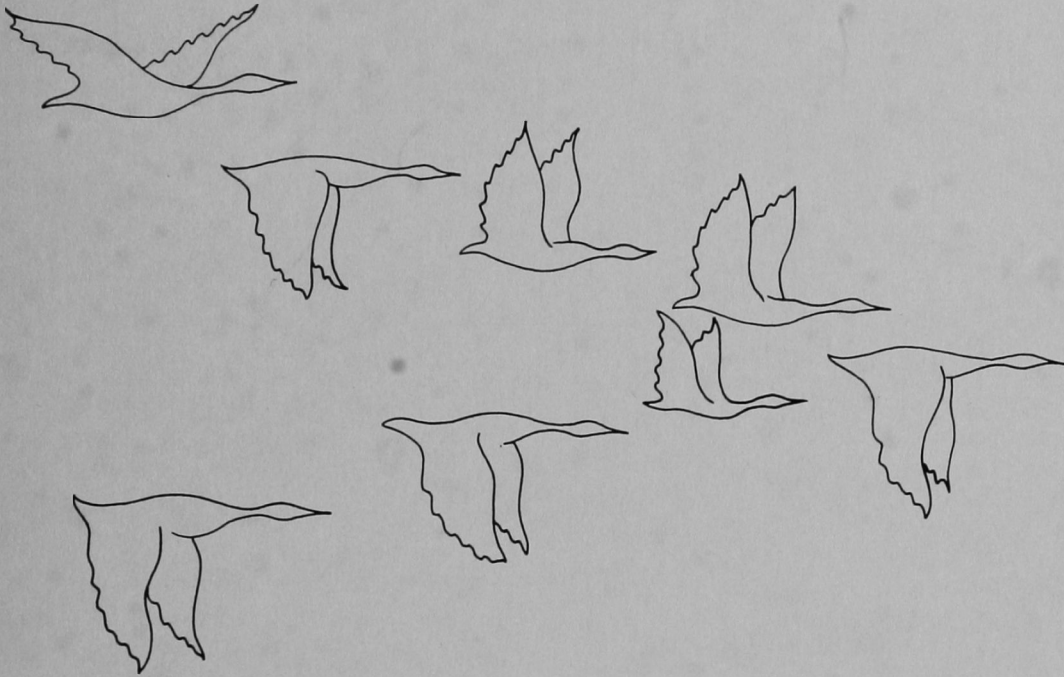


Annual Review
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ANNUAL REVIEW

1987-88

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CANADIAN WILDLIFE SERVICE

The Canadian Wildlife Service (CWS) is part of Environment Canada, a federal department, and is responsible for the protection and management of migratory birds through development of regulations, habitat management, and supporting research and surveys. With the provinces and territories, the Service undertakes programs of research and management related to other wildlife where there is a national interest and advises other federal agencies on wildlife matters. CWS participates in international agreements and programs on wildlife conservation.

Administratively, CWS is organized into a Headquarters office in Hull, Québec, and five regional offices: Atlantic (Sackville, New Brunswick); Québec (Sainte-Foy); Ontario (Ottawa); Western and Northern (Edmonton, Alberta); and Pacific and Yukon (Delta, British Columbia).

TABLE OF CONTENTS

Page

MIGRATORY BIRDS CONSERVATION

North American Waterfowl Management Plan	1
Waterfowl Populations	2
Habitat Management	2
Whooping Crane Recovery Program	3
Comprehensive Native Land Claims	3
Protocol to Amend the Migratory Birds Convention	4
Latin American Program	4
Wildlife Habitat Canada	4
Regional Activities	
Atlantic Region	5
Quebec Region	10
Ontario Region	16
Western and Northern Region	23
Pacific and Yukon Region	30

WILDLIFE RESEARCH AND CONSERVATION

Headquarters	
Porcupine Caribou Herd Agreement	36
Regional Activities	
Quebec Region	36
Western and Northern Region	37
Pacific and Yukon Region	39

TOXIC CHEMICALS

Headquarters	41
Regional Activities	
Atlantic Region	45
Quebec Region	45
Ontario Region	45
Western and Northern Region	46
Pacific and Yukon Region	47

	Page
LONG-RANGE TRANSPORT OF AIRBORNE POLLUTANTS (LRTAP)	48
Regional Activities	
Atlantic Region	50
Ontario Region	50
National Wildlife Research Centre	51

MANAGEMENT AND ADMINISTRATION

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	52
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)	54
Canadian Council on Ecological Areas (CCEA)	54
Humane Trapping	55
Scientific and Technical Publications	55
Socio-economic Insights and Advice	56
Wildlife '87	57

MIGRATORY BIRDS CONSERVATION

In 1987-88 the Migratory Birds Program consisted of about 200 person-years nationally with an operating budget of \$3.5 million. This accounted for more than half of total CWS resources across the country. The program is directed toward the management and protection of migratory bird species and involves the establishment and enforcement of regulations under the Migratory Birds Convention Act and Canada Wildlife Act, habitat management and protection, population monitoring and surveys, environmental impact assessment, native land claims, and international liaison.

North American Waterfowl Management Plan

Implementation of the NAWMP has been a primary focus of the Migratory Birds and Wildlife Conservation Branch during 1987-88. A number of joint ventures and initial projects have been initiated in cooperation with the United States, Provinces and Territories, and several private conservation organizations.

The first-step project was launched at Quill Lakes, Saskatchewan in cooperation with the Province, Ducks Unlimited Canada, Wildlife Habitat Canada and several U.S. funding sources. The project is designed to conserve and enhance upland nesting habitat for ducks around significant wetlands near Quill Lakes. The first-step project is intended to build momentum toward implementation of the \$1 Billion Prairie Habitat Joint Venture called for under the Plan. The Quill Lakes Project is a one-time "good faith" venture, cost-shared 50:50 between Canadian and U.S. funding sources.

The groundwork is currently being put in place for the implementation of the full Prairie Habitat Joint Venture. Several potential funding sources and planning documents are being investigated.

The Black Duck Joint Venture called for under the NAWMP has also been implemented. A strategic plan has been drawn up and several aspects of the monitoring and research program for Black Ducks are under way.

An Eastern Habitat Joint Venture was initiated this year to conserve and protect wetland habitats in eastern Canada outlined in the Plan. Cooperative arrangements among funding sources in Canada and the U.S. have been established and several sites have tentatively been selected for habitat securement.

The Arctic Goose Joint Venture planning group has met and in cooperation with the NAWMP Committee has developed an approach to implementing this venture under the Plan. Work on marking geese in the western arctic commenced last year and birds were followed south by teams of observers over winter.

Waterfowl Populations

The situation for most North American waterfowl populations did not significantly improve in 1987 compared to a recent string of poor years. Prairie habitat conditions improved marginally but the impact of farming practices on breeding ducks continues. Prairie Mallard populations improved slightly in 1987 but not enough to remove current restrictive hunting regulations. Drought appears to be returning, as much less than normal snowfall has been recorded throughout key prairie nesting habitat. Unless significant precipitation is received by spring 1988, continental waterfowl populations will continue to decline.

Black Duck winter inventory figures declined in 1987, hence restrictive hunting regulations established in 1984 were continued. Mallards hybridizing with Black Ducks was identified as a major factor in the decline of Black Ducks in the western part of the Canadian breeding range.

On a positive note, breeding populations of Mallards reached an all-time high in Ontario, making this province a key producer for eastern Canada and the Mississippi and Atlantic Flyways. Populations of several species of geese continue to expand; coupled with changing migration patterns, geese continue to provide new and exciting opportunities for viewing and harvest.

Habitat Management

The twenty-ninth Ramsar site, Southern Bight-Minas Basin, Nova Scotia, was deposited in IUCN's Conservation Monitoring Centre for inclusion in the List of Wetlands of International Importance. The area is a major staging area for shorebirds. The Area Advisory Committee for the development of a management plan for Polar Bear Pass has been appointed. It will draft a management plan for review by all interested departments.

The establishment of three new Migratory Bird Sanctuaries in NWT initiated in early 1987 is expected to be completed by 1988. The areas are major seabird colonies at Prince Leopold Island, Cape Searle and Reid Bay.

Wildlife Habitat Canada has provided financial support to Environment Canada to acquire properties for the completion of the Portobello National Wildlife Area in New Brunswick. The first acquisition was completed this year.

The Wetland Mapping and Designation Program saw the completion of the mapping and rating of all inland and coastal wetlands in New Brunswick. The data will be used in the design of waterfowl surveys, by land-use planners, and by environmental consultants. Land-use agreements based on the wetland data accumulated in all three Maritime Provinces will be negotiated in 1987. The program will be expanded to include the western

one-third of Newfoundland. On the Prairies the first year of a three-year prairie pothole monitoring project was completed. The data will be used during the implementation of the North American Waterfowl Management Plan.

His Royal Highness, Prince Philip witnessed the signing of an agreement with the Province of Saskatchewan for the transfer of provincial lands and the completion of the Last Mountain Lake land assembly. The area will be declared a National Wildlife Area in 1988.

The Prairies experienced another bad year for crop damage by waterfowl. Prolonged cold wet weather in the fall resulted in swathed grain being left in the fields well into October, subject to damage by migrating waterfowl. Negotiations are being carried out with the three prairie provinces to renew the five-year Crop Damage Prevention Program.

Whooping Crane Recovery Program

Canada and the U.S. signed a Memorandum of Understanding in April, 1985 to ensure international coordination and cooperation in efforts to restore populations of the Whooping Crane. Canadian and U.S. program coordinators were appointed and are members of recovery teams in both countries. Canadian and U.S. Recovery Plans have been completed and approved.

As of January 1988, the world population of Whooping Cranes in the wild and captivity now numbers 194, up from the 45 which existed in 1963 when the present program began. Of these about 132 are in the Wood Buffalo - Texas population, about 20 in the Grays Lake population and about 42 are in captivity.

Operational portions of both recovery plans have largely been implemented and plans are being developed to begin an investigation of the possibility of creating a flock of migrating cranes in northern Ontario by 1995.

Comprehensive Native Land Claims

CWS continued to play an active role in native land claims. Issues of special interest are native harvesting rights, environmental protection, conservation area establishment and management, and native participation in renewable resource management. In 1987, CWS attended caucus and negotiation sessions for the Tungavik Federation of Nunavut and Dene/Métis claims in the Northwest Territories, and also provided input for claims in Quebec, Newfoundland (Labrador), British Columbia and the Yukon.

Implementation of the Western Arctic Claim (COPE), finalized in 1984, has proceeded somewhat more slowly than expected, but the various Boards and Committees established by the Claim are beginning to function well.

CWS continues to be involved in the implementation of the James Bay and Northern Quebec Agreement.

Protocol to Amend the Migratory Birds Convention

A Protocol to amend the subsistence hunting provisions of the Migratory Birds Convention was signed by Canada and the U.S. in 1979. However, it has not been ratified yet by the U.S. A discussion paper on an additional agreement between the two countries to spell out details of how the Protocol will be implemented is being prepared.

Latin American Program

Projects funded in 1987 included a study of Snow Geese wintering in Mexico (a project which will assist the Arctic goose joint venture of the North American Waterfowl Management Plan), an ecological survey of aquatic birds and wetlands in the Dominican Republic, and a bird banding training mission in Cuba funded by the LAP, Long Point Bird Observatory and the World Wildlife Fund Canada.

The final collections for toxic chemical analysis of prey species of Peregrine Falcons took place in Mexico. The write-up of this multi-year and multi-country collaborative project is under way now. The data will be published in a special issue of The Canadian Field-Naturalist devoted to the Peregrine Falcon.

Work continued on the production of the South American Shorebird Atlas; publication is expected by mid-summer.

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Wildlife Habitat Canada

The Wildlife Habitat Conservation Stamp for 1987 was taken from an original work by George McLean. It is entitled "On the Wing-Canada Geese". Purchase of the \$6.50 stamp was required with each Migratory Game Bird Hunting Permit, to be affixed to each licence.

Prints of the original painting were also available for purchase.

Artwork for the 1988 Stamp was prepared by Robert Bateman. It shows two male Pintail ducks in the spring.

Wildlife Habitat Canada has, since the fall of 1984, contributed more than \$14 million towards the conservation of essential wildlife habitat.

Regional Activities

Atlantic Region

Regulations and Enforcement

Illegal spring hunting of waterfowl in New Brunswick was markedly less than in recent years, following suspension by the province of use of the provincial general hunting licence in coastal areas during the spring migration period.

Through the cooperation of the Nova Scotia Department of Lands and Forests, a temporary warden was assigned to migratory bird enforcement duties in the Port Joli area during the latter part of the waterfowl hunting season. The additional presence thus effected had a salutary effect on local compliance, and several charges were also laid. During the same period, a combined operation involving enforcement personnel from several agencies was successful in apprehending some persistent violators in the Cole Harbour-Jeddore area. Charges of night hunting for geese were upheld, and subsequent fines and forfeitures totalled about \$5,000. Temporary shifts of CWS enforcement personnel between provinces contributed to this successful operation as well as to other initiatives.

Following extensive consultation, involving hunters, governments and NGOs, action to improve management of the Newfoundland turr hunt moved into the regulatory arena. Discussions were begun with the U.S. Fish and Wildlife Service with the intent to have murrees declared as migratory game birds under the Migratory Birds Convention.

Enquiries from the public led to extensive reviews of regulations governing waterfowl hunting in Newfoundland, woodcock hunting in the Maritimes, and the holding of migratory birds under aviculture permits.

A permit system to regulate visitor access to Machias Seal Island Migratory Bird Sanctuary was introduced in 1987, and achieved the desired control with minimal problems.

Special regulations designed to improve the quality of hunting experienced at Wallace Bay National Wildlife Area, N.S., were introduced, the first time this has been attempted in the Region. Public response was favourable.

Habitat Protection and Management

New sites listed as wetlands of international importance under the Ramsar convention were

- Grand Codroy Estuary - Newfoundland (declaration was a Wildlife '87 event)
- Musquodoboit Harbour - N.S.
- Southern Bight Minas Basin - N.S.
- Shepody Bay - N.B.

The Mary's Point Section of Shepody National Wildlife Area and the Shepody Bay Ramsar site were declared as Canada's first site in the Western Hemisphere Shorebird Reserve Network (a Wildlife '87 event).

Additional parcels of land were purchased at Portobello Creek, New Brunswick through funding from Wildlife Habitat Canada (WHC). The Portobello area is being established as New Brunswick's fifth National Wildlife Area.

CWS participated on WHC review committees, and the Region is a partner in the WHC Wetland Protection and Enhancement Project on Prince Edward Island.

National Wildlife Areas were administered and managed with emphasis on wetland impoundments and monitoring the results of previous management techniques. New management plans were prepared for Sand Pond and Margaree Island National Wildlife Areas and plans were updated for other sites.

The Maritimes Wetlands Inventory was completed and the computer-stored data-base reviewed, updated and made fully operational. A workshop was held promoting the use of the maps and electronic data-bases.

A pilot wetland research project was undertaken in northern Nova Scotia studying parameters that most influence waterfowl production. This work should prove useful on a wide scale in adjusting the wetlands evaluation scoring scheme (Golet) to better reflect waterfowl production.

Sampling transects for eelgrass were established in southern Nova Scotia locations to assess any cyclic or drastic changes in eelgrass densities.

Environmental Assessment

CWS participated in the Environmental Protection Working Group on the Northumberland Strait Crossing Project, by providing resource data and reviewing consultants reports. The working group recently completed a review of the draft Initial Environmental Evaluation.

Population Monitoring and Surveys

Black Duck breeding pair surveys were conducted in all four provinces in 1987; all of these except P.E.I. were helicopter surveys. Funding for the aerial surveys came through the Black Duck Joint Venture. The Newfoundland survey used 10 km x 10 km plots, rather than the 5 km x 5 km plots used in N.B. and N.S., to minimize the number on which no Black Ducks were found. The P.E.I. ground surveys in spring and summer (4 coverages) were continued for the 5th year, with collaboration by provincial wildlife personnel.

A collection of papers on waterfowl population surveys in the Region, integrated over an historical perspective towards a regional population model, was published in 1987 as CWS Occasional Paper no. 60.

Operational waterfowl banding, with major support from the Atlantic Flyway cooperative banding fund, continued, with over 4000 birds banded in 1987, including 1700 Black Ducks. Captures of Black Ducks were low at several stations, possibly because of low water levels.

Analysis of sea duck harvest data obtained in Newfoundland by two independent methods confirmed earlier suspicions that the National Harvest Survey questionnaire approach greatly underestimates the kill for that group and area.

Operational surveys for monitoring populations and harvest of woodcock were maintained. The spring singing-ground counts were coordinated with the U.S. Fish & Wildlife Service, and with provincial wildlife agencies (including Ontario), and with CWS-Quebec Region. Efforts to assess harvest per unit effort were increased in 1987.

Banding of Thick-billed Murres at arctic colonies was continued, with about 4000 chicks banded at Coats and Coburg Islands. Monitoring of seabird (murre, fulmar, kittiwake) numbers on permanent plots was effected at Prince Leopold Island, in collaboration with CWS-HQ and CWS-W&NR personnel.

A new trapping method for migrating shorebirds was devised, with 5000 sandpipers banded in 1987 - double the previous best year's catch with less effort expended. A publication is in preparation, and the method has already been used successfully elsewhere.

Aerial surveys and ground-checking of Nova Scotia gull colonies was carried out in 1987. Reports on similar surveys in P.E.I. and eastern N.B. in 1986 were completed.

Data collection and screening for the Maritimes Breeding Bird Atlas continued at an accelerated rate, despite shortage of funding to maintain the coordinator's position. Much effort is needed to keep up the volunteer effort and to ensure uniform coverage of remote areas. At least 868 data cards comprising 20,334 records were received in 1987 from 434 observers.

The Maritimes Nest Records Scheme was coordinated and a report prepared and sent out to all contributors. Contributions were near average, with 1361 cards received. The 108 cooperators were the 3rd largest number in 28 years, but nearly all observers turned in fewer records than in 1986; the unusually dry summer was suggested as a possible cause.

Research

A study of Black Duck movements and mortality between fledging and migration was undertaken, using radio-telemetry, at the Shepody NWA, N.B. Movements through August and September were minimal, and losses in that period were mostly attributed to Great Horned Owls. Of 45 birds surviving to the start of hunting season, at least 20 were lost in the next month as retrieved or unretrieved (by the hunter) kill. Unexpectedly, two more were retrieved, with radios attached but no longer transmitting, in December in southwestern Nova Scotia. The experiment will be repeated in 1988, to increase the samples and to assess inter-year variation.

A study of the relative importance of coastal and inland habitats to breeding Black Ducks in Nova Scotia was carried out under contract by a university researcher, using Black Duck Joint Venture funding. Movement along rivers to coastal brood-rearing areas was less than anticipated, despite the dry summer.

Data and specimen collections for the study of eider bioenergetics in the lower Bay of Fundy were completed in April-June, and processing continued to year-end. Surveys of eider numbers and reproduction in southwestern New Brunswick suggested that heavy local predation of eider ducklings by gulls at inshore islands, as observed in each of the last four years, may not be representative of the N.B. population as a whole.

Development of a computerized registry for seabird breeding colony data moved through the design phase into experimental input. Testing of input and output using one discrete data-set is under way, and major input should begin in 1988.

A number of manuscripts based on past seabird work progressed to publication, acceptance, or submission stages during the year, some of which were already mentioned last year. Others included MSS on ecology of Dovekies wintering off Atlantic Canada, on wing-moult of fulmars and shearwaters, on breeding of kittiwakes in Labrador, and on foods of murrelets wintering off Newfoundland.

A model for simulating trends of Thick-billed Murre populations was developed, and is being refined. Initial runs suggest declining numbers, but this could change when real data for some parameters are substituted for the guesses used in the first approximations.

Bird Problem Mitigation

A gull management strategy for the Atlantic Provinces was drafted and is being revised for public consultation. Gulls are perceived as nuisance birds in Newfoundland, but cause only occasional and local complaints in the Maritimes. Their impacts on other birds may be more serious.

Information was assembled on the scale of sea duck threats to commercial mussel growers in the Maritimes, and efforts to bring other government agencies to recognize the potential conflict were continued.

Rare and Endangered Species

A display on rare and endangered species was assembled, and opened to the public by the Minister, at P.E.I. National Park (as a Wildlife '87 event). It has been displayed in various locations since that time.

With financial support from World Wildlife Fund Canada, through Mount Allison University, and with collaboration by Fundy National Park and N.S. Dept. of Lands & Forests, the CWS-AR continued the "mass hack" of young Peregrine Falcons to re-establish the species in the Maritimes. In all, 29 birds were released at 4 sites in 1987. The return of mature birds released in earlier years to the vicinity of former hack sites necessitated relocation of 2 operations, although none of the returned birds actually bred in 1987. Opening of the site at Blomidon Provincial Park, N.S. was featured as a Wildlife '87 event.

World Wildlife Fund also assisted CWS, the provincial wildlife agency, and the Newfoundland Natural History Society in a survey of the coast of Labrador between Nachvak and Nain for evidence of breeding Peregrine Falcons and Harlequin Ducks. Several breeding records of both species were obtained, but a high incidence of apparent non-breeding by Harlequins was noted. CWS has assembled information on the status of the eastern population of Harlequin Ducks to determine if this stock, legally hunted until now, should be designated as vulnerable.

CWS collaborated with other agencies and NGOs for a re-survey of breeding areas of the Piping Plover, now designated as an endangered species. Preliminary figures suggest a total of about 225 pairs, slightly below the estimate in 1983.

Quebec Region

Population Management

Seabirds

For the past few years the populations of some species of seabirds have continued to decline along the North Shore. CWS has therefore completely reorganized and redeployed its enforcement team on the Lower North Shore to concentrate on the Sainte-Marie Islands and Blanc-Sablon area.

CWS negotiated and entered into working agreements with the Quebec-Labrador Foundation (QLF) and the Wildlife and Cultural Society of Harrington Harbour. CWS held a joint exhibition with QLF based on CWS's educational program, "If I could only be a seabird", which was presented as a theatre play performed by children from the North Shore area. This seemed to be a very effective means of reaching parents. QLF received funding from Wildlife Habitat Canada and assistance from CWS to produce a small brochure to encourage North Shore residents to protect their local heritage, seabirds.

To strengthen enforcement, CWS also signed agreements with the Canadian Parks Service (CPS) and officers from Fisheries and Oceans Canada for the implementation of the Migratory Birds Convention Act during their regular patrols.

The Quebec Region participated in the National Seabird Surveillance and Bio-monitoring Program by organizing a special expedition to Akpatok Island in Ungava Bay to count Thick-billed Murres and measure their productivity.

CWS continued its Razorbill marking program along the North Shore. This program will be reinforced next year, as the 13th quinquennial seabirds inventory is undertaken in all migratory bird sanctuaries of the North Shore.

Terrestrial Birds

The 4th year of the Quebec Breeding Bird Atlas project was very successful, and the number of volunteers increased again this year. A few species were added to the list of birds nesting in Quebec, the Turkey Vulture, the Common Black-headed Gull, Cooper's Hawk and the Wild Turkey. This project in which about a thousand volunteers participated led CWS to raise fundamental questions regarding volunteers and participating private groups. The Quebec Region contributed significantly to the development of a Conservation and Protection national policy which should be ready before spring migration.

Game Birds

Common Eiders

Canadian and American specialists held a colloquium to review the status of different populations of Common Eiders and to define the steps necessary for the management of this species. Two precise measures were identified: a marking project for northern and estuarine populations in 1989 and a repetition of inventories in northern colonies, especially in Ungava Bay.

We have also carried out in the summer of 1987 in Ungava Bay an eider marking project under a contract with the Makivik Society.

During the last field season a study on the utilization of shallow waters in the Mingan Park Reserve was completed. This research project was an unsolicited proposal from Laval University, to be carried out jointly with CPS.

Nesting populations are at a very low level on the North Shore. CWS undertook negotiations with the Montagnais of La Romaine to launch a pilot project to augment this population which is under strong hunting pressure.

Black Ducks

The continuation of the Black Duck inventory in the boreal forest for a 4th year of a five-year project has permitted CWS in the Quebec Region to improve its inventory technique developed at the beginning of the project.

Black Ducks and Mallards were marked at nine banding stations covering their main production zones. Two of these stations were operated in cooperation with the ministère du Loisir, de la Chasse et de la Pêche (MLCP).

Snow Geese

The monitoring of the spring population took place in very difficult conditions because flocks were spread along a very long section of the St. Lawrence River. At least 283,500 birds were counted in the estuary. The recruitment rate of 37% in the fall indicated a total fall population of more than 400,000 birds.

An exchange of biologists between the Quebec Region and the Pacific and Yukon Region allowed each region to benefit from each other's knowledge and expertise on Brant winter migration along the West Coast and on the winter inventories of Ducks in the estuary. A bioenergetic study and an

investigation of the level of contamination of these species are being conducted and will provide very valuable indications on the probable degradation of the estuarine environment.

American Woodcock

A working group made up of woodcock hunters and CWS members was formed to better evaluate the status of the population of this species which seems to be declining in certain parts of its range. A questionnaire specifically designed to assess hunting pressure and changes in the traditional habitat of this bird was prepared and sent to woodcock hunting clubs.

Shorebirds

A data gathering and inventory system, similar to the one established for the Breeding Bird Atlas, was inaugurated to identify zones and periods of concentration and passage of shorebirds through Quebec. Given the enthusiasm of participants and preliminary data gathered this year, very good results are expected from this inventory.

Bird Problems

Only 14 complaints were received this year, all of them having to do either with crop damage by Snow Geese in Montmagny or pollution of beaches and water intakes, mistakenly thought to have been caused by Ring-billed Gulls.

Relations with Native Groups

James Bay and Northern Quebec Agreement

Native people had two main concerns: they raised the problem of birds marked with collars and the changes in the last few years in the migratory movements of Snow Geese and Canada Geese along James Bay. Discussions are currently going on with native people for the development of relevant projects to deal with these preoccupations.

Negotiations with the Conseil Attikamek - Montagnais (CAM)

Technical support and advice were provided to the federal negotiator on numerous occasions for the development of a framework agreement. A pilot project has been discussed with CAM to increase the productivity of eiders in the La Romaine area (Lower North Shore). If accepted, this project would have in the mid-term minor but not inconsiderable economic benefits for this village.

Habitat

The Atlas of priority areas for protection along the St. Lawrence, an exhaustive document identifying areas of importance for migratory birds, will be shortly released at a workshop organized to sensitize municipalities along the river and the gulf, various environmental consultants and interest groups to the conservation of habitats and encourage their participation.

Further to the adoption this year of a national policy on oiled birds, the Quebec Region developed an emergency intervention plan in case of oil spills and a network of intervention points along the river and in the Gulf of St. Lawrence. The action plan involves the participation of volunteers, MLCP, and of CPS in Forillon and Mingan. A demonstration of techniques to scare birds away from dangerous areas was given in the first intervention centre set up in Cap Tourmente NWA.

On the same occasion, in the context of a broad simulation exercise coordinated by the Coast Guard, CWS presented a workshop aimed at showing to the different groups of the network the methods used to clean oiled birds. A video-cassette on this workshop is being prepared and will serve as reference material for the intervention groups.

The Quebec Region participated actively in the development of a national policy on wetlands, particularly during recent consultations held in Sainte-Foy.

1987 was marked with several prestigious events which highlighted this special year dedicated to wildlife conservation in Canada.

CWS in the Quebec Region decided to make better known the significance of the Ramsar Convention to the public. Two NWAs were designated last spring as wetlands of international importance under this convention. Under a provincial agreement, large stretches of protected wetlands were added to the territories already included in the two NWAs. Well-publicized celebrations contributed to the success of Wildlife '87: a commemorative plaque was unveiled at baie de L'Isle-Verte NWA in July, in addition to participating in an exhibition in cooperation with la Société de conservation de la baie de L'Isle-Verte; in September a similar ceremony was held in Valleyfield, the city nearest to lac Saint-François NWA, with the participation of MPs, municipal representatives, conservation groups and CWS.

But the event that attracted the most public attention and media coverage was undoubtedly the presence of the Duke of Edinburgh at Cap Tourmente NWA on October 22. Several ministers, including the Honourable Tom McMillan, MPs and representatives of the Department of the Environment and of several provincial departments joined the leaders of the main conservation groups of the country to unveil a plaque highlighting the Ramsar status conferred on the Cap Tourmente NWA in 1981, when the Convention was signed by Canada.

The Duke of Edinburgh contributed a great deal to this event by agreeing to inaugurate a new ten meter high observation tower erected jointly by the Soci  t   linn  enne and CWS.

The Soci  t   which manages interpretation activities in the reserve since 1985 saw the number of visitors reach 68,200 this year.

Still at Cap Tourmente, the controlled hunt was very much appreciated this year; geese were abundant on the mudflats and in the fields; thanks to the good reproduction rate in the North, the young represented 37% of the fall flight.

CWS/Canadian Parks Service Pilot Project

This project was launched in the Quebec Region. Its purpose is to better publicize services offered to the public in Environment Canada's NWAs and national parks. A very interesting part of this project is a joint effort by Cap Tourmente NWA and La Mauricie National Park to make their activities and natural history better known to visitors.

Endangered and Threatened Species

Peregrine Falcon

For the second consecutive year CWS and the Fondation pour la sauvegarde des esp  ces menac  es (FOSEM) organized a joint release of young falcons, this time from the top of the Price Building in the heart of Old Quebec. Quebec City's contribution and technical support to this project as owner of the building were quite appreciated. Operation Faucon P  lerin '87 was a great success. Thanks to the good location of the site chosen for the release, the young falcons could be seen by the very large audience attending the Quebec festival. The main performing stage was just across from the Price Building. Coverage by electronic media was excellent: more than 40 interviews were held on the subject of the release of six falcons in the summer.

A pair of adults attempted to nest in Sainte-Foy, near the river, but without success. The male was not banded and the female originated from a release organized in Toronto in 1984. Elsewhere in Quebec two successful nests were reported and three pairs established territories.

To top the celebration of this year dedicated to wildlife conservation in Canada, the Service presented the Jardin zoologique du Qu  bec with two Peregrine Falcons on the occasion of the magnificent exhibition on diurnal and nocturnal raptors entitled "Chouette alors" organized by the Parks Service. These birds will complete their collection and contribute to a better appreciation by the public of this remarkable species.

Piping Plover

The regional Piping Plover Rehabilitation Plan will be completed shortly. It will be possible to implement some elements of this plan next summer. Thirty-seven nesting pairs of this species were inventoried in 1987 on the entire territory of Îles de la Madeleine thanks to a joint project with the Province of Quebec Society for the Protection of Birds (PQSPB), l'Association québécoise des groupes d'ornithologues (AQGO) and CWS.

Loggerhead Shrike

Only one pair of this species currently listed as "threatened" since 1986 was confirmed nesting in 1987. Following the intervention of a volunteer participating in the preparation of the Breeding Bird Atlas, the Service sent a letter to the owner of the site where the nest was found, asking him to conserve his hawthorns which he was planning to chop down.

Ontario Region

Waterfowl Surveys and Research

Waterfowl, Southwestern Ontario

Aerial surveys were conducted during the spring and autumn migration periods to assess the effects of low water levels and habitat management on waterfowl use of the Long Point/Turkey Point marsh complex. The surveys section also completed the Ontario portion of the Continental Canvasback survey and coordinated the Ontario field portion of the national parts survey. Ground surveys of 349 breeding waterfowl plots were completed. These plots have been surveyed regularly since 1971. Results showed Mallards to be at an all time high while once again Black Ducks were at an all time low. A progress note entitled "Breeding waterfowl surveys in Southern Ontario 1971 to 1987" was completed to illustrate population trends in various waterfowl species.

Black Duck research projects continued in cooperation with the University of Western Ontario. The study of relative condition of Mallards and Black Ducks during autumn was completed by a U.W.O. graduate student. Results showed that generally Mallards are in better condition than Black Ducks. Mallard-Black Duck mate choice studies continued at Lake St. Clair. Papers entitled "Social experience influences mate preferences of Black Ducks and Mallards" and "The influence of male dominance on pairing behaviour in Black Ducks and Mallards" were prepared from the work done at the St. Clair National Wildlife Area and were accepted by the Journal of Animal Behaviour.

A new record number of waterfowl (2,069) was banded by the surveys section at National Wildlife Areas and inland production areas despite the record drought. Results of such banding will enable relative survival rate analysis for production versus staging areas. In addition, banding and blood sampling of waterfowl for relative lead levels will permit a determination of the effects of lead ingestion on the birds' long-term survival.

Gizzards were analyzed for lead ingestion from approximately 400 birds from the Napanee vicinity.

Waterfowl, Northern Ontario

A special survey area was established over a 120,000 km² block of northeastern Ontario in order to monitor the population trend of Black Ducks there during a period of restrictive hunting regulations; these special limits have been instituted in response to the general long-term decline in Black Duck numbers noted on the wintering grounds. Helicopter surveys of 314 survey plots (2X2 km each) during early May (the nest initiation period for the species) revealed a moderately high breeding density (up to 38 pairs/100 km²). Approximately half of this area had

been surveyed in 1985 and comparison of results revealed a significant increase in Black Duck breeding density over that time. The Mallard population also appeared to be increasing, particularly in the southern and western sections of the block. All other species of waterfowl plus Common Loon were recorded during the survey which will be repeated every year for the next four years.

As part of the ongoing assessment of the distribution of breeding waterfowl throughout northern Ontario, helicopter surveys of four blocks (approximately 25-2X2 km plots each) were completed in the eastern Hudson Bay Lowlands, thus extending coverage up to the Winisk area. Waterfowl breeding densities were generally low inland, increasing nearer the coast. The block of sub-arctic tundra at Cape Henrietta Maria held the highest overall density of waterfowl yet recorded in northern Ontario (492 pairs/100 km²). Three survey blocks remain in the northwest of the Province to complete coverage both of the Lowlands and of northern Ontario in general. Logistic assistance for this work has been provided by the Ontario Ministry of Natural Resources.

Waterfowl, Eastern Ontario

The first year of a two-year investigation into the staging of diving ducks, primarily Greater and Lesser Scaup along the Prince Edward County shore of Lake Ontario was completed. Stomach contents were analyzed from a large sample of these ducks killed in fishermen's nets. As well, ground observations were undertaken to determine feeding sites and activity patterns of the birds. The distributions along the near shore of various benthic prey species were surveyed.

Survey staff also participated in the Continental Canvasback Survey, the Mid-December Canada Goose Survey and the Mid-winter Waterfowl Survey, the latter two in cooperation with the Ontario Ministry of Natural Resources.

Shorebirds

The manuscript of the "Atlas of Distribution of Nearctic Shorebirds on the Coast of South America" was completed and reviewed, and production of the volume started. The 674-page manuscript summarized results of the five-year program of surveys undertaken between 1982 and 1986 to determine the major areas used by Nearctic shorebirds on their 'wintering' grounds on the coast of South America, and included extensive information on the habitats and geomorphology of the coastlines of the continent. The Atlas will serve as a major resource document for governments and non-government agencies concerned with conservation of critical coastal wildlife habitats in the Western Hemisphere.

Fieldwork to identify key shorebird areas in Brazil continued with aerial surveys of the north-central coast in May and the Araguaia River wetlands on the Ilha Bananal in September 1987. The May surveys continued the

very fruitful collaborative work with the Companhia Vale do Rio Doce (CVRD), completing a series of surveys of the north-central coast of Brazil which have identified some of the most important habitats for shorebirds on the north coast of South America. Previously unknown stopover areas used by Red Knots were discovered and sightings made of colour-marked birds, adding important knowledge concerning the routes and stopover sites used by this species; breeding colonies of Neotropical wading birds were also mapped. The data from the surveys will be used to delineate a proposed 'Sister Reserve', to be included in the Western Hemisphere Shorebird Reserve Network on the Maranhao State coast. The September surveys, supported by VALEC, the consortium planning a proposed railway route linking industrial concerns in south and north Brazil, were the first to be undertaken of the very important seasonally flooded interior wetlands of the Ilha Bananal on the Araguaia River.

Work on the physiology and migration of High Arctic shorebirds was continued at Alert, Ellesmere Island, as part of an international program in collaboration with the U.K. Nature Conservancy Council. The work has produced some valuable data on the physiological reserves which shorebirds are able to bring to the breeding grounds, which is both of basic biological interest and conservational significance in understanding the role of stopover areas in the life cycles of the birds. Results of the work were presented at the international meeting "The Canadian Arctic Islands: Canada's Missing Dimension", organized by the National Museum of Natural Sciences in Ottawa in November 1987.

Work also continued on assessing the very important breeding areas for shorebirds in the Foxe Basin on Rowley Island. Methods were developed for habitat description and analysis which will be applicable for use in planned remote sensing studies to be carried out in collaboration with staff from the Canada Centre for Remote Sensing.

Colonial Waterbirds of the Great Lakes

The status of nesting Caspian Terns and Common Terns in Lake Ontario was determined by nest counts. New colonies of both tern species have sprung up at the recently constructed East Port Development area of Hamilton Harbour. The second part of a two-year study of encroachment by Ring-billed Gulls on Caspian Tern nesting habitat at Tommy Thompson Park was completed during the 1987 breeding season.

A jointly authored report was prepared by CWS, Cornell University and NYSDEC on the use of monofilament lines as a method to repel gulls from Common Tern nesting areas.

Data were collected on the diet of Black-crowned Night Herons at Tommy Thompson Park, Toronto, which held the largest colony in the lower Great Lakes in 1987.

A paper "The distribution and status of colonial waterbirds nesting in western Lake Erie" will appear soon as part of the book "The Biogeography of the Island Region of Western Lake Erie".

Two manuscripts describing the results of a previous study of the ecology of Great Lakes Terns wintering in Latin America were completed: "Ecology of Common Terns (*Sterna hirundo*) and Elegant Terns (*S. elegans*) wintering near Mollendo, Peru" and "The importance of the sand crab (*Emerita analoga*) in the diet of three larid species in southern Peru".

During the 1987 breeding season, Caspian Tern chicks at a colony in Lake Ontario were colour-banded. In February 1988, a joint study by CWS, the University of Zulia, and the Venezuelan Ministry of Environment was made of Great Lakes Caspian Terns that wintered along the coast of the Gulf of Venezuela. Reports describing the findings will be completed during 1988-89.

Boreal Birds

A study continued of the effect of forest harvesting and other environmental changes on the birds of the Boreal Forest of Ontario to develop prediction indices that will allow assessment of the consequences of habitat change. Emphasis is placed on the relationship between boreal birds and insect pests, in particular the effect of songbird predation on low level spruce budworm populations and the response of bird populations to budworm outbreaks.

Support for volunteer-based surveys culminated in the production of the Ontario Breeding Bird Atlas. The information collected will give a baseline against which changes can be measured well into the future.

A new Forest Bird Monitoring Program, using volunteers, was tested and proved highly successful. The program, to measure trends in forest breeding birds, will annually quantify the relative density of breeding birds in all major forest habitats in Ontario. Information on birds can be related to land-use changes to develop status predictions.

Gull and Goose Control

CWS issued permits, provided advice and monitored the effectiveness of operations to control nesting colonies of Ring-billed Gulls at several urban/industrial sites (e.g. Tommy Thompson Park and Mugg's Island, Toronto; Dow Chemical, Sarnia; Lakeview Generating Station, Port Credit; and Lemieux Island Filtration Plant, Ottawa).

A joint study was carried out by CWS and the Animal Research Centre, Agriculture Canada, to determine the effectiveness of spraying fertile bird eggs with Daedol oil to prevent hatching. Daedol oil is a highly refined USP white mineral oil that is odourless and tasteless. After

promising tests on chicken eggs in the laboratory, Daedol oil was used with good success on Ring-billed Gull eggs in the field. Two manuscripts describing the results of the two-part study have been submitted to the Wildlife Society Bulletin.

Canada Geese were removed from the Toronto waterfront. A total of 987 adults were shipped to the State of Mississippi while three Ministry of Natural Resources districts, Blind River, Thunder Bay and Sudbury received 100, 50 and 150 goslings respectively.

Habitat Protection and Management

Ramsar designation proposals were completed for Polar Bear Provincial Park and the Southern James Bay Migratory Bird Sanctuaries, and were submitted at the Ramsar Conference held in Regina in 1987. Work was ongoing with OMNR, Ducks Unlimited and Wildlife Habitat Canada toward a wetland protection program for Ontario and in identifying and evaluating wetland sites for the "First Step" program of the Eastern Canada Joint Venture of the NAWMP.

At Long Point NWA, the fifth and final year of the Bald Eagle hacking project was successfully completed with the release of six additional eaglets. This cooperative project with OMNR and Elsa has augmented by 28 birds the natural population of the endangered Bald Eagle. The released birds will be monitored to determine the ultimate success of the project - nesting of released birds. Monitoring of the deer exclosure/control plots continued to demonstrate the detrimental effect that deer are having on tree regeneration and plant growth at Long Point. A report describing the situation and including recommendations to deal with the overbrowsing problem was prepared.

Monitoring the response of vegetation to water level manipulation continued in the D.U. impoundments at Big Creek NWA, and in August, 1987 a waterfowl banding station was again operated successfully.

In March, 1987, a Wildlife '87 open house was held at Big Creek NWA in conjunction with the annual waterfowl viewing weekend. In May, CWS conducted a field trip to Long Point NWA during the FON annual meetings, and in June, Environment Week activities with public school groups were undertaken at Big Creek NWA.

Support for NGO research at Long Point/Big Creek included work on beach/foredune erosion and deposition (University of Guelph) and snapping turtle ecology (U. of G.). On Long Point, CWS collaborated with University of Guelph (OVC) researchers studying the ecology of Lyme disease, a tick-borne disease of deer and small mammals, but infectious to man.

Habitat Assessment and Mitigation

CWS continued its commitment to EARP through involvement with the RSCC, remedial action plans and provision of advice and expertise to NGOs and industry. Regional participation in Wildlife '87 continued, and included the planning and co-ordination of Regional CWS events.

Regulations and Enforcement

CWS coordinated a Waterfowl Enforcement Workshop at Lake St. Clair NWA attended by 22 RCMP and OMNR personnel. The workshop was a review and introduction to enforcement of the MBC Act and Regulations. Some 20 seminars on enforcement at RCMP and OMNR offices were attended by CWS personnel in late summer and early fall.

A high level of enforcement was maintained by the RCMP at Chatham and Windsor; a close check was maintained on Border and International Waterways. A spy blind operation was set up at Lake St. Clair and an RCMP aircraft was used to detect hunters beyond the legal hunting distance from shore.

East and south of Ottawa, 40 Damage Permits were issued to keep some 200,000 Canada Geese away from vulnerable crops in fertile South Nation River area and Wolfe Island. The Canada Geese spend approximately six weeks in the area in the spring; OMNR, RCMP and CWS staff multiply contacts with the farmers and increase patrols to ensure a smooth stay and passage of the geese through this corridor.

On Wolfe Island, enforcement by RCMP, OMNR and CWS resulted in the posting of 19 baited areas with 4 charges, one for hunting over bait.

Complaints about bird nuisance were received during the summer season, most of them relating to Ring-billed Gulls.

CWS participated in the making of a 20-minute TV film by Loyalist College on local gull problems, also on the use of falcons at Canadian Forces Base Trenton, to keep birds from the runways.

Number of permits issued or renewed:

Avicultural	931 (11,667 birds kept, 50 species)
Taxidermy	279
Scientific	66
Damage	199
Salvage	133
Baiting	52
Total	- 1,660

Enforcement of the MBC Act by the RCMP in the James Bay area, mainly charges laid on native residents for hunting before the opening of regular season, were stayed in Court. Native hunting is still being reviewed by Justice.

Western and Northern Region

Threatened Species

Whooping Crane Ecology and Rehabilitation

As part of the continuing efforts to protect and conserve the endangered Whooping Crane, CWS carried out aerial surveys in 1987 to monitor cranes and their nests in and near Wood Buffalo National Park. At least 32 nests are known to have been constructed in 1987, establishing an all-time record and an increase of 3 nests over 1986. Three nests originally contained one egg each but the remaining 29 nests had the usual clutch of 2 eggs each.

Twenty-four surplus eggs were removed and at least 34 eggs remained in Wood Buffalo National Park. Twenty-seven chicks are known to have hatched and of these, 26 survived at least until 8 - 10 August when 21 chicks were colour banded.

Production in Wood Buffalo National Park in 1987 was the highest on record with 25 chicks, including all 21 chicks banded in 1987, safely arriving in Texas. One of the chicks was observed 350 km NW of the Aransas winter range although its parents are in the Refuge.

The population now contains about 77 (58%) colour banded individuals, including 17 adults, 39 subadults and 21 juveniles. Survival of subadults has been excellent and several new breeding pairs are anticipated in 1988. If habitat conditions in Wood Buffalo National Park remain favourable, 1988 should again be a good productive year.

Of the 24 surplus eggs removed from Wood Buffalo National Park, 12 live eggs were placed in nests of Greater Sandhill Cranes at the Grays Lake National Wildlife Refuge in Idaho, as part of a cooperative USA-Canada management program. Although all eggs hatched, an extremely serious drought took a heavy toll of Whooping Crane chicks and only two eventually fledged. Many native Sandhill Crane chicks also succumbed.

All seven live eggs shipped from Wood Buffalo National Park to the Patuxent Research Centre in Maryland, USA hatched but two of the seven chicks eventually died. The remaining birds will be used for captive propagation purposes. Five non-viable eggs collected in Wood Buffalo National Park were forwarded to the Patuxent Research Centre for analysis.

As of January 1988 the world population of Whooping Cranes numbered about 194 birds. Of these about 132 are in the Wood Buffalo-Texas population, about 20 in the Grays Lake population and about 42 are in captivity.

A Whooping Crane "hotline" set up in Saskatchewan has worked well and has resulted in a great increase in sightings reported to the CWS office in Saskatoon.

Anatum Peregrine Falcon Recovery Project

In 1987 the Wainwright Captive Breeding Facility produced 79 young from 28 breeding pairs. Few were held back as future breeders. Therefore, 75 young were released at nine release sites, in six provinces. The peregrines are raised on captive bred quail at the rate of 60,000 per year.

In June, the National Wildlife Directors approved the Anatum Peregrine Falcon Recovery Plan. The National Recovery Team met in December in Saskatoon and recommended more intensive sampling of peregrine falcon prey and egg shells to determine the effect of toxic chemicals that are present in their food chain.

Piping Plover

A field study was conducted in Alberta during 1987 which examined aspects of the breeding biology of the Piping Plover. The first annual report, which is currently being prepared, will include information on breeding chronology and reproductive success. A five-year research and conservation proposal was prepared and the CWS committed itself to financially support surveys and management recommendations in Alberta and a report on 1987 surveys in Manitoba.

Migratory Bird Studies

Studies of homing, nest-site selection, fall residency and population regulation in upland-nesting ducks continued at the St. Denis National Wildlife Area, Saskatchewan, in 1987. Preliminary information suggested that mallards responded favourably to reduced nest predation in 1986, but more data are needed to verify this trend. Some results have been summarized and submitted for journal publication; other aspects are nearing completion. Complementary studies of mallard incubation behaviour and American Crow breeding biology are continuing in cooperation with graduate students.

Breeding Bird Survey (BBS) data were further analyzed, and the number of routes surveyed in Saskatchewan was doubled as the first stage of doubling participation throughout the Prairie Provinces. Two reports on bird trends in the prairies, from BBS data, were accepted for publication. An article on Eskimo Curlew was produced for the Audubon Wildlife Report.

An experimental goose nesting habitat survey, in cooperation with the U.S. Fish and Wildlife Service, was carried out in the arctic from the Mackenzie Delta to Baffin Island. With Inuvialuit help, over 2000 Snow Geese were banded at Kendall Island, Anderson River and Banks Island Migratory Bird Sanctuaries, to allow determination of the degree of mixing of Snow Geese from the three colonies and the populations that

winter in either California or Mexico and New Mexico. A study of the effect of aerial and marine disturbance on arctic geese and swans was completed, with field work on Brant and White-fronted Geese, to develop guidelines for industry to reduce disturbance to breeding waterfowl in the Beaufort Sea-Mackenzie Delta region.

Canada, U.S.A. and various countries in South and Central America are presently developing a proposal to create a hemisphere-wide system of reserves for shorebird conservation. As part of this program, aerial shorebird surveys were conducted in 1987 throughout the southern half of the three prairie provinces. These surveys attempted to define the number of shorebirds using the prairies during spring and fall migration, and to identify major staging areas. As an extension of the International Shorebird Survey Program, a volunteer network of ground data collectors was created in 1987. Preliminary results from aerial surveys show that two sites in southern Saskatchewan are worthy of Hemisphere Reserve Status (250,000 birds or 30% of flyway population), and at least four other sites merit Regional Reserve Status (20,000 birds or more), two in Alberta and one each in Manitoba and Saskatchewan. A third year of field work to identify nesting habitats of shorebirds in the Mackenzie River Delta, using Landsat Thematic Mapper imagery, was successfully concluded.

An electronic mailing list called Wildnet was established early in 1987 to allow discussion of issues related to computing and analysis in fisheries and wildlife research, using worldwide electronic mail networks. Wildnet has so far been a useful medium for discussion among researchers in government, universities, and various other organizations on software, research design, conferences, environmental policy, and so on.

A 24-hour Whooping Crane reporting system for sightings from the public, conservation officers and NGO representatives was established. Sight evaluations were completed for spring and fall migration. These sightings were tabulated and distributed to cooperators as well as added to a Whooping Crane data base. A report on the preliminary identification of Whooping Crane staging areas in prairie Canada was presented at the 5th North American Crane Workshop at Lake Wales, Florida, in February 1988. In addition, data on foraging and roosting habitat was collected this past field season.

The field portion of the study on the effects of fire on grassland vegetation and the associated passerine and small mammal community was concluded this past summer. The plant community has shown a small increase in floral and structural diversity following single prescribed burn. The diversity of the bird community increased following fire although the density of some of the more common species, for example, Clay-coloured Sparrow declined. The number of small mammal species and the density of these animals declined on burn areas. At present, several papers and a fire management plan for Last Mountain Lake National Wildlife Area are in preparation.

Information on the incidence of lead poisoning in waterfowl in western Canada continued to be gathered, with a view to formulating a program to alleviate lead poisoning problems.

Studies were conducted on the physiological state of moulting female Mallards in relation to hunting pressure and survival; preliminary results suggest that late nesting successful females experience higher rates of hunting mortality than unsuccessful females.

Loggerhead Shrike Conservation

A project was initiated to evaluate the status and distribution of this threatened bird in the Prairie Provinces. A study in 1987 was jointly funded by CWS and the World Wildlife Fund with the support of the wildlife agencies of Alberta, Saskatchewan and Manitoba. Surveys were conducted which delineated the breeding distribution and relative density of breeding pairs in the three provinces and a preliminary draft of an action plan prepared. More detailed field studies are planned for 1988.

Remote Sensing

CWS continued to test the applications of LANDSAT satellite imagery to wildlife uses. Fieldwork and contracts with Ecosat Geobotanical Services Limited demonstrated the usefulness of LANDSAT Thematic Mapper imagery to pin-pointing nesting habitat for shorebirds in the Mackenzie Delta area of the Northwest Territories.

Northern Ducks

The third year of a detailed study on annual variation in breeding populations and productivity in ducks was completed. The study provided information comparable to data collected 25 years earlier on the same area, located 16 kilometers outside of Yellowknife, Northwest Territories.

Habitat Conservation

Prairie Crop Damage Prevention Programs

Weather conditions improved prairie-wide in 1987, after two abnormally wet extended harvest seasons. Crop maturity was ahead of 1986, and with excellent-good weather in mid-September, crops were virtually all in the bin by month-end. Except for several local areas in Manitoba, the crop damage prevention programs had been terminated by late September.

The 5-year Federal-Provincial Agreements for Prevention (DOE) and Compensation (CDA) will expire in March 1988, and negotiations are under way for renewal of the Agreements.

Trumpeter Swans

Surveys of the NWT flock continued in 1987. Ninety-six Trumpeter Swans (53 adults and 43 cygnets) were collared and banded. Information on migration routes and wintering habitat use is now being collected through the cooperation of observers throughout Canada and the USA. Preliminary observations indicate the NWT flock is not only pioneering new breeding areas, but may also be selecting new wintering sites in the USA. Red collared Trumpeter Swans have been observed in Nevada, Idaho and Oregon. These locations are a considerable distance from the overcrowded traditional wintering range of the Canadian breeding populations.

As a Wildlife '87 project, CWS and Parks Canada have initiated a three-year cooperative Trumpeter Swan transplant to Elk Island National Park, Alberta. In addition to Environment Canada, major sources of funding for this project are: World Wildlife Fund, Wild West and Alberta Parks, Recreation and Wildlife Foundation. In July of 1987, four family groups, eight adults and 18 cygnets were captured from the Grande Prairie flock, transported to and released on wetlands at Elk Island National Park. Fall migration monitoring indicated that eight adults and five cygnets left Elk Island and have migrated to traditional wintering areas near Yellowstone National Park, USA. Elk Island will be monitored during spring migration in anticipation of the return of transplant cygnets.

North American Waterfowl Management Plan

Habitat Conservation Section staff were involved in many aspects of the development and implementation of the NAVMP. In cooperation with other CWS staff and outside agencies, staff assisted in the development of the Manitoba and Alberta Provincial Implementation Plans, plan preparation for the first-step projects in Saskatchewan and Alberta and in the implementation and evaluation of the Prairie Pothole Pilot Project at Redvers, Saskatchewan. The evaluation assesses the overall impact of habitat treatments on duck populations by comparing changes in habitat cover types between the treated project area and untreated control area. Staff served on all technical and steering committees for these projects.

As solutions to the waterfowl production problems on the prairies must come incidentally to changes in agricultural land-use practices, CWS staff have initiated a long-term cooperative project at Redvers, Saskatchewan to measure the efficiency of conservation grazing techniques in providing safe nesting cover for waterfowl. The study will compare nest success of upland-nesting ducks under continuous grazing and deferred rotation grazing. The costs of producing more ducks and the economic returns to the farmer will also be identified.

The Prairie Habitat Monitoring Project measures the type and magnitude of changes occurring in the migratory bird habitat base in the settled portions of the Prairie Provinces. The results of the study will demonstrate the extent and severity of habitat loss in different habitat zones and will be used to aid habitat managers, policy makers and politicians in developing realistic and effective habitat conservation measures. The project will also have direct relevance to habitat programs developed under the NAWMP.

Data for the project are derived from samples of approximately 24 quarter sections each at 130 + locations in a variety of landform types across the provinces of Alberta, Saskatchewan and Manitoba. 1985 has been taken as the baseline year and samples will be resurveyed at approximately five-year intervals.

Beaufort Sea Bird Monitoring

The third year of a program to monitor the effects of offshore oil and gas production on birds in the Beaufort Sea region has been completed. The annual productivity of the Red-throated Loon is being used as the indicator of impacts. Five years of data prior to any major development will be gathered to determine the natural annual fluctuations in the productivity of the loon. This data will provide a benchmark for comparison once major oil and gas development has occurred.

Population Management and Enforcement

A significant reduction (-35%) in the number of May ponds in Prairie Canada was recorded in 1987 compared to 1986, and the number of ponds in 1987 was also well below (-19%) the average of the 10 previous years. Agricultural practices continue to impact many wetland basins and most wetland margins. Although total duck populations were slightly larger (+8%) in 1987 compared to 1986 in Prairie Canada, numbers were still below (-10%) the 10-year average. Similarly, Mallard populations were slightly greater (+5%) in 1987 compared to 1986, but were also less (-14%) than the 10-year average.

Restrictive hunting regulations were in effect once again in 1987 in the provinces of Manitoba, Saskatchewan and Alberta to achieve a harvest of Mallards 25% less than what would have occurred under the Stable Regulations Period. Continued cooperative programs for harvest management are required to complement various habitat programs and to achieve the long-term goals of the North American Waterfowl Management Plan.

The Population Management Section continues to provide waterfowl and habitat monitoring services for the annual estimate of national and continental waterfowl populations, in cooperation with the United States Fish and Wildlife Service. These same services are being provided for

the various habitat enhancement and retention programs associated with the North American Waterfowl Management Plan and the Prairie Habitat Joint Venture. The Population Management Section is also active in the continued formation of the Arctic Goose Joint Venture, and is participating in three pilot banding and neck-collaring programs in the western and eastern Arctic. Annual duck banding at various sites in the southern prairie regions continue to provide estimates of annual survival.

Northern Operations

Polar Bear Pass NWA

The agreement relating to "The Cooperative Management of Wildlife of Polar Bear Pass NWA" has been completed. An Area Advisory Committee has been established and is presently preparing the first draft of the Area management plan. The draft plan should be available for public review in 1988.

Proposed Migratory Bird Sanctuaries

Discussions on the establishment of Prince Leopold Island, Cape Searle and Reid Bay as sanctuaries are continuing. Tungavik Federation of Nunavut has indicated that it will support the decision of the communities regarding the sanctuaries. The Hunters and Trappers Association of Resolute has confirmed that it supports the designation of Prince Leopold Island.

Northern Mineral Policy

CWS is cooperating with DIAND on three conservation initiatives resulting from DIAND's Northern Mineral Policy. These include a review of the status of the Thelon Game Sanctuary and the proposed IBP sites in NWT. CWS has also undertaken a review of the boundaries of sanctuaries north of 60 N and will be completing a report in 1988.

Environmental Impact Assessment

Work continued this year on monitoring the effects of the Churchill River Diversion Project on waterfowl in northern Manitoba as part of federal efforts towards implementing the Northern Flood Agreement. The region participated in reviews of environmental impact statements prepared for the Shand generating station and the Rafferty/Alameda dams project in Saskatchewan and uranium mining projects proposed for the northern part of the province. In addition, the region contributed a member to the C&P Task Force established to provide input into reforming the Environmental Assessment and Review Process (EARP).

Pacific and Yukon Region

Waterfowl

The spirit of cooperation created by the NAWMP was put to good use in waterfowl population surveys. A waterfowl breeding pair survey was initiated in the grasslands of the interior involving the combined efforts of the British Columbia Wildlife Branch, Ducks Unlimited Canada and CWS. The first year's survey provided enough data to accurately determine what future efforts would be required. The British Columbia Waterfowl Technical Committee met twice, once in conjunction with the Yukon Waterfowl Technical Committee, and is nearing the completion of the revised B.C. Waterfowl Management Plan. Cooperative management of urban Canada Goose problems was expanded with the inclusion of local municipalities in the active management of those populations.

In Yukon, CWS continued to monitor bird populations at important spring staging sites near Whitehorse by means of ground-based counts and (with the assistance of Ducks Unlimited and Yukon Renewable Resources) aerial surveys. The past two years of these data were integral in a paper entitled "Spring Staging Areas for Trumpeter Swans in the Southern Lakes Region of Yukon", which was prepared for the Proceedings of the 11th Trumpeter Swan Society Conference.

CWS continued to take an active role in cooperative ventures and interagency communications in the Yukon, primarily via the Yukon Waterfowl Working Group. CWS continued to encourage long-term revitalization of the North American Breeding Bird Survey in Yukon by acting as the Yukon coordinator. We also participated with YTG and DU in the third year of aerial surveys of waterfowl populations in the Needlerock area. Analyses of invertebrate samples collected within the study area in 1986 was completed, and a draft report covering all phases of CWS activity was completed in February, 1988.

A report, "Status of Migratory Bird Populations on the Yukon Coastal Plain", was published in the CWS Technical Report series.

Snow Geese

Regional participation continued in the development of the Arctic Goose Joint Venture. Wrangel Island Lesser Snow Geese wintering on the Fraser River Delta were again banded and neck collared, in cooperation with Washington Department of Wildlife, British Columbia Waterfowl Society, British Columbia Wildlife Branch and Ducks Unlimited. Collar sightings of geese marked the previous year continued to be gathered in the Vancouver and northern Washington areas. Sightings were reviewed from contributors in California, Oregon, Alaska and Wrangel Island.

Two intensive studies of Snow Goose biology are under way on the Fraser River Delta. One examines their behaviour during the winter as it may affect survival of young birds and recruitment to the population. The other investigates habitat use in the Fraser and Skagit estuaries and impact of geese on estuarine and upland habitat. Weekly airphoto counts of all geese in the Fraser Estuary were conducted along with less frequent surveys of the Skagit Delta. A report summarizing those counts for the years 1986/87 and 1987/88 is being prepared. A preliminary study on marsh plant growth patterns and variation was conducted during the summer and a report summarizing the results is being prepared. Other reports on the historical abundance and distribution of Snow Geese, comparison of different estimation techniques are nearing completion. Finally a study of harvest of Snow Geese on the Fraser River Delta during 1982/83 and 1983/84 was published.

Brant

A major effort was mounted in 1987/88 to evaluate the winter distribution of different stocks of Pacific Flyway Brant. Many agencies collaborated in this study including the Polar Continental Shelf Project, the U.S. Fish and Wildlife Service (USFWS), the Washington State Department of Game and the Northwest Territories Department of Renewable Resources. CWS biologists banded more than 800 Brant in the western Canadian Arctic, fitting 17 of them with radio transmitters. At a major staging area in Alaska, USFWS personnel, aided by CWS biologists, picked up radio signals from at least 12 of the radio-marked birds as they stopped off during October. At the time of writing only one radio-marked bird has been detected further south, in Baja, California, but band recoveries by hunters and visual sightings of specially designed coloured leg bands are providing a wealth of information. Several promising ways of improving management of Brant along the Pacific Coast are emerging.

Marine Birds

The seabird colony inventory was brought close to completion in 1987. The inner islands of the Scott Group and the islands on the west side of Chatham Sound were surveyed. The former contain about half a million Cassin's Auklets which makes British Columbia the centre of that species population. The latter islands contained no birds and were heavily populated by mink and beaver. Only some of the islands along the mainland coast remain to be surveyed.

Research on salmon-seabird interactions was started in autumn. Two cruises with a chartered vessel were conducted over the offshore bank area of Barkely Sound, Southwestern Vancouver Island. Observations were made on distribution of seabirds and 66 birds were collected for stomach analysis. Of these, only 38 contained identifiable food items. Cassin's

Auklets were found to have eaten mostly zooplankton and Northern Fulmars, squid. The gulls, shearwaters and Common Murre were mainly piscivorous. Fish were observed in 21 birds. Of those fish identified, 6 birds had eaten Herrings and one bird contained Sandlance. Fishes eaten ranged in size from 7 to 12 cm. Since juvenile salmon sampled over the offshore banks of Barkley Sound in September and October 1987 were well over 20 cm long, the absence of salmon in birds' stomachs may be explained by the fact that they were too long to be taken as prey at that time of the year.

A symposium was held at the Institute of Ocean Sciences, Sydney, B.C., on the ecology and status of marine birds in the Strait of Georgia on December 11, 1987. The symposium was sponsored by CWS 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 proceedings will be published by CWS by the end of 1988.

Ornithology Atlas

The most recent comprehensive treatment of the bird fauna of British Columbia was in 1974 when "A Review of the Bird Fauna of British Columbia" by J.A. Munro and Ian McTaggart-Cowan was issued. Since that time, there have been many studies on the birds of the province and their habitat which have resulted in new information on aspects of the natural history, and in extensions or reductions of the known distribution of many species. In addition, over the past 40 years, many changes have occurred to bird habitat through industrial and agricultural practices and urbanization which have affected the birds and their distribution within the province. The Royal British Columbia Museum, British Columbia Wildlife Branch, and CWS have been working cooperatively to bring together all existing information on the birds of British Columbia, to review and synthesize that information, and to complete species accounts and distribution maps on the over 440 species of birds that are known to occur or have occurred in the province. In 1987, all species accounts for the non-passerine birds were completed and final map production for Volume 1 was begun. In addition, first draft maps were prepared for Flycatchers to Waxwings of Volume II. The first volume, "The Birds of British Columbia: Non-passerines", will be ready for publication early in the 1988 fiscal year; volume 2, "The Birds of British Columbia: Passerines" should be ready for publication by the end of the 1989 fiscal year.

Wetland Habitat Studies and Mapping

CWS is summarizing a 1986 report by B.C. Research that analyses the feasibility of using Landsat Thematic Mapper data for mapping wetlands. The report will appear as a CWS technical report in March 1988. A report

of an assessment of historical changes in estuarine habitat on Vancouver Island will also be completed in March.

Aerial survey data on Snow Geese from fall 1986 were compiled and mapped to delineate fall staging habitat along the Yukon Coastal Plain. The map is scheduled for completion in March 1988 with financial assistance from the Northern Oil and Gas Action Program.

In order to help CWS satisfy the terms of the Inuvialuit Final Agreement, CWS is producing a map of migratory bird habitats on the Yukon Coastal Plain. This is being prepared using the same imagery as is being used for the Snow Goose studies (above). Other agencies, particularly the Yukon Department of Renewable Resources, are cooperating in this effort, the products of which will also be useful for habitat studies of other wildlife in which they have a particular interest, e.g. wolves, foxes, muskoxen, moose. This map will be a valuable aid in land-use decision making for the Coastal Plain.

Earlier this year, an initial mapping effort was completed in the Babbage River Delta - King Point area. This project examined the potential of Landsat Thematic Mapper imagery to differentiate various tundra types. Additional imagery is being obtained in order to apply the most promising techniques from this effort to the majority of the Coastal Plain.

Habitat Management and Assessment

Habitat protection activities in B.C. concentrated on influencing land-use policies and programs of federal and provincial agencies. Advice with respect to habitat requirements of migratory birds was provided in several joint federal-provincial land-use planning schemes including the Fraser, the Squamish and the Cowichan river estuary management plans, and by responding to more than 200 interagency land-use referrals. Active participation in DOE RSCC Task Forces providing input to EARP Panel projects was also continued.

CWS made progress towards the establishment in Boundary Bay of a National Wildlife Area by acquiring management control of 23 hectares of tidal land adjacent to the federal property at Boundary Bay Airport. We also initiated a monitoring study to document vegetation colonization following removal of drift logs, a DU project.

We continued monitoring habitat rehabilitation projects at the Campbell River, Cowichan River, and Englishman River estuaries. Habitat management was promoted by: ongoing operations of Migratory Bird Sanctuaries (MBSs) and National Wildlife Areas (NWAs); by reviewing and revising management plans for MBSs and NWAs; and by participating in the federal-provincial Pacific Estuary Advisory Team, a sub-group of the Pacific Estuary Conservation Program. Other committee involvement included the Creston Valley Wildlife Management Area biological committee, Transportation of Dangerous Goods Committee, and providing advice to the Deas Island Park master plan.

In Yukon, during the past year, 159 Land-Use Permit applications were received by the Lands office of DIAND, and 119 (75%) were forwarded to CWS for comments/concerns. The majority of applications (62) involved highway maintenance/construction (quarry sites, stockpile sites, geotechnical surveys, and road construction). There were 33 applications for mining exploration/development access roads, and 18 applications relating to timber harvesting and milling.

Land-Use Advisory Committee meetings were held infrequently over the past year, as dictated by problems/concerns relative to specific applications.

CWS continued to provide input to the Northern Land-Use Planning process through the regional departmental representative. During 1987, the NLUP program again focussed on the S-E Yukon. CWS carried out aerial and ground surveys of waterfowl populations in the Watson Lake area during early spring, and completed an assessment of selected wetlands in the Liard River Valley during the summer months. Efforts to document the distribution of breeding Trumpeter Swans in the Liard Valley were continued in conjunction with the summer activities.

Regulations and Enforcement

The Regulations and Enforcement Section participated in a new initiative, National Police Week. We were invited to participate at one of the local shopping centres, with a number of local police forces, RCMP, B.C. Conservation Officer Service and Federal Fisheries. The theme this year was "The Police in Your Community". CWS Enforcement displays were geared towards conservation and protection, CWS in general and CWS Enforcement in particular. It was estimated that in excess of 100,000 people went through the displays during the week.

Enforcement personnel planned and hosted a CITES workshop this year. The workshop covered identification, investigation problems and techniques, and identification of enforcement needs. We had 46 personnel from 11 different agencies attend the workshop. As a result of CITES awareness and attention, CWS enforcement personnel along with RCMP investigated, seized and forfeited over \$25,000 worth of CITES controlled products that were unlawfully in Vancouver.

This year the section targetted training needs and initiated a program of comprehensive training for RCMP Detachment personnel. We identified the northern part of British Columbia for initial training. In cooperation with the RCMP Migratory Bird Coordinator, we attended NCO conferences and made presentations along with follow-ups at detachment level. Concentration of training was mainly at known hunting areas and areas with large permit sales. The program will be evaluated prior to next hunting season.

The Enforcement staff was involved again in the Canada Goose egg pickup program for the Okanagan Valley. This program has been successful in reducing the number of Canada Geese in the Valley and the number of Canada Goose complaints. We also assisted in the annual roundup of moulting Canada Geese at Stanley Park. A total of 1200 birds were moved to various locations in the Fraser Valley.

A number of cooperative patrols and road blocks with RCMP and B.C. Conservation Officer Service were done in key times and areas.

WILDLIFE RESEARCH AND CONSERVATION

Headquarters

Porcupine Caribou

On July 17, 1987, the Minister of the Environment and the U.S. Secretary of the Interior signed the Conservation of the Porcupine Caribou Herd Agreement in Ottawa.

The main objectives of the Agreement are:

- . to conserve the Porcupine Caribou Herd and its habitat through international cooperation and coordination of actions designed to minimize the risk of irreversible damage or long-term adverse effects as a result of the use of caribou or their habitat;
- . to ensure opportunities for customary and traditional uses of the herd;
- . to enable users of Porcupine Caribou to participate in the international co-ordination of the conservation of the herd and its habitat through membership on the International Porcupine Caribou Board.

The Porcupine Caribou Herd, numbering approximately 180,000 animals, migrates seasonally between northern Alaska, the Yukon and the Northwest Territories. Native communities in both countries depend on it for food.

Regional Activities

Quebec Region

St. Lawrence Beluga

Leadership in conservation and protection of the beluga was entrusted to CWS in the Quebec Region on the account of Conservation and Protection. Among the various tasks performed by the Service, CWS participated with other federal and provincial departments in the development of a discussion paper on the threats to belugas in the estuary. This document was recently released jointly by the Minister of the Environment and the Minister of Fisheries and Oceans. CWS represents the Department in the development of a joint intervention plan for the conservation of the beluga with Fisheries and Oceans Canada. CWS also participates in the organizational committee for the Forum on the Survival of the Beluga, which will take place in Tadoussac, from September 28 to October 2, 1988.

Western and Northern Region

Wood Bison

The status of wood bison herds currently being held in corrals in Alberta, Manitoba, and Yukon was monitored under the terms of five-year cooperative agreements signed with each of these jurisdictions. During summer 1987, nine, four, and one calves, respectively, were born on site at the corral locations. Total herd sizes within enclosures now number 43, 104, and 45, respectively. Establishment of wood bison populations in the wild in each jurisdiction is the number one objective. The Dene Tha Indian Band and the Waterhen Indian Band are actively involved in the Alberta and Manitoba projects, respectively. Measures instituted in 1986 to correct poor calf production at Hay-Zama, Alberta, appear to have been successful; however, problems continue to exist at Waterhen, Manitoba, and have appeared in the Yukon. Corrective measures have been instituted. The first releases to the wild are scheduled to occur in the Yukon and Manitoba during spring 1988. A Wood Bison Recovery Team was established in 1986 and has completed the 1987 Status Report for Wood Bison. The Status Report which recommends downlisting of wood bison from the endangered to the threatened category, has been submitted to COSEWIC for approval.

Peary Caribou

Aerial surveys, carried out by CWS to determine numbers and distributions of Peary caribou (Rangifer tarandus pearyi) and muskoxen (Ovibos moschatus), were flown between 1 and 22 July 1987. The survey area included Melville and Byam Martin islands, Northwest Territories, in the Canadian Archipelago. A systematic unbounded line transect survey was flown at about 90 m above ground level along transects at 6.4 km intervals, for an overall coverage of about 27%. The survey aircraft was a Bell-206B turbo-helicopter on high-skid gear, equipped with an Omega/VLF Navigation System. A four-person survey crew was used. We observed 418 caribou and 2855 muskoxen on Melville Island and 90 caribou and 70 muskoxen on Byam Martin Island. Numbers of caribou and muskoxen were estimated at about 943 and 5652 on Melville and 98 and 100 on Byam Martin, respectively. Overall estimated mean density for all caribou was 2.2 caribou/100 km² on Melville and 8.4 caribou/100 km² on Byam Martin and for all muskoxen was 13.4 muskoxen/100 km² on Melville and 8.6 muskoxen/100 km² on Byam Martin. Caribou calves represented 19.4% of all caribou seen on Melville and 18.9% of all caribou seen on Byam Martin. Muskox calves represented 15.2% of all muskoxen seen on Melville and only 2.9% of all muskoxen seen on Byam Martin. Muskoxen have increased markedly within the 1987 two-island survey area by about 140% from 1974. Peary caribou have continued to decline markedly in number within the 1987 survey area by about a further 39% from 1974 and an overall 92% from 1961. The number of Peary caribou summering within the 1987 survey area would not safely support essentially any significant level of sustained annual harvest; especially, if it involved the removal of breeding age females.

Barren-ground Caribou, Beverly Herd

The final field season of a study of the effects of forest fires in the Northwest Territories on the habitats, movements and physical condition of the Beverly herd of barren-ground caribou was completed in March 1987. The adequacy of the present forested winter range to support the population is being assessed by examining the physical condition of the caribou in early and late winter. The Fort Smith Hunters and Trappers Association cooperated in this aspect of the study. Results suggest that sufficient winter range is available to the herd; however, the caribou are not using portions of the historical winter range that have a high burn rate. Major reports on phases of the study will be completed by April 1988.

Woodland Caribou

Special attention will be given to the rare woodland caribou in western Canada beginning in April 1988. The first step will be coordinating a review of known populations and their status.

That will be followed by an identification of data gaps and steps being taken and required to learn more about these vulnerable caribou. One objective is to seek more dialogue and cooperative ventures among jurisdictions as several groups of caribou cross one or more jurisdictional boundaries in their annual travels.

Polar Bears

In 1988, the third year of field work on the three year program to re-evaluate the status of the population of polar bears in the Beaufort Sea for the Northern Oil and Gas Action Program was completed. One hundred and ninety-nine polar bears were captured, ensuring a good sample in each of the three years of the program. Heavy ice conditions prevailed in 1986 and, as a result, the abundance of young seals appears to be low. In response, the reproductive rate of polar bears appears to be much reduced from 1985 levels. The mean weights of cubs born in 1986 and 1987 were significantly lower than they were in 1985. In 1985, about half of the six-year-old females were accompanied by cubs (i.e. the year in which they normally produce their first offspring). In 1986 and 1987, only 12-13% of six year old females did so. This reduction was similar to the reduction in productivity of female polar bears that occurred in the mid-1970s, also in association with the heavy ice conditions of 1974. At the time of writing of this summary, analysis of data is continuing and a final report is anticipated by the end of March, 1988.

Studies of the influence on polar bears of ice conditions, of seal distribution and abundance, and of the importance of polynyas continued at Dundas Island for 4 weeks in April and May. The importance of

polynyas to overwintering populations is being evaluated by studying the use of these areas by polar bears and marine mammals in the spring. In particular, studies of the reproductive ecology of walrus are continuing. In 1987, the first successful drugging and branding of walrus in Canada was completed.

A three-year study of condition in black and polar bears (a comparison of fat deposition and use by a land and sea bear) will be finished by the summer of 1988. Formulas have been developed for measuring the lean body weight of an animal from external measurements. This technique has potential for use in monitoring the condition of polar bear populations through time.

The final report of a study of the distribution and movements of polar bears on the Hudson Bay coast during summer and fall was completed and is available. A new study on age and sex-specific mortality rates is beginning and is projected to last for three years. Three hundred and eight polar bears were captured in the fall of 1987. There were no handling mortalities. Depending on the availability of funds, this project will include a study of the fidelity of female polar bears to the site of their own birth.

The National Computerized Data Base continues to be maintained and now has over 18,000 records. It is currently held on the University of Alberta Computer and updated copies are sent to the NWT Wildlife Service once a year. Other agencies have access to extractions of material on request.

Pacific and Yukon Region

Porcupine Caribou

This was the fourth and final year of a study funded through NOGAP, on the summer ecology of the Porcupine caribou herd. This study was designed to provide baseline information on the herd during this critical time period should Beaufort oil and gas exploration and development become a reality. In this final year the majority of our efforts were directed toward completing a final report. To this end we:

1. Analyzed weather data with the objective of detailing the regional weather patterns of the study area.
2. Completed a draft digital classification of an MSS satellite image for vegetation types.
3. Analyzed our field data on vegetation, activity budgets, insect harassment, habitat selection, etc.

During the year we were instrumental in the construction of three computer simulation models on the herd. These models can be employed to help guide future research on the herd by all jurisdictions. The work was largely contracted out to Dr. Fred Bunnell, U.B.C. and focussed on the organization of a number of workshops including all researchers and managers of the herd. A draft report on the three models is expected in March. This project was funded by NOGAP/DIAND.

Through the University of Alaska, Fairbanks, we initiated a study on the body condition of the Porcupine herd. In this initial year, we hope to establish the field protocol to monitor condition from hunter killed animals. The field procedure in this initial year involved the collection of 40 animals. Data and lab analysis is presently progressing well. This project was funded by NOGAP/DIAND.

In conjunction with the body condition study, we were able to collar 10 orphan calves (as a result of our collection of the mothers). This study will provide information required in the population dynamics model as it pertains to the overwinter survival of orphan calves.

As well, we have cooperated with other agencies on various studies. Our major effort this year was our participation in the census on the herd during July. We were responsible for the composition counts on the ground, as well as participating in the photo counts.

TOXIC CHEMICALS

Headquarters

CWS at NWRC continued to provide advice on the impacts of toxic chemicals on wildlife to various client agencies. Besides screening numerous applications for permits for pesticide research and new product registration, major reviews of the following pesticides were produced: tributyl-tin compounds, fenoxaprop ethyl, dimethipin, fomesafen, and lentagran. Evaluations of metsulfuron-methyl, triadimial and ethalfluralin were finalized. A discussion document was prepared for metsulfuron-methyl. Evaluations and negotiations related to the products carbofuran, diazinon, diquat, lindane, DDT, hexazinone, triclopyr, methoxychlor, diflufenzuron, cloethocarb, fluridone, granular insecticides and chemical seed dressings are on-going.

Work continued on a project to improve guidelines to registrants for the scientific and technical information that should be submitted to support claims for product safety to wildlife. As part of this exercise, aquatic plant testing protocols were developed for metsulfuron-methyl and generic non-target plant testing guidelines are being prepared. CWS is participating in an interdepartmental working group which is currently developing guidelines for microbial pesticides. The development of scientific criteria for the assessment of ecological effects of pesticides also continued. Baseline information on wildlife use of agricultural habitat in mixed wood plain ecozones is being readied for publication. These data will be used to develop terrestrial exposure scenarios for pesticide evaluation. CWS continues to participate in a U.S. task force on terrestrial wildlife impact assessment and methodology development.

CWS also collaborated with the U.S. Environmental Protection Agency in an attempt to cancel the registration of the insecticide diazinon for use on turfgrass in the U.S. It has been shown that significant kills of migratory waterfowl occur as a result of this registered use. The final outcome of the court case is still pending. NWRC laboratories participated in the investigation of a number of kills thought to be related to pesticide use including two kills resulting from diazinon on golf courses in Ontario.

Following last year's work, attempts were made to better characterize the impact of grasshopper insecticides on Burrowing Owls, a threatened species in Canada. Minimal spraying took place, but a single overspray event once again demonstrated the impact of the insecticide carbofuran on the Burrowing Owl. A report summarizing CWS concerns was prepared for Agriculture Canada; this report is to form the basis of negotiations with the company which manufactures the product. These negotiations will attempt to identify ways to eliminate exposure of the owls. At present, the only viable solution appears to be a cancellation of all grasshopper and alfalfa-pest registrations.

To allow for the systematic consideration of threatened and endangered species in the pesticide evaluation process, two computer databases were developed. The first allows for the mapping of the distribution of each species, and the second contains information on the biology of each species. Data on 20 species have been entered in 1987/88. The databases will also be used by State of the Environment in their atlas, and possibly by the National Atlas.

CWS participated in poster and platform sessions at the annual meeting of the Society of Environmental Toxicology and Chemistry. CWS also co-chaired the session "Impacts of Agricultural Chemicals on Prairie Wetlands".

Experiments with 2-PAM (a chemical reactivator of cholinesterase activity) were conducted on brain and plasma from Japanese Quail exposed to organophosphate and carbamate pesticides. The results to date show that there are limitations to this approach in discriminating between OP- and carbamate-induced inhibition. In spite of the limitations, however, the technique is sometimes useful, and we recommend its application to field-collected animals which are suspected of being poisoned by cholinesterase inhibitors. A report which details these recommendations is in preparation.

Several experiments to test the stability of avian blood cholinesterase on filter paper were conducted. The results show that the enzyme is stable for at least 4-6 weeks on the filter paper, but that the degree of inhibition of enzyme activity by chlorpyrifos (an OP) and by carbofuran (a carbamate) is not as high as the inhibition in frozen plasma. The usefulness of the filter paper blood collection technique is, therefore, uncertain. A report on our recommendations is being prepared.

CWS has continued to monitor environmental contaminants in Canadian wildlife. Livers and blood were obtained from Herring Gulls (N=30) and Double-crested Cormorants (N=30) from one site on the Atlantic coast and two sites on the Great Lakes. Organochlorine concentrations and mixed function oxidase activity (three assays) have been determined in all liver samples. Biochemical analysis will be completed in the second year of this project (1988/89).

Seabird contaminant monitoring activities continued with the collection of eggs and tissues of four Arctic species. Articles on the contaminant levels in seabirds from all three Canadian coasts were written and submitted to scientific journals. In addition, eggs and tissues of Peregrine Falcons from a number of areas of Canada were analyzed and the results were incorporated in an ongoing review of environmental contaminants in Peregrines and their prey. Draft reports on "Environmental Contaminants in Peregrine Falcons" and "Environmental Contaminants in Prey of Peregrine Falcons in Canada" were provided to the Peregrine Falcon Recovery Team. Advice on the significance of levels of DDE and other chemicals in recently collected Peregrine prey

was provided to a number of provincial agencies as requested. A draft review of environmental contaminants in Canadian raptors was also written.

A project designed to monitor the levels of organochlorine contaminants in the blood of raptors migrating around the Great Lakes was continued for a second year. Results indicate ongoing exposure to a variety of pesticides, especially in species such as Sharp-shinned Hawks, Cooper's Hawks and Merlins which feed mainly on other birds and winter in the southern U.S. and Latin America. A brief summary article was written on this work. In a related study, eggs were collected from accipiter hawks in southern Ontario to determine OC levels and possible effects on breeding success. An NWRC biologist also assisted Ontario Region in a cooperative project with the Ontario MNR to examine pesticide levels and effects in American Kestrels nesting in agricultural areas in southern Ontario.

A laboratory study to investigate the chronic and acute toxicity of three PCB congeners to Japanese Quail and American Kestrels, begun last year, was completed. Results show the considerable differences between species in their biochemical response to PCB exposure. Data analysis and write-up are under way for this project.

The review of the potential impact of selenium-contaminated refuges in the western United States on wintering Canadian waterfowl, initiated last fiscal year, was revised and updated.

The determination of levels and impacts of dioxins in the marine coastal environment in the Strait of Georgia was the main activity of the Chemistry Research Division. A joint project was initiated with CWS and EP in Pacific and Yukon Region as part of a Pestfund project to investigate the impact of chlorophenols in the B.C. environment. In 1987, 20 Great Blue Heron eggs from Crofton and UBC were analysed, and the levels of 2,3,7,8-TCDD were found to have increased approximately three fold since 1986 at the former site, where there is a kraft pulp and paper mill. Levels remained about the same at the UBC colony. Levels of the more highly chlorinated dioxins did not change significantly between the two years. Coincidentally, the colony at Crofton failed to fledge any young. Dioxin levels in eggs of Double-crested Cormorants near Crofton were 1/3 to 1/2 of those in heron eggs. Crab hepatopancreas, sculpin, oysters, mussels, clams and sediments from 12 locations along the Strait of Georgia, representing a variety of possible sources of dioxins, have been analyzed to determine the main sources of dioxins in the heron food chain. The main sources are chlorophenol treatment of lumber, chlorine bleaching in kraft mills and combustion. Each source has a unique "signature" pattern of dioxins. Preliminary analysis of the data indicates that chlorophenols are the main source of the more highly chlorinated dioxins. The increase in 2,3,7,8-TCDD in the Crofton heron eggs is consistent with a

kraft mill source. Combustion does not appear to be a significant source. Two manuscripts have been prepared which describe the last two years' work: one is for immediate publication as a CWS Progress Note and the second is for submission to a scientific journal.

Laboratory Services processed 1600 wildlife specimens for chemical analysis and archiving in the CWS National Specimen Bank, and about 300 samples were analysed in-house for OC compounds and PCBs in support of various regional and HQ projects. These projects included eggs of Herring Gulls from the Great Lakes, caribou from northern Canada, waterfowl from the St. Lawrence River and Great Lakes, Great Blue Herons from B.C. and Quebec, Peregrine Falcon eggs, Ivory Gull eggs and Piping Plover eggs. In addition, 41 ducks from Ontario were collected for residue analysis.

The Wildlife Subprogram Coordinator of the FICP submitted Herring Gull egg homogenate to 15 federal, provincial and private laboratories for determination of PCB congeners. The returned data was statistically analyzed and a report was submitted to the FICP program coordinator at Agriculture Canada as well as to the participants. In addition, in cooperation with Seakem Oceanography Ltd., the accuracy of OC and PCB analysis was compared in Ringed Seal blubber and Arctic Char liver samples. A PCB congener quantification study is on-going.

To assist the research at NWRC, a computerized system to track projects and in- and out-going samples was installed. The in-house computer network was expanded with the acquisition of new network services and the SPANS and DOTS systems have been incorporated into the NWRC system. Staff were trained in both these systems as well as in the new operating system at EMR.

The Wildlife Toxicology Fund, administered by the World Wildlife Fund Canada, has completed its third year of operation. As of September 1987, 49 projects were approved by the Research Advisory Board.

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Regional Activities

Atlantic Region

Further studies were carried out in New Brunswick on the effects of innovative fenitrothion spraying on forest songbirds. Data on the growth of nestling birds as an indicator of spray impact were evaluated. A synthesis of information on the responses of forest songbirds to fenitrothion was completed preliminary to development of a departmental position on the continued use of that insecticide. Expertise and laboratory services were again provided to monitors of a hemlock looper control program in Newfoundland. A contribution was made to a refinement of a regional C&P pesticides policy and strategy/action plan. A survey was made of bird use of an agricultural landscape in Prince Edward Island subjected to intensive pesticide use.

In the context of an initiative by New Brunswick to model wildlife habitat supply under different forest management strategies, a pilot study was undertaken to evaluate a bird census technique: the study has implications for the assessment of bird populations in forest landscapes stressed by toxic chemicals.

Quebec Region

A data book on the use of pesticides in rural environments is being prepared. CWS also participates in a survey directed by the Environmental Protection Branch of Environment Canada on the mode of utilization of pesticides by farmers. The object of this survey is to check whether farmers comply with the prescribed conditions for the use of pesticides regarding quantity, methods of application and season. CWS also included seven questions regarding wildlife.

In addition, a CWS specialist acts as a joint thesis director for two graduate students who are investigating toxic chemicals contamination in Mallards and Great Blue Herons in the area of Montreal.

Ontario Region

Surveillance of Toxic Chemicals in Great Lakes Wildlife

Herring Gull eggs were collected at 14 sites throughout the Great Lakes. Eggs were collected from the St. Clair River for the first time; Herring Gulls were found nesting atop the navigational aid markers. Analysis shows that levels of the major contaminants remain unchanged or are decreasing. PCB levels ranged from 9-34 ppm, which is the lowest we have ever recorded for Great Lakes Herring Gull eggs. Embryonic mortality in Herring Gull eggs was found to be normal at Hamilton Harbour and Fighting Island where it was elevated last year. The Double-crested Cormorant population is continuing to increase; numbers on Lake Ontario increased

by more than 50% while those on the Canadian Great Lakes as a whole increased to over 8,200 pairs, a 38% increase from 1986. Two birds with deformities were found this year of over 2,200 examined. Weekly surveys of waterbird usage of Windermere Basin are continuing. A botulism die-off of over 300 ducks was discovered there this autumn.

Waterfowl (Mallards) were collected for PCB analysis from Lake St. Clair, Long Point, Lower Detroit River and inland southern Ontario for PCB analysis. In addition, Oldsquaws were collected from the Lower Niagara River to document uptake of toxic chemicals from that system.

Impacts of Agricultural Pesticides on Wildlife - New Initiative

Extensive bird surveys were carried out in 36 corn, soybean, apple and grape fields in Essex County and the Regional Municipalities of Haldimand-Norfolk and Niagara in 1987. A database has been set up to handle these data. The purpose of the surveys was to determine what bird populations are potentially at risk from their use of agricultural fields. Also, nest box trails for American Kestrels were set up on the Niagara Peninsula and at Midland, and existing ones at St. Thomas (Hawk Cliff) and Sudbury (John Lemon) were used to assess contaminant levels in kestrel eggs and in locally raised young. A literature review and questionnaire survey was conducted of all bluebird nestbox trail operators in Ontario to determine the feasibility of using their data in assessing impacts of agricultural pesticides on bluebirds.

Western and Northern Region

Toxic Chemicals Monitoring

Progress was made in establishing a network of communications with federal and provincial agencies and non-government organizations in western Canada. A collaborative study of the effects of carbofuran spraying on prairie songbirds and small mammals was carried out by CWS, the University of Saskatchewan and Agriculture Canada; two reports of the results are in progress. A study of effects of grasshopper spraying on Loggerhead Shrike reproduction resulted in extensive data on reproductive success and growth, but no data on use of insecticides, because very little spraying occurred. The effects of carbofuran on ducklings will be examined through a contract with the University of Manitoba. Other projects are being planned to address CWS concerns about contamination of wetlands with deltamethrin insecticide and effects of herbicides on waterfowl habitat.

Pacific and Yukon Region

Great Blue Herons and Toxic Chemicals

The presence of dioxins in Great Blue Herons was the paramount issue in the region's toxic chemicals program this year. Elevated levels of dioxins in heron eggs collected from three colonies on the Strait of Georgia between 1982 and 1986, and the failure of the most heavily contaminated colony to raise any young this year, was widely publicized. Interest in the issue has remained high and a great deal of effort has been put into preparing for the 1988 nesting season. One phase involves a multi-year doctoral study under the direction of the University of British Columbia and CWS, now under way to examine natural variation in productivity and over-winter survival. Mirrors have been installed over about 200 nests in nine colonies in the Strait of Georgia to aid that study and to determine if there is a difference in productivity related to dioxin. Another cooperative study with UBC has been planned and will be implemented in April. Eggs from three colonies will be incubated and the hatchlings examined and various tissues analyzed to determine if dioxins affected development of the embryos. A clutch exchange study will show whether or not behaviours of the adults might have contributed to failure of the colony.

AIM Consultants Ltd. was contracted to prepare an analysis of the potential impact of pesticides on migratory birds in the region, and a review of research activities in British Columbia dealing with the environmental impact of pesticides. A final report is due late in the fiscal year.

LONG-RANGE TRANSPORT OF AIRBORNE POLLUTANTS (LRTAP)

Research continued on the impacts of long-range air pollution on wildlife. It is designed to provide an understanding of the mechanisms and magnitude of the effects of acidity on wildlife. Studies were continued in 1987-88 on:

- (1) Kejimikujik integrated watershed baseline characterization, and study of the effects of acid deposition on benthic nutrient release and wetland productivity (Atlantic Region);
- (2) Breeding distribution and productivity of waterfowl in acid-sensitive waters of southwestern New Brunswick (Atlantic Region);
- (3) Effects of acidic precipitation on waterfowl populations in northern Ontario (Ontario Region);
- (4) Effects of wetland acidity on breeding biology of Tree Swallows (Ontario Region);
- (5) Field-testing of a monitoring program for waterfowl productivity and waterfowl foods (Ontario Region);
- (6) Effects of lake acidity on metal uptake by biota and the toxicity of low-level metal exposure to birds (NWRC);
- (7) Development of a model of the effects of acid precipitation on waterfowl in eastern Canada (NWRC, Ontario and Atlantic Regions);
- (8) Assessment of socio-economic benefits at risk due to acid rain stress on wildlife populations (Headquarters).

Scientific advice on the impacts of acid precipitation on wildlife is provided to the Interdepartmental LRTAP Science Subcommittee (ILC) and the Federal-Provincial Research and Monitoring Coordinating Committee (RMCC) for LRTAP.

Canadian scientists took part in a review of the aquatic effects research program of the United States National Acid Precipitation Assessment Program (NAPAP), held in May 1987 in New Orleans. Dr. A.W. Diamond summarized CWS research in a paper on the "Influence of Acidification on Wildlife Productivity". Dr. Diamond also presented a talk on "Impacts of Acid Rain on Aquatic Birds" at the 4th World Wilderness Congress meetings in Colorado, July 1987, as part of a symposium dealing with acid rain impacts on wilderness, parks and nature reserves.

A technical workshop on "Modelling the Effects of Acidic Precipitation on Waterfowl in Eastern Canada" was held in Dartmouth in October 1987. CWS scientists, environmental consultants and scientists from other government agencies and universities, formulated a framework for the

model, and identified sources of data that could be used to quantify the model. Such a model will be useful in providing estimates of the impact of various acidic emission scenarios on waterfowl and their habitat.

CWS scientists from Ontario and Atlantic Regions, and NWRC, also contributed to the second annual Conservation and Protection Research Seminars held at the Canada Centre for Inland Waters (CCIW), Burlington, Ontario in January 1988.

Regional Activities

Atlantic Region

Field studies on the influence of acidity on the retention and release of benthic nutrients were completed in the Kejimikujik Calibrated Basins (N.S.), along with baseline characterization of the benthic invertebrates. Preparations were made for the long-term monitoring of aquatic bird populations in the Kejimikujik area. A summary paper on the biological studies conducted there since 1980 is in press.

The second and final year of the pilot study of Black Duck breeding density and productivity in potentially acid-sensitive wetlands in the Lepreau (N.B.) area was completed.

Ontario Region

The CWS-Ontario Region LRTAP program completed a very successful field program in 1987. Dietary studies for waterfowl in relation to lake acidity were completed following an examination of Common Merganser duckling diets in the Sudbury area. A paper entitled "Duckling diet and invertebrate food resources in relation to lake acidity" has been prepared for publication in a scientific journal.

Further progress was made on the wetlands study in the Sudbury area. Reproduction of Tree Swallows was found to be negatively influenced by acidity with swallows nesting near acidic wetlands producing fewer and smaller fledglings than birds breeding near wetlands of higher pH, with a further tendency for swallows breeding near the most acidic wetlands to lay relatively late in the season and produce a smaller total volume of eggs. Diet and foraging investigations completed in 1987 may provide possible explanations for poor reproduction at acidic wetlands, including the scarcity of calcium-rich prey such as molluscs.

Remonitoring studies for Common Loons, waterfowl and their foods was tested in 1987. Long Point Bird Observatory received funding to monitor Common Loon reproductive success in relation to lake sensitivity, pH and acid deposition levels using a network of volunteers. In 1987, a total of 534 people registered in the Ontario Lakes Loon Survey with information from 463 lakes currently being compiled and analysed. CWS also conducted special loon surveys in the Experimental Lakes Area of northwestern Ontario, as well as the Ranger Lake and Wanapitei study areas. Field testing of the monitoring program for waterfowl productivity and waterfowl foods was also initiated in 1987. Modifications to the survey format and procedure have been made based on comparisons of the relative effectiveness of aerial versus ground brood surveys for various species. The waterfowl production and food chain monitoring program will be implemented in the Algoma area in 1988, with Muskoka-Haliburton to follow in 1989.

In 1987, initial steps were taken to develop a regional model of the effects of acid precipitation on waterfowl in eastern Canada. Information from CWS LRTAP studies will be used extensively in the development and calibration of this model.

National Wildlife Research Centre

Physiological and reproductive effects of dietary metal exposure in birds were investigated. This work resulted in three published papers on the chronic toxicity of methylmercury, aluminum, cadmium and lead in birds. Concentrations of dietary mercury that caused problems for birds in caged experiments, were within the range available to birds that obtain food from acid-stressed lakes.

Work on the development of biochemical indicators of metal exposure in birds was continued, resulting in publication of two reports in 1987/88.

MANAGEMENT AND ADMINISTRATION

Convention on International Trade in Endangered Species
of Wild Fauna and Flora (CITES)

The major event during 1987 was the hosting by Canada of the Sixth Meeting of the Conference of the Parties to CITES in Ottawa, July 12-24. The Meeting was attended by 84 of the 95 Party states to CITES, 21 non-party governments and governmental organizations, plus 105 other groups and organizations. With over 700 people participating, the Ottawa Meeting drew over 50% more delegates than did the 1985 Buenos Aires Meeting.

Canada was well represented at the Meeting not only in terms of the official Canadian delegation but also through the large number of provincial and territorial governments and non-governmental organizations granted observer status. The Canadian delegation of 15, headed by the CWS Director General, included five CWS officers, two from External Affairs, two from Fisheries and Oceans, one from Customs and Excise, one from Indian and Northern Affairs, two provincial-territorial government officers, Dr. N. Mrosovsky from the University of Toronto as the reptiles advisor and Dr. David A. Munro as Chairman of the Meeting. More Canadians participated as observers in Ottawa than at any previous Meetings of the Parties at the federal level. Twenty-five Canadian non-governmental organizations also participated in the Sixth Meeting of the Parties.

The Parties tabled 149 proposals to amend the Appendices. Of these, 41 proposals were withdrawn and 20 were rejected. Included in the proposals accepted was one removal from the Appendices of an Appendix I species and 36 from Appendix II. There were three transfers from Appendix I to Appendix II, 27 species or entire families were added to Appendix II, 11 to Appendix I and 10 transfers from Appendix II to Appendix I.

Of concern to Canada was a Netherlands proposal to include walrus, now covered by a Canadian Appendix III listing, on Appendix II. The range states, including Canada, of the species were able to persuade the Netherlands to withdraw the proposal as the species is adequately managed in all appropriate jurisdictions. Other proposals of concern to Canada were an Equadorian proposal to include all of the approximately 350 species of Hummingbirds on Appendix II and a United States proposal to include all North American pitcherplants on Appendix II. Both proposals were successful. As there is no known or suspected trade in the five species of Hummingbirds nesting in Canada, and because Canada supported the pitcherplant proposal, the additions will not cause any problem in Canada.

A considerable amount of time during the Meeting was spent discussing the finances of the Secretariat. After very considerable debate in committee and in plenary the budget for the biennium 1988/89 was approved at U.S. \$3,000,000. This means that the Canadian contribution to the Trust Fund will increase from U.S. \$24,972 in 1987 to U.S. \$49,618 in 1988.

Resulting from a lack of procedures and the very haphazard way CITES Committees have been established at previous Meetings of the Parties, Canada, with the co-operation of Switzerland, the United Kingdom and Zimbabwe, tabled a proposed resolution respecting the establishment of committees. The proposal was amended and shortened by the Parties resulting in a resolution that will have far-reaching but positive effects on the functioning of CITES between biennial meetings. The amended resolution, accepted unanimously by the Parties, provides for

- rules for the establishment of committees,
- establishment of the Standing Committee of the Parties,
- establishment of an Animals Committee,
- establishment of a Plants Committee,
- establishment of an Identification Manual Committee, and
- establishment of a Nomenclature Committee.

All committees operate only between biennial Meetings of the Parties.

In Canada, during January 1987, responsibility for the enforcement-related aspects of CITES was transferred from the Program, Marketing and Operational Services Branch to the Legislation, Regulations and Enforcement (LRE) Division of the Migratory Birds and Wildlife Conservation Branch. Under the new arrangement, LRE will be the primary CWS contact for Customs and the RCM Police concerning investigations, the detention, seizure and forfeiture of CITES goods and/or providing training to law enforcement agencies with respect to enforcement of CITES. The Administrator, CITES, will continue to co-ordinate the CITES program in Canada, look after the international CITES responsibilities, Canadian CITES permit policy, the issuance of CITES permits and for providing training to federal, provincial and territorial authorities concerning the issuance of CITES permits.

During February 1987, Canada chaired a North American Region CITES Meeting in Winnipeg, Manitoba.

The agenda of the meeting included problem areas between Canada, the United States and Mexico concerning enforcement of the Convention, a review of Appendices amendment proposals and resolutions to be discussed at the Sixth Biennial Meeting in Ottawa (July) and positions to be taken by Canada and by the United States concerning the proposals.

The annual meeting of Canadian federal, provincial and territorial Management and Scientific Authorities took place in Hull, Quebec, October 28-29, 1987. The meeting reviewed the results of the July Biennial Meeting of the Parties and started preparations for the next,

Seventh, Meeting of the Parties scheduled for Jakarta, Indonesia, October 9-20, 1989.

During 1987, the federal government issued 1907 (1789) CITES Import and Export Permits, 87 (71) Transit Certificates and 40 (42) Scientific Certificates. During the same period, provincial and territorial government CITES authorities issued 3617 (3552) CITES Export Permits for specimens being exported from Canada. Comparable 1986 figures are shown in brackets.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC)

CWS supplies a secretariat, Secretary and office space in Place Vincent Massey. At the 1987 annual meeting in April, 36 species were assigned official status in Canada. At least 36 species status reports are expected in 1988 which will mark five consecutive years of high Committee productivity. Election of a new Chairperson is anticipated; Tony Keith having served several elected terms, now wishes to step down.

Canadian Council on Ecological Areas (CCEA)

CWS provides a staffed secretariat for CCEA, which is also supported by funding and in kind by most jurisdictions and by NGOs. In 1987-88, CCEA confirmed its focus on the establishment of protected ecological areas, in a Canada-wide network.

At the annual August meeting, in Winnipeg, provinces, the GNWT and the World Wildlife Fund reported positive progress and approaches in their jurisdictions. CCEA Awards were given to Dr. S. MacDonald for his work leading to the establishment of Polar Bear Pass as a protected ecological area (under the Canada Wildlife Act), and to the Wagner Natural Area Society, Alberta, for leasing and managing an important ecological site over the last four years for protection, scientific study, and public awareness. A workshop was held on "Environmental Monitoring in Ecological Areas". Progress on CCEA projects was reported, including the national Registry of ecological areas (related to the Lands Directorate's mapped ecoregions of Canada), a paper on the scientific value of ecological areas, work by the publicity committee, and advice and commendations to management agencies.

As CCEA moved forward in actions in its area of focus this year, administrative details have been settled, and further attention will be given to relations with related organizations, notably COSEWIC, MAB, and the U.S. Natural Areas Association. An Atlantic Working Group of CCEA is now very active.

The seventh Annual meeting of the Council will be at the University of Prince Edward Island, August 19-21, 1988. Two proposed themes are "Ecological Reserves: What they can do for you, what you can do for them", and "Marine and Freshwater Reserves".

Humane Trapping

In response to recommendations of the Standing Committee on Aboriginal Affairs and Northern Development, Cabinet approved the continuation of the humane trapping program for a five-year period. Subsequently a funding agreement was renewed with the Fur Institute of Canada (FIC) and \$656,000 was provided over the past fiscal year for research and development of humane trapping systems. The International Fur Trade Federation has agreed to provide \$1.2 million over the next 3 years.

The FIC Agreements with the Alberta Environmental Centre (AEC) and University of Minnesota were maintained. The prototype marten trap developed through the AEC program was submitted for manufacture on an experimental basis and some 100 of them will be distributed to several trappers in the fall of 1988 for field trials. The six-person research team at AEC continued its work with traps for mink, fisher and red fox. Prototype traps for mink and fisher successfully passed the compound testing phases and will be tested on experimental traplines in the fall.

A final report of a two-year program of evaluating the physiological and behavioural responses of red foxes caught in "soft holding" foot traps was presented to the FIC in March 1988. Trap-caused damage was virtually nil and blood chemistry analysis indicated that after an initial increase due to the trapping event "stress" leveled out over a 30-minute period to that which is experienced by free ranging foxes running or eating. Stress indicators for the restrained foxes were significantly lower than those of foxes being chased by a dog. A final report on further studies using the conventional steel leg-hold trap for comparative purposes will be released in June 1988.

The FIC also entered into contract with Washington State University which has the facilities and expertise to undertake research on trapping systems used to take beaver in underwater situations. Work commenced in December 1987.

The three Working Groups established at the inaugural March 1987 meeting of the Technical Committee of the International Organization for Standardization continued their work toward development of international humane trap standards. To date seven countries have agreed to participate fully and nine countries hold observer status.

Scientific and Technical Publications

Major scientific publications of 1987-88 were the first LRTAP report, Studies of the effects of acidification on aquatic wildlife in Canada: Waterfowl and trophic relationships in small lakes in northern Ontario, by D. McNicol et al.; Bison ecology in relation to agricultural development in the Slave River lowlands, edited by H. Reynolds and A.W.L. Hawley; A simulation model for the Greater Snow Goose population,

by J. Gauvin and A. Reed; and The birds of the Fraser River delta: Populations, ecology and international significance, by R. Butler and W. Campbell, all in the Occasional Papers series. At the end of the year the second LRTAP report, "Lacustrine birds and their habitat in Quebec," was in production. Nine Progress Notes were published. Twenty-two Hinterland Who's Who titles were revised and reprinted, and the HWW order form was redesigned. A list of priorities for new species and topics to be added to the popular series was established by the Scientific Editorial Review Board.

During the year, 17 titles were added to the Technical Report series, now in its second year. Seven of the titles were produced by the Western and Northern Region, four by Headquarters, three by Pacific and Yukon, two by Quebec and one by Ontario.

Socio-Economic Insights and Advice

Extensive consultations were conducted among federal and provincial government sponsors on emerging management and funding needs to be addressed in the 1987 Survey on the Importance of Wildlife to Canadians. The needs of several new sponsors (Department of Fisheries and Oceans, DOE Acid Rain Program, and Humane Trapping Program) were incorporated. Contractual arrangements were completed with Statistics Canada for conducting the survey between February and April, 1988. Insights from the Survey on the Importance of Wildlife to Canadians in 1981 continue to enhance wildlife management initiatives at local, provincial, regional, national and international levels. To date 12,500 copies of reports published on the subject have been distributed based on public requests received. Substantial numbers continue to be requested. A popular synopsis of Wildlife/Economic linkages for the CWS Hinterland Who's Who series has been developed from the data. The data base was essential in providing socio-economic advice for several Cabinet documents, and CWS's marketing and communications strategy. The results were also essential in demonstrating the socio-economic significance of the North American Waterfowl Management Plan and its potential contribution to the Western Diversification Initiative and the Prairie Farm Rehabilitation Agreement among others. Socio-economic insights and advice were provided on a number of complementary areas such as wetland evaluation methodologies, a draft wetland policy, State of the Environment Reporting, Long Range Transport of Airborne Pollutants, and Environment/Economy Integration.

A paper on The Strategic Role of Marketing in Wildlife Conservation was prepared for the Federal/Provincial Colloquium Task Force. This paper was acknowledged by the International Foundation for the Conservation of Game as a contribution to an international symposium on Sustainable Economic Benefits and Contribution Towards Rural Development in Africa and is being published in the Conference proceedings. The proceedings of another international symposium on Birds as a Socio-Economic Resource were edited for and published by the International Council for Bird

Preservation in England. The book is titled The Value of Birds. An invited paper on the Contributions of a socio-economic perspective to wildlife conservation was presented at the 18th Congress of the International Union of Game Biologists in Krakow, Poland as part of a special seminal session in this area. CWS has also been cooperating with the Wildlife Society of Mexico in organizing an International Wildlife Symposium on "Economic and Social Aspects of Wildlife" in 1988. CWS distributed a report prepared for Wildlife Colloquium Task Force and reviewing wildlife utilization studies in Canada to provincial wildlife directors. It is entitled Wildlife Use and Value in Canada by P.G. Whiting and Associates.

Wildlife '87

The Minister of the Environment proclaimed 1987, the centenary of the establishment of Last Mountain Lake Wildlife Sanctuary, as a year to celebrate wildlife conservation. The Canadian Wildlife Service, in cooperation with many other government and non-government conservation agencies, played a major role in realizing efforts to benefit wildlife throughout the year. Among the most important achievements was the designation of 11 new Ramsar sites, which are internationally significant wetlands. Canada now has 28 Ramsar sites with a total area larger than all the other Ramsar sites in the world combined.

His Royal Highness, the Duke of Edinburgh, unveiled a plaque designating Last Mountain Lake, Saskatchewan, as a National Wildlife Area, and Shepody Bay, New Brunswick, was named Canada's first Hemispheric Shorebird Reserve in what will be a network of 17 different sites crucial to the survival of shorebirds in North and South America.

Several major conferences were hosted during the year, among them the Ramsar Convention on Wetlands of International Importance (Regina) and CITES, the Convention on International Trade in Endangered Species (Ottawa), with delegates from 84 nations. During the CITES conference in July an international agreement with the U.S. to cooperatively manage the Porcupine caribou herd was signed by the Minister of the Environment and the U.S. Secretary of the Interior.

The year ended on a high note with a wildlife art exhibit, "The Art of Survival: Canadian Artists in Aid of Endangered Wildlife", at the Royal Ontario Museum. Environment Canada was one of the sponsors of the exhibit, which featured 19 of Canada's top wildlife artists. The final event was the Christmas Bird Count, which had 10,000 Canadians participating, including the Minister of the Environment.

Throughout the year CWS provided the secretariat to and was a member of the National Wildlife '87 Steering Committee. The Steering Committee produced pins, T-shirts and the Wildlife '87 Newsletter, all featuring the Wildlife '87 logo of a Whooping Crane in flight. A colour poster of the Whooping Crane was produced by CWS and distributed nationally to celebrate Wildlife '87.

Regional Activities

Ontario Region

As part of the national program, Wildlife '87 was marked in Ontario Region by a series of projects and other activities. April activities began with National Wildlife Week at the National Museum in Ottawa. At the Ottawa Science Fair, a conservation project was selected in honour of Wildlife '87 and a copy of "Birds of Canada" given the winner. Wildlife '87 was featured in the CWS/OR exhibit at the Brighton Lions Club Sports Show and at the Ontario Ecology and Ethology Colloquium. Throughout the year, CWS/OR worked closely with Ontario Wildlife '87 Co-ordinator, Ian Kirkham, supporting his activities and helping present Wildlife '87 exhibits, posters, and materials at Ramsar and CITES Conventions, the Federation of Ontario Naturalists annual conference, and Environment Week/World Environment Day events. CWS/OR contributed to national and Ontario Newsletters and provided Wildlife '87 materials to numerous individuals, NGOs, school boards and other groups. A series of articles describing the major wildlife initiatives of the Region were distributed to Ontario daily newspapers.

In September, CWS/OR and Wildlife '87 exhibits were presented at the Children's Environmental Festival at Toronto's Harbourfront. CWS/OR and Wildlife '87 materials were also shown at the Federation of Ontario Naturalists' "Introduction to Bird Watching" at the Harbourfront in November, and at a Waterfowl Viewing Weekend and Open House at St. Clair NWA. In December, CWS/OR attended a reception hosted by the Minister of Natural Resources to honour MNR's Conservationist of the Month Award Winners. To launch the spirit of Wildlife '87 into another 100 years of conservation, our Director spoke, and Wildlife '87 exhibits and materials were presented. CWS/OR was instrumental in organizing "The Art of Survival", a Wildlife '87 event of national scope. An art book companion piece for this Royal Ontario Museum exhibition retails across Canada with a portion of proceeds credited to the Endangered Species Recovery Fund. At CWS/OR's Ottawa office Christmas party, Wildlife '87 posters and materials were given to children. Wildlife '87 was concluded with a Christmas birding "Kick-on" event to launch another century of wildlife conservation in Canada. CWS/OR participated through its ongoing staff activity in Christmas Bird Counts and the St. Clair NWA's Count.

Western and Northern Region

Wildlife '87 resulted in a full commitment by Habitat Staff to make the program a success. It was highlighted at Last Mountain Lake in June when a Federal-Provincial Agreement was signed by the Honourable Tom McMillan and by the Honourable John Maxwell, Minister of Saskatchewan Parks, Recreation and Culture to designate Last Mountain Lake as a National Wildlife Area. The Agreement was witnessed by His Royal Highness, Prince Philip, Duke of Edinburgh.

Additional events associated with Wildlife '87 are mentioned in other sections of the Annual Review under Migratory Birds Conservation -- Regional Activities.

