelets were detected on 38% and 17% of the census days on the two plots with scattered large trees. During the breeding season, murrelets were detected calling an average of 33 minutes during morning censuses (maximum = 101 min.). We feel that use of inland censuses is a viable technique to quantify habitat and distributional patterns and should be used throughout their potential range in California to determine their status in the state.

#### EGG SIZE IN THE WESTERN GULL: EFFECTS OF YEAR, TIMING AND AGE

Penniman, T. M., M. C. Coulter (Savannah River Ecology Lab, Drawer E, Aiken, SC 29802), L. B. Spear, and J. F. Penniman (Point Reyes Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

Western Gull eggs were measured on southeast Farallon Island, CA during seven years. Average volume of three-egg clutches were least in 1978 and 1983, years of extreme warm water conditions. Little within-year variation in egg volume occurred during these two years; in other years, early nesters produced larger eggs. Egg volume increased with age of female to seven years old and then varied little, regardless of year. We examine interactions among egg size, age and timing and discuss the effects of variation in oceanic prey availability.

#### AGGREGATIVE RESPONSE OF COMMON MURRES AND ATLANTIC PUFFINS TO THEIR PREY

Piatt, J. F. (Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503)

At-sea studies of temporal and spatial patterns of association between Common Murres, Atlantic Puffins, and capelin were conducted during the summers of 1982-4 around the Witless Bay Seabird Sanctuary, Newfoundland, Canada. Seasonal abundance and flock sizes of murres and puffins in the study area were strongly correlated with local abundance and density of capelin schools. Murres were correlated with higher density aggregations of prey than puffins, and this was

reflected by their flocking behavior (larger, more aggregated flocks than puffins). Both murrees and puffins exhibited threshold (Type III) aggregative responses to prey density, with murrees having a significantly higher prey density threshold than puffins. Prey density thresholds were not fixed, but rather changed daily in apparent response to daily variations in density and distribution of capelin around the colony. Interspecific differences in prey density thresholds may be explained by differences in body size and may influence the evolution of life-history strategies.

#### STATUS OF THE CLIPPERTON ISLAND MARINE BIRD POPULATIONS

Pitman, R. L. (Southwest Fisheries Center, P. O. Box 271, La Jolla, CA 92038)

French-owned Clipperton Island (10/18'N, 109/13'W) lies 600 miles west of mainland Mexico in the eastern tropical Pacific. Early visitors to the island reported vast numbers of seabirds, but a survey in 1958 found only a few hundred, and these were being held in check by an introduced pig population. The pigs were removed, and the birds have since flourished. Currently, Clipperton may have the largest Masked and Brown Booby colonies in the world; together they number in the tens of thousands. (A final estimate is awaiting the results of a helicopter survey planned for winter 1987). Six other species also breed on the island in smaller numbers: Sooty Tern 5,000, Brown Noddy 500, Red-footed Booby 250, Black Noddy 100, White Tern 50, Red-tailed Tropicbird 2. Two forms of Masked Booby have bred on the island for at least 30 years. The yellow-billed *Sula dactylatra californica* makes up 99% of the population while the orange-billed *S. d. granti* numbers only a few dozen. Mating appears to be assortative between the two forms, and evidence suggests they may be acting as separate species. The marine bird populations of Clipperton are once again imperiled, maybe permanently this time, as the French government has been encouraging private development of the island.

#### FIXED-POINT DETECTION INDEX FOR MEASURING MARBLED MURRELET ACTIVITY AT INLAND LOCALITIES

Sander, T. C., and H. R. Carter (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

Marbled Murrelets (*Brachyramphus marmoratus*) have been heard and/or observed flying over various inland localities, but a standardized method has not been developed or used to describe murrelet activity in a manner which can be compared between days, times of day, times of year, or years. We have developed a detection index derived from a fixed-point count with unlimited distance of all vocal and/or visual detections during dawn or dusk activity periods. A detection was defined as a single or continuous stream of vocalizations and/or observations that definitely could be attributed to a single or specific flock of murrelets. Aspects of detections recorded were: start time, duration, type, distance/direction, and associated behaviors. In 1987, we field tested this technique during breeding and nonbreeding seasons in Prairie Creek Redwoods State Park, CA. We discuss the utility of this index for describing murrelet activity in old-growth forests, for monitoring changes in activity over time, and over large areas.

#### AGE AND SEX DETERMINATION IN BLACK SKIMMER CHICKS

Schew, W. A., and C. T. Collins (Dept. of Biology, California State University, Long Beach, CA 90840)

Sexual dimorphism was studied in 40 Black Skimmer checks (*Rhynchops niger*) during the 1985-7 breeding seasons at Bolsa Chica Ecological Reserve, Huntington Beach, CA. Male and

female chicks were found to exhibit the same sexual dimorphism seen in adult birds. Age of chicks was determined from hatching dates and also extrapolated from linear wing chord and weight measurements. Sex of chicks was determined after day 24 when differences in body mass became significant. Males reached an asymptotic weight of 360 g and females reached an asymptote of 263 g.

#### OFFSHORE DISTRIBUTIONAL PATTERNS, FEEDING HABITS AND ADULT-CHICK INTERACTIONS OF THE COMMON MURRE IN OREGON

Scott, J. M. (Dept. of Zoology, Oregon State University, Corvallis, OR)

I observed 1,554 Common Murre (*Uria aalge*) chicks at sea during 365 nautical miles of offshore transects from 1969 to 1973. Common Murre chicks were most abundant within 1.75 nautical miles of a colony. However, chicks were observed at greater distances offshore than were unaccompanied adults. Single chicks were observed at sea unaccompanied by an adult 87 times (10.7%), accompanied by one adult 704 times (86%), and accompanied by two adults 19 times (2.3%). I observed no seasonal or year-to-year variation in the number of adults accompanying chicks at sea. Seventeen of 18 adults accompanying chicks at sea were males. Common Murre chicks were observed diving only three times. I observed accompanying adults dive 242 times for as long as 153 seconds.

#### STATUS OF MARBLED MURRELET IN BRITISH COLUMBIA

Sealy, S. G. (Dept. of Zoology, University of Manitoba, Winnipeg, MB, Canada R3J 2N2), H. R. Carter (Point Reyes Observatory, Stinson Beach, CA 94970) and K. Vermeer (Canadian Wildlife Service, Delta, B.C., Canada V4K 3Y3)

Coastal British Columbia was the focus in the early to mid-1900's by naturalists who searched intensively for the nest of the Marbled Murrelet. At present, no confirmed nests have been discovered, but other evidence (fully developed ova, shelled eggs removed from collected females; eggs, downy young, fledglings, and adults recorded inland) suggests that the species nest widely in coastal B.C. The timing of breeding and molts, and diet of nesting Marbled Murrelets have been determined. Gillnet mortality has been identified in Barkley Sound, Vancouver Island, and logging of old-growth forests may be a serious threat in the Province. Marbled Murrelets are distributed patchily in inshore waters during the breeding and non-breeding seasons, and at-sea observations of two populations suggest post-breeding movements occur to wintering sites elsewhere.

#### VOCALIZATIONS OF MARBLED MURRELETS IN A MATURE HEMLOCK FOREST; SOUTH-EAST ALASKA, SUMMER 1987

Sharpe, F. A., C. G. D'Vincent, and R. M. Nilson (Intersea Research, Inc., P. O. Box 1667, Friday Harbor, WA 98250)

Vocalizations of Marbled Murrelets (*Brachyramphus marmoratus*) flying to saltwater from inland nesting sites or calling from stationary positions within the tree canopy during predawn hours were noted at five different sites along timbered shorelines. A noteworthy density of eight individuals (or pairs) were heard calling from fixed locations from the canopy of a mature western hemlock stand on a steep, north-facing slope in the Bay of Pillars on the west shore of Kulu Island. The irruptive, clumped nature of the vocalizations and the relatively short distances between the

sources of the calls (50-100 yards) suggest a possible semi-colonial breeding population at this site. Similar north-facing sites dominated by Sitka spruce yielded no canopy calling birds and fewer flyovers. At several locations, murrelets arriving on saltwater from inland sites were noted typically arriving in pairs and would circle and call (both shrill and buzzy calls) for periods of up to two minutes before landing on the surface. Observations made from small craft indicated that, compared to adults, recently fledged chicks tended to have more abbreviated, buzzy calls, exhibited less alarm when approached, and had a greater tendency to take flight rather than dive when approached. Additional observations on the feeding ecology of all seabirds in the vicinity of humpback whales were noted to determine if these birds could be used as reliable indicators of prey choice in humpbacks. Marbled Murrelets were less instructive in this regard than other seabirds as their foraging patterns could not be consistently correlated with the browsing patterns of humpback whales although prey species did appear to overlap in certain areas.

#### PREVALENCE AND EFFECT OF PLASTIC INGESTION IN HAWAIIAN SEABIRDS

Sievert, P. R., L. Sileo (National Wildlife Health Research Center, 6006 Schroeder Road, Madison, WI 53711) and S. I. Fefer (Hawaiian and Pacific Complex National Wildlife Refuge, P. O. Box 50167, Honolulu, HI 96850)

During 1986 and 1987, we studied the prevalence of ingested plastic in 16 species of Hawaiian seabirds and its effect on growth rates and survival of Laysan Albatross (*Diomedea immutabilis*) and Black-footed Albatross (*D. nigripes*) chicks. Plastic was found in 14 species and was more prevalent in birds of the Hawaiian Island chain than in those from Johnston Atoll, 850 miles southwest of Honolulu. Plastic occurrence was significantly different between 1986 and 1987 for three of eight species examined. Chicks of Red-tailed Tropicbirds (*Phaethon rubricauda*) and Laysan Albatross had higher plastic prevalence values than adults. Ranking of plastic ingestion from highest to lowest generally followed the taxonomic ordering of Diomedidae, Hydrobatidae, Procellariidae, Fregatidae, Phaethontidae, Sulidae, and Laridae. The effect of plastic ingestion on growth and survival of albatross chicks appears to be insignificant. The major cause of chick mortality in 1987 was dehydration.

#### CAUSES OF MORTALITY OF ALBATROSS CHICKS FROM HAWAII

Sileo, L., and P. R. Sievert (National Wildlife Health Research Center, 6006 Schroeder Road, Madison, WI 53711)

As part of an investigation of the effect of plastic ingestion in seabirds, approximately 350 albatross (*Diomedea immutabilis*) and (*D. nigripes*) carcasses from the Northwest Hawaiian Islands were examined by necropsy during the summer of 1987. Selected tissues from many of the carcasses were collected for microbiological, parasitological, toxicological, or histopathological examinations. Laboratory tests are not yet complete, but preliminary indications are that dehydration was the most common cause of death. Emaciation, parasitic dermatitis, paint chip poisoning, and nocardiosis were also found. There was no evidence that ingested plastic caused mortality.

Dear PSG Member:

Nominations are being sought for the regional representative positions listed below. Any member in good standing is eligible to make nominations for consideration by the Elections Committee. All suggestions for nominations, and a written confirmation of the suggested nominee's willingness to serve must be received by the Elections Committee Chairperson by June 1st.

Please take time to submit your suggestions and submit (or have each suggested nominee submit) a copy of the CONFIRMATION OF WILLINGNESS TO SERVE form provided on the back of this page. Thank you for your cooperation in this matter.

As a Pacific Seabird Group member in good standing, I wish to nominate the following: (Please provide the individual's name, affiliation, and address)

CHAIR - ELECT \_\_\_\_\_

SECRETARY \_\_\_\_\_

TREASURER \_\_\_\_\_

REGIONAL REPRESENTATIVES

Alaska \_\_\_\_\_

Oregon - Northern California \_\_\_\_\_  
(members with zip codes starting with 954, 955 & 959-961)

British Columbia - Washington State \_\_\_\_\_

Latin America \_\_\_\_\_

Pacific (Hawaii, South Pacific, and Asia) \_\_\_\_\_

\_\_\_\_\_

SIGNED \_\_\_\_\_

Please be sure to have your suggested nominees fill out and send in a copy of the form on the reverse side of this letter. Fold, stamp, and mail this form to the Elections Committee Chairperson.

Dear

You have been suggested as a possible nominee for the office of \_\_\_\_\_  
\_\_\_\_\_ for a term to begin  
at the end of the next annual executive council meeting. If you are willing  
to accept the nomination, and are willing to serve if elected, please  
complete the following form, and mail it to the Election Committee Chairperson,  
Palmer Sekora, U.S. Fish and Wildlife Service, 26208 Finley Refuge Road,  
Corvallis, Oregon 97333. The chairperson must have your confirmation on or  
before June 1st.

CONFIRMATION OF WILLINGNESS TO SERVE IF ELECTED:

I, \_\_\_\_\_, as a member in good standing of the  
Pacific Seabird Group, am willing to serve as \_\_\_\_\_,  
if selected as a nominee for this office by the Elections Committee, and  
elected by the members. I have read the description of the duties of this  
position (refer to PSG Bulletin 8:25-32).

SIGNED \_\_\_\_\_  
AFFILIATION \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
PHONE \_\_\_\_\_  
DATE \_\_\_\_\_

urn Address) \_\_\_\_\_  
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affix  
stamp  
here

TO: Palmer C. Sekora  
Elections Committee Chairperson  
Pacific Seabird Group  
U.S. Fish and Wildlife Service  
26208 Finley Refuge Road  
Corvallis, OR 97333



## DISTRIBUTION AND ABUNDANCE OF MARBLED MURRELETS IN WASHINGTON MARINE WATERS

Speich, S. M. (NCASI, 4817 Sucia Drive, Ferndale, WA 98248), T. R. Wahl (3041 Eldridge, Bellingham, WA 98225) and D. A. Manuwal (Wildlife Science Group, College of Forest Resources, University of Washington, Seattle, WA 98195)

Censuses of marine birds, including Marbled Murrelets, were made of Puget Sound in the summers of 1978-9, 1982, 1984, and 1986, and the winters of 1978-80, 1982-4, and 1986. Censuses of the Washington Pacific Ocean coast were made during pelagic trips, cruises, and coastal surveys from 1966 to the present. Maximum numbers observed, densities, and projected totals of Marbled Murrelets are given for marine shorelines and coastal areas of Washington, as available. Projected totals of Marbled Murrelets are 500-1,000 in southern Puget Sound and 2,000-4,000 in northern Puget Sound. Boat, aircraft, and land census methods are compared and discussed. Vulnerability to oil spills is evaluated.

## A SECOND-YEAR CALIFORNIA GULL (*LARUS CALIFORNICUS*) BREEDS SUCCESSFULLY IN A COASTAL COLONY

Starks, D. S. (San Francisco Bay Bird Observatory, P. O. Box 247, Alviso, CA 95002)

The California Gull breeds in California to as far west as Mono Lake. In May 1981, a small colony (42 nests) was first investigated in south San Francisco Bay by volunteers of the San Francisco Bay Bird Observatory. This colony has grown to 1,425 nests (May 1987) and young have been banded with both USFWS and color bands. In July 1985, an individual in second-year plumage (and color banded) was observed with an adult in breeding condition and young. Immature gulls breeding is not unknown. However, of the four-year gulls documented in the literature (Herring Gulls), all immatures were in their third year. Data suggests that in rapidly expanding colonies, immatures may be recruited to fill available nesting sites. To our knowledge, this is the first documented record of a four-year gull breeding in its second year.

## CHRONIC OILING OF MARINE BIRDS FOUND ON BEACHED BIRD SURVEYS IN CALIFORNIA

Stenzel, L. E., G. W. Page, H. R. Carter, and D. G. Ainley (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 97970)

We present part of the results of an analysis of a 14-year data base of beached bird surveys collected largely by volunteers along the California coast from June 1971 through May 1985. Suspected cause of death could not be determined for most carcasses, but causes for those with sufficient evidence were mostly human-related. Oiling was the most common of the identified causes found. Oiling rates varied between regions of the coast, individual beaches, different years, and different species, although oiled carcasses were found at all times of year in each region and during all years. Incidences of apparently small oil spills, of noticeably greater impact than the background oiling levels, could be identified through the appearance of oiled carcasses on several nearby beaches at approximately the same time.

## MAGELLANIC PENGUIN REPRODUCTIVE SUCCESS IN DIFFERENT HABITATS AT PUNTA TOMBO, ARGENTINA

Stokes, D., and P. D. Boersma (Institute for Environmental Studies and Dept. of Zoology, University of Washington, Seattle, WA 98195)

Magellanic Penguins nest in areas of different density, different distances from the sea, and different nesting types. Nest types include excavated burrows, exposed scrapes, scrapes under dense vegetation, and scrapes under dead bushes. Nest cover can be important in protecting eggs and chicks from predators and also protecting chicks from exposure to weather extremes. Reproductive success was measured over four years. During the 1984-5 season, 99% of the chicks died from exposure and starvation. Chick weight near-fledging differed between years and was heaviest in 1983 and lowest in 1985. There are significant differences between areas and nest types in reproductive success.

## MATE AGE AND REPRODUCTION IN WESTERN GULLS: DOES ROBBING THE CRADLE PAY?

Sydeman, W. J., P. Pyle, S. D. Emslie, T. M. Penniman, and D. G. Ainley (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

We describe the age structure of 325 known-age pairs of Western Gulls on southeast Farallon Island, 1983-7. From the female's perspective, 20.3% mated with a male of equal age, 25.9% mated with older males, and 53.8% had younger mates. Almost 50% mated with males within one year of the female's age. The proportion of females mated with younger males steadily decreased with increasing female age. We examine the effects of the deviation from equal age on timing of laying, clutch size, egg size, chick growth and fledgling success. The age distribution of mates and the influence of mate age on reproductive activities will be discussed in relation to mate limitation due to a female biased sex ratio.

## POPULATION DECLINE OF THE COMMON MURRE IN CENTRAL CALIFORNIA

Takekawa, J. E. (San Francisco Bay NWR, Box 524, Neward, CA 94560), T. E. Harvey (Hawaiian and Pacific Islands NWRC, P. O. Box 50167, 300 Ala Moana Blvd., Honolulu, HI 96840) and H. R. Carter (Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970)

Common Murres (*Uria aalge*) breed in California from Castle Rock in northern California to Hurricane Point Rocks in the Big Sur area. Following historic declines, breeding populations increased steadily through the 1970's and peaked in the early 1980's. Since then, heavy gillnetting, oil spills, and the 1982-3 El Nino have caused severe mortality of murres and other seabirds. In 1985-6, murre colonies in central California were aerially surveyed. In 1982, the central California murre population had declined by 59%. In northern California where gillnetting has not occurred, colonies have remained relatively stable. We discuss the application of ground truthing factors in refining aerial census data and the management implications for gillnet fisheries.

## SOME ACTIVITIES IN THE CRECHES OF THE ELEGANT TERN (*STERNA ELEGANS*) IN RASA ISLAND, BAJA CALIFORNIA, MEXICO

Tobon-Garcia, E. D., and E. Velarde (Institute de Biologia, U.N.A.M., Apartado Postal 70-153, 04510, Mexico, D.F., Mexico)

Elegant terns (*Sterna elegans*) breed in Rasa Island in dense mixed-species colonies. Creche formation is characteristic of this species during the pre fledgling period. Activities within the creche may be important to define the function of the creche in the species. Frequencies of feeding, clepto-parasitism, aggressions, and preening were recorded in the 1986 and 1987 breeding seasons, and compared against time of day, period of season, and creche size. Significant differences were found in feeding and preening frequencies at different times of the day, and aggression and preening at different creche sizes, showing an "optimum creche size." Other non-significant differences, however, showed certain tendencies.

## DIET OF THE ELEGANT TERN (*STERNA ELEGANS*) IN RASA ISLAND, BAJA CALIFORNIA, MEXICO

Tordesillas, M., and E. Velarde (Instituto de Biologia, U.N.A.M., Apartado Postal 70-153, 04510 Mexico, D.F., Mexico)

The breeding and feeding ecology of seabirds is highly dependent upon the distribution, abundance, and seasonal fluctuations of their food resource. These have only been studied for the Elegant Tern in the Pacific coast in the vicinity of San Diego. Isla Rasa, in the northern Gulf of California, is the breeding site of 97% of the world population of this species. The diet of the Elegant Tern was studied on this island in 1985 and 1986 during the breeding season. A total of 223 adult birds were captured, obtaining 126 regurgitations. The most important species in the diet were: Northern Anchovy (*Engraulis mordax*) 54%, Pacific Sardine (*Sardinops sagax*) 15%, both commercially important. Other families such as Scombridae, Atherinidae, Ophidiidae, and Kyphosidae comprise less than 7% of the diet. Seasonal and interannual differences are analyzed.

## DIET OF THE PERUVIAN BOOBY (*SULA VARIEGATA*, TSCHUDI) ALONG THE PERUVIAN LITTORAL

Tovar, H. S., and V. C. Guillen (Instituto del Mar del Peru, Apartado 22, Callao, Peru)

During February 1987 and March 1987, the islands of Macabi (north), Mazorca (center) and Ballestas (south) were visited in order to study the diet of the Peruvian Booby (*Sula variegata*) based on the collection and analysis of regurgitations. It was determined that the Peruvian Booby fed, during February 1986, on Peruvian Anchovy (*Engraulis ringens*), Pacific Sardine (*Sardinops sagax sagax*), Jack Mackerel (*Trachurus symmetricus murphyi*), Pejerrey (*Odontesthes regia regia*), Conjinoba (*Serirolella violacea*), White Anchovy (*Anchoa nasus*) and Sauri (*Scomberesox saurus scombooides*). During March 1987, the Jack Mackerel, Conjinoba, and White Anchovy were not present in the diet. The total length range of the Peruvian Anchovy was between 7.0 and 18.5 cm with the mode at 17.0 cm. The average weight of the afternoon regurgitations was 104 g.

## MURRES (*URIA* SPP.) IN THE SOUTHERN BARENTS SEA AFTER A CRASH IN THE POPULATION OF CAPELIN (*MALLOTUS VILLOSUS*), A PRELIMINARY REPORT

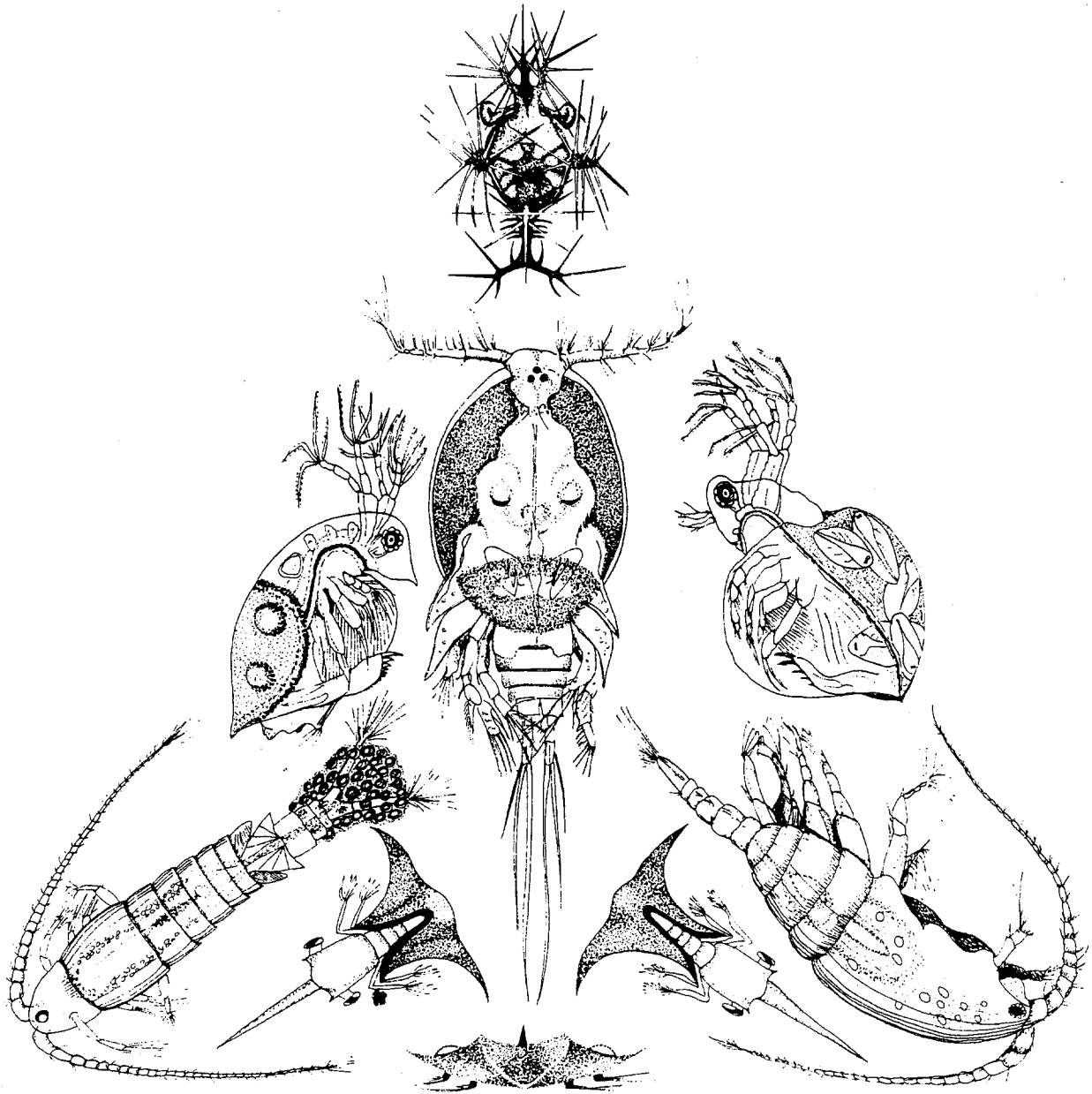
Vader, W., V. Bakken, R. Barrett, K. E. Erikstad, G. Gabrielsen, F. Mehlum, and K-B. Strann (Tromso Museum, N. 9000, Tromso, Norway)

Common (*U. aalge*) and Thick-billed Murres (*U. lomvia*) are common breeding birds in the Barents Sea, with complementary but overlapping distributions. Along the coast of N. Norway W. of the North Cape, murre populations have been decreasing at least since 1965, mainly because of drowning in fishing nets. In E. Finnmark and probably on Bear Island, the population has at least been stable. In 1985, the Barents Sea stock of Capelin (*Mallotus villosus*), the main food item of murres in the region, was almost completely wiped out, probably by the combination of very heavy fishing and predation by cod (*Gadus morhua*). Breeding populations of Common Murres in the area decreased steeply after 1985, by 70-85% in N. Norway and c. 90% on Bear Island. Populations of Thick-billed Murres, on the other hand, decreased only slightly in N. Norway and not at all on Bear Island. The numbers of Common Murres counted at sea in the Barents Sea also decreased dramatically between 1985 and 1987. A probable explanation for this different response is the different diet of the two species. Although both species feed their young mainly with capelin in the area, Thick-billed Murres have a much more generalized diet outside the breeding season (the adult birds maybe even during the breeding season), while Common Murres seem to be more or less dependent upon pelagic fish all year round.

## MURPHY'S PETRELS IN THE CALIFORNIA CURRENT

Veit, R. R. (Dept. of Ecol./Evol. Biology, University of California, Irvine, CA 92717)

Small numbers of Murphy's Petrels (*Pterodroma ultima*), a poorly known species that breeds only on islands in the southeastern Pacific, have recently been sighted 50-100 miles off the west coast of the United States during the months of April-July. These sightings, which have occurred in four different years since 1981, are clustered near a persistent thermal front which forms a boundary between upwelled, nutrient-rich water near the coast and the cooler, less saline waters of the California Current. Examination of physical, chemical, and biological data collected almost annually since 1949 by CalCOFI surveys clearly indicate that this front consistently forms during spring and disperses in summer and fall. It is a zone of persistently high zooplankton and squid concentration and is actively sought by albacore fishermen. It is not, however, a zone of high avian biomass. Sooty Shearwaters, as well as most other pelagic birds of the area, reach peak concentrations much closer to shore. Thus, the distribution of a rare bird species provides clues about oceanic habitats not obvious from patterns of avian biomass distribution.



Rauson 84

## REGIONAL REPORTS

### BRITISH COLUMBIA/WASHINGTON STATE, KEES VERMEER

#### A. British Columbia

##### *Queen Charlotte Islands*

The southern portion of Moresby Island was set aside as a federal park reserve in 1987. The region contains many seabird colonies. Most numerous are those of Ancient Murrelets and Cassin's Auklets, but there are also nesting colonies of Fork-tailed Petrels, and Rhinoceros Auklets and Tufted Puffins. Many Marbled Murrelets undoubtedly nest in the forest fringe adjacent to the sea. The reserve will protect the region from logging and other development activities. The park reserve may become a national park in the near future.

##### *Symposium on Seabirds*

A symposium was held at the Institute of Ocean Sciences, Sidney, B.C., on the ecology and status of marine birds in the Strait of Georgia on December 11, 1987. The symposium was sponsored by the Canadian Wildlife Service and the Pacific Northwest Bird and Mammal Society. The symposium was a success and more than 100 people attended. Speakers ranged from various disciplines such as physical and biological oceanography, aquatic plant and marine invertebrate sciences, and ichthyology and ornithology. The emphasis of the symposium, however, was on the ecology of marine and shoreline birds in one particular ecosystem: the inland sea of the Strait of Georgia. The multidisciplinary proceedings will be published by the Canadian Wildlife Service by the end of 1988.

PSG members undoubtedly will want to obtain a copy of the proceedings from the Canadian Wildlife Service when published. There are reviews on the breeding and feeding biology of marine and shoreline birds and articles on bird communities in specific habitats, such as beaches, fiords, estuaries and rocky shorelines. There are also specific articles on population trends of Glaucous-winged Gulls, Double-crested and Pelagic Cormorants, and the nesting of Pigeon Guillemots, Black Oystercatchers, Bald Eagles, Great Blue Herons and Northwestern Crows. Many recommendations are given for future studies to manage the marine bird resource in the Strait of Georgia.

##### *Seabird Studies in 1987*

1. Nesting and feeding ecology of Great Blue Herons on Sidney Island - Robert Butler.
2. Inventory of nesting seabirds in the Scott Islands - Moira Lemon and Michael Rodway.
3. Nesting biology of Least Sandpipers in the Queen Charlotte Islands - John Cooper.
4. Continuation of population study of Ancient Murrelets on Reef Island - Tony Gaston.
5. Selection of nesting habitat of Black Oystercatchers, Double-crested and Pelagic cormorants in the Gulf Islands - Kees Vermeer and Ken Morgan.
6. Seabird distribution over offshore banks, S.W. Vancouver Island - Kees Vermeer and Ken Morgan.

7. Seasonality and distribution of marine birds in fjords:

- a. Saanich Inlet - Ken Morgan.
- b. Jervis Inlet - Kees Vermeer.

B. Washington State, including research outside the region

1. Ecology of Magellanic Penguins, Argentina - Dee Boersma.
2. Habitat selection of Magellanic Penguins, Argentina - David Stokes.
3. Long-term pair-bonding of steamer ducks, Argentina - Eugene Fowler.
4. Predation of Fork-tailed and Leach's Storm-Petrels, Tatoosh Island - Dee Boersma.
5. Finishing write-up of reproductive efforts of Glaucous-winged Gulls - Walter Reid.
6. Review of Antarctic Treaty of Biological Reserves - Walter Reid.
7. Continuation of studies on Rhinoceros Auklets - Ulrich Wilson.
8. Continuation of studies on Marbled Murrelets - Lora Leschner.

## GREAT LAKES, HANS BLOKPOEL

*Brock University, St. Catherine's, Ontario*

Ralph D. Morris and his students will continue work at their principal gull/tern study area on the breakwall/lighthouse complex offshore from Port Colborne, Ontario in Lake Erie. In 1988, they intend to expand their initial observations of chick mobility and adoption in broods during peak and late periods of nesting by using color-banded chicks. Detailed data on parental care behavior of tropical nesting Brown Noddies are now in hand from a colony near Culebra, Puerto Rico.

*Canadian Wildlife Service, Burlington and Ottawa, Ontario*

D. V. (Chip) Wesloh and John Struger continued monitoring pollutants in the Great Lakes during the 14th year (1987) of the Great Lakes Herring Gull Egg Monitoring Program for toxic chemicals. Eggs were collected from 13 colonies from throughout the Great Lakes. Most contaminant levels have decreased sharply since the program was first started in 1974. This was also the 9th year of a long-term census project for Double-crested Cormorants on the Great Lakes. In 1974, the Great Lakes wide population comprised approximately 125 nests in 10 colonies; in 1987, over 11,000 nests were counted in 50 colonies. Other studies included embryonic mortality in Herring Gulls and contaminants in Forster's Terns and Black-crowned Night Herons. Monitoring of toxic chemicals will continue in 1988.

Hans Blokpoel and Gaston D. Tessier monitored the effectiveness of projects to reduce or eliminate Ring-billed Gull colonies located at urban or industrial sites in southern Ontario during the 1987 breeding season. A survey of Caspian Tern colonies in the Canadian Great Lakes was conducted and Caspian Tern chicks were color-banded at a Lake Ontario ternery.

*Lakehead University, Thunder Bay, Ontario*

John Ryder and students are continuing work on Ring-billed Gulls. Vicky Johnston is in the final stages of her M.Sc. thesis on body size, reproductive success and assortative mating in Ring-billed Gulls. Elizabeth Murray completed her Honours B.Sc. thesis on the determination of the number of eggs laid by Ring-billed Gulls using post-ovulatory follicles. Anke Roth is starting her thesis research on seasonal changes of internal organ weights in Ring-billed Gulls. Shelagh Hamer is continuing her research on skeletal characteristics of immature and mature Ring-billed Gulls.

Their group also started studies on the American White Pelican population in the Lake of the Woods. This is the only reported nesting colony location in Ontario. They are primarily interested in an initial documentation of the location, numbers and reproductive success of the population nesting on the Three Sisters Island complex. The study was funded by the World Wildlife Fund.

#### *Census of Waterbird colonies in the Great Lakes*

Bill Scharf (Biology Dept., Northwest Michigan College, Traverse City, Michigan) and Hans Blokpoel will coordinate efforts to census waterbird colonies in the Great Lakes in 1988. The results will be used to help update the ICBP's *Status and Conservation of the World's Seabirds*.

#### NORTHEAST REGION, MARK TASKER

##### *Europe and the northeastern Atlantic*

W. R. P. Bourne is at present on board a fleet auxiliary in the Persian/Arabian Gulf and is writing up results gained from recent trips to the South Atlantic.

There have been severe problems in Norway. Reports from Torgeir Nygard and Rob Barrett both highlight catastrophic declines in seabird numbers in northern Norway. On Bear Island, the Common Murre population has declined from 200,000 pairs in 1986 to 20,000 pairs in 1987. In Norway north of 70° N, there were around 140,000 pairs in 1964 but only 7,000 in 1987. The reasons behind these declines are not fully understood but two factors appear to be most significant. First, incidental catches in gill nets took a heavy toll up until 1985 and, secondly, there was a crash in the capelin stock. This fish is the staple food of auks and other seabirds in the region. The crash may have been caused by overexploitation. Research is in progress by Rob Barrett and others of Tromso University to examine factors affecting the declines.

Other research in progress in Tromso includes studies of seabirds at sea (also being carried out by T. Nygard and others off southern Norway): studies of seabird, censusing and monitoring of the larger Norwegian colonies; studies of the parasites of Black-legged Kittiwake and Atlantic Puffin chicks and studies of the genetic differences between populations of Common Murres.

Studies at sea continue in Britain, where the Seabirds at Sea Team (Mark Tasker, Andy Webb, Stuart Beim and Genevieve Leaper) have recently been joined by Nancy Harrison. Studies have now moved to waters west of Britain as well as continuing in the North Sea. In this latter area, useful cooperation is being built up with researchers working at sea from Norway, Denmark and the Netherlands. Mike Harris and Sarah Wanless continue in their work on developing simple methods to monitor parameters affecting population sizes of common British seabirds. They have also made great strides in mastering the problems associated with radio-tracking seabirds away from the colony.



The Seabird Group and the Nature Conservancy have virtually completed the fieldwork associated with the Seabird Colony Register. This has been organized by Clare Lloyd and provides a comprehensive modern picture of seabird numbers breeding in Britain and Ireland. Most populations seem healthy, with the exception of the large gulls (Great and Less Black-backed and Herring), whose numbers have declined by, on average, 50% since the last comprehensive survey in 1969-70. Numbers of terns breeding on the northern isles of Scotland have declined also. This fall in numbers seems to be associated with changes in the sandeel (sandlance) stock, which may or may not be caused by man's fishing activities. This is being investigated by John Uttley and Pat Monaghan at Glasgow University.

Bob Furness and his students continue to investigate the effects on seabirds of changes in net-mesh size for commercial fisheries. It is hypothesized that a raising of the minimum net-mesh size will cause fewer discards to be available to seabirds, thus potentially impacting some populations. Studies on Common Murre breeding biology are being carried out by Adrian de Nevo and Ben Hatchwell at Sheffield University, under supervision from Tim Burkhead.

#### *Northwestern Atlantic*

From the western side of the Atlantic, Bill Drury has written to inform of activities in Maine. Studies are being carried out on terns at Petit Manan Island. Breeding success in 1987 was mixed, with heavy rain causing some problems. A Peregrine Falcon took to hunting at the colony, also, perhaps an unfortunate side effect of a reintroduction attempt. (This same problem has occurred "naturally" at a colony in Wales.)

Bill Drury, Steve Kress and Jane Arbuckle monitor seabirds on sections of the Maine coast. In 1987, they found that the Great Cormorant population had continued to increase. It now stands at 103 pairs compared to 33 in 1983. Populations of terns in Maine are declining or, at least, not reproducing successfully. Problems in the area are attributed to the local gull populations. A management plan for the tern-nesting locations is being compiled.

Julie Porter has supplied the following useful summary of Newfoundland research:

Memorial University of Newfoundland

Newfoundland Institute for Cold Ocean Science

David C. Schneider. During 1987, I investigated the distribution of marine birds and capelin schools in relation to coastal upwelling along the Avalon Peninsula.

Julie M. Porter. I am investigating recruitment to the breeding group and the formation of new colonies in the Black-legged Kittiwake. Areas of study include southeastern Newfoundland and Cape Breton, Nova Scotia. I am using a combination of behavioral, ecological and genetic techniques.

#### Department of Biology

W. (Bill) Threfall. Studies are continuing on octo- and endo-parasites of seabirds. Work on the breeding biology, movements and distribution of gulls is being undertaken. Research on habitat selection by Leach's Storm-Petrels is now being analyzed.

#### Department of Psychology

W. A. (Bill) Montevecchi (also NICOS). Seabirds are studied as energy consumers and as natural monitors of prey stocks and of oceanographic conditions in marine ecosystems. Radio-isotopically labeled water is being used to directly measure the energy expenditure of free-ranging seabirds that cover the full spectrum of body sizes in the northwest Atlantic (storm-petrels, murre, gannets) and that interact at different levels of marine food webs. Foraging behavior patterns and prey harvests are the objectives of ongoing studies with Leach's Storm-Petrels and Northern Gannets.

Anne Storey. We have documented the first colony of Manx Shearwaters in North America and have examined the establishment of new colonies. We studied communication and its role in mate attraction in these Manx Shearwaters. Atlantic Puffins have been investigated to examine sex-related differences in activity budgets and opportunities for extra pair copulation.

Shelley L. Bryant. The activity patterns of Leach's Storm-Petrels are the focus of my master's thesis research. A comparison between two colonies is being made, with the principal difference being the presence or absence of breeding gulls at the colony. Activity measures will be carried out throughout the night and include visual counts of birds in the air, vocalization counts, mist-netting and the monitoring of individually latticed burrows. Preliminary data collection suggests that Leach's Storm-Petrels at the colony with gulls arrive later than those at the colony without gulls, particularly on bright moonlit nights.

Vicki L. Birt (also Biology, NICOS). Differences in genomic DNA, mitochondrial DNA and proteins of murre and gannets from different colonies are being examined. Data will be used to quantify both the genetic heterogeneity of colonies and the movements of breeding birds between colonies. Molecular markers are also being sought to identify the breeding colonies of murre hunted on their wintering grounds.

#### Canadian Wildlife Service

Richard D. Elliott. (1) Looking at ways to reduce the harvest of Thick-billed Murres in Newfoundland through more effective management. (2) Completing the fourth of a five-year project to assess oil-related seabird mortality through beached-bird surveys on the southern Avalon Peninsula. (3) Assessing mortality of murre and puffins in cod and salmon gill nets adjacent to breeding colonies.

R. Ian Goudie. (1) Assessing the population size of Harlequin Ducks and developing management plans to protect the remaining population. (2) Managing eider duck breeding and wintering numbers in Newfoundland.

## SOUTHERN CALIFORNIA, ZOE EPPLEY

### *California Channel Islands*

Dave Lewis is continuing to monitor Channel Islands seabirds for the Channel Islands National Park Service.

### *California State University, Long Beach*

Charles Collins and team are continuing their fieldwork on growth and development of California Least Terns. They have data from 1979 to the present on annual and colony variation. They, in association with Bill Schew, have expanded their work to include Black Skimmers and Elegant Terns.

Kathy Kean is continuing her studies of California Least Tern breeding biology at Camp Pendleton and Los Angeles Harbor. She is particularly interested in parental care and foraging ecology.

Barbara Massey continues her long-term studies on a banded population of California Least Terns. The banding program dates from 1976, and she is starting to analyze data on survival, duration of breeding life and pair bonds, as well as population dynamics. A radiotelemetry study, designed to monitor foraging in Least Terns, was abandoned in 1987 because behavioral aberrations of breeding birds indicated stress.

Bill Schew is studying: the growth of Caspian Terns at Bolsa Chica Ecological Reserve, methods of age and sex determination in Black Skimmers, Gull-billed Tern growth and demography at Salton Sea. His thesis work concerns ecological and developmental determinants of growth in terns. He solicits any original data, published or not, for this project and in return will provide copies of the analysis for publication elsewhere. Here is a good chance to get a free analysis of any tern growth data sets lingering in field notes or files.

Stuart Warter is continuing his studies of the fossil flightless goose/eider *Chendytes*, of the California Channel Islands.

### *Los Angeles County Museum of Natural History*

Ralph and Betty Anne Schreiber are continuing their long-term studies of the breeding biology of pelecaniform birds on Johnston Island in the mid-Pacific. Their banding and breeding studies have been continuous since 1979, and they now have over 7,000 known age, uniquely banded individual birds. They are working on a new public display of birds for the museum that will feature 17,000 sq. feet of walk-through habitat. They are in the process of raising 5.1 million dollars to fund the work. Please send money.

### *San Diego Natural History Museum*

William Everett is working on the marine birds of Baja California's west coast and offshore islands, with particular attention to Black-vented Shearwaters.

*University of California, Irvine*

Zoe Eppley is continuing her studies on ecological and phylogenetic variation in development of charadriiform birds. She completed a project on the development of Western Gulls this summer. She will be going to the Antarctic in winter 1988 to study behavioral and developmental adaptations to cold in Kelp Gulls, sheathbills and skuas.

Nancy Harrison has joined the Seabirds-at-Sea Team of the Nature Conservancy Council, Aberdeen, Scotland, and is working on the distribution of North Sea marine birds.

George Hunt, Dennis Heinemann and Dick Veit of UCI with Inigo Everson, Peter Prince and John Croxall of the British Antarctic Survey are concluding their studies of spatial and temporal correlations of seabirds and fur seals with krill around South Georgia Island.

George Hunt, Beth Flint, Margaret Rubega from UCI and Peter Prince from the British Antarctic Survey and Ted Cooney and Ken Coyle from the University of Alaska, Fairbanks, are continuing a three-year project on the Pribilof Islands, Bering Sea. They are evaluating the effects of prey abundance, foraging distribution, and energetics of Black-legged Kittiwakes, Red-legged Kittiwakes, and Thick-billed Murres on reproductive performance in a large and small colony. Prey abundance is assessed using bioacoustics and net tows. Doubly labeled water in combination with activity and dive recorders are used to assess energetics. They are looking for volunteers for summer 1988; write George Hunt, Eco/Evo Biology, UCI, Irvine, CA 92717 for further information.

Margaret Rubega is studying the feeding behavior of diving birds (grebes and alcids) in the laboratory using kinematics.

Dick Viet in association with John McGowen (Scripps Institution of Oceanography) is studying pelagic bird communities in different oceanographic regimes in the southern California Bight using repeatedly sampled CalCOFI transects.

*University of California, Los Angeles*

Terry Bucher and Mark Chappell (UC Riverside) are continuing their work on respiration and thermoregulation in penguins.

Pat Mock was involved in George Hunt's study on the Pribilof Islands this summer and worked on the energetics of growth in Thick-billed Murres. He is continuing his validation studies of the cyclopropane method of determining in vivo lipid content of vertebrates.

Bryan Obst, now an Assistant Professor at UCLA, is finishing his study on the mechanics of feeding and spinning behavior in phalaropes and now is working on digestion in chickens. He has plans to work on energetics of gulls and storm petrels.

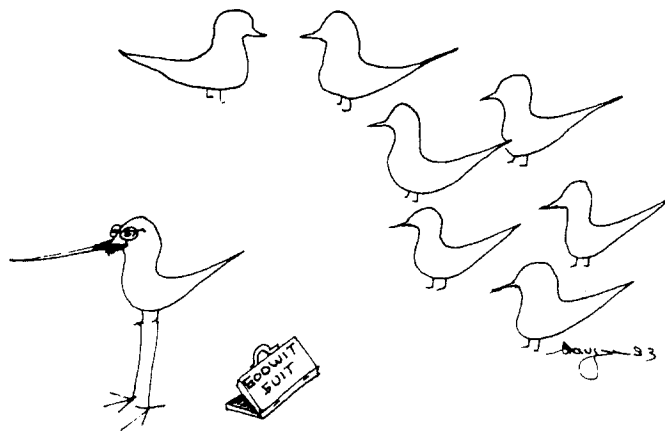
Bernice Wenzel, with Esmail Meisami of the University of Illinois, are studying the cellular anatomy of the olfactory mucosa and olfactory bulb in procellariiform species in comparison with other birds.

*University of California, San Diego-Scripps Institution of Oceanography*

Don Croll is studying the diving and energetics of Thick-billed Murres of Coats Island, NWT, Canada. The study includes measurement of average daily metabolism, daily activity budgets, and diving behavior of Thick-billed Murres. His laboratory studies include determination of resting metabolic rate, energetic costs of various at-sea activities, and physiological parameters important during diving.

*University of San Diego*

Hugh Ellis is investigating the functional basis for lower resting metabolic rates in dark seabirds.



THAT HENRY! ALWAYS PLAYING BOOWIT...

## SEABIRD NEWS

### LAYSAN ALBATROSS BREEDING IN THE EASTERN PACIFIC - AND A COMMENT

Recently, I reported that Laysan Albatross (*Diomedea immutabilis*) had become regularly present at Alijos Rocks, Mexico, throughout their normal winter breeding season, and appeared to be interested in nesting (Pitman 1985. *Western Birds* 16:81-92). Alijos Rocks are 185 nautical miles off the west coast of Baja California. Since then I have received a report from Beth Dunlap that Laysans with chicks were found on Guadalupe Island off central Baja during 1986. (Ms. Dunlap has submitted a note to *American Birds* with details of her finding.) In May 1987, I photographed three Laysans standing in an *Ipomoea* patch on San Benedicto Island, in the Revillagigedos, approximately 230 nautical miles south of the tip of Baja. There was no sign of nesting at the time, but all three birds were displaying vigorously: whistling, bill-clapping, sky-pointing, etc. Presumably a colony will start up on this island in the near future and very likely on other islands of the archipelago. The nearest known Laysan colony is in the Hawaiian Islands and this represents a breeding range extension of nearly half the Pacific Ocean. It will be very interesting to see where else colonizing Laysans show up in the future.

At the recent PSG Meeting in Asilomar, we heard about the large amount of plastic debris that foraging Laysan Albatross ingest (more so than any of the other 15 species of breeding seabirds recently studied for rates of plastic ingestion in the Hawaiian Islands). We also heard how this plastic seems to have little or no detrimental effect on the growth and survival of Laysan chicks. Small animal communities build up around any kind of flotsam in the open ocean, including plastic. Crabs and barnacles settle out and grow; spawning fish attach their eggs; small fish regularly associate, probably for protection and feeding. I have seen Laysan Albatross "surface seizing" around piles of abandoned fishing gear in the mid-Pacific, presumably taking advantage of these associations for opportunistic feeding. Laysan Albatross populations in the central Pacific have been rapidly rising in recent years, possibly to the point now of needing to expand their breeding range. There can be no justification for the amount of persistent debris currently found in the ocean, but perhaps it is time to consider whether plastic waste has been more of a boon than a bane to the trash-picking albatross. Maybe what we are seeing is a case of albatross eutrophication.

Robert L. Pitman. Southwest Fisheries Center. P. O. Box 271, La Jolla, CA 92038.

## CONSERVATION NEWS

### *The Chafarinas' Audouin's Gull Colony in 1987*

There has been concern about Audouin's Gull colony on the Chafarinas' Islands where these gulls have suffered both human disturbance and, more importantly, from interactions with Yellow-legged Gulls. The Yellow-legged Gulls have been both competitors as well as important predators. After strong international lobbying, ICONA (Instituto para la Conservacion de la Naturaleza), in charge of managing the archipelago, intervened with conservation measures in the spring of 1987. A Yellow-legged Gull monitoring program led to the culling of almost 1,000 adults. As a consequence, the population of Audouin's Gulls increased to 2,845 nests (over 1,930 nests in 1986) and an estimated 1,027 chicks fledged. There is hope that the situation will continue to improve because ICONA plans to continue its campaign.

Eduardo de Juana and Juan M. Varela  
from a report to Medmarvis

### *Destruction of the Drana Lagoon*

Drana Lagoon is one of the most important parts of the Evros Delta in eastern Greece. This has been a critical wintering area for waterfowl, wading birds and seabirds (primarily gulls and terns). Up to 70,000 waterfowl (50% of the birds in the Evros Delta) roost in the lagoon. Because of its importance, this area was listed as a Ramsar Wetland of international importance and was made a national park. In May 1987, farmers from a nearby village bulldozed a sandspit in the lagoon and flattened a landward dike to allow rapid drainage. We do not know how great the damage has been. For further information, please contact V. Goutner and J. Jerrentrup, Department of Zoology, University of Thessaloniki, 54006, Thessaloniki, Greece.

### *Northern and central California gill-net conflicts with protected wildlife*

#### Background - 1980-4

The incidental take of seabirds, particularly Sooty Shearwaters and Common Murres, became an obvious problem when large numbers of these species became stranded on Monterey Bay beaches in 1981. It soon became apparent that the nearshore gill nets set for halibut were also taking a disturbing number of some marine mammal species, including the threatened southern sea otter.

The problem spread north of the Gulf of the Farallons in June of 1982, where the most heavily impacted species were Common Murres, harbor porpoises, and harbor seals. There, also, beaches littered with dead seabirds and marine mammals attracted media attention, public outrage, and generally a climate supportive of restricting the fisheries.

Several factors contributed to the emergence of this fisheries/wildlife conflict. Most important was a sharp increase in the number of gill-net fishermen in the preexisting halibut fishery. Two new gill-net fisheries began developing as well: a white croaker fishery, which took substantial numbers of birds, and a deeper water fishery for rockfish, which appears to have a negligible incidental take problem. In addition, the gill-net fisheries shifted from twine nets to monofilament, which seem to take somewhat higher levels of birds and mammals.

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) unofficially felt that the California fisheries were state-managed and left it to the state to take action. The California Department of Fish and Game (CDFG) was unwilling to use the Migratory Bird Treaty Act or the Marine Mammal Protection Act because using these federal laws would have required completely shutting down the fisheries. The CDFG, when pushed, was willing to experiment with restrictions on the fisheries to reduce the incidental take to "acceptable levels" without ending the fisheries. This would require legislation because the authority did not exist in the Fish and Game code.

In 1981, two graduate students (Don Croll and Tom Keating) at Moss Landing Laboratory, with some assistance from CDFG, began at-sea monitoring of a small percentage of gill-net operations in Monterey Bay. They were able to expand their monitoring in 1982 with funding from the Monterey Peninsula, Santa Clara Valley, and Golden Gate Audubon Society chapters, the U.S. Marine Mammal Commission, Point Reyes Bird Observatory (PRBO), and a \$2,000 grant from ICBP-US.

The monitoring program, combined with considerable political pressure, led to a CDFG recommendation late in 1981 that gill-netting be prohibited in shallow waters of Monterey Bay. A bill aimed at reducing the incidental take without eliminating the fisheries was signed into law in June 1982, largely through the efforts of Friends of the Sea Otter, PRBO, and the Monterey Peninsula Audubon Society. That legislation set patterns that would be repeated in each of the next few years. The regulations prohibited gill nets in waters shallower than 10 fathoms in Monterey Bay. The bill also gave the Director of CDFG the authority to declare emergency temporary gill-net closures if, after a public hearing, the director determined that "any local population of any species of seabird or marine mammal is in danger of irreparable injury or that mortality in any local population of any species of seabird or marine mammal is occurring at a rate that threatens the viability of the local population as a direct result of the use of gill nets of trammel nets."

From Santa Cruz south to Port San Luis in San Luis Obispo County, the pattern continued of large closures that shifted the problem to adjacent areas of deeper waters where gill-netting was still allowed. Monitoring by Moss Landing Marine Laboratory and CDFG indicated that the 10-fathom closure in Monterey Bay had largely solved the seabird incidental take problem but that there was a substantial take of sea otters. Additional legislation in 1984, 1985, and 1986 seems to have solved that problem by gradually putting either 15-fathom or 20-fathom closures into effect on that entire section of the central California coast.

Another pattern developed in the Gulf of the Farallons (Sonoma, Marin, San Francisco, and San Mateo counties). As soon as the 1982 bill was signed (June), pressure was put on the Director of CDFG to close areas off Marin County where PRBO was observing heavy gill-net related mortality, and large numbers of Common Murres and marine mammals had stranded on local beaches. The Director made the first use of his new emergency authority to institute temporary closure. The problem immediately shifted to San Francisco and San Mateo counties. More hearing followed in 1982 and 1983, usually leading to further or renewed temporary closures along portions of the coast.

Late in 1982, CDFG was convinced that it should make a serious commitment to monitoring the entire area where incidental take problems were occurring from San Luis Obispo County north to the Sonoma-Mendocino County boundary (gill-netting was already prohibited north of that line). Monitoring began in the Gulf of the Farallons in 1983 with observation of roughly 10%



of nest pulls. Sampling increased to about 15% in 1984-6 years. Significant supplemental funding from the Gulf of the Farallons monitoring has been provided to CDFG by the San Francisco Foundation and the U.S. Marine Mammal Commission.

By late 1983, both CDFG and PRBO were estimating murre mortality in the Gulf of the Farallons gill nets at 25,000-30,000 (roughly 15% of the estimated breeding population) for that year alone. CDFG began hosting a series of meetings with environmental groups and sport and commercial fishermen and their organizations. In December, CDFG, PRBO, and the Pacific Coast Federation of Fishermen's Associations drew up a consensus package of regulations which was signed into law in June of 1984. These regulations provided a patchwork of mainland coast where gill-net/wildlife conflicts were most predictable. Monitoring continued through 1986 to determine how effective the new regulations were.

#### Resolution - 1985-7

Evaluating the new restrictions proved difficult. They were in effect for only half of 1984. The 1984 breeding season on the Farallon Islands revealed a drastic reduction in the murre breeding population but how much of the decline was due to gill-netting and how much to the 1982-4 ENSO?

Monitoring indicated mortality had dropped to 6,000-8,000 in 1984 but that still represented perhaps 10% of the greatly reduced murre breeding population. CDFG and the fishermen were unconvinced. The concerned environmental groups realized there was still a serious problem, and they began escalating the political process. Congresswoman Barbara Boxer and several other California congressmen pushed for the involvement of USFWS and NMFS.

The 1985 season resulted in another murre mortality estimate of 6,000-8,000. Meanwhile, CDFG estimated that perhaps 300 harbor porpoise were taken in gill nets in central and northern California in 1983. A major meeting of all the concerned agencies and organizations in January 1986 failed to produce progress in the Gulf of the Farallons.

That spring, the Marin and Golden Gate Audubon chapters and United Anglers of California initiated a legal approach. They retained counsel to analyze the legal implications of the continued incidental take. That analysis, by Stuart Somach, clearly stated that any seabird incidental take was illegal under MBTA. These organizations, joined by the Center for Environmental Education, the Whale Center, and the National Audubon Society, then petitioned the secretaries of Commerce and the Interior to enforce MBTA and MMPA. The California organizations also asked the California Attorney General to render an opinion to CDFG on its legal responsibilities under state and federal law.

At this point, mid-1986, the biological, political, and legal approaches all converged. CDFG monitoring indicated continued mortality in the 6,000-8,000/year range. Analysis of PRBO data suggested that roughly 75% of the murre decline could be attributable to gill-netting with the balance due to the ENSO and oil spills in 1984 and 1986. CDFG also estimated harbor porpoise mortality continuing at a rate of 200-300/year. Harbor porpoise population work that NMFS was pressured into continuing because of the gill-net problem began to indicate that the mortality levels could not be sustained. NMFS and USFWS finally took strong positions on the issue late in 1986, based on both the biological information and legal requirements. The California Attorney General wrote a strong opinion to CDFG on the state's legal obligations. And the concerned environmental and sport-fishing groups continued to involve more state legislators in the issue.

In spite of the favorable constellation of information and pressure, a protracted series of meetings was needed in late 1986 to reach agreement on a new package of permanent regulations for the Gulf of the Farallons (January 1987). The difficulty, as in the past, was that the regulations had to survive the legislative process. A bill that had a backing or, at least, neutrality of commercial fishermen had a much better chance of passage. Failure in the legislature left litigation as the unpleasant alternative. Consequently, the environmental organizations put considerable effort into winning support of the fishermen. For example, in the 1987 bill (as with a 1986 bill that largely affected the sea otter range), we included a low interest loan package developed by the fishermen to help move gill netters impacted by the regulations into new or alternative fisheries.

The regulations in the 1987 bill that all parties think will solve the incidental take problem in the Gulf of the Farallons include: total prohibition on gill-netting north of Point Reyes, a 40-fathom closure from Point Reyes to Point Ano Nuevo (just north of Santa Cruz), and a 3-mile closure around the Farallon Islands and Noonday Rock buoy. All of these closures are year-round.

In September 1987, the bill passed both state houses and was signed into law. This was a nice ending to a long ordeal. We hope that the major problem has been solved.

Burr Heneman  
Adapted from a report to ICBP-US Section

#### *Yellow-eyed Penguins*

The Yellow-eyed Penguin, *Megadyptes antipodes*, with a population of 1,500-2,000 breeding pairs, is the world's rarest penguin. One-third of the population breeds on the South Island of New Zealand. The South Island population has declined by 50% over the last two years. There are two main reasons for this decline: (1) the uncontrolled grazing by farm stock, which leads to deterioration of the coastal vegetation where penguins breed and (2) the large numbers of penguin chicks killed by introduced predators (ferrets, stoats and feral cats). The Yellow-eyed Penguin Fund has recently become established to raise funds so that conservation measures can be implemented. You can contact the trust at: Yellow-eyed Penguin Trust, P. O. Box 5409, Dunedin, New Zealand.

## INCREASING HUMAN IMPACT ON UNINHABITED ISLANDS

January 5, 1988

Editor, Pacific Seabird Group Bulletin  
Savannah River Ecology Laboratory  
P. O. Drawer E  
Aiken, South Carolina 29801

Dear Editor:

I have a conservation issue I would like to bring to the attention of the Pacific Seabird Group. A dozen years ago when I started doing regular marine bird and mammal survey cruises in the eastern tropical Pacific, the few islands in that area were largely uninhabited. In the last decade though I have noticed an alarming trend of human colonization that is a potential threat to many forms of island life, including seabirds.

The following is a quote from Van Dyke and Brooks (1983. Uninhabited islands: Their impact on the ownership of the oceans resources. *Ocean Devel. and Intern. Law Jour.* 12:265-300): "Article 121 of the Draft Convention of the Third United Nations Conference on the Law of the Sea grants a 200-mile exclusive economic zone [EEZ] and continental shelf to all islands, excepting only those 'rocks which cannot sustain human habitation or economic life of their own'." Later, they go on to say, "In today's world of high technology, any land protrusion can be made 'inhabitable' if a nation is willing to expend sufficient resources." A concerted effort by island-owning nations to occupy what are often very inhospitable sites, sites that would have otherwise remained uninhabited, is exactly what has been happening in the eastern tropical Pacific and, I assume, elsewhere.

Because of the large geographic area and potential resources included within a 200-mile EEZ, there is a lot at stake for island-owning countries. For example, Clipperton Island (France) in the eastern tropical Pacific, with barely 1 sq. mile of surface area, is the basis for France's claim to a 200-mile EEZ that encompasses 125,000 sq. miles of seabed around the island. The recently formed Societe d'Etude, Developpement et Exploitation de l'ilot Clipperton has been given permission by French authorities to develop the island in order to bolster France's claim to the atoll and adjacent waters. Bryan Nelson (1978. *The Sulidae: Gannets and Boobies*. Oxford Univ. Press) credited Clipperton with the largest Brown Booby colony in the world and possibly the largest Masked Booby colony before it was destroyed by introduced pigs. When the pigs were removed in 1958, the Masked Booby repopulated the island and currently numbers in the tens of thousands again (personal observation). Now, with the prospect of development, the colony is once again at risk and one of the largest booby colonies in the world may be sacrificed merely to establish a presence on Clipperton.

The situation on Clarion Island (Mexico) in the Revillagigedos group, is considerably more grave. A small military installation that currently consists of 11 men was established in 1979. This action, according to Van Dyke and Brooks (op. cit.), was part of a plan to "reaffirm Mexico's claim to the 11-square mile cactus-covered dot." Shortly after their arrival, settlers on the island released pigs and rabbits as a source of food; both occur over the entire island now and threaten endemic plants and the two endemic landbirds, as well as ground-nesting seabirds (Everett in press, Condor). Clarion Island is one of two islands in the world where Townsend's Shearwater breeds.

Malpelo Island (Colombia) is a bleak, soilless rock that is another possible contender for the world's largest Masked Booby colony (R. C. Murphy estimated 25,000 in 1941). A more inhospitable place for humans to live could not be imagined, but in the last two years the Colombians have built a boat landing, a helicopter landing pad, and have erected a small house. When I visited the island in fall 1987, five soldiers were stationed on the rock with all of their food and water being supplied by the mainland.

Cocos Island (Costa Rica) was also largely uninhabited up until around 1979 when it became a national park. At that time a small military outpost was established and a handful of soldiers have been stationed on the island ever since. They are also provisioned almost entirely by the mainland.

The pattern here is quite clear: with the advent of the 200-mile EEZ, countries with island holdings have become involved in what is little more than an underwater landgrab. The rules of the game stipulate that an island must be inhabited to become eligible and a small military presence seems to fill the bill in most cases. It is a small price to pay for control of such a vast amount of ocean resources. Islands that were previously "uninhabitable," with no previous economic worth, suddenly taken on new value when a handful of wholly dependent settlers take up residence. The bog losers in all this are of course the plants and animals that come with the islands. We are all too familiar with what happens to fragile island biota when man comes ashore with his pets and pests.

I think letters from PSG to the French, Mexican and Colombian governments to remind them of what is at stake at Clipperton, Clarion and Malpelo islands, respectively, is necessary at this point, to potentially alleviate some specific problems, but this does little to resolve the more general problem of island occupation and "development." A way needs to be found to protect uninhabited islands from the kind of unwitting carelessness described above, while still providing for the rights of resources to sovereign nations. If not, we may be headed for another round of decimation and extinction on oceanic islands.

Sincerely,

Robert L. Pitman  
Southwest Fisheries Center  
P. O. Box 271  
La Jolla, CA 92038

## INTERNATIONAL COUNCIL FOR BIRD PRESERVATION

### INTERNATIONAL COUNCIL FOR BIRD PRESERVATION - U.S. SECTION

#### *Proposed Gray's Harbor National Wildlife Refuge, Washington*

Gray's Harbor, Washington, is one of four sites in North America hosting more than one million migrant shorebirds. Much of the harbor is owned by the port of Gray's Harbor. The area has been the site of a conservation movement over the years. Conservationists have tied up development of critical parts of the harbor. A few years ago, the ICBP-US Section passed a resolution supporting the preservation of the area. While the Washington congressional delegation is finally becoming more supportive, the future is not assured. Conservationists want the area designated as a National Wildlife Refuge to ensure protection. The ICBP-US Section has passed a resolution in support of this.

#### *U.S. Birdwatch*

The ICBP-US Section has initiated a short newsletter entitled *U.S. Birdwatch* which is sent to member organizations. Information pertinent to the PSG will be summarized in the PSG Bulletin.

#### *Membership*

The Pacific Seabird Group is a member of the ICBP-US Section. Our representatives are Ron Naveen (who has been elected Vice Chairman of the section) and Malcolm Coulter. We report pertinent information of the meetings to the PSG membership in the PSG Bulletin. If individuals wish, they may become non-voting members of the organization for a membership fee: Associate (\$35-99), Supporting (\$100-249), Sustaining (\$250), Patron (\$500), Benefactor (\$1,000). You should send your support to: International Council for Bird Preservation - U.S. Section, NAS - 801 Pennsylvania Avenue, S.E., Washington, D.C. 20003.

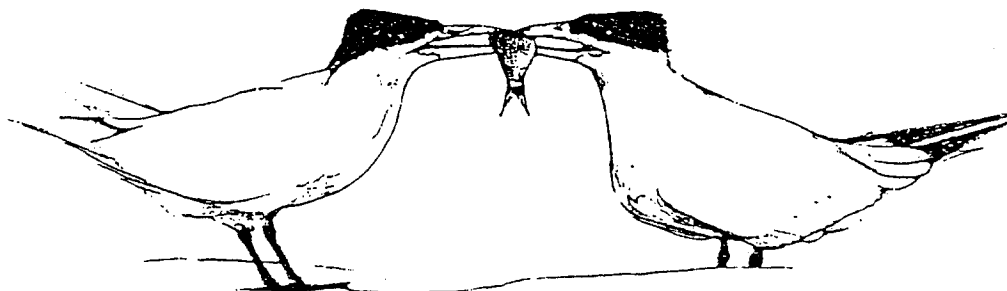
## ICBP SEABIRD SPECIALIST GROUP

### NEW CHAIRMAN, ICBP SEABIRD SPECIALIST GROUP

Ralph Schrieber, after many years of service, has resigned as chairman of the ICBP Seabird Specialist Group. Ralph has contributed substantially over the years to seabird conservation throughout the world. David Duffy, who has worked on seabirds off the coasts of North America, South America and Africa has taken on the responsibilities. David is co-editor of the Boletin de Aves Marinas Latinoamericanas. The Boletin, in Spanish, has attempted to increase communication among Latin American seabird researchers. It is produced by the Pacific Seabird Group. If you wish to contribute to the ICBP Seabird Specialist Group, you may contact David Duffy at: Escuela de Ciencias Ambientales, Universidad Nacional, Heredia, Costa Rica, Central America.

## NEW ICBP LATIN AMERICAN REPRESENTATIVE

Montserrat Carbonell has recently resigned her post as ICBP/IWRB (International Waterfowl Research Bureau) representative due to other obligations. Charlie Luthin, chairman of the ICBP Stork, Ibis, Spoonbill Specialist Group has taken her place in the interim. While working for the Brehm Fonds in West Germany, he hosted a conference in Tabasco Province in Mexico aimed at conserving a large and important coastal wetlands there. He has also organized a conference on Scarlet Ibis in Venezuela for the coming spring. We hope that he will be responsive to seabird conservation needs. He will be stationed at Gainesville where he can be reached at: P. O Box 1369, Melrose, FL 32666.



## BIBLIOGRAPHIES

### PUGET SOUND ACCESS

The Puget Sound Institute and the University of Washington Libraries have worked together in a project known as the SOUND ACCESS in developing a computerized bibliographic database of literature, both scientific and grey, including physical and biological aspects of the environment, human impacts, political policy, and other subject areas. Further information about this database may be obtained from the Puget Sound Institute, College of Ocean and Fisheries, HA-40, University of Washington, Seattle, Washington 98195.

### REVIEW OF BIBLIOGRAPHIC SOFTWARE

While preparing the Puget Sound bibliographic database, Timothy Jewell and others reviewed 68 bibliographic software packages to determine the best one for their project. Their review of these software packages may be obtained from Thomas Moritz, Library, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118.

### SHOREBIRD BIBLIOGRAPHIES

Sven Blomqvist of the University of Stockholm has produced two shorebird bibliographies that are available from the Otenby Bird Observatory, P1. 1500, S-380 65 Degerhamn, Sweden. They are: (1) Bibliography of the genera *Caladris* and *Limicola*, with 1,364 references (\$7.00) and (2) Bibliography of the genus *Phalaropus*, with 394 references (\$4.00). The prices include surface postage; for air mail, add \$1.00; although not stated, this is \$1.00 presumably for each if ordering both.

## NEW PUBLICATIONS

### SEABIRDS OF ARUBA

van Halewyn, R. 1987. Marine Birds of Aruba. Research Institute for Nature Management, Arnhem, The Netherlands. 144 pp.

In 1984 and 1985, a joint Aruban-Dutch project was carried out to survey the seabirds of Aruba, Netherlands Antilles in the Caribbean, and to develop a conservation program. Terns are the most important nesting seabirds. Before 1970, only two species, Roseate and Bridled Terns (*Sterna dougallii* and *S. anaethetus*), bred there. The area has subsequently been colonized by Cayenne (*S. sanvicensis*), Common (*S. hirundo*), Sooty (*S. fuscata*), and Least (*S. albifrons*) Terns as well as Brown Noddies (*Anous stolidus*). The Cayenne Tern with a breeding population of 3,000 to 4,000 pairs is the most common. Fewer than 100 nests of any other species were counted. The largest oil refinery in the Caribbean, located on Aruba, posed minor threats of oil pollution, but the plant was closed in March, 1985. However, eggging by local fishermen cause severe disturbances to the birds.

In addition to the presentation of the surveys and conservation problems, the report includes a nice discussion of the general ornithology, including information on kelp parasitic relationships among the seabirds.

Malcolm C. Coulter

### FOUR BOOKS ON THE SEAS AROUND ALASKA

During the last few years, four books have been published that have dealt with the oceanography and the biological resources of the marine waters around Alaska. These are:

Barnes, P. W., D. M. Schell, and E. Reimnitz, eds. 1984. *The Alaskan Beaufort Sea*. Academic Press, New York.

This includes a chapter on pelagic and nearshore birds by G. Divoky and a chapter on shorebirds by P. Connors.

Hood, D. W., and J. A. Calder, eds. 1981. *The Eastern Bering Sea Shelf: Oceanography and Resources*. NOAA, Washington, D.C. Distributed by the University of Washington Press, Seattle. 2 Volumes.

The second volume includes chapters by G. Hunt and other authors on feeding ecology of seabirds, breeding distribution, and pelagic distribution, as well as a chapter on shorebirds (R. Gill and C. Handel) and one on birds at the ice-edge (G. Divoky).

Hood, D. W., and S. T. Zimmerman, eds. *The Gulf of Alaska*. NOAA, Washington, D.C. Available from the U.S. Government Printing Office at \$46.

This includes a chapter on marine birds by A. DeGange and G. Sanger.

Malcolm C. Coulter

## FRENCH SEABIRDS

Groupe de Travail sur les oiseaux marins. 1986. *Bilans et propositions de recherches*. Groupement d'Interet Scientifique oiseaux marins. 78 pp.

This contribution of the French Seabird Group includes surveys and status of the seabirds around France. Research interests as well as conservation needs are discussed. A brief summary of French holdings is also included. While little information is presented on these areas, it indicates areas where even basic survey information is needed.

Malcolm C. Coulter

## SEABIRDS IN THE NORTH SEA

Tasker, M. L., A. Webb, A. J. Hall, M. W. Pienkowski, and D. R. Langslow. 1987. *Seabirds in the North Sea*. The Nature Conservancy Council, Aberdeen, Scotland. 336 pp. (12 pounds sterling).

and

Tasker, M. L., and M. W. Pienkowski. 1987. *Vulnerable concentrations of birds in the North Sea*. The Nature Conservancy Council, Aberdeen, Scotland. 39 pp. (5 pounds sterling).

The Seabirds at Sea Team of the Nature Conservancy Council surveyed seabirds in the North Sea between 1979 and 1986 to determine where the birds were, the seasonality of their occurrences and to estimate the impact of possible oil pollution. These reports are the culmination of this enormous project. The first of these volumes includes a general description of the area, seabird biology and detailed species accounts, dealing largely with distribution at sea. The second volume contains a series of generalized maps by month with indications of major concentrations of seabirds.

During the study, more than 80% of the observations were of four species: Fulmars, Gannets, Kittiwakes and Murres. The most vulnerable species, Murres, Razorbills and Puffins usually feed within 20 km of their nesting areas during the breeding season but are widely dispersed at other times.

Malcolm C. Coulter

## NEWFOUNDLAND BIRDS

Now Available - *Newfoundland birds: Exploitation, Study and Conservation* (1987) by W. A. Montevecchi and L. M. Tuck at U.S. \$10.50 from the Nutall Ornithological Club, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138.

"Plastics in the Sea," a Special Issue of *Marine Pollution Bulletin* Vol. 18, Number 6B, June 1987. pp. 305-65.

This special issue is a compilation of 13 selected papers from the Sixth International Ocean Disposal Symposium that cover the entire scope of the plastic debris problem throughout the world's oceans. Individual papers address the sources, types, abundances and distribution of plastic at sea and the biological implications of this debris. Case studies of entanglement in plastic debris



and fishing gear and plastics ingestion are presented for Northern Fur Seals, California pinnipeds, Hawaiian seabirds, Gannets in the North Sea, seabirds off Newfoundland, and sea turtles. Two papers discuss possible legal strategies for international action to reduce plastic pollution from ships and land-based sources.

The combination of specific case studies containing important data and broad overview papers that summarize the data with a global perspective make this special issue particularly valuable. The case study by C. W. Fowler correlates population declines of Northern Fur Seals with strong evidence of entanglement in trawl net debris and plastic packing bands and identifies an immediate need for legislation and enforcement of regulations to halt the disposal of fishing gear and plastic trash in the north Pacific Ocean and Bering Sea. Similar documentation of seabird entanglement in active fishing gear off Newfoundland by Piatt and Nettleship gives data of the loss of more than 25,000 birds annually, with probable reductions in populations of Gannets, Razor-bills, and Common Murres.

The papers giving legal strategies for reducing plastic pollution largely suggest laws which could be implemented, rather than citing successful measures currently in force. Hopefully, the data presented in this symposium will be helpful in promulgating effective regulations.

Copies of this Special Issue are available from Pergamon Journals Inc., Maxwell House, Fairview Park, Elmsford, New York 10523, for \$14.00 plus \$2.00 postage and handling.

D. Michael Fry

Pratt, H. D., P. L. Brunner, and D. G. Berrett. 1987. *A Field Guide to the Birds of Hawaii and the Tropical Pacific*. Princeton University Press, Princeton, New Jersey. 409 pp. and 45 color plates. \$190.95 paperback; \$50.00 hardbound.

This work has been at least 10 years in the making but even impatient ornithologists, lingering for a complete field guide to the birds of the tropical Pacific, will be inclined to believe it was well worth the wait. Doug Pratt, Phil Bruner and Delwyn Berrett combined their extensive field experience and knowledge of the area, resulting in a major field guide encompassing most of the islands of the tropical Pacific and the adjacent open seas.

The illustrations by Dr. Pratt and their accompanying notes are the major focus of the text. All species of birds that have been recorded for this part of the Pacific (about 500) are included in the field guide. Most (about 400) are breeders, regular visitors or migrants to the islands, and these are illustrated in color and described in the species accounts. Some of the rarer visitors to the islands, as well as some of the extinct species, are also included in color plates and species accounts. The remaining species (about 100) are rare visitors or stragglers, and these are shown in black and white figures in the text or not illustrated at all. These species have abbreviated species accounts. For species included in the color plates, a variety of plumage types are often presented including adult, subadult, immature, juvenile, breeding and non-breeding plumages as well as color morphs. These color plates are excellent. Land birds are arranged by island groups to assist the field user while seabirds, waterbirds and shorebirds are in phylogenetic order. These color plates are very useful for most groups of birds but the lack of other than definitive plumages for waterfowl make this portion of limited value.

The field guide is prefaced by an introduction which includes sections "How to Use This Book," a description of the islands and their habitats and a section on conservation. The

introductory sections are very valuable background for an understanding of birds and their place in the island ecosystem. These sections are especially appropriate in meeting the stated objective of raising the environmental awareness of people concerning the tropical Pacific. This is critically needed as this area has a large portion of the world's extinctions, and many of these fragile island habitats remain threatened by man's activities.

The Conservation section of the Introduction includes a list of extinct birds and endangered and threatened birds of the tropical Pacific. The extinct bird list did not include reference to the Laysan honeycreeper and Laysan millerbird which became extinct on Laysan Island, Hawaii, at the turn of the century due to the devegetation of Laysan Island by intentionally introduced rabbits.

The body of the book includes the species accounts. Each account includes subheadings on appearance, habits, voice, identification and occurrence. A reference is given for many species to provide a source of additional information which may be useful to the reader. The species accounts are brief and well written. For the seabirds with which I am most familiar, there were a few errors in information presented on occurrence. For example, black-footed albatross are listed as breeding on Johnston Atoll but do not occur there. There were apparent inconsistencies in the presentation of occurrence information which lead to some confusion. In certain instances, such as in the black-footed albatross account, Kaula Island is correctly included as a breeding locality separately from the NW Hawaiian Islands where they also occur. Yet, in the Laysan albatross and Christmas shearwater account, Kaula Island is not listed as a breeding location though these species breed there. It is unclear whether this is an inconsistency in presentation or an error in the information on distribution. Further, it is difficult to determine whether or not distributional records are newly presented results of the authors' extensive field efforts or from prior references. For example, I know of no definitive records of Townsend's (Newell's) shearwater or Christmas shearwater breeding on Molokai, Hawaii, and a reference for these sightings would be difficult to obtain from the information as presented.

Taxonomy follows the Checklist of North American birds adopted by the American Ornithologists' Union (AOU) in 1983 with the 1985 Supplement and a number of revisions introduced here. The revisions presented here include Newell's (Townsend's) shearwater, Hawaiian (dark-rumped petrel) and Tristram's (sooty) storm-petrel. These revisions are reasonable for reasons succinctly stated and should be further considered by AOU.

Several worthwhile appendices follow the species accounts. These include a summary of hypothetical species, regional Checklists, regional maps, a glossary and a bibliography.

This book should be evaluated with regard to its intended purpose as a field guide. Its excellent color plates, organization and summary of information on species results in a guide to be appreciated by bird enthusiasts interested in this region. No longer will birders need to carry guides to birds of North America, Japan and, when available, individual island checklists when afield. This effort clearly fills this gap. Both the paperback and cloth-bound edition are clearly printed on quality paper. The size of the book allows it to be readily handled in its field. However, the binding (which all reviewers must mention) of the paperback edition has yet to pass the test of time in the field.

Publication of this field guide will not only greatly aid the birder but will hopefully serve to impart a conservation ethic and understanding throughout the Pacific. This field guide is highly recommended to anyone with an interest in birds of this region.

Stewart L. Fefer

## BULLETIN BOARD

### *Alcid request*

Alcids are needed as part of a study using stable-isotope analysis. I require frozen muscle and bone samples from a variety of alcids. Samples may be from adult or juvenile wild birds. I am particularly interested in obtaining material from workers who have collected birds as part of dietary investigations. For more information, please contact Keith A. Hobson, Dept. of Zoology, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2.

### *Chinese Seabird Research*

I have been in contact with Cheng Zhao-Qing who has been studying seabirds at Chenlushan Island in the Yellow Sea. He is anxious to correspond with other seabird researchers. If you are interested, you may contact him at: Dr. Cheng Zhao-Qing, East China Normal University, Shanghai 200062, Peoples Republic of China.--Malcolm Coulter

### *Colonial Waterbirds*

Have you seen these recent papers?

Diet studies of seabirds: a review of methods

Divorce in larids: a review

A review of Parent-offspring conflict and brood reduction in the Pelicaniformes

Nest site selection in Sooty Tern in Puerto Rico and Hawaii

Aspects of the ecology of the Blue-footed and Peruvian Boobies

Sexing fledglings and yearlings of Magellan Penguins by discriminant analysis of morphometric measurements

Trapping and color banding Brown Noddy and Bridled Tern adults at the breeding colony

A summary of alcid records from Hawaii

Range extension for the the Gray Backed Tern in the western Pacific

Nesting of the Masked Booby on the Dry Tortugas, Florida: the first record for the contiguous United States.

They have all appeared within the past year in *Colonial Waterbirds*. You can be sure not to miss such seabird literature by subscribing (\$25 to 563 Fairview Avenue, Ottawa, Canada K1M 0X4). The editors welcome submission of manuscripts for publication. Send them to: Dan Anderson (Dept. of Wildlife and Fisheries, U.C. Davis, 95616) or to Jim Kushlan (Dept. Biological Sciences, East Texas State University, Commerce, TX 75428).

### *Cormorant*

*Cormorant* is the journal of the African Seabird Group. It publishes papers dealing with seabirds of the whole southern hemisphere. All back numbers (volumes 1-14: 1976-87) are presently available at a price of U.S. \$10.00 per issue. However, a full set of 20 numbers may be obtained on payment of only U.S. \$100.00, including postage. If not already a member, you may also wish to join the African Seabird Group and receive *Cormorant* for 1988. Subscription for 1988 is U.S. \$15.00. One volume of *Cormorant*, made up normally of two numbers, is issued a year. Write to J. Cooper, African Seabird Group, c/o Percy FitzPatrick, Institute of African Ornithology, University of Cape Town, Rondebosch 7700, South Africa.

### *Dutch Seawatching Group*

The Dutch Seawatching group has been collecting extensive data on migration of seabirds along the Dutch coast since 1974. They are beginning to analyze the data and, so far, have examined the effects of weather factors on migration patterns. Unfortunately, the only information I have is in Dutch (which I don't understand). You can get additional information (in English) from: Jan E. den Ouden or Leen Stougie, CvZ, Daimantstraat 22, 1074 GD Amsterdam, Netherlands.

### *Oil Spill in Uruguay*

J. Carlos Gambarotta has recently reported evidence of an oil spill in La Laguna Jose Ignacio in Uruguay. Between October 12 and 16, he found oil on the beach under a superficial covering of sand. He has recorded up to 1,500 White-rumped Sandpipers, 500 Lesser Golden Plovers as well as lesser numbers of other species in this lagoon. He estimates that up to 4,000 shorebirds may visit the area at any one time. There is concern that the damage may be more widespread but undetected.

### *Oriental Bird Club*

The Oriental Bird Club, established over a year ago, has recently published its second issue of the *Forktail*. The PSG has requested exchange status with the Oriental Bird Club. To contact the organization, write to: The Oriental Bird Club, c/o The Lodge, Sandy, Bedfordshire, United Kingdom SG19 2DL.

### *Trumpeter Swan Society, 11th Conference*

The Trumpeter Swan Society held its 11th Conference in Everett, Washington, 3 - 6 February 1988. For further details on the meetings, contact: The Trumpeter Swan Society, 3800 County Road 24, Maple Plain, MN 55350; (612) 476 - 4663.

### *Volunteer field assistants needed at the Alaska Maritime National Wildlife Refuge*

Volunteer field assistants are needed for seabird monitoring at several sites on the Alaska Maritime N.W.R. Field work begins in mid-May to early June and extends through August. Duties include observing nest sites periodically to determine reproductive success, counting birds on plots to determine population trends, banding birds to determine adult survival, and observing birds at sea to determine pelagic distribution. Locations of work include the following island groups: Aleutians, Pribilofs, Shumagins, Barrens, and other islands in south central Alaska. Housing, food, and transportation will be provided. For positions in the Aleutians, call (907) 592-2406 or write U.S. Fish and Wildlife Service, Box 5251, FPO Seattle 98791. For other positions, send letter and resume to Refuge Manager, Alaska Maritime NWR, 202 Pioneer Ave., Homer, AK 99603.

*Wanted - books and journals*

Our hosts for the 1986 PSG meeting, Dr. Juan R. Guzman and the Universidad Autonomia de Baja California, would greatly appreciate having for their library any extra copies of duplicates of your own or agency reports and publications dealing with marine biology in general and marine ornithology in particular. Any science reference books or back issues of journals you no longer want or have shelf space for would also be appreciated. Small shipments can be sent directly to Dr. Guzman (Departamento Biologica Marina, Apartado Postal 219-B, La Paz, B.C.S., Mexico) or to Dr. Charles T. Collins (Department of Biology, California State University, Long Beach, CA 90840) who will arrange surface transport to La Paz. Larger shipments should be sent via Dr. Collins.

**1st International  
Conference on Penguins**

**16-19 August 1988 — Dunedin, N.Z.**

*Current research and recent developments*

**For further information please write to:**



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