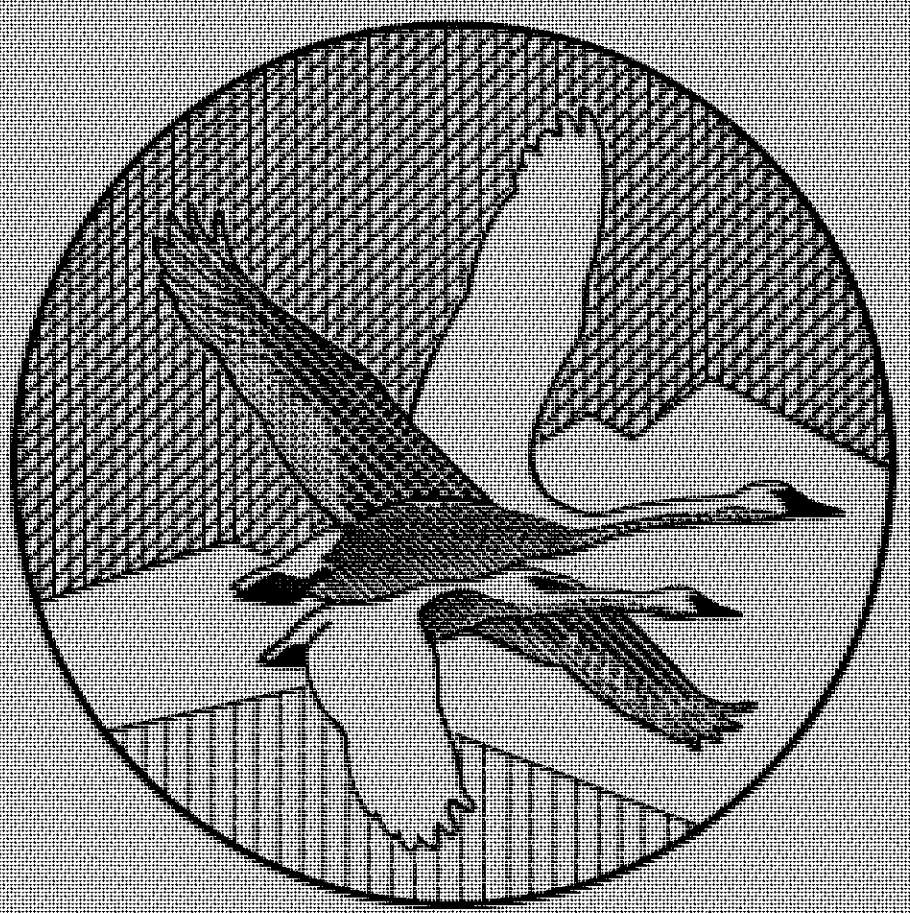
PROCEEDINGS & PAPERS



The Sixth
Trumpeter Swan Society Conference

Proceedings & Papers

of the
Sixth Trumpeter Swan
Society Conference

David K. Weaver
Editor

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The Trumpeter Swan Society
August 1981

Conference hosted by the
Anchorage Audubon Society
at the
Anchorage Westward Hilton
Anchorage, Alaska
September 7-11, 1978

Conference Chairman
James G. King

Conference Program Co-chairmen
Sigurd T. Olson
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Preface

It was great to meet in Anchorage, Alaska in September of 1978, where wrote former Society President Raymond St. Ores, "The heady and magnificant aroma was omnipresent." During St. Ores' talk on "Why a Trumpeter Swan Society," Ray said that, "We speak for the Trumpeters because the swans cannot speak for themselves."

The objectives of the Sixth Trumpeter Swan Society Conference were: 1) to focus attention on the 80 percent of the world population of Trumpeter Swans that summer in Alaska; 2) to learn what plans and programs the various landowners who will control Trumpeter Swan nesting habitat have for safeguarding this unique bird; 3) to anticipate and discuss future problems and needs of the Alaskan Trumpeter Swan population in view of an expanding economic and human community; and 4) to provide an opportunity for conferees to observe Trumpeter Swan habitat.

All of those objectives were met with gusto. A total of 67 conferees were registered and many others sat in for parts of the paper sessions. Alaska had 43 registrants and British Columbia and Alberta had three each. Two participants each came from England, Hawaii, Maryland, Minnesota, and Washington, DC. Participants ranged from representatives from the United States and Canadian governments and the State of Alaska to spokesmen for the Alaskan Federation of Natives and the Alyeska Pipeline Service Company.

It was proper that Mel Monson, who discovered Trumpeter Swans nesting in the Copper River watershed, would welcome us to Alaska. It was good to hear from the author of The Trumpeter Swan, Its History, Habits and Population in the United States (1960), Win Banko. (That great book was reprinted by Bison Press in 1980 and is recommended for your study.) Henry Hansen also came from Hawaii to tell us about rediscovering Alaska's Trumpeters. Former Society President, Ron Mackay, came from White Rock, British Columbia, to describe the Trumpeter as an endangered species in Canada.

The half-day sessions on research and on management considerations made us realize that scientists were busy studying the Trumpeter's needs and that Alaska land management agencies were protecting and managing Trumpeter Swan habitat. The session on "Winter Distribution, Habitat and Habits" demonstrated that wintering habitat may be as critical for Pacific Coast Trumpeters as it is for the mid-continent population (the scarcity of adequate habitat in the current wintering ranges may be the most important limiting factor for all Trumpeter Swans).

The Sixth Conference was a meeting of the "old-timers" and the "newcomers" in Trumpeter Swan research and management--a meeting of the Bankos, Sladens, Hansens, Mackays, and Kings with the Timms, Sheas, Turners, McKelveys, and Davies. The Sixth Trumpeter Swan Society Conference provided "a framework for the exchange of knowledge about the Trumpeter Swan" and "a common meeting ground for all who are interested in the Trumpeter Swan." It also helped "to promote research into the ecology and management of the Trumpeter Swan," as well as "to advance the science and art of Trumpeter Swan management, both in captivity and in the wild." The Sixth Conference went a long way toward meeting a number of the Society's objectives.

To you fortunate readers who have secured copies of the Sixth Conference Proceedings and Papers, may I suggest that you read between the lines. The Conference was held during real strife in Alaska over what interests would control the lands. The Alaskan primary elections were based on environmental issues, and the Governor vote was nearly tied between the Republican and Democratic parties, with Jay Hammond re-emerging as Governor several weeks later. This was history in the making.

Harold H. Burgess
President
The Trumpeter Swan Society
August 1981

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Acknowledgments

The Sixth Trumpeter Swan Society Conference was hosted by the Anchorage Audubon Society, a non-profit conservation organization which emphasizes environmental awareness and environmental education. Many of its members contributed freely of their time and talents. Special thanks to: Jane Glynn and Elaine Pratt, visitor's information packet; Janet Klein, program booklet; Thelma Nunguesser and Peggy Tans, banquet arrangements; John Pitcher, illustrations; Sharon Pitcher and Judy Shuler, publicity; Stacey Scott, field trip coordinator; and Gordon Tans, overall coordinator. Members of Anchorage Audubon were willing and able workers and gracious hosts and hostesses.

Field trip leaders were various, but Garvan Bucaria and Walt Pedersen must be singled out as the primary contributors. Garvan provided a select, adventuresome few with an intimate look at the Copper River Delta country and Walt flew many conferees in his float plane on a tour of the Kenai National Moose Range and environs. To them, sincere appreciation and gratitude.

Many people participated in the Conference's paper and panel sessions. The contribution of their knowledge and experience is greatly appreciated. Active support of the Sixth Trumpeter Swan Society was given by many agencies and organizations, including: Department of the Interior, U. S. Fish and Wildlife Service, U. S. Forest Service, National Park Service, Tennessee Valley Authority, Canadian Wildlife Service, Alaska Department of Fish and Game, Alaska Department of Natural Resources, British Columbia Fish and Wildlife Branch, National Audubon Society, U. S. Army, Chugach Natives, Inc., NANA Development Corporation, Alyeska Pipeline Service Company, and Hennepin County Park Reserve District.

Ron Way, as Special Assistant to the Assistant Secretary of the Interior for Fish and Wildlife and Parks, did an admirable job in representing the Department of the Interior. He did his homework in preparing for the keynote address which dealt with Alaska Native and political affairs, the Alaska National Interest Lands Bill, and Trumpeter Swans, alike. Well done, and thanks.

Mardy Murie, a longtime voice for natural resources conservation, took time from her busy schedule to provide conferees with food for thought in speaking of the Trumpeter Swan as a symbol--symbol for a healthy, balanced world.

Special thanks are due to Forrest B. Lee of the Fish and Wildlife Service's Aleutian Canada Goose Recovery Team, who traveled all the way from Adak in the Aleutian Islands to attend the Conference and to present a slide show about the Aleutian Canada Goose Recovery Program. It was interesting and well-received.

And to Mel Monson who welcomed The Trumpeter Swan Society and the Sixth Conference to Alaska, and to the people of Alaska who offered such heartwarming hospitality, thank you for helping to make a memorable Conference.

Conference Chairman, Jim King and Program Co-chairmen, Sig Olson and Dave Weaver, provided the overall organization, continuity, and impetus to the Sixth Trumpeter Swan Society Conference, the Alaskan conference spawned by Society President Ray St. Ores on the waters of Jackson Hole's Snake River.

A sincere debt of gratitude to Ronald Robbins for providing tape recordings of portions of the Conference proceedings not covered otherwise and to Elaine Pratt, who was magnanimous with her time, contributing her secretarial talents liberally in transcribing the Conference tapes. Alice Fink and Ann Bassett patiently typed the final copy.

* * * * *

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Program

The Sixth
Trumpeter Swan Society Conference
Anchorage, Alaska
September 7-11, 1978

Thursday, September 7

8:00 am . . . . . Registration, Anchorage Westward Hilton

Morning Session, 9:15 - 12:30

Conference Opening

Introduction . . . . . Conference Chairman, James G. King
Welcome to Alaska . . . . . .Melvin A. Monson
Response . . . . . President, The Trumpeter Swan Society, Raymond L. St. Ores
Welcome to Anchorage . . . . . President, Anchorage Audubon Society, Gordon Tans
Keynote Address . . . . . Special Assistant to the Assistant Secretary of Interior for Fish and Wildlife and Parks, Ron Way

Conservation of a Wildlife Resource
Chairwoman, Elaine Pratt, Anchorage Audubon Society

The Swans, Focal Point for Worldwide Bird Conservation. . . . . .William J. L. Sladen
Trumpeter Swans and the Growth of a Conservation Ideal. . . . . .Winston E. Banko
Alaska Natives and Habitat. . . . . John T. Shively
Citizen Action for Trumpeter Swan Conservation. . . . . David R. Cline
The Trumpeter Swan as Symbol . . . . . Margaret E. Murie
Why a Trumpeter Swan Society . . . . . Raymond L. St. Ores

12:30 - 1:30 pm Lunch

Afternoon Session, 1:30 - 5:00

Populations Status
Chairman, Winston E. Banko, National Park Service

Rediscovering Alaska's Trumpeter Swans. . . . . Henry A. Hansen
Status of the Trumpeter Swan on the Kenai National Moose Range. . . . . .Robert A. Richey
The Trumpeter Swan--an Endangered Species in Canada . . . . . .Ronald H. Mackay
Current Status of Wild Populations of Trumpeter Swans on National Wildlife Refuges in the Lower 48 States . . . . . Eugene D. Stroops

Current Research and Research Needs
Chairman, Winston E. Banko, National Park Service

Trumpeter Swans in the Grande Prairie Region of Alberta . . . . . Gordon Holton
An Evaluation of Trumpeter Swan Breeding Habitat in the Grande Prairie Region of Alberta . . . . . .Bruce Turner
Nesting Ecology of Trumpeter Swans in Yellowstone National Park . . . . . .Ruth E. Shea
Panel Discussion -- Moderator, James A. Cooper, University of Minnesota
Panel Members: Bruce Turner, Ruth E. Shea, William J. L. Sladen, George K. Brakhage, R. W. McKelvey

5:00 pm Dinner break

7:30 pm Cracker-barrel -- Leader, Raymond L. St. Ores, Fish and Wildlife Service
Program: The Aleutian Canada Goose Recovery Program . . . . . Forrest B. Lee

Friday, September 8

8:00 am . . . . . Registration, Anchorage Westward Hilton

Friday, September 8 (cont'd.)

Morning Session, 9:00 - 12:30

Management Considerations
Chairman, Henry A. Hansen, Fish and Wildlife Service

Nongame Wildlife Program of the U. S. Fish and Wildlife Service . . . . . Harvey K. Nelson and George K. Brakhage
The Need for Joint Cooperative Action in Land Use Planning for Swan Habitat Protection . . . . Michael C. T. Smith
Relationships between Trumpeter Swan Distribution and Cabins in the Susitna Basin, Alaska. . . . . Daniel E. Timm
The Pacific Coast Trumpeter Swan Management Council: a Proposal . . . . . .James G. King
Impact of Hunting and Disturbance on the Interior Trumpeter Swan Population . . . . . Peter E. K. Shepherd
Moose River Swans, Duck Hunters, and the Bureaucracy . . . . . .Walt Pedersen
The Trumpeter Swan Population of Grande Prairie, Alberta . . . . . Bruce Turner

12:30 - 1:30 pm Lunch

Afternoon Session, 1:30 - 5:00

Management Considerations (cont'd.)

Panel Discussion -- Moderator, James G. King, Fish and Wildlife Service
Panel Members: Michael C. T. Smith, Bruce Turner, James C. Bartonek, Daniel E. Timm, Peter E. K. Shepherd

Providing for Habitat

Panel Discussion -- Moderator, Dave Spencer, University of Alaska
Panel Members: Louis Jurs, Sigurd T. Olson, Richard J. Hensel, Carl A. Propes, Jr., Ben L. Hilliker, Daniel E. Timm, Wilbur "Skip" Ladd, Jr.

7:00 - 9:00 pm Happy Hour and Banquet

Saturday, September 9

8:00 am . . . . . Registration, Anchorage Westward Hilton

Morning Session, 8:30 - 12:30

Winter Distribution, Habitat, and Habits
Chairman, Harold H. Burgess, Fish and Wildlife Service

Distribution and Abundance of Wintering Trumpeter Swans in South-coastal Alaska . . . . . M. E. "Pete" Isleib
The Winter Habitat of Trumpeter Swans in the Vicinity of Petersburg, Alaska . . . . . Jeffrey Hughes
Winter Distribution, Mortality Factors, and Habitat Conditions of the Trumpeter Swan in British Columbia . . R. W. McKelvey
Status of Swans Wintering on Vancouver Island between 1971 and 1977 . . . . . R. G. Davies
The Winter Distribution of Trumpeter Swans in the State of Washington. . . . . .Robert G. Jeffrey
Movements of Trumpeter Swans into and within the Tri-state Area of Idaho, Montana, and Wyoming . . . . Ruth E. Shea
The Trumpeter Swan on Army Lands in Alaska . . . . . H. Griese, W. Gossweiler, and J. Kerns
Ancestral Breeding and Wintering Ranges of the Trumpeter Swan
in the Eastern United States . . . . . .Philip M. Rogers and Donald A. Hammer
Panel Discussion -- Moderator, Ruth E. Shea, University of Montana
Panel Members: Pete Isleib, Jeffrey Hughes, R. W. McKelvey, R. G. Davies, Donald A. Hammer

12:30 - 1:30 pm Lunch

Saturday, September 9 (cont'd.)

Afternoon Session, 1:30 - 5:00

Regular Membership Meeting of The Trumpeter Swan Society
Chairman, Ray St. Ores, President of The Trumpeter Swan Society

Sunday, September 10 and Monday, September 11

Field trips to view Trumpeter Swan habitat:

#1 -- Cordova and float plane survey of Copper River Delta.

#2 -- Automobile tour of Kenai Peninsula and float plane survey of Kenai National Moose Range from Sterling.

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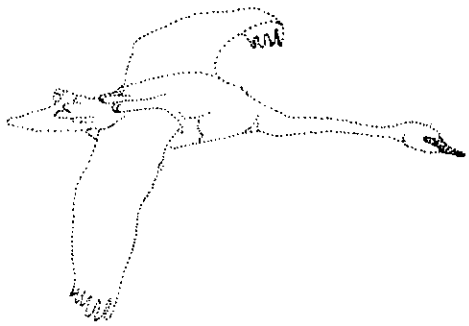

Thursday Morning - September 7

Conference Chairman: James G. King
U. S. Fish and Wildlife Service, Juneau, Alaska

CONFERENCE OPENING

REMARKS OF THE CONFERENCE CHAIRMAN

James G. King

The Sixth Trumpeter Swan Society Conference is now in session. It's certainly great to see you all here and I look forward to having a chance to chat with each of you. I must say I have a feeling of rather eager anticipation and excitement when I look at the agenda that our program committee has prepared, and the people that are on it, and all of you that are here. At the Fifth Conference, 2 years ago, I detected that there was a great deal of enthusiasm for an Alaska meeting, and as I was the only person from Alaska present, I got approached on this matter, and my immediate reaction was, "Impossible!" I've got a busy field season each summer and decided it didn't seem appropriate to do it in Juneau. But, your officers were persistent and I finally agreed to see if I could find somebody else to do it. So when I got back, I contacted Janet Klein of the Anchorage Audubon Society and she discussed the matter with the Anchorage Audubon Board. They graciously agreed to be host for The Trumpeter Swan Society. And I also contacted Sig Olson, who is one of the few Charter Members of The Trumpeter Swan Society, I believe, that lives in Alaska, and he agreed to be co-chairman for the program. So, this made me think of Harry Truman and his famous "buck stops here," and my part in this meeting has been not stopping the buck. I've passed it all the way.

Alaskans like to have the feeling that they have an extra measure of energy and enthusiasm. Sometimes it doesn't materialize, but I really have the feeling that as far as this meeting is concerned, the people from the Anchorage Audubon Society have shown a real measure of Alaskan enthusiasm, and I'm hoping at the appropriate time that Sig and Dave Weaver (the other program co-chairman) and Gordon Tans of the Audubon Society will introduce the many people that had a part in making this meeting come about.

As many of you are aware, early explorers a hundred years and more ago reported on Trumpeter Swan occurrences in Alaska. There's been a few specimens of eggs and skins in museums, so they were known to be here for a long time. However, it wasn't until 1956 that a trained biologist and a scientific journal described a breeding population of Trumpeters in Alaska. That individual has now completed nearly three decades of wildlife work in Alaska. He's still employed by the Fish and Wildlife Service here in Anchorage and we thought it would be most appropriate for him as the senior Trumpeter Swan investigator in Alaska to provide a welcoming for The Trumpeter Swan Society. So I would like to introduce to you the George Washington of Trumpeter Swan work in Alaska, Melvin Monson.

* * *

WELCOME TO ALASKA

Melvin A. Monson
U. S. Fish and Wildlife Service
Anchorage, Alaska

Boy, what an introduction! Welcome folks! Mr. Chairman, Mr. Way, Members of The Trumpeter Swan Society, and guests. Little did I realize as I was plowing my way through the glacial waters of the Brenner and Tasnuna Rivers 24 years ago searching out salmon spawning areas that I would be addressing the Sixth Trumpeter Swan Society Conference. In fact, way back then I was too concerned about safely navigating the rough waters of these rivers in a small rubber boat to realize the significance of finding a nesting population of Trumpeter Swan. I am pleased to have this opportunity to welcome you to Alaska. It is not often that a fishery biologist is asked to participate in a bird conference. This may be a first.

It is only proper that the Conference be held here, as the State supports about 80 percent of the known Trumpeter Swan population. This should come as no great surprise to those who know the wilderness characteristics of much of the land and to those who understand the basic habitat requirements of this magnificent bird. One complements the other.

Prior to World War II, man's impact on Alaska's environment did not result in significant changes in land use nor did those impacts impose a serious threat to wildlife. Following the war, however, the picture changed rapidly as man began to promote developments of all kinds. Thirty years ago, when I first arrived in this country, one could fly for days and not be aware of man's presence.

With the discovery of major oil fields on the Kenai Peninsula and Cook Inlet, this picture changed drastically. Within a relatively few years, thousands of miles of seismic line were run through remote areas in the search for oil. The discovery of oil at Prudhoe Bay followed by the construction of the 800-mile Trans-Alaska Pipeline has had by far the most significant environmental impact to date. Plans are now underway to construct a gas line. Other developments, such as large hydroelectric projects, logging, mining, and road construction, can result in significant losses of fish and wildlife habitat unless they are carefully planned.

Other major actions such as the d-2 Legislation, State and Native land selections may further threaten the existence of Trumpeters.

Your interest in the welfare of this great bird, as demonstrated by your attendance at this meeting, plus the fact that the Conference is being held in Alaska, is a landmark in conservation. The preservation of Trumpeter nesting and rearing areas is indeed a challenge. The results of your deliberations and the actions that you recommend can help to assure the species' survival.

We hope you will enjoy your visit and that you will participate in the scheduled field trips to see some of the Trumpeter Swan's habitat in this magnificent country. (Incidentally, Mt. McKinley was available for viewing last night.)

Anchorage is our largest city and has about everything you can expect to find in any large city. It has many fine hotels, restaurants, varied entertainment, arts and craft shops, art galleries, and a fine museum. Even though the prices may seem high, you get more for your dollar here than you would in Munich, London, or Tokyo.

God's creative ability is on display for hundreds of miles in any direction from Anchorage. A sunny day is required for maximum appreciation.

When I accepted the invitation to welcome you, I had no idea that many people would attend from Canada, Hawaii, the lower 48 states, and Alaska. I am amazed, for somehow I had envisioned a small gathering. Such interest requires a story.

Many years ago, a lady who lived in Billings, Montana, was considered to be one of the foremost authorities on the life of General Custer. When she built a new home she decided to have a picture painted of General Custer in action at the "Battle of the Little Bighorn." The picture was to occupy an entire wall in the living room of her new home. She hired the best artist in the West and instructed him to paint a picture of Custer. The only requirements she set forth were that the painting had to reflect what Custer was thinking just before he was killed and that she didn't want to see it until it was completed.

The artist went to work and when it was finished the lady invited her friends for the unveiling. When the curtain was pulled, there stood Custer at the top of a hill. Above his head was a cow with a halo over its head. In the foreground were great numbers of Indians picking cotton. The guests were silent for some time. Then, one by one they thanked her and said good night. Soon only the artist remained. The lady turned to him and said, "What possessed you to paint such a picture?" The artist replied, "You asked me to paint a picture of Custer and what was on his mind before he died. I figured he said, 'Holy cow, look at all those cotton-pickin' Indians'."

As I look out at this large gathering here today, all I can say is, "Holy cow, look at all the cotton-pickin' swan watchers."

Again, let me welcome you to Alaska!

* * *

Jim King: Our next speaker is a person who had a lifelong dream of coming to Alaska, but somehow he'd never gotten it worked out. When I showed up down in his country 2 years ago, I think suddenly the light dawned and he looked on me as opportunity. Really, the concept of this meeting we discussed on a field trip in Jackson Hole. With that I would like to introduce our President, Ray St. Ores.

RESPONSE

Raymond L. St. Ores
President, The Trumpeter Swan Society

Thank you, Jim. It was 2 years ago under the shade of the Grand Tetons when the idea did appear, and Jim was essentially correct that Alaska might be a nice place for me to come for a meeting. He said he was approached. As a matter of fact, he was told that the next meeting was going to be up here, and he was going to be in charge of getting the thing going. He was hesitant, but before the meeting was over down there, as we were floating down the Snake River on a raft, he decided that he would accept the responsibility, and that's the reason why we're here today. We are here, of course, because Alaska does have 80 percent of the world's population of Trumpeter Swans. It is a magnificent place for them to be, and Governor Mel, I certainly accept your welcome to Alaska. I've known Mel for some years. He is an employee of the Fish and Wildlife Service, and I knew him when he was in Washington a great many years ago. A beautiful, beautiful state, a beautiful city, beautiful meeting place -- what more could we ask for? A little different than the first meeting we had. The first conference was held, I guess, around 1969 in a little log cabin in northern Minnesota, and we, the conferees and attendees, slept in barracks up there. One of the people who was at that meeting is also here today, the former manager at Red Rock Lakes National Wildlife Refuge. He got ill and we had to take him off to the hospital from the boondocks up there. You'll meet him in a little bit, later today.

There was some mention of the number of long distance travelers here. It is truly an international society. We do have Mr. and Mrs. Ted Down, Ted and Florence, from England. I wish these folks would stand up. Ted told me last night over dinner at a legal sounding English pub restaurant (I don't remember what the name of it was, I could not prounounce it if I had to, three long names) that he belongs to some 60 conservation societies. I don't know what he does for a living, but I think he probably has access to the Queen's treasury!

Thanks to the Anchorage Audubon Society for hosting us. This is the Top Cob's swan song. Pun. We're happy to be here and let's get on with the program. Thank you so much.

* * *

Jim King: The Anchorage Audubon Society is an extremely active and interesting group. I think they have a substantially larger membership than The Trumpeter Swan Society. They're a great bunch. The president now is Gordon Tans, an attorney here in Anchorage. Gordon heads this great organization, and when you see the events that have been arranged for this meeting, you'll be impressed with their style of getting things done. So next, I'd like to present to you Gordon Tans of the Anchorage Audubon Society.

WELCOME TO ANCHORAGE

Gordon Tans
President, Anchorage Audubon Society

Thanks, Jim. Welcome to Anchorage and to the Conference. I personally don't know too much about Trumpeter Swans. I've seen a few outside of Anchorage, and sometimes a few are reported passing through Potter Marsh, just south of Anchorage in the springtime. But other than that, my experience with Trumpeter Swans has been nothing. In fact, I was totally unaware of The Trumpeter Swan Society until last summer, about August, when Dave Weaver came into town. He was considering, of course, the conference being in Alaska, and I believe he decided either in Anchorage or shortly before he got here that it was going to be held in Anchorage. I think it was a sunny day that day, however. That was about a year ago, and we've had a year to plan the program.

There's a number of Anchorage Audubon people who really are owed thanks for this. I don't see most of them. Elaine Pratt is here. She prepared the visitor information packets that were distributed to some of the out-of-town people. The written program is solely the work of Janet Klein, one of our past presidents who was referred to earlier. The art work in the program is from John Pitcher, who very unfortunately could not be here. He's out of town. But some of his work, including some sketches of the Trumpeter Swans are on display at the Artique. The Artique is a gallery which is just two blocks away on G Street, between 3rd and 4th. Judy Shuler, whom I don't see here, is responsible for the publicity. She's gotten Ray St. Ores and Sig Olson on TV, and we've got spots on the radio, and things have been in the newspaper. So, we may get more people out on Saturday. At any rate, I'm really pleased at the attendance we have now. So, with a year to plan, things should go fairly smoothly. If they do, then you have those people to thank whom I've mentioned. If they don't, I suggest you complain to Ray St. Ores.

We've got the field trips set up. I encourage you to take one or more, if you can, of those field trips. The trip to Kenai on Sunday, which is a drive down the highway, a 3-hour drive through some beautiful territory, seems to be the most popular one so far. We do need people to drive on that trip. Perhaps there are some local people who have a car and are willing to take some riders down there. So, if you can drive, there's a sign-up sheet out with the rest of the field trip sheets.

I'm really pleased to see so many people here. You know, when we started out over the course of the past year, I've asked Dave Weaver and Jim King and Sig Olson, "Well, how many people do you think are going to come to the Conference?" And they would say, "Well, I don't know. How many people do you think are going to come?" So based on that concrete type of information, we went ahead and made the plans, and well, here we are. So, I hope you enjoy yourselves, and once again, welcome.

* * *

Jim King: We have an example of the dynamic nature of the Carter Administration, now. Dick Myshak, who was listed on your program as going to be here representing the Secretary of the Interior, got diverted to other things, and he has sent his able special assistant to fill that spot on our program. We're lucky to have him. I talked to him yesterday, and found that he's a very knowledgeable person in land management affairs of the United States. We're very glad to have here with us, Ron Way. I think he also said he's a member of the Minnesota Mafia of the Department of the Interior.

KEYNOTE ADDRESS

Ron Way
Special Assistant to the Assistant Secretary
for Fish and Wildlife and Parks
U. S. Department of the Interior
Washington, DC

I've been accused of worse. I found out last week during a trip to Bismarck, North Dakota (I was talking with the Governor's folks out there trying to settle a wetlands problem that we've got, many of you may know about it), that I was going to be coming up to Anchorage and that I had to prepare a speech for this gathering. Now, I just want to assure you, so that there are no illusions here, my background is in political science. I'm a journalist, I worked in pollution control, and I didn't even hear about the Trumpeter Swan until a week ago. But, this has provided me with a great opportunity to find out something about this magnificent bird. And so, what I did, I checked out Winston Banko's book on the Trumpeter Swan, read it cover to cover, and I was just amazed as to find out what kind of creature it is that we have here in the United States. And, I was pleased too to find out something that I didn't know before -- that the Hennepin County Park Reserve District in the Twin Cities in Minnesota has some Trumpeter Swans. They're providing some information, some research down there, and Bob Herbst (my boss) made sure that I would know this little fact before I got up here.

I must say that I'm just not accustomed to going five time zones away from home on such short notice. This morning I woke up at 3:30, something I never do, and, darn, I couldn't get my eyes closed again. There's not much to do in Anchorage at 3:30 in the morning. So what I did, I went back and read some more documents on the Alaska Lands Bill that is pending before the Congress, and from there, I picked up some more things that I want to tell you this morning. I'll get into that a little bit later.

President St. Ores, Chairman King, officers and members of The Trumpeter Swan Society, members of the Anchorage Audubon Society, ladies and gentlemen . . .

It is my pleasure to be with you today here in Alaska for the Sixth Conference of The Trumpeter Swan Society. Alaska -- land of the midnight sun, the grizzly, the Eskimo, the Trumpeter Swan, the caribou, the bush pilot, Mt. McKinley . . . and today, the land of one of the hottest races for Governor in the Nation.

Like most of you here, like Alaskans and like persons elsewhere, we in the U. S. Department of the Interior have an interest in the outcome of the Alaska election because the Alaska National Interest Lands Bill now pending before the United States Congress received considerable attention in the just-ended primary campaign. And the legislation likely will receive even more attention in the upcoming general election campaign. As you know, the Department of the Interior has the lead responsibility for representing the Administration on the Alaska National interest lands legislation, the so-called d-2 bill. The debate on this bill in the Congress as well as here in Alaska is critically important in shaping the future of this State, its people, its wildlife, and its spectacular and valuable natural resources. President Carter and Interior Secretary Andrus have assigned the Alaska lands bill as the Administration's No. 1 environmental priority.

Make no mistake about it, the outcome of these debates affects all of us, not the least of whom are those of you who are devoted to the objectives of proper caring for the Nation's waterfowl species and other wildlife.

My remarks today are in behalf of Mr. Richard Myshak, Deputy Assistant Secretary for Fish and Wildlife and Parks. Mr. Myshak had to remain in Washington, in major part because the U. S. Senate will soon resume its deliberations on the d-2 Legislation. So very much is at stake with that legislation that Dick chose to remain close to the debate.

So, my greetings on behalf of Mr. Myshak. My greetings also on behalf of the "top cob" for Fish and Wildlife and Parks in the Department, Assistant Secretary Robert L. Herbst. Like Dick Myshak and me, Secretary Herbst hails from the great State of Minnesota, and all of us are proud of the fact that President St. Ores, like several others here today, makes his home in our part of the country. Although Minnesota no longer is within the natural migratory range of the Trumpeter, we note with some pride that researchers are utilizing the Hennepin County Park Reserves in Minnesota to continue the important study efforts on the Trumpeter Swan.

But in particular, Secretary Herbst and Dick Myshak want to extend to all of you their sincere congratulations for the outstanding success you folks have had in helping make the world safer for the Trumpeter.

Because of the high importance of the d-2 bill, I want to take a few minutes to review some of the key issues in that debate, which now is centered in the U. S. Senate. I'm going to read from Secretary Herbst's testimony last April before the House Merchant Marine and Fisheries Subcommittee. In his testimony, Secretary Herbst discussed some general concepts that were used in developing the proposal, and he reviewed the Administration's specific recommendations for parks, wild and scenic rivers, and refuges.

Today, I'm going to read only a small portion of the testimony, including those sections that address two major points of controversy: the Yukon Flats region and the Nowitna region.

From his testimony:

> "Opponents of conservation in Alaska have said the Administration is merely playing a 'numbers game' with Alaska acres. Such statements reflect either a basic misunderstanding of the Administration's proposals or a deliberate distortion of them.
>
> "In developing these proposals we simply recognized the fundamental fact that land is the most basic element of this conservation proposal. Without the land, there is nothing else, Mr. Chairman, no grizzly bears, no caribou, no trumpeter swans or canvasback ducks. And unless that land is then managed for the protection of the resources, all the 375 million acres in Alaska will not be enough to protect the array of birds, mammals and fish that survive there now.
>
> "Mr. Chairman, it is simply imperative that we protect both enough land -- the right land -- and that we impose the correct management regime if we hope that our grandchildren will still be able to see the diversity of wildlife that today still sets Alaska's wildlands apart from what remains in all the rest of this Nation -- and most of the world.
>
> "It was precisely because we were able to carefully tailor a proposal that matched resources, boundaries and management that the Administration is able to recommend its balanced 92 million-acre approach to Alaska National interest lands. Initially I recommended to Secretary Andrus that more than 120 million acres of Federal lands be included in the proposals. All of these acres qualified for inclusion in the Four Systems, but many of those acres were in areas with potentially serious use conflicts. Ultimately Secretary Andrus and I and the other Assistant Secretaries cut nearly 30 million acres from the original proposals in an effort to avoid serious conflicts with the State of Alaska, some of the 12 Regional Native Corporations, and with known and even potential mineralized areas. It was possible to drop such large areas from our proposals precisely because we aren't playing a 'numbers game.' We were confident that these changes would cause no irreparable harm to the proposals because the areas, the resources and management approaches were so carefully matched. But I want to emphasize that they are the bottom line -- they contain no fat. . . .

"I anticipate that amendments will be offered to place the lands we recommend as the Nowitna and the Yukon Flats National Wildlife Refuges under the jurisdiction of the Forest Service on the grounds that to do so would permit 'multiple use' management of the resources in these areas. The Administration opposes such changes.

"Throughout the debate on this bill, both in and out of Congress, the term 'multiple use' has been used in a variety of ways which have sometimes obscured the issues. While certainly it is true that a refuge can almost always accommodate more than its principal use -- protection of fish and wildlife -- the fact is that these other uses must be compatible with the refuge's primary mission. On the other hand, the traditional concept of multiple use as applied to Forest Service and BLM lands does not necessarily give primary consideration to wildlife values. Multiple use in this sense is not appropriate for the Nowitna area, which produces nearly one-quarter million waterfowl each year.

"Similarly, it is not appropriate for the Yukon Flats area which annually contributes 2.1 million ducks to all parts of the United States, Canada, and Mexico.

"In fact, often multiple use management when misapplied results in a single use which destroys or degrades other values. In my opinion, there is no more clear example of single use of a resource than draining a prime wetlands area for development.

"I urge the Committee to approach the establishment of these recommended units of the Wildlife Refuge System not on the basis of short-term economic gain for a few but rather on the basis of long-term protection of their invaluable and irreplaceable wildlife values. By so doing you will serve the National interest, and you will serve future generations. . . ."

Now, let's take a closer look at what has happened with the proposals for protecting the important waterfowl habitat in Nowitna and Yukon Flats.

Nowitna - Secretary Herbst noted in his testimony that the Administration's proposal for a wildlife refuge along the Yukon and Nowitna Rivers recognized that these areas contain, he said,

"Some of the highest value nesting habitats in the proposal, including nesting areas for one of Alaska's expanding trumpeter swan populations. Vital nesting habitats for the endangered peregrine falcon and migration feeding sites for geese are included in the proposal."

Secretary Herbst strongly urged the Committee to agree with the Administration proposal for Nowitna.

The Committee and the House agreed, and placed 1.56 million acres of the Nowitna area in refuge status.

Unfortunately, the Senate is now considering a proposal that places most of the area in a BLM conservation unit. Zero acres are included in a refuge.

Multiple use.

Yukon Flats - In his April testimony, Secretary Herbst strongly recommended that the Yukon Flats -- which is one of the crown jewels of wildlife habitat in North America -- be placed in refuge status. The Committee agreed, and in its report it noted that the Flats area is Alaska's largest interior solar basin, containing 40,000 lakes, oxbows, and potholes and 25,000 miles of streams which provide extremely valuable feeding grounds for many species.

The Committee report said that 130 species of birds have been identified in the Yukon Flats area. From the report:

"The estimated density of ducks is 99.4 per square mile with total breeding populations of 1.07 million. This breeding population produces an estimated fall population of 2.1 million which migrates to all parts of the Lower 48, Canada and Mexico. . . . There is also an estimated fall population of 8,000 Canada and 5,000 white-fronted geese migrating to all four flyways, Canada and Mexico."

Also, the report said that because the Yukon Flats area is not subject to drought, it may have the highest sustained rate of waterfowl production in the United States and Canada.

The full Committee and House agreed that the Yukon Flats area deserved wildlife refuge status, and made it a 9.4-million-acre refuge.

Unfortunately, the Senate is now considering a bill which divides the Yukon Flats into a refuge, in part, and a BLM recreation area, a BLM conservation unit and a National Forest managed by the U. S. Department of Agriculture.

Multiple use.

Obviously, the task before us is to convince the Senate that such areas as Nowitna and Yukon Flats -- and some of the other valuable wildlife lands -- deserve a greater degree of protection. That task will not be easy.

* * *

In preparing for today, I had the good fortune to read Winston Banko's paper, The Trumpeter Swan, and other documents on this fascinating bird. I came across some quotes by writers that I thought were interesting:

In 1912, Edward Howe Forbush wrote in his History of Game Birds:

> "The trumpeter has succumbed to incessant persecution in all parts of its range, and its total extinction is now only a matter of years. The trumpetings that were once heard over the breadth of a great continent, as the long converging lines drove on from zone to zone, will soon be heard no more."

In his October 1934 National Geographic Magazine article, Allan Brooks said of the Trumpeter:

> "One of the largest living native birds of North America presents a problem for its perpetuation that requires all the intelligence and effort that conservationists can concentrate on it. . . ."

Once on the brink of non-existence, today's Trumpeter Swan population has increased to over 5,000 birds, and, at least in Alaska, apparently is growing. The most current and complete census of Trumpeters summering in Alaska, taken in 1975, disclosed 4,170 birds, which is 80 percent of the total world population. It is appropriate and worthwhile that this Sixth Conference of The Trumpeter Swan Society is meeting here in Anchorage to devote its attention on the special considerations of maintaining Trumpeter Swan habitat in Alaska. It is appropriate for two reasons:

First, as you will hear during the course of this Conference, the problem confronting the Trumpeter in the Lower 48 is one mainly of management of the birds that range there, although I understand that there are some developing problems in maintaining wintering habitat.

Second, decisions on the Alaska d-2 bill and other decisions by the people of Alaska that will be made in the next few months and years will have a critically-important bearing on the future success of the 80 percent of the Nation's Trumpeter Swan population. The special problem confronting the Trumpeter in Alaska is one of maintaining habitat.

The 1975 census of the Trumpeter was broken down into eight geographical areas:

-- the Gulf Coast, extending from Yakutat to Cordova within 20 miles of the coast,
-- the Copper River Canyon directly adjacent to the Gulf Coast,
-- the Gulkana Basin, located between the Chugach Mountains and the Alaska range,
-- the Kenai area,
-- the Cook Inlet Basin, except for Kenai,
-- the Fairbanks area,
-- McGrath, and
-- Koyukuk.

In going through this list, it is important to keep in mind that the d-2 proposals pending in the Congress will miss the most productive Trumpeter Swan habitat.

Habitat areas that will remain Federally owned are in the Gulf Coast area, a major portion of which is on National Forest land, and in the Kenai area, which is part of the Federal Kenai Moose Range. Pending d-2 proposals which would add to Federally-owned Trumpeter habitat include a little more than half of the habitat in the Koyukuk area; a very small portion of the habitat in the Fairbanks area that is contained within the Denali National Park additions; a small portion of the McGrath area; and most of the Copper River Canyon area.

Now, it is difficult to predict what the Congress will finally do with the Alaska d-2 legislation, but the important point is that over 21,000 square miles of eligible Trumpeter Swan habitat almost certainly will remain outside of Federal ownership, leaving a varied ownership pattern for Trumpeter habitat in Alaska.

It is worth noting here that today in Washington there is a good deal of discussion about the future of the Copper River Delta area, and these discussions are important to all of us who are interested in protecting the extremely valuable waterfowl -- including Trumpeter -- habitat in this remarkable region of Alaska. There are many direct interests involved in the present-day discussions -- the State of Alaska, the Chugach Native Corporation, members of both Houses of the Congress, the Fish and Wildlife Service, and the U. S. Forest Service. What is being decided is who will own the land in the Delta area, how the land will be managed, how the potential for coal production will be developed, and how through all of this will there be an equitable solution for the Chugach Native Corporation. Every decision to be made will in some way affect the future of the Delta region and the millions of waterfowl and other wildlife that utilize the area.

So, what does all this come down to?

In my mind, it comes down to two points that are well worth your consideration during this Conference:

First, as I noted, the most productive Trumpeter Swan habitat in Alaska is not now, and will not be, under Federal ownership, even after the Congress completes its work on the pending d-2 legislation. The Trumpeter Swan habitat will be located on lands that are under varied ownership patterns and, hence, will be subjected to a varied array of developmental pressures. Please bear in mind that the Congress cannot legislate and the Administration cannot direct the safety of the Trumpeter Swan. The well being of this magnificent swan is up to The Trumpeter Swan Society, the Audubon Society and the others -- the State of Alaska, the Native groups, and the private landowners, included. A broad conservation effort is an absolute essential.

The second point is: we do not ever again want to see the population of Trumpeter Swans diminish to a point where they must be listed as an endangered species. Not only would that mean that the quality of the human and physical environment has diminished, but, as we all know, such a listing brings with it limitations on any human activity that could further imperil the listed species. For a number of reasons, we must do everything within our collective powers to maintain the high quality of existing Trumpeter and other waterfowl and wildlife habitat in Alaska.

You people have every right to be abundantly proud of your success with the Trumpeter Swan. But don't, for heaven's sake, rest on your laurels. There is much important work that remains to be done.

Thank you, and good luck.

* * * * *

Thursday Morning - September 7

Chairperson: Elaine Pratt
Anchorage Audubon Society, Anchorage, Alaska

CONSERVATION OF A WILDLIFE RESOURCE

TRUMPETER SWANS AND THE GROWTH OF A CONSERVATION IDEAL

Winston E. Banko
National Park Service
Hawaii National Park, Hawaii

It was easy to give a positive response to an invitation to share ideas with you today. Trumpeter Swans occupy special niches in the hearts of us all and I am as pleased to renew acquaintance with this magnificent creature as I am to meet people I have only read about for years.

To visualize Trumpeter Swans in the light of a conservation ideal we need to don a historian's hat and review the events of the past three and a half centuries. We need historical perspective to understand where we stand today and to chart future progress.

Although year of first contact is obscure, European man and Trumpeter Swans have co-occupied the North American continent now for a period of about 270 years. Because identification and record keeping during early settlement of the continent was poor, over 100 years elapsed before Trumpeters were specifically recognized in print. The remaining 170 years can be divided into three more or less distinctive periods, each characterized by different patterns of man's attitudes and activities.

For 185 years (1709-1893), European man responded to Trumpeter Swans in ways which permits the period to be described as follows:

AGE OF DISCOVERY AND EXPLOITATION

It is clear from John Lawson's 1709 account that early pioneers recognized Trumpeters as distinct from Whistling Swans among the host of waterfowl that wintered on the shallow bays and estuaries along the eastern seaboard from Massachusetts to North Carolina. Different accounts, beginning about 1632, indicate principal interest in native swans of this early period was in their flesh for eating and quills for writing. Even before 1800, swan skins became incorporated into the fur trade, remaining an article of commerce for over a century.

There is little doubt that Trumpeters were exterminated over the majority of their historic range nearly to the point of extinction during their initial exploitative 185-year old history. It is significant, however, that appreciation of Trumpeters as living objects also appeared early, first in attempts at domestication (Texas) in 1836, presumably of injured individuals, and later in 1871 by the raising of cygnets (Iowa). It is during this period, too, that American naturalists, both Yankee and Canadian, left us with such a rich legacy of information as to the relative population abundance and geographical distribution of this striking species over the entire breadth and depth of the continent.

ERA OF FEDERAL INTERVENTION, 1894-1935

The nearly two centuries of exploitation of Trumpeter Swans for personal use and commercial profit were followed by a period of government reaction which lasted for 40 years.

In 1894, just as the last few swan skins were being received in the Canadian fur trade, the United States Congress passed and President Grover Cleveland signed the Lacey Act which, by prohibiting killing of wildlife in Yellowstone National Park, thereby almost by chance, furnished protection needed for survival of our largest waterfowl. While the effect of passage of the Lacey Act on Trumpeter Swans in Yellowstone Park during the 1890's is unknown, the declaration of Federal protection over what had previously been considered a local exploitable resource broke new ground and planted the seed for a conservation ethic which was to come to full fruitage later.

By the turn of this century, the conservation prophets of the day were predicting the tragic extinction of the Trumpeter Swan. No one knows how few Trumpeters there were in the United States, south of Canada, three quarters of a century ago, nor when their lowest level was reached. But it seems clear from the picture that emerged later, in the 1920's and 1930's, that there were probably fewer than 50 and perhaps less than 25. Summer records for Yellowstone National Park from 1915 to 1921 indicate a maximum of five seen. A year later, in 1922, a report that there were about 15 swans resident on Red Rock Lakes was credited by survey biologist Charles Sperry, and the same figure for the population was estimated 8 years later.

Numbers of Trumpeters in Alaska during this early period is obscure. While Hansen, Shepherd, King, and Troyer (1971) suggest that about 3,400 Trumpeters may be projected for Alaska on the basis of surveys carried out in 1959 and 1968, abundance during the early years of this century may have been less due to the colder climate then prevalent. According to the foregoing authors, deglaciation has created new breeding grounds for Trumpeter Swans in the Prince William Sound, Yakutat, and lower Copper River Valley areas for at least the past 100 years, and perhaps longer.

In 1918, conservationists won a key Congressional victory of fundamental importance to migratory birds of North America, including Trumpeter Swans, with passage of the Migratory Bird Treaty Act. Subsequent authorization in 1934 to acquire and maintain habitat for waterfowl was of even greater direct benefit. By 1930, the National Park Service began to carry out studies of Trumpeter Swans in Yellowstone Park. In 1932, George Wright, a volunteer conservationist of the Park Service, conducted the first annual census, discovering in the process the critical importance of the Red Rock Lakes breeding grounds and widespread losses because of shooting based on theoretical confusion of Trumpeter Swans with Snow Geese. Establishment

of the Red Rock Lakes Migratory Waterfowl Refuge by Executive Order in 1935 was the natural result of Wright's findings and the culminating action of an unprecedented 40-year period of conservation action benefiting Trumpeter Swans.

The pattern of conservation activity in Canada during the early years of this century began even earlier than that in the United States. In British Columbia, for example, J. A. Munro estimated only about 100 Trumpeter Swans in 1916. Winter surveys initiated in 1920 revealed a substantial flock wintering at Vaseaux Lake in 1922. Vaseaux Lake was promptly declared a a Federal sanctuary and a winter feeding program established. Ten years later, feeding of Trumpeter Swans in British Columbia was expanded to include those birds wintering at Lonesome Lake where normal dependence on stretches of open water in the Atnarko River was interrupted by land slides in 1932 and 1936.

Establishment of the Red Rock Lakes Migratory Waterfowl Refuge in 1935 marked the beginning of a new era for Trumpeter Swans. A whole host of accomplishments characterizes this period which continues to the present time. Research and management of Trumpeter Swans in the United States during the past 43 years may be highlighted as follows:

PERIOD OF RESEARCH AND MANAGEMENT, 1936 -

late 1930's

1936 Winter feeding initiated at Red Rock Lakes.
1938 First transplant of cygnets from Red Rock Lakes to National Elk Refuge, Wyoming.
1939 Transplant program expanded to include Malheur National Wildlife Refuge, Oregon.

1940's

1941 Closure of Snow Goose hunting in Idaho.
1942 Closure of Snow Goose hunting in Montana contiguous to Red Rock Lakes and Yellowstone National Park.
1946 Closure of Snow Goose hunting in appropriate parts of Wyoming.
1948 Long-range research program initiated at Red Rock Lakes.
1949 Transplant program expanded to include Ruby Lake National Wildlife Refuge, Nevada.

1950's

1956 Trumpeters provided to Delta Waterfowl Research Station, Manitoba, Canada.
1956 Substantial breeding population of Trumpeters discovered in Alaska.
1957 First Trumpeters transferred to public zoo (National Zoological Park, Washington, DC).
1958 Research initiated on relative abundance and distribution of Trumpeters in Alaska.

1960's

1960 Results of 9-year study of Red Rock Lakes population published. Trumpeters transferred to Lacreek National Wildlife Refuge, South Dakota.
1961 Public zoo program expanded - 24 pairs transferred.
1963 Trumpeters transferred to Turnbull National Wildlife Refuge, Washington.
1966 Trumpeters transferred to Hennepin County Park Reserve District, Minnesota.
1968 The Trumpeter Swan Society organized.
1969-1970 Canadian surveys show 402 Trumpeter Swans wintering on Vancouver Island and adjacent mainland.

I am not going to attempt to highlight events in Trumpeter Swan research and management since 1970. Some 16 issues of the Newsletter and conference Proceedings and Papers of The Trumpeter Swan Society efficiently document the regular explosion of progress you have witnessed in the United States and Canada the past 10 years. Suffice to say that the late 1970's testify that we are well into the era of research and management, with no end in sight.

Sorting of past accomplishments into three distinct periods of progress reveals how an inspiring aesthetic resource models growth of a conservation ideal. While past successes are easy enough to list, direction of future progress is more difficult to chart.

Where will the Era of Research and Management lead, and when will it end? Are we already witnessing the genesis of a Period of Complacency induced by achievement of conservation success? Or are we standing at the threshold of a Golden Age of Appreciation as Trumpeter Swans are reestablished and increase of human populations and endless appetite for material resources creates competitive pressure for conflicting uses of wilderness habitats by man. It is becoming progressively more difficult to maintain the rate of conservation progress. Insight and inspiration are needed at this point to identify real from apparent limiting factors and, perhaps, break new ground. The present research momentum must not be lost but continue to nourish increased growth of an inspiring conservation ideal.

* * *

ALASKA NATIVES AND HABITAT

John T. Shively
NANA Development Corporation
Anchorage, Alaska

INTRODUCTION

It is a pleasure to speak before the Sixth Trumpeter Swan Society Conference. Jimmy Huntington of Galena originally was scheduled to speak on this topic, but, unfortunately, Mr. Huntington is on jury duty and cannot attend. I think that is unfortunate as he would have made an excellent speaker for the Conference. Also, Jimmy comes from an area where there is Trumpeter Swan habitat, whereas I represent a region where there are Whistling Swans, but not Trumpeter Swans.

I would like to discuss today some of the implications of the Native Claims Settlement Act as it relates to the protection of habitat for the Trumpeter Swan and other important species.

OVERVIEW OF THE ALASKA NATIVE CLAIMS SETTLEMENT ACT

In 1971, Congress passed the Alaska Native Claims Settlement Act in order to settle the claims which Alaska Natives had on virtually all of Alaska. Among other provisions, the Act provided for approximately 44 million acres of land to be conveyed to Alaska Native corporations. Land would be in fee and would contain both surface and sub-surface rights.

I believe there is some misconception about how Natives will treat the land. Many people feel that because Natives will receive both surface and sub-surface title, their primary interest in the land is development. It is my experience that much of the land which has been selected by Native corporations has been for subsistence use by villages rather than for pure economic development. There is no question that some lands were chosen for their economic value, but because of the structure of the Claims Settlement Act, the bulk of the land is around the villages and this is land that traditionally has been used for subsistence living.

Native corporations generally are attempting to enhance the subsistence lifestyle. In order to do this, it is necessary to protect the habitat of the animals on which the subsistence lifestyle is based. Thus, the Alaska Natives have some very common interests with groups such as The Trumpeter Swan Society which are very concerned about protecting the habitat in Alaska.

THE TRUMPETER SWAN AND THE ALASKA NATIVE CLAIMS SETTLEMENT ACT

Most of the land conveyed under the Alaska Native Claims Settlement Act is outside of areas that are used for Trumpeter Swan habitat. However, there are some major conflicts. Those areas include the Koyukuk, the Fairbanks area, McGrath, Gulkana, and parts of the Gulf Coast. There will be some Native selections in these areas and some of those selections will include existing or potential swan habitat.

It is important to recognize that swans have been here as long or longer than Alaska Natives. Yet this magnificent species has survived despite tens and thousands of years of occupation of Alaska by Alaska Natives. This in itself is an example of the concern and responsibility that Natives have for the land and its resources.

NATIVES AND HABITAT PROTECTION

As many of you are aware, Congress is presently considering enacting the Alaska National Interest Lands legislation which would designate between 80 million and 100 million acres of land as National Parks, National Wildlife Refuges, National Preserves, National Forest, and Wild and Scenic Rivers. These designations would provide some protection for the Trumpeter Swan. Unfortunately, most Trumpeter Swan habitat is not recommended for inclusion in any of these conservation units.

Some of the Trumpeter Swan habitat will be on Native lands and other of the habitat will be on State land. Obviously, what happens to these lands is of primary importance to the continued revival of the Trumpeter Swan. There is no question that there will be some development on State and Native lands. The key to this development is to make sure it does not interfere with critical habitat areas of species such as the Trumpeter Swan.

In my opinion, one of the biggest threats to habitat and to the Trumpeter Swan population, as well as other species, is the increased use of the land by individuals. The carrying capacity of the land in Alaska is limited because of its fragile nature. The more Alaska is opened up by roads and other means of general transportation, the more population pressure there will be on the resources.

Natives in the northern and western part of the State have been particularly concerned about road development. In the NANA [NANA Development Corporation, a Native corporation] region, we have consistently opposed the construction of any roads which would connect our region with the Fairbanks-Anchorage road system. This is because we believe that the wildlife populations in our region cannot support the increased pressure which would result from individuals being able to drive their cars and campers into our region and depleat our already tenuous supply of birds and game.

In the NANA region, we have proposed a cooperative management system between the State, the Federal government, and the Eskimos of our region. We feel that by cooperating in land use, we can best protect the habitat of all three owners. Cooperative management is the key to the protection of habitat in the State of Alaska.

CONCLUSION

To The Trumpeter Swan Society, the magnificent bird you have chosen to protect is the sole emphasis of your organization. However, to the Alaska Natives, the Trumpeter Swan is merely one part of a very important ecological system that must be retained if Natives are to continue to be able to have a subsistence lifestyle. Any actions taken to protect the Trumpeter Swan will certainly be actions designed to help protect other land and wildlife resources. Such protection is of primary importance to the Alaska Natives.

I would just like to again stress in closing that protection of habitat can only come if the Federal government, the State government, and the Natives can cooperate in land management. If this cooperation cannot take place, there will be a fractured management system, fractured development, and, in the end, those people and that wildlife which have lived in harmony in the rural areas for tens of thousands of years will be the big losers.

* * *

CITIZEN ACTION FOR TRUMPETER SWAN CONSERVATION

David R. Cline
Alaska Representative
National Audubon Society
Juneau, Alaska

For many people, wilderness and wildlife are what Alaska is all about. There are annual wildlife spectacles here that can be witnessed nowhere else in America or the world. Many laws, international treaties, and agreements have been carefully forged to protect these wildlife values for the benefit of people everywhere. These contracts in conservation carry serious obligations and responsibilities for all Americans.

The Trumpeter Swan is in many ways symbolic of the Alaskan wilderness. Ecologically, wilderness and swans are symbiotic. The degree to which we are successful in conserving Alaskan swans will thus be inextricably tied to the American wilderness preservation movement, and to providing permanent protection to the bird's northern wild country haunts.

Contrary to some popular opinions, Alaskan swans and other wildlife are not secure simply because their northern habitats are so vast and remote. Nor has this ever been the case. The historical record of decimated Alaskan wildlife is a long and disturbing one.

Attempts at restoration of these animals have required heroic and costly measures.

Alaskan wildlife is continually faced with threats from many quarters as man settles and develops Alaska.

Increasingly numerous and complex regulatory measures are useless unless there is protection of critical habitats.

Alaska today is a region of conflicting goals, preferences, and aspirations. It is both a frontier and homeland. For the most part, the conflict focuses on energy development. Drilling platforms, pipelines, tanker terminals, and high rise office buildings represent the advance of the industrial system in the Arctic. The cumulative impact of all this development is bringing immense and irreversible changes to the North. Enormous disruptions of wildlife and human lifestyles are occurring. Many Alaskans see us simply repeating the mistakes here that we made in the lower 48.

Continued human population growth and attendant resource development appears inevitable in Alaska's future. But resource exploitation and irreversible wildlife losses need not be. National energy and recreation needs will be met in some way, but they need not be met in any way. Some increased disturbance to Trumpeter Swans seems a virtual certainty. But bold and timely action by conservationists can overcome the losses, and maybe even secure a few gains.

We all know that the major threats to Trumpeter Swans are habitat loss, environmental degradation, and disturbance at critical stages in their life history, particularly their breeding cycle. These threats are, of course, not partial just to swans, but to the entire community of northern wildlife, be they game or non-game species.

As has always been the case, and always will be, successful conservation and management of swans will require bold and spirited citizen action blended with a socially sensitive and scientific approach to wildlife management as must be practiced by state and Federal wildlife conservation agencies.

Citizens should participate in timely evaluations with respect to the capacity of resource agencies to implement and achieve the basic goals in Trumpeter Swan conservation. They need to cooperate in development of effective management policies to better assure equitable distribution of benefits between present and future users of the swan resource.

Furthermore, they must help assure tht the primary goal of a conservation policy for Trumpeter Swans is maintenance of resource systems in desirable states as an essential part of scientific, ecologically sound management. To achieve such a goal will require a more sophisticated approach to conservation that takes into account the ecosystem as well as a selected species like the swan.

This paper is an attempt to identify those actions, both proven and untested, that citizens concerned with Trumpeter Swan conservation might consider taking to help secure this noble bird's future.

Being in part an "activist" organization, Audubon has long recognized the need for a strong and effective educational thrust to help shape public attitudes and inform people on appropriate courses of action.

You might be interested to know that the Society's involvement in environmental education here in Alaska is not entirely of recent vintage. In was in 1914, in fact, that the National Association of Audubon Societies published 6,000 copies of a book entitled "Alaskan Bird-Life" for free distribution in Alaska. This was in recognition of the need for a brief, accurate, and readable account of the important forms of bird life in the various parts of Alaska.

Then in 1976, the Anchorage Audubon Society in cooperation with the parent society published an "Alaskan Bird Chart and Guide" for distribution to all of the elementary and junior high schools in the State. This educational effort was the result of many years of patient and persistent work by Jim King of the U. S. Fish and Wildlife Service in Juneau. Jim originated the idea for the bird chart after observing the keen interest young people had in birds, and because of his desire to develop that interest to the benefit of both a new generation of Alaskans and the birds that are here to brighten their lives.

The recently established Alaska Audubon Office, working closely with Audubon chapters in the State and organizations like The Trumpeter Swan Society, aims to vigorously pursue both traditional and innovative educational programs, all of which are ultimately supportive of sound conservation action. Joint ventures we might consider in this regard could include:

1) Publish articles in Audubon magazine (which for 3 consecutive years has received the National Magazine Award for Reporting Excellence), an extremely important medium for informing the total readership about our Nation's Trumpeter Swan heritage.

2) Run radio and television spots that dramatize the value of Trumpeter Swans as a vital component of our Nation's wildlife heritage, and give guidance as to where to go for additional sources of information on swans. Such Audubon spots have proven extremely successful to date nationwide in alerting the public to the plight of such species as the timber wolf, cougar, Whooping Crane, and American alligator.

3) Produce a documentary film on the conservation of Trumpeter Swans in Alaska for use on public television, and as an educational tool for schools in Alaska and nationwide. The Alaska Office of the National Audubon Society is currently working with Alaskan film producer Joel Bennett of Juneau in producing such a film on "The Bald Eagle and the Alaskan Wilderness."

4) Develop an attractive and professionally done rotating educational exhibit depicting the life history and natural values of the Trumpeter Swan. Such a display could prove to be an extremely valuable educational tool at conferences and meetings, fairs, and at Alaska airports, museums, schools, and hotels.

5) Encourage placement of professional teacher naturalists in Alaskan education centers to conduct tours and outdoor classes for youth groups and others.

6) Make available an education staff person to provide professional advice on land use to public and private institutions interested in utilizing swan habitat for educational purposes.

7) Help sponsor a summer camp for conducting wildlife conservation courses designed particularly for teachers and community leaders, and carrying university credit.

8) Promote the hiring of wildlife extension agents by the Cooperative Extension Service to provide current information on swans and other wildlife to residents of both rural and urban areas of the State.

9) Conduct a Trumpeter Swan workshop for the general public, particularly private landowners on whose properties swans are known to nest. Such a workshop should be aimed at exchanging information and techniques on swan management.

10) Produce audio-visual and video programs on the ecology of Trumpeter Swans and their wetland habitats for State-wide use in schools and organizations.

Also of utmost importance will be citizen involvement in the Alaska socio-political scene wherein most of the major decisions affecting wildlife are made. In this regard, one of the most critically important things to be accomplished on behalf of swans and other non-game species is to secure passage of both state and Federal non-game conservation legislation.

Traditionally, public wildlife programs have been designed to primarily benefit hunters. Until recently, sportsmen have been the primary financial and political support of such programs. But times are changing. A new trend is now apparent in the form of increasing demands by a general public concerned with declining wildlife resources nationwide, for broadened wildlife programs involving non-consumptive uses of non-game species. For better or worse, I believe they are our main constituents of the future.

To accomplish this, wildlife management agencies can no longer afford their preoccupation with bag limits and season dates while thus catering to a singular hunting clientele. And they will have to forget about trying to improve on nature everywhere. To continue devoting most of their energies to producing two ducks where there was one just for someone to shoot is totally irrelevant to the times.

As pointed out by wildlife specialists Hendee and Schoenfeld, "It doesn't make sense to spend virtually all available research money on game and habitat problems, at the expense of inquiry needed to extend the benefits of wildlife to a broader segment of society through non-consumptive uses, for example."

A sound non-game program should be an integral part of a balanced and comprehensive wildlife program, aimed at the preservation or management of non-game and its environment. General revenue funds are the only logical support for programs that benefit the public at large. Such non-game funds should be made available for land and water acquisition, research, inventory, law enforcement, public education, and the other components that comprise traditional conservation programs. In fact, I see unprecedented opportunity to complement and bolster present programs. Habitat acquisition for swans and other waterfowl is one important area where both game and non-game funds could be expended instead of the entire load falling on the license buyer.

Alaskan wildlife agencies should anticipate greater public concern for swans and other wildlife, welcome and encourage it, and take the initiative in providing the leadership for a multi-faceted wildlife conservation program. They should realize that perpetuation of all wildlife and the ecosystems they inhabit is an inherent right of each citizen, be they hunter or non-hunter.

On the national scene, a progressive non-game Fish and Wildlife Conservation Act has passed the Senate, but languishes in the House because of opposition from the U. S. Chamber of Commerce and a threat of Presidential veto. Conservation lobbying efforts have not yet been able to overcome this opposition.

Non-game management in Alaska has for the most part not proceeded much beyond the preliminary investigative and talking stages. A bill drafted by citizens in 1976 for management of non-hunted wildlife, and increasing talk pushing such legislation, are indicative of increasing interest in state non-game legislation, however. Obviously conservationists will need to work harder on both the state and national scenes to obtain passage of high priority non-game legislation.

Passage of the Alaska National Interest Lands (d-2) Bill offers an opportunity unique in North America to involve people in planning for the management and use of new National Parks and wildlife refuges. But let us not be lulled into believing passage of this legislation will in and of itself assure perpetuation of swans and other Alaskan wildlife. As we will hear repeatedly during this Conference, about 75 percent of Alaska's Trumpeter Swans in fact inhabit non-d-2 State- and Native-owned lands.

In designing a citizen action strategy to benefit swans by working on the State and Federal political scenes, I believe we can profit by thoroughly evaluating the organization and functions of the Alaska Coalition. This loosely structured, ad hoc amalgamation of some 35 organizations committed to passage of a strong Alaska lands bill has demonstrated the value of organized, persistent, intensive, cooperative grassroots lobbying against seemingly overwhelming odds.

Although the long hoped for legislation is not yet a reality, it eventually will be. It is my feeling that rather than have the Alaska Coalition disband following the d-2 lands fray, that it be held together in Alaska and its membership broadened to target citizen lobbying pressure on top priority State environmental issues like Trumpeter Swan conservation.

In my opinion, the degree to which we are successful in implementing the Alaska lands legislation, and so too in managing Trumpeter Swans, will to a great extent depend on the quality of leadership in key Federal conservation agencies, particularly the U. S. Fish and Wildlife Service.

Conservationists should be urging the Department of the Interior to design innovative recruitment procedures that will assure selection of the most highly qualified administrators for key leadership positions in Alaska. Administrators who are once: 1) proven and respected leaders in the field of wildlife conservation; 2) innovative in their thinking so as to help design and implement cooperative management programs that will function effectively across land jurisdictions; and 3) socially sensitive and astute so as to make new programs work at the resource/human interface in rural Alaska, particularly to assure the meaningful involvement of Native landowners. In other words, the status quo, bureaucratic approach to decision making just won't do in Alaska.

Conservationists must also increase their efforts to establish better rapport with key State and Federal wildlife conservation agencies in Alaska. They should seek to cooperate more closely with State and Federal resource agencies in information exchange, regulation setting, and to help them secure the manpower and money allotments required to do the best possible job in the study and conservation of all wildlife, the non-hunted as well as the hunted species.

What is wrong in this regard? Basically, the problem is that little or no ongoing communication exists between the State and Federal wildlife agencies representing sportsmen, and the increasing number of citizen conservationists and environmental groups. Misunderstanding and mistrust are festering on both sides. While this standoff between potentially natural allies continues, wildlife values including those involving Trumpeter Swans, are whittled away. Eventually many will be lost if the present trend continues. This is a situation we can no longer afford. The truth is, we never could.

The key to helping assure protection of wildlife values on state lands is strong state legislative support. Currently, that support is simply not there. We might ask why? Basically, I believe it is primarily due to the lack of enough grassroots public involvement and support.

Take for instance the designation of State critical habitats for wildlife. To date, the Alaska Department of Fish and Game (ADF&G) has for the most part had to carry the struggle alone with only minimal support of conservationists. This year, for example, the proposed Orca Inlet-Controller Bay Critical Habitat proposal (which incidentally would have been of great benefit to Trumpeter Swans) got essentially nowhere in the legislature despite the best efforts of the ADF&G. The reason? Strong grassroots conservation support was non-existent with other interests in the areas.

Another area in which citizen conservationists can work to strengthen the State's wildlife program is to help design legislation that would make commercial fisheries management separate from it.

Alaska has always been a leading commercial fishery state. The industry promises to be an increasingly important economic mainstay in the future, particularly as multi-million dollar salmon enhancement and rehabilitation projects and the new bottomfish program gain greater momentum. It is inevitable that the ADF&G will be given greater responsibilities for commercial fishery research, management, and regulation, and, I'm afraid, to the increasing detriment of the Department's sport fish and wildlife programs.

Even now, commercial fisheries dominates the Department's overall program. Take for example the agency's fiscal year 1979 budget and manpower ceilings. The two commercial fisheries related divisions show a total budget of $18.6 million with 466 positions as compared to the sport fish and game divisions with a combined budget of $10 million and 225 positions. The Commissioner of Fish and Game reportedly spends close to 75 percent or more of his time on commercial fisheries related matters. This tends to create a leadership vacancy at the highest levels of State decision making affecting wildlife, and causes increasingly heavy burdens to fall on division directors with many of their priorities taking second place to commercial fisheries.

This management dilemma is not new. It has been building in the State over a considerable period of time. In fact, several years ago it brought legislative action dividing the former Board of Fish and Game (the State fish and game regulation setting body) into a Board of Game and a Board of Fish. Even with this, the new boards are experiencing serious difficulties dealing with increasingly numerous and complex management questions.

I believe it is now time for conservationists to seriously consider helping design legislation that would reorganize the Alaska Department of Fish and Game into an Alaska Department of Fisheries, and Alaska Department of Wildlife - not game, but wildlife. Only by such bold and drastic action will Alaska wildlife get the recognition and attention it deserves and will species like the Trumpeter Swan receive the high level of professional attention the State is potentially capable of providing it.

Activities of the Alaska Department of Natural Resources (DNR) also deserve greater attention from citizen conservationists as concerns protection and management of swans on State lands. The State's land classification regulations as promulgated by the DNR establish procedures for designating State lands according to their most appropriate use. Proposed revisions in their Alaska Division of Lands Regulations, Land Planning and Classification, for example, are currently before

the public for review and comment.

Within the coming months, up to 55 million acres of additional lands may be conveyed to the State as part of the d-2 lands legislation. The State has a mandate to designate and dispose of State-owned lands for a variety of public and private uses. Recently passed legislation requires that some types of classification and disposal action occur quickly in accordance with prescribed time tables. Alaska is a land-hungry state, and at least some swan lands are likely to be identified for intensive uses, including residential, commercial, industrial, private recreation, open-to-entry, and homesites. Some swan nesting lakes have in fact already been impacted from recreational users, probably leading to early abandonment of nesting sites.

It is important to note that three new land categories are being recommended for inclusion in the classification system. They are Greenbelt, Wildlife Habitat, and Resource Assessment. All could be of great value in protecting Trumpeter Swan habitat on State lands. The Resource Assessment category is designed to apply to newly acquired State lands by placing them in a transition or holding pattern to allow time to review their resource values before classification for appropriate uses.

Conservationists must get involved now to have these new land classification categories established. They must then become more intimately familiar with the distribution of Trumpeter Swans on State-selected lands, and work to have critical swan habitat committed to the "Wildlife Habitat Land" category where maintenance of habitat productivity would be the primary goal.

Time is very short. Pressures to commit State lands to development are growing. A concerted effort to protect State-owned Trumpeter Swan habitat must be made now.

Citizens should also seriously consider taking action to support innovative and progressive reforms in tax structures and other economic incentives for the preservation of swan habitat and that of associated wildlife. This will be especially critical on many Native-owned lands in Alaska.

Pursuant to the Alaska Native Claims Settlement Act of 1971, Alaskan Natives will become owners of a significant amount of swan habitat. My personal experience in working with the Alaska (d-2) lands issue over the past 7 years has me convinced conservationists have an unprecedented opportunity to work more closely with Alaskan Natives in developing cooperative wildlife conservation programs. I am not as pessimistic as most that the future of species like the Trumpeter Swan is necessarily in jeopardy just because Natives are getting title to much of their best habitat.

History of course shows that Natives lived in harmony with Alaska's land and wildlife for thousands of years. Not until the arrival of white man did we begin to have really serious problems with maintaining Alaska's wildlife abundance. And for the most part, it is our industrial/agrarian pursuits that continue to impact most seriously on swans and other wildlife.

At the same time, it is obvious that the ways of the Alaska Native are changing. Many are moving ever farther away from traditional subsistence living. Some have become corporate leaders. Most are now corporate stock holders. Furthermore, a wage-boosted subsistence lifestyle is most typical in the Alaskan bush whereby seasonal cash income is used to obtain the sophisticated weaponry necessary for an efficient harvest and mechanization for gaining access to the resource. We must remember, however, that this situation has developed largely because our laws have pushed them in that direction.

It cannot be denied either that abuses in resource utilization have occurred in rural Alaska, and in some places are becoming of ever increasing concern. Undoubtedly some Trumpeter Swans are being shot each year. But overall, I think the Alaskan Native's record of living in harmony with swans is pretty good compared to ours.

Despite traumatic social/cultural change, most Native people still prefer to live in bush villages with wildlife and wildland key influences on this decision. I will even stick my neck out and say that given the proper incentives, this will probably continue to be true in most instances, and that swan habitat in the hands of some rural Native owners is likely to receive greater protection than similar habitat on State land that eventually goes into private ownership or is committed to resource development pursuits.

It was, after all, Alaska Natives who proposed the Alaska Native Land Bank, now a part of the Alaska d-2 lands bill (HR 39). Under this concept, all Native corporations are authorized to enter into written agreements with either the State or Department of the Interior to enhance the quantity and quality of Alaska's renewable resources. In exchange for not alienating or transferring lands committed to the Land Bank for a period of not less than 10 years, or permitting developments or improvements on such lands, the Native owners are protected from adverse possession or taxation. This in essence is an incentive to preserve wildlife habitat for subsistence and other compatible uses by removing pressures to develop or dispose of these lands through property taxation.

It is my understanding that language changes are currently being worked on for the Senate bill that would provide opportunity for non-Native rural property owners also to participate in the Land Bank. In addition, participants in the program will be encouraged to enter into cooperative agreements with Federal and State agencies to manage their private lands in ways compatible with objectives for adjacent State and Federal holdings. For example, design of a cooperative management agreement involving the U. S. Fish and Wildlife Service, State of Alaska, and private landowners adjacent to, say the proposed new Koyukuk National Wildlife Refuge in northwestern Alaska, could require that all signatory parties agree to provide maximum protection to known Trumpeter Swan breeding habitat since this will be a key objective on the new refuge.

Then there is the opportunity to strengthen already existing cooperative management agreements. Take, for example, the agreement between the U. S. Fish and Wildlife Service, Alaska Department of Fish and Game, and Alaska Department of Natural Resources for the Bering River-Controller Bay, Trumpeter Swan Management Area. This agreement could be greatly strengthened by addition of the Chugach Native Corporation as a signatory party, and by strengthening language that would commit the Corporation to cooperate in conserving the Trumpeter Swan in their region.

That the Chugach Natives would be willing to do this, even to the extent of agreeing to accept restrictive language in the Alaska lands bill (HR 39), was made evident to me during recent negotiations with their leadership in Washington, DC. In order to obtain exchange lands in the Bering coal field area of the Copper River Delta, Corporation leaders agreed to commit themselves to cooperating in Trumpeter Swan conservation should the land exchange eventually be consummated.

Should a Native Land Bank and cooperative management agreements not prove adequate to protect Trumpeter Swan habitat on private land, then I believe serious consideration should be given to initiation of a Federal wetland acquisition and/or lease program. The latter might prove particularly attractive because it would enable Native landowners to keep their land in a natural state while deriving some annual income from it. Another monetary incentive to Trumpeter Swan conservation could be the payments-in-lieu of taxes program as embodied in the wildlife refuge bill that passed the House two months ago. HR 8394 is relatively non-controversial and is supported by the Administration. By fiscal year 1983, the bill would provide $14.6 million for in-lieu payments. By targeting such payments for incorporated Alaska municipalities outside organized boroughs, the economic benefits derived could potentially trigger much greater interest in the conservation of Trumpeter Swans and other northern wildlife.

Research, as we know, must provide the basic building blocks for a truly effective wildlife program, be it for swans or any other species. As new leadership evolves in the Fish and Wildlife Service, there will be urgent need for conservationists to provide assistance in helping the agency rebuild a now badly watered down migratory bird research program. Despite the fact funding for the agency's Alaska program has increased tenfold in recent years, there is still no specific program for waterfowl, let alone Trumpeter Swans.

Some would argue that expenditure of substantial national wildlife refuge and Bureau of Land Management dollars for Outer Continental and National Petroleum Reserve - Alaska studies must be recognized as legitimate wildlife research initiatives. While it is true that much important new information has been gained from such expenditures, such bootleg, "soft" research is typically done on a crash basis in response to a major industrial initiative. As such, it is primarily dependent on undependable, other agency, pass-through-monies, and of too short duration to really provide the necessary facts for wise, long-term management.

The time is also right I believe, for conservationists to push for establishment of an Arctic Wildlife Research Center in Alaska. Such a center would be all-purpose in scope and international in focus. It would consolidate the now badly diffused and splintered Federal research responsibilities for wildlife. It would thus of necessity have a strong migratory bird orientation. Certainly the study of Trumpeter Swan ecology would rank as a high priority.

Another argument for strengthening migratory bird research is implementation of new migratory bird treaties with Japan and the Soviet Union. As this is accomplished, we will have a major international obligation to focus greater attention on migratory species that up to now have been presumed to be okay or attracted little national attention or concern.

Many of these suggestions for citizen action on behalf of Trumpeter Swans may well sound too idealistic to be practical. It is reality, though, that here in The Trumpeter Swan Society we have highly motivated people committed to the well being of a unique North American wildlife species with growing aesthetic, scientific, educational, and social appeal and value.

Given a greater ongoing presence in Alaska, and the recruitment of more Alaskans to the Society's ranks, I believe it very possible to attract much greater support for protection of Trumpeter Swans. It is very important to recognize what a great difference even one individual can make. Just look at the accomplishments of Jim King. Admittedly, there are few Jim Kings around. But maybe some of the rest of us with less knowledge and patience could combine our talents and time with his and really make a difference on behalf of swans.

The formation of an Alaska Migratory Bird Council and/or Alaska Chapter of The Trumpeter Swan Society might be given serious consideration. Such bodies could also well serve an important watchdog function on behalf of Alaska swans, a clearing house for the latest scientific and educational information, and an action arm of wildlife conservation should the welfare of the species be threatened

Ideally, these action organizations would recruit a mixed membership of scientists, educators, State and Federal wildlife professionals, citizen conservationists, and Native landowners. And let's not forget the opportunity to involve young people in such futuristic and noble endeavors.

Rest assured that the National Audubon Society stands ready to cooperate in every way possible as we attempt to balance our Alaska and national programs between conservation action and environmental education.

In summary, I feel future success in Trumpeter Swan conservation in Alaska will depend to a great extent on the ability of resource management agencies to blend the old with the new. New alignments, programs, authorities, and sources of funds are needed, but by themselves will not be enough to overcome the continuing loss of swans due to accelerating human impacts in bush Alaska.

Any wildlife program involving swans will only be successful with a strong political base. Thus strong and effective citizen action is called for. By adding together all the people interested in the welfare of Trumpeter Swans and other Alaskan wildlife, we could have a solid citizen action force. Then and only then will we really have a chance of best assuring the long term survival of the species, and so, too, their wilderness haunts.

I, for one, am optimistic that much can be accomplished toward these ends. Let's then move The Trumpeter Swan Society from cozy cocktail ecology circles to the point position in development and implementation of a Trumpeter Swan conservation strategy for Alaska. Make it the cutting edge of a dynamic and progressive citizen action program that serves as a wildlife conservation model in the North. After all, the Trumpeter and the people whose lives it graces deserve no less.

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TRUMPETER SWAN AS SYMBOL

Mardy Murie
Moose, Wyoming

Members of The Trumpeter Swan Society, I should now at this point say, "Hello," and walk out of the room. I was committed to come to Anchorage to attend and take part in the Women Writers' Conference which begins tomorrow. When the date of it was changed to the present date, beginning tomorrow, I wrote a note to Dave Weaver, who had asked me if I could be at the Trumpeter Swan session again, and I told him that since the dates were close I could drop in and say, "Hello" on the first morning of your session. Well, I don't know whether to call Dave Weaver insidious or invidious, or what, and I didn't have the time to look up those words in the dictionary before I left home. But anyway, the next thing I knew when I had a house full of five grandchildren, all hungry, and was trying to write the lecture I have to deliver for the Writers' Conference tomorrow, I received a copy of your program and my name was on the program. So I thought, "Well, I'll just fix him." I was your banquet speaker 2 years ago in Jackson Hole, at the Triangle X Ranch, and I thought, "Well, I'll just go find those cards that I had some notes on and say things I said 2 years ago, and none of them will remember what I said 2 years ago, and I'll just give them some of it again," because I really didn't have time to think very much. Two years ago my topic was "Trumpeter Swan as Symbol" and this year Dave put me on the program again with "Trumpeter Swan as Symbol."

Our lives are full of symbols, I think especially in America. The Statue of Liberty stands as a symbol of our concept of government, our flag stands as a symbol of loyalty, and of course, the moon is a symbol of love and the lion is the symbol of courage. But, I think the Trumpeter Swan is a symbol of what man needs, as well as what the swan needs. What the swan needs is the symbol of what we need -- a whole planet, a healthy planet. But, I think also that the concern for the swan as evidenced in this Society is a symbol also of an awakening in the consciousness of people, of concern for our world -- a world inherited, used, abused, nearly lost; a complete world, moving, breathing, burgeoning with life -- fish, fowl, flowers, animals, and man. There is the word altruism, and I think it could be applied to the formation of this Society. A few years ago, I read a book by the Quaker writer Charles Trueblood. One of the things that stayed in my mind in one of his chapters was this statement:

> A man may be said to have reached maturity when he plants trees, in the shade of which he knows he will never sit.

And I think The Trumpeter Swan Society itself is a symbol of a more altruistic concern for all of life, because keeping the Trumpeter Swan healthy means keeping that complete world, the habitat. George Schaller who was doing research in India trying to find some snow leopards wrote:

> When the last snow leopard disappears from the icy crags, an intangible aura of mystery will vanish, too.

We need all this wildlife to have a complete life ourselves, for our own health. Even from the selfish man's point of view, from a purely anthropocentric point of view, we need all this wildlife.

A young friend sent me some clippings, quotes that he had gathered over the years about wilderness, and this is one of them:

> "Please tell Major General Adams or whoever is in charge of this business that Henry Lake, Idaho, is to immediately be struck from the Army planning list for any purposes. The verdict is for the trumpeter swan and against the Army. The Army must find a different nesting place." Franklin D. Roosevelt, Memorandum for the Secretary of War, 1941.

So, many people have felt we need this wildlife. I have had discussions, conversations, in my living room at Moose about wildlife. I have asked this same question of many people, "What is it that fascinates us so about wildlife?" Nobody seems to be able to put very many words to it, but there it is. It's an intangible thing -- free, often melodious, intriguing, pricking our curiosity, and lifting us out of ourselves and away from the petty, nagging concerns of every day.

Two years ago we had a bicentennial. My friend had the television set going, she was watching the bicentennial programs from all over the country. When it became 2:00 o'clock in the afternoon, time for me to go down to the swimming hole and have my daily swim, as I was walking down through the woods to the swimming hole -- natural swimming hole -- I heard suddenly the Sandhill Cranes, a pair of them flying overhead and making that wonderful wild sound that they make, and a moment later I heard a jet plane going over Jackson Hole. It occurred to me just then, I guess we're going to have to live in this mix. And, it is living in this mix that we need all the wisdom we can command as Winston Banko said and as Dave Cline expressed in his paper that Dave Spencer just read. Sandhill Cranes and jet airplanes. Can we live with that mixture, and at the same time keep these magical presences which tell us that all's well? The universe is still whole. All this I think is a strong filament binding us all together.

If I open my door in Moose, Wyoming, and find a perfect stranger standing on the doorstep, and he says, "Mrs. Murie, I have been studying whales in Australia," I would open the door wide. He couldn't possibly have any evil intent. This is a great bond among people working with wildlife and people who love wildlife. And, at the same time, whatever damages or desecrates this filament of love and interest demeans us all. And so, to preserve this network there are many organizations. The Trumpeter Swan Society is one. Someone said -- yes, Mr. Down belongs to 60 different conservation organizations. This is all part of this great filament binding people together and placing wildlife in a safer position all over the world. So the Trumpeter Swan is a symbol of all wildlife seeking a place, seeking a habitat, and that habitat is the most important thing of all, as Mr. Shively just explained so clearly to us. And this applies to man also. We are all companions down a long path of evolution, and there is much to learn from wildlife and there is much to gain from it, even from a selfish man's point of view, because studying the Trumpeter Swan and keeping its habitat is also insuring a healthy world for us all, a world in balance.

In all this, my great comfort these days is in my contact with young people. I have many of them come to my door at Moose. I meet them wherever I go. I'm greatly encouraged. I think there are going to be plenty of people to carry on the

work that's now going on.

We have in Jackson Hole a summer science school called Teton Science School. It has now become part of the National Park Conservation Education System there. One of the students there later came to Alaska. She has been working. First year she was up here, she worked as a cook on the Yutana Barge going up the Yukon. Had a wonderful time. Wrote an article about it which was in Alaska Magazine. The last 2 years, she's been working down on the Kenai for the Forest Service. But, she has been writing to me in the meantime and from one of her letters she says:

> I don't think hiding away is the answer for us young people. More than ever now, action must be taken to preserve wild lands, to change the lifestyles that are not harmonious for more natural man/nature relationships. How to begin such a tall task.

This, I think, expresses the spirit of some of the young people that I know.

I had a young girl who had been working down in southern Colorado for the Forest Service watching a Peregrine Falcon nesting site. Toward the end of the season, she came through Moose on her way home. She told me that she was afraid the Forest Service and the Bureau of Indian Affairs were going to open up another stretch of road which would bring a tourist facility very near the Peregrine Falcon nesting site. She was so concerned about this bird that she was in tears. She said, "I don't care what happens to me or to my job. I only care about those birds." Well, something was done about the birds. She was back down there again this summer and the birds are still there. But these feelings, these gropings of the young people, the concern of you comparatively few people for the swan, are also symbols perhaps, symbols of a stopping to take a look at our civilization, a slowing down in our mad rush. Where are we going, what are we taking, what are we keeping? And so, this Society is not only a symbol, but an example.

Two years ago in Jackson Hole I saluted you as the keepers of the flame of love for wildlife. I do that again. And I also would say, "Don't even be afraid to be called conservationists." One young friend said, "Conservationists are not much fun to live with, but they sure make great ancestors."

Have a fine meeting.

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WHY A TRUMPETER SWAN SOCIETY

Raymond L. St. Ores
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> "At the far end of town
> where the Grickle-grass grows
> and the wind smells slow-and-sour when it blows
> and no birds ever sing excepting old crows...
> is the Street of the Lifted Lorax."
>
> Dr. Seuss

Like everyone else, I have my favorite authors, such favoritism developing over years of reading all kinds of literature. I use "literature" in its broadest sense.

And as I look at my favorites, including Dr. Seuss, and their writings, I see a pattern or similarity emerge that answers in part, at least, the question: "Why a Trumpeter Swan Society?"

In Dr. Seuss' book The Lorax, we see the Lorax try to stop the total extirpation of the Truffula Tree Forest and all of its animal life.

As we turn a page of this children's book, we hear speaking the owner (the developer) of the factory which is manufacturing "Thneeds" from Truffula Tufts:

> "The instant I'd finished, I heard a ga-Zump!
> I looked.
> I saw something pop out of the stump
> of the tree I'd chopped down. It was sort of a man.
> Describe him?...That's hard. I don't know if I can.
>
> "He was shortish. And oldish.
> And brownish. And mossy.
> And he spoke with a voice
> that was sharpish and bossy.
>
> "Mister!' he said with a sawdusty sneeze,
> 'I am the Lorax. I speak for the trees.
> I speak for the trees, for the trees have no tongues.
> And I'm asking you, sir, at the top of my lungs' --
> he was very upset as he shouted and puffed --
> 'What's that THING you've made out of my Truffula Tuft?'"

We turn a few more pages and again we hear the entrepreneur saying:

> "But the next week
> he knocked
> on my new office door.
>
> "He snapped, 'I'm the Lorax who speaks for the trees
> which you seem to be chopping as fast as you please.
> But I'm also in charge of the Brown Bar-ba-loots
> who played in the shade in their Bar-ba-loot suits
> and happily lived, eating Truffula Fruits.
>
> "'NOW...thanks to your hacking my trees to the ground,
> there's not enough Truffula Fruit to go 'round.
> And my poor Bar-ba-loots are all getting the crummies
> because they have gas, and no food, in their tummies!'"

And it goes on!

The significance of Dr. Seuss' book is that here's a fairy-tale character -- The Lorax -- speaking on behalf of a fairy-tale forest of Truffula Trees and all the fairy-tale animals living therein.

The Trumpeter Swan Society speaks for the Swans because the Swans cannot speak for themselves. There is a parallelism here.

In 1851, Thoreau penned in his journal:

> "The squirrel has leaped to another tree, the hawk has
> circled farther off, and has now settled upon a new
> eyrie, but the woodman is preparing to lay his axe
> to the root of that, also."

While Thoreau spoke of trees and their dependent animal life, wasn't he really telling us to beware of the destruction of all wildlife habitat, including the wetlands on which the Trumpeter Swan depends?

Cato, the Roman philosopher, might also have been talking to our Society when he said:

> "Some men have said that it is not the business of private
> men to meddle in government -- a bold and dishonest saying
> which is fit to come from no mouth but that of a tyrant or
> slave. To say that private men have nothing to do with
> government is to say that private men have nothing to do
> with their own happiness or misery; that people ought not
> to concern themselves whether they be naked or clothed, fed
> or starved, deceived or instructed, protected or destroyed."

Since our governments are responsible for perpetuating Trumpeter Swans, ought not we, The Trumpeter Swan Society, express our feelings by offering constructive criticism and action?

Who else will speak for the Swans?

In 1960, P. H. Wolf published an article "Land Drainage and Its Dangers as Experienced in Sweden." His work documented the destruction of a whole watershed in central Scania.

I think he could have been talking to our Trumpeter Swan Society and suggesting a charted course when he wrote:

> "In our desire to get economic security, we do not hesi-
> tate to organise society in such a way that it becomes
> more and more repulsive to humanity. There is no joy in
> owning more than the bare necessities of life if one has
> only a meagre understanding of the abiding values in life.
> Thus, if we exploit the resources of the land to breaking
> point, until there are no longer any natural rivers in
> existence, until there remain only the kinds of trees that
> grow the fastest in the form of spruce and similar varieties,
> where there were once leafy groves and rich forests of
> valuable and beautiful trees; until we have only factory
> workers and engineers, but no fishers or hunters, how-
> ever few they may be, and our farmers are forced towards
> an ever exaggerated 'rationalisation,' which will sooner or
> later threaten the whole of our national capital of water
> and land with complete ruin -- we have no proper understanding
> of life. A far deeper insight into the values of life is
> needed, if our whole western civilisation is not to collapse."

Mr. Wolf must have been speaking to our Society. We're meeting here in Alaska because we are concerned over preserving Alaskan rivers and wetlands in their natural states such that they will continue to produce Trumpeter Swans.

This Society was formed on the premise that its members must have, as their primary goal, the perpetuation of the Trumpeter Swan as a living member of the wild birds of our world.

All of our other goals (i.e., research, management, data assembling, restoration, etc.) are really subtasks to help perpetuate Trumpeter Swans in the wild, forever!

The Trumpeter Swan Society is the Steward for that speces!!!

I will close my presentation with a little poem by the late Richard Dorer, another of my favorite authors. After hearing it, there should be no question, in any mind here today, of the need for a Trumpeter Swan Society.

IF THEY SHOULD NEVER FLY

If they should never fly again
    Through sunlit skies or mist or rain
Those wary waterfowl that roam
    The heavens' vast uncharted dome;
If in the Spring's awakening
    The surge of life should fail to bring
A cry of Geese or drifting chains
    Of Swans upon the trackless lanes;
If from the depth of foggy fen
    The strident call of Mallard hen
Were but a thing of memory,
    How dull and drear the Spring would be.

If I should lift my eyes on high
    To scan the hazy Autumn sky
For migrant fowl, and found no trace,
    Just empty, lifeless, endless space;
If in the sunset's afterglow
    There were no lines to ebb and flow
With thrilling majesty of flight
    Into the shades of coming night;
If that domain to which they cling
    Were lost through ruthless plundering,
Then truly they would cease to fly
    And stewardship would wane and die.

Richard J. Dorer

"Why a Trumpeter Swan Society?"

I Submit That The Question Is Redundant.

* * * * *

Thursday Afternoon - September 7

Chairman: Winston E. Banko
National Park Service, Hawaii National Park, Hawaii

POPULATIONS STATUS

REDISCOVERING ALASKA'S TRUMPETER SWANS

Henry A. Hansen
U. S. Fish and Wildlife Service
Honolulu, Hawaii

During this period in history when plants and animals are becoming endangered in alarming numbers, there is some comfort in the knowledge that the process can also be reversed. Among the notable successes such as the northern fur seal, sea otter, American antelope, and giant Canada Goose, one other species is highly visible and symbolic -- the magnificent Trumpeter Swan (Cygnus buccinator).

Following more than a century of exploitation and intolerable human encroachment, the Trumpeter Swan was brought to the brink of extinction by 1920. Within half a century this, the largest waterfowl in the world, had recovered sufficiently for it to officially be declared no longer an endangered species. That historic action occurred in December of 1968.

The remarkable recovery of the Trumpeter Swan was, in part, the result of protection from hunting, intensive management of remnant populations, and the initiation of a successful transplanting program in the mainland states and Canada. Entirely independent of man's heroic restoration effort to the south, an unidentified Trumpeter population in Alaska was concurrently thriving and presently numbers between 4,500 and 5,000 swans. The population growth, range, and ecology of Alaska's Trumpeter Swans have been reported in detail in previous publications (Hansen et al. 1971; Hansen 1973; King 1976). Therefore, this will be but a brief account of the rediscovery of the species in Alaska and speculation as to what may have happened to it in the century between its original identification at various locations between 1850 and 1863 and a renewed verification of the species in 1954.

Banko (1960) gave a detailed account of Trumpeter distribution from an exhaustive review of early records. Of significance in perusal of these records is the distribution in Alaska. The lack of any notes regarding breeding birds south of the Alaska Range is noteworthy since the present centers of high density are in the south-central area of the State which was thoroughly explored by prospectors, trappers, and government survey personnel during the late 19th and early 20th century. That a bird as visible as a swan could have been overlooked by naturalists, ornithologists, and other experienced outdoorsmen seems unlikely and suggests that few swans were successful nesters in this area prior to 1920.

Between 1924 and 1954, swans were reported from time to time at several locations extending from the Copper River Delta through Cook Inlet to Lake Minchumina west of the Alaska Range. Although sometimes reported as Trumpeters, the taxonomy of these swans was never verified except for two killed in 1949 on the Chickaloon Flats of the Kenai Peninsula. The others were "identified" by their size or their call.

Wildlife biologists did not become fully aware of the presence of a substantial breeding population of Trumpeter Swans in south-central Alaska until a broad program of field work in the lower Copper River Basin was initiated. In mid-August of 1955, an intensive aerial survey of the Bremner and Tasnuna River valleys revealed 69 adults and five broods totaling 15 cygnets. Identification of this population as Trumpeters was verified through measurement of eggs (Monson 1956). This discovery was the impetus needed to initiate a specific, in-depth Trumpeter Swan investigation which eventually culminated in a good determination of the range and abundance of this species in Alaska as well as a hypothetical limit of breeding range across the continent (the 145-day ice-free line).

Two basic criteria were used to identify nesting Trumpeter Swans; i.e., distinguish between Trumpeters and Whistling Swans (C. columbianus). From the air, the type and location of the nest is the most readily distinguishing feature. The Trumpeter almost invariably nests in emergent vegetation in the manner of some diving ducks. Construction of the nest itself renders it very visible because the amount of vegetation needed to produce its great bulk leaves a wide circular moat of water around the nest. Whistling Swans, in contrast, tend to nest on land rather than over water. In general, Trumpeters are birds of the boreal forest whereas Whistlers normally choose the open tundra. Where these two ecosystems join, the nesting range of the two species of swans may overlap to some degree.

The second criteria used for positive identification of the Trumpeter, and which incidentally was also used to verify the type of nesting structure, was measurement of eggs wherever nests could be safely reached by floatplane or boat. In some areas, swans were caught and banded for migration studies. The weight and measurement of adults was also used as an identifying criterion.

Occasionally, a Trumpeter-type nest is sighted from the air well beyond the hypothetical range limit of this species and in Whistling Swan habitat. Of those nests I have personally seen, none has been located in a readily accessible area and, thus, not examined to verify the species. During most years, Trumpeter cygnets could not reach flight stage out there on the tundra because of the abbreviated ice-free period, so those nests could represent the first effort of inexperienced swans or unsuccessful attempts at pioneering new areas.

As we understand the current distribution of the Trumpeter Swan in relation to its ecological requirements and to recent climatalogical changes (glacial decay and retreat), it appears that the Trumpeter could not have been much more abundant historically in Alaska than it is at present, particularly on the fringe of its range near the open tundra. Conversely, Trumpeters are undoubtedly more abundant now south of the Alaska Range than they were during the early days of the Alaskan exploration. This premise is based on the documented retreat of glaciers since 1884 (Abercrombie 1899; Tarr and Martin 1914), in what is now some of the prime Trumpeter Swan habitat. Those areas and much more habitat were not available to swans 100 years ago.

As King (1976) pointed out at the Fifth Trumpeter Swan Society Conference, a remnant Trumpeter population may have survived in the unglaciated valleys of interior Alaska and it was the nucleus for the currently expanding population.

Now that the decimating factors associated with early North American exploration and conquest have been brought under control, we must still maintain a constant vigilance against encroachment and deleterious land use practices to keep the Trumpeter Swan prospering and free of threat. The very nature of this magnificent creature is incompatible with close human association or undue intrusion into its breeding domain. Our challenge is to keep it surviving thriftily on its own terms.

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STATUS OF THE TRUMPETER SWAN ON THE KENAI NATIONAL MOOSE RANGE

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The Kenai National Moose Range, 112 miles by road but only 20 air-miles from Anchorage, provides within its 2,700-square-mile boundary more than 1,800 square miles of Trumpeter Swan (*Olor buccinator*) habitat. Two-thirds of the refuge is lowland, with low ridges, rolling hills and muskeg, much of it timbered with spruce-birch-aspen forest. There are more than 2,800 lakes, 160 miles of rivers, and many more miles of smaller streams and drainages. The remaining third of the refuge lies in the Kenai Mountains which rise to their highest point of 6,612 feet.

It is the lowland region lying westward of these mountains to the Cook Inlet shoreline that supports not only Trumpeter Swan habitat but also major road systems and numerous recreational facilities. Included are commercial fly-in fishing camps, two oil and gas field complexes with their associated road systems and powerline and pipeline rights-of-way, and a favored playground for much of the State's population residing in the greater Anchorage area.

North of the Sterling Highway, which generally bisects the Range, more than 1,200 lakes dot these lowlands. This lake region and its connecting drainage system supports 80 percent of nesting Trumpeter Swan habitat.

Although Trumpeter Swans may have been identified on the Kenai during the 1940's, serious investigation and subsequent refuge records date only from 1957 and revealed at that time 20 nesting swan pairs on the Kenai Moose Range.

During the succeeding 22 years, recorded active nest sites reached their peak of 39 in 1965, thereafter steadily lowering in total number to 21 observed sites in 1972, increasing to 28 active sites this season [1978]. The annual mean for active Trumpeter Swan nest sites on the Kenai is 25.4. Although there has been some variation in observed active nests, it has been difficult to attribute this change to any specific event or happening. A late spring and persistent low temperatures during 1975 may have contributed to a very low 48.8 percent of the cygnets reaching flight stage. This, however, was followed by a high cygnet survival rate of 87 percent in 1976. Our records show an average survival rate of cygnets to flight stage on the Moose Range of 70 percent.

It has been suggested that the Kenai habitat is saturated and little growth potential remains for this range. Indeed, natural fluctuations and the population have remained relatively static. We regularly observe new nest site locations every season without recording an increase in nesting pairs. This shifting of nest sites within a local area, assuming the same swan pairs, may be the result of marginal habitat, some unidentified disturbance, or other related factors such as unstable water levels.

Since the late 1960's, several Trumpeter Swan nest sites have been relocated due to lowering water tables. In one instance, a nesting pair was unsuccessful for two seasons because a lowering lake level provided a land bridge making the offshore nest site accessible to predators. Other observed nests constructed during early spring runoff gradually became high and dry vegetative mounds without protective surrounding water. Low seasonal precipitation and relatively droughty conditions for the Kenai lowlands beginning in 1967 were contributing factors in the 87,000-acre wildfire on these lands in 1969. Continuing below normal seasonal rainfall may well be associated with the 3- to 4-foot drop in the water table observed on many refuge lakes. Observers of some early spring arrivals have frequently found a pair of birds resting on yet ice-covered lakes waiting impatiently for the delayed breakup. Some pairs have seemingly hurriedly elected to construct their

nests in a less favorable site at the ice-free lake outlet thereby accepting, perhaps, a less than secure location.

This season, only two of the known swan nests were supported directly by any of the stable water levels created by beaver living in the estimated 250 houses on the refuge. Also this year's nest site locations associated with lake environments ranged in size from 25 to 350 acres. Of the 28 observed nesters, 10 (37%) had located their sites on islands, two on peninsulas, eight along shorelines, three at creek outlets, and five on or adjacent to creeks.

Refuge records identify swan pairs at certain locations that were continually successful nesters season after season and those at other sites that were consistently poor nesters. Generally, the successful nesters were found in more remote locations with stable water conditions where they were less likely to be disturbed.

By contrast, during an August 1978 aerial survey of 365 square miles of swan habitat west of Cook Inlet and 35 miles west of the City of Kenai, 175 Trumpeter Swans were observed. Twenty-three pairs of adult swans were sighted with 74 cygnets. Fourteen pairs were without broods. It was obvious after flying similar swan surveys on the Moose Range that the swan density was much higher on the west side. For example, of approximately 2,100 square miles (1,800 sq. mi. on the Moose Range) surveyed on the Kenai Peninsula this season, only 82 adults were observed comprising 27 nesting pairs. The data suggest that the western Cook Inlet area surveyed may support up to seven times more adults and five times more breeding pairs of Trumpeter Swans per square mile than the Kenai Peninsula area. No marked birds were observed during this survey.

Our Kenai observations indicate that not all Trumpeter brood rearing requirements are available at several lake nest sites. Family movements between lakes exposes the group to predators as well as to accident. One local resident reported that a land otter (Lutra canadensis) captured every cygnet from the swan brood on his lake. Many lakes on the Moose Range are either very large or have no inlet or outlets, and water levels fluctuate substantially. Any favorable, if somewhat marginal, sites have already been taken by the resident swans, and any surplus birds may have relocated on the west side of the Inlet. Although comparable data are lacking, Moose Range lakes undoubtedly are subject to greater use by aircraft, boats, canoes, and fishermen than are the smaller, more secluded lakes on the western side on the Inlet.

On the Kenai, the Trumpeter Swan population can expect to face continued economic expansion and human community growth. Since our survey includes some areas adjacent to the refuge, some loss of nesting sites may be associated with increased economic and human disturbance. Human activity when allowed to intrude creates an obvious deterrent. For example, some nest site locations in the developing industrial North Kenai area appear to have been displaced eastward into the Moose Range. This movement may have forced some nesting pairs into limited or marginal habitat conditions although perhaps providing temporary security from human disturbance.

Some years ago, a gas pipeline right-of-way was constructed along the Cook Inlet coastline adjacent to the refuge. Near its land terminus and direct departure into the Inlet to an offshore gas production platform, a Trumpeter Swan pair was displaced when someone decided to cut a road back to the nearby lake for crew recreation. This pair abandoned the site. The following year, a pair attempted unsuccessfully to nest in marginal habitat 2 miles away. This preferred nesting habitat was lost to new development.

Observed human community expansion has also frequently displaced swan pairs from lake to lake within the local area. The sale of a lakeshore residence to a new owner not particularly concerned with the Trumpeter Swan nest site nearby, apparently displaced a Trumpeter pair following the owner's operation of an all-terrain vehicle to the nest location. The following season, we assumed the same pair established a new nest site on an island in an adjacent lake. Continued island visits by canoeing youngsters displaced the pair to yet another lakeshore some distance away. We think this swan pair has now relocated to eight different sites in its attempt to escape human disturbance and find suitable habitat.

Commercial tent camp operators are not permitted to construct camps at Trumpeter Swan nesting lakes, yet there seems to be always one who values the dollar more, only to leave cold eggs in a nest upon his departure.

Wintering swans on the Kenai at Skilak Lake outlet were common until 1966. We believe increased human activity in that immediate area may have encouraged the groups to depart. The current Trumpeter Swan population on the Moose Range may well be determined by its insulation from disturbance.

Upcoming changes in land status under the Alaska Native Claims Settlement Act of 1971 will convey certain public lands to private ownership. Portions of the Moose Range will be lost and, although all final selections are not known, major portions of favored swan habitat involving as many as one dozen Trumpeter Swan nesting sites may be affected by this future land exchange.

Many of our observations on the Kenai naturally are presumed because of the lack of marked birds. Although the refuge staff has assisted in banding and neck-collaring numerous refuge Trumpeter Swans, disappointingly there have been few sightings of returning birds. It would appear juvenile birds go elsewhere during their non-breeding years. However, we have received several positive sightings of Kenai wintering swans near the Skagit River and at Ocean City in Washington State.

Human use of the Kenai National Moose Range is increasing steadily as the population of south-central Alaska continues to grow. The displacement of swans due to conflicts with humans is inevitable. It will be our responsibility to continue efforts to protect the Moose Range Trumpeter Swan population through the monitoring of the population and soliciting the support of public, oil and gas representatives, Native interests and others in the development of safeguards to perpetuate this unique species and in the protection of the outstanding wildlife features of this refuge held in trust for present and future generations.

* * *

THE TRUMPETER SWAN - AN ENDANGERED SPECIES IN CANADA

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The Trumpeter Swan is the largest and rarest of the eight species of swans found throughout the world. Although it was removed from the Endangered Species List by the United States Government in 1968, except for the Whooping Crane, it is probably the rarest bird in Canada.

From information presently available, it would appear that there are two indigenous, geographically isolated populations of Trumpeter Swans in North America. One breeds in Alaska, the Yukon, and northern British Columbia, and winters along the Pacific coast from Alaska south through British Columbia and Washington to the Puget Sound area. Some of that group also winters in the north-central interior of British Columbia. The other population breeds to the east of the Rocky Mountains in the Peace River Block of British Columbia and Alberta, in other scattered locations in Alberta, in Saskatchewan, and in the Yellowstone National Park region of Montana and Wyoming, and winters on the headwaters of the Snake and Yellowstone Rivers in Idaho and Wyoming.

The eastern population, which includes most of the Trumpeters raised in Canada, is much smaller than the northwestern population and therefore should be given special attention as an endangered segment of the total population. This paper refers mainly to the Canadian portion of the eastern population.

PRESENT POPULATION

It has been possible to make precise annual counts of the Trumpeters at Lonesome Lake, British Columbia, Grande Prairie, Alberta, Red Rock Lakes National Wildlife Refuge, Montana, Lacreek National Wildlife Refuge, South Dakota, and the various captive flocks. Annual surveys have not been made over the vast mountainous habitat of Alaska, British Columbia, and the Yukon because of prohibitive aircraft costs, but intensive surveys have been made often enough to provide good estimates. An estimate of total population by areas is given in Table 1.

Table 1. North American Trumpeter Swan population.

Area	Estimated population			
	Breeding	Wintering	Migrating	Total
(1) West of Rocky Mountains				
Alaska	4,150	2,100		
British Columbia	A few pairs	2,130		
Yukon	A few pairs		130	
Washington		50		
Total				4,280
(2) East of Rocky Mountains				
Tri-state (Montana, Idaho, Wyoming)	500	720		
Peace River Block (Alberta, British Columbia)	200			
Cypress Hills (Alberta, Saskatchewan)	20			
Lacreek Refuge	190	190		
Other refuges, zoos, etc.	200	200		
Total				1,110
GRAND TOTAL				5,390

CANADIAN NESTING AREAS

Trumpeter Swans were first reported in the Grande Prairie area of Alberta in 1918. The first survey was made there in 1946 when 100 swans, made up of breeding pairs, cygnets, and immatures, were counted. Annual counts since 1954 have fluctuated from 132 birds that year to 69 in 1958, 138 in 1961, 63 in 1966, and 152 in 1974. The large nesting territory required by each pair of Canadian Trumpeters, together with the scarcity of suitable nesting habitat, limits the number of birds that can be accommodated there. However, there seems to have been a recent extension of the range in that region to new nesting lakes in conifer fringe areas adjacent to the traditional aspen-parkland type nesting lakes.

There have been several successful Trumpeter nestings near Drumheller, Brooks, and Longview in Alberta, presumably by natural colonization from Grande Prairie stock. However, new local breeding groups have not proliferated, primarily because of human molestation.

The three or four pairs and their families in the Cypress Hills region of Alberta and Saskatchewan have just managed to hold their own since Trumpeters were first reported there by Lister in 1951. Shortage of suitable nesting territories and human interference would appear to preclude any great increase in the size of that flock.

Nieman and Isbister reported a pair of Trumpeters with a brood of two cygnets on three isolated lakes in the aspen-parklands between Meadow Lake and North Battleford, Saskatchewan in 1973. The present status of that group of swans is unknown to the author at this time.

MIGRATION ROUTES AND WINTERING AREAS

Information on the movements of Canadian Trumpeters has been collected through a neck-collaring and leg-banding program by Canadian Wildlife Service officers since 1954. Observations of marked birds have shown that Alberta and Saskatchewan Trumpeter Swans join the birds from Red Rock Lakes and Yellowstone Park to winter on the headwaters of the Snake and Yellowstone Rivers in and adjoining Yellowstone Park. Trumpeters from the Grande Prairie region travel some 850 miles down the eastern side of the Rockies through Alberta and Montana to the wintering grounds. Although there have been no observations of marked birds from the Cypress Hills group during migration, it is presumed that they follow the valleys of the Milk and Yellowstone Rivers in their southerly flight.

One observation of a collared swan in the Columbia River valley of British Columbia during the spring migration period indicates some use of the Rocky Mountain Trench on the return journey to the Grande Prairie nesting grounds.

LIMITING FACTORS

Trumpeters have few natural enemies except for man. Eagles, Great Horned Owls, coyotes, or cougars may take swans under certain local conditions, but predation by those animals is not significant. Although it is illegal to shoot Trumpeter Swans, many are killed each year during open waterfowl seasons. The large birds usually fly low over lakes and marshes and make conspicuous targets for waterfowl hunters, some of whom cannot resist the temptation to shoot. That is probably the most important cause of mortality in Trumpeters.

Another mortality factor associated with hunting is lead poisoning, caused when swans ingest lead shot while feeding in areas that have been shot over by hunters.

The large territory required by each nesting pair of Canadian Trumpeters serves to limit the number of breeding pairs that can be accommodated on the nesting grounds and, hence, the productivity of the area.

The very limited winter habitat created by the warm springs in the greater Yellowstone region would appear to be the critical factor in the regulation of future numbers of wild Trumpeters east of the Rockies.

DISCUSSION

Although Trumpeter Swans were once common nesting birds in the Great Plains region of Canada and the United States, their pristine habitat has been drastically reduced by the tractor and the plow. Nevertheless, some pockets of habitat still exist which can be developed and restocked as exemplified by the accomplishment at the Lacreek National Wildlife Refuge in South Dakota.

The Restoration Committee of The Trumpeter Swan Society under Chairman Kent Brace has drawn up a list of potential release sites in Canada. In view of the present small breeding population of Trumpeters in Canada, probably less than 100 pairs, a restoration program deserves serious Canadian consideration. Granted, there are many aspects -- besides nesting habitat -- to be considered in a restoration program. There are many thorny problems to be solved such as the swans' effect on other waterfowl, the possibility of jeopardizing traditional uses of waterfowl habitat, and the provision of wintering habitat. However, such a program might receive enthusiastic public support with the present emphasis being placed on the non-consumptive use of natural resources.

While not pertaining to the eastern group of Trumpeters, one aspect of the restoration program that requires immediate attention is the problem of a small population of feral Mute Swans that has been gradually increasing along the southeast coast of Vancouver Island. Those birds are encroaching on traditional Trumpeter Swan wintering habitat and should be eliminated in favour of the rare, indigenous species. The possibility of developing a local nesting population of Trumpeter Swans should be investigated.

Our first concern in Canada, however, must be the preservation of the small number of nesting Trumpeters that we now have. While most Trumpeter breeding areas are remote, many of the Grande Prairie birds raise their young near farmsteads and roads. There has been little human disturbance on the nesting lakes to date because of the wide fringes of emergent vegetation and the slimy mud bottoms that make them unattractive to swimmers and boaters. Nevertheless, the stress on the swans is gradually increasing with the expanding human population in the area and some action should be taken to preserve the nesting habitat and to protect the birds from disturbance.

Wintering habitat is also an indispensable requirement for the perpetuation of wild Trumpeter Swan populations. That habitat which is shared by American- and Canadian-raised swans is critical to the continued existence of the wild Trumpeters east of the Rockies. With the ever burgeoning demands for energy, all rivers and lakes, including those used by wintering swans, are being eyed for their power potential. It behooves all of us, individually and collectively, to make sure that the Trumpeter Swan receives every consideration in the early stages of planning for any power development.

This paper was prepared with assistance from the Canadian Wildlife Service.

* * *

CURRENT STATUS OF WILD POPULATIONS OF TRUMPETER SWANS ON NATIONAL WILDLIFE REFUGES IN THE LOWER 48 STATES

Eugene D. Stroops
U. S. Fish and Wildlife Service
Monida, Montana

My comments today will address population changes of the Trumpeter Swan since the last meeting of The Trumpeter Swan Society 2 years ago.

Trumpeter Swans are presently located on nine National Wildlife Refuges (NWR) in eight western states:

1.	Red Rock Lakes	Montana
2.	Lacreek	South Dakota
3.	Malheur	Oregon
4.	Ruby Lake	Nevada
5.	Turnbull	Washington
6.	National Elk	Wyoming
7.	Crescent Lake	Nebraska
8.	Valentine	Nebraska
9.	Camas	Idaho

Successful production of Trumpeter Swans has occurred on all of these areas.

Trumpeter Swans were captured at the Red Rock Lakes National Wildlife Refuge and transplanted to five of the above NWR's in an attempt to establish breeding populations in part of this bird's former range.

This transplant program took place over a period of 28 years between 1938 and 1966. During this time, approximately 350 Trumpeter Swans were moved to new locations.

Current information on Trumpeter Swan populations was provided by the staff of the above listed refuges. The staffs were also asked to provide information as to the potential of the current refuge populations relative to expansion, stability, or decrease in the respective refuges.

The following Trumpeter Swan population information is a summary of that received from these National Wildlife Refuges.

RED ROCK LAKES NWR

It seems appropriate to start with Red Rock Lakes NWR since this refuge's Trumpeter Swans comprise the parent population for many of the Trumpeters found on National Wildlife Refuges today.

1976-77	Peak winter population	358 (315 adults/43 cygnets)
1977	Breeding season	41 pairs 34 active nests 70 cygnets hatched on the Refuge 47% cygnet mortality 37 cygnets fledged on the Refuge 21 cygnets fledged off the Refuge in adjacent habitat 58 cygnets fledged in the Centennial Valley, MT
1977	Fall population	176
1977-78	Peak winter population	315 (267 adults/48 cygnets)
1978	Breeding season	60 pairs 43 active nests 105 cygnets hatched on the Refuge 53% cygnet mortality 49 cygnets fledged on the Refuge 19 cygnets fledged off the Refuge in adjacent habitat 68 potential cygnet production in the Centennial Valley, MT

The production information does not include 17 eggs from four clutches which were picked up in 1977 and 32 eggs from six clutches that were picked up in 1978. These eggs were provided to private propagators with the required Federal permits.

The Red Rock Lakes Refuge population has been relatively static for the past 21 years and has leveled off at approxi-300 birds in the winter population.

A supplemental winter feeding program is required to maintain the population at this level. Insufficient winter habitat and food limits further expansion of the Refuge population. Without supplemental feeding, it is estimated that the Centennial Valley nesting population would decrease 40 percent.

LACREEK NWR

1976-77	Peak winter population	159 (146 adults/13 cygnets)
1977	Breeding season	5 pairs 5 active nests 13 cygnets fledged on the Refuge
1977	Fall population	23
1977-78	Peak winter population	191 (126 adults/65 cygnets)
1978	Breeding season	6 pairs 6 active nests 14+ cygnets fledged on the Refuge

Movement and dispersal of breeding pairs and expansion of the breeding area into western Nebraska and western South Dakota is occurring. Present indications are that this population will stabilize at approximately 200 birds due to saturation of the wintering habitat.

VALENTINE NWR

1978	Breeding season	1 pair 1 active nest Production is unknown

CRESCENT LAKE NWR

1978	Breeding season	1 pair 1 active nest Production is unknown

TURNBULL NWR

1976-77	Peak winter population	39 (31 adults/8 cygnets)
1977	Breeding season	16 (16 adults/0 cygnets)
	No nesting observed on the Refuge. No sub-adults returned to the Refuge. All attempts to locate the missing segment of this population were unsuccessful.	
1977-78	Peak winter population	10 (10 adults/0 cygnets)
1978	Breeding season	1 pair 1 active nest 2 cygnets fledged on Refuge

During the winter of 1977, the supplemental feeding program and aeration to provide open water was discontinued. Current Fish and Wildlife Service policy is to discourage artificial feeding to prevent unnatural concentrations of waterfowl. The management decision intended to force the birds to move to other wintering areas and to maintain the population under natural conditions.

It now appears that a lack of suitable winter habitat for this Refuge population was the cause of the drastic reduction in Trumpeter Swan numbers on the Refuge in 1978. Turnbull Refuge's population reached a maximum number of 42 birds in 1976.

MALHEUR NWR

1976-77	Peak winter population	32 (19 adults/13 cygnets)
1977	Breeding season	24 total 3 pairs 3 active nests No production
1977-78	Peak winter population	7 (5 adults/2 cygnets)
1978	Breeding season	30 total 11 pairs 6 active nests 11 cygnets fledged on Refuge

This area appears to have marginal Trumpeter Swan nesting habitat because of the southern latitude, limited essential habitat, or other unknown reasons.

The wintering population may be affected by the following considerations which would tend to limit population expansion: (1) mortality on the Refuge could be much higher than is presently suspected; (2) the birds may be pioneering into the

surrounding area and have not been located; and/or (3) Trumpeter Swans may be migrating to unknown areas, possibly with Whistling Swans. Malheur Refuge's population has never exceeded 52 birds.

RUBY LAKE NWR

1976-77	Peak winter population	28
1977	Breeding season	14 total 4 pairs 3 active nests 8 cygnets fledged on Refuge
1977-78	Peak winter population	48 (40 adults/8 cygnets)
1978	Breeding season	19 total 6 pairs 2 active nests 3 cygnets fledged on Refuge

There is acceptable nesting habitat in the Ruby Valley which is not occupied by Trumpeter Swans. It also appears that breeding pairs are pioneering into the surrounding area, but this area has not been specifically defined. Human interference limits use of part of the potential Trumpeter Swan habitat on the Refuge during the public use season.

Winter habitat on the Refuge can presently support a small expansion of the population. The Ruby Lake Refuge population reached a maximum number of 48 birds in 1978.

NATIONAL ELK REFUGE

1976-77	Peak winter population	24
1977	Breeding season	4 total 2 pairs No active nests
1977-78	Peak winter population	12
1978	Breeding season	5 total 1 pair No active nests

Currently, there is only a limited potential for development of nest sites on the Elk Refuge in backwater areas along the Gros Ventre River. Some open water is available during the winter, but a winter food source is extremely limited, thus limiting expansion of the winter population.

CAMAS NWR

1976-77	Peak winter population	2
1977	Breeding season	4 total 1 pair 1 active nest 2 cygnets fledged on Refuge
1977-78	Peak winter population	No birds observed
1978	Breeding season	2 total 1 pair No active nests

The 1977 production was the first recorded on the Refuge. In the past, occasional sightings of Trumpeter Swans have been recorded during the winter for short periods.

Potential for expansion on Camas Refuge is very limited due to availability of only marginal habitat.

SUMMARY

1. If success of the transplant program is evaluated by a comparison of numbers of birds moved from Red Rock Lakes NWR against present population numbers at the transplant sites, one would have to conclude that with the exception of the Lacreek NWR flock, this program is not entirely successful.
2. Although existing nesting habitat is adequate and might provide for future expansion of Trumpeter Swan populations, suitable existing winter habitat seems to be a serious limiting factor to future expansion of the Trumpeter Swan in the lower 48 states.
3. To maintain some existing Trumpeter Swan populations at their present levels, some type of supplemental feeding program may be necessary even though this type of management is considered to be less than desirable.

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Thursday Afternoon - September 7

Chairman: Winston E. Banko
National Park Service, Hawaii National Park, Hawaii

CURRENT RESEARCH AND RESEARCH NEEDS

TRUMPETER SWANS IN THE GRANDE PRAIRIE REGION OF ALBERTA

Gordon Holton
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HISTORY

The remnant populations of Trumpeter Swans of the Red Rock Lakes National Wildlife Refuge, Yellowstone National Park, and Alaska have received extensive investigation (Banko 1960; Hansen et al. 1971; Paullin 1973; Page 1976; Shea in study). However, relatively little is known of the 100 to 180 Trumpeter Swans comprising the population in Alberta. These birds nest within a 5700-square-kilometer (2200-square-mile) area lying immediately north and west of the city of Grande Prairie.

The Canadian Wildlife Service (CWS) initiated a banding program in this region in 1954 and has conducted aerial surveys each autumn since 1957. The banding program has shown that the birds winter in the northwestern United States along with the Red Rock Lakes and Yellowstone Park Trumpeters (Mackay 1957). Colour neck banding, in accordance with international protocol (Sladen 1974), was initiated in 1973 (Pryor 1974). While investigations of habitat have not been extensive (Mackay in prep.), Banko and Mackay (1964:164) reported that the Grande Prairie population "seems to be restricted by a shortage of proper habitat and the large space required by a breeding pair."

Unlike Trumpeter Swans in the United States whose breeding habitat has been incorporated into refuges, or were refuges prior to transplant programs, the Grande Prairie Trumpeter Swan population nests in an area of expanding agricultural activity. This may result in alteration of those physical components of the habitat which Banko (1960) found to be characteristic of Trumpeter Swan breeding habitat (Bellrose 1976). Also, increased human disturbances may cause abandonment of breeding territories (Hansen et al. 1971; Page 1976). Annual CWS surveys (unpublished data) suggest certain formerly used water bodies no longer support breeding pairs.

Hansen (1973) suggested using Grande Prairie Trumpeter Swans as introductory stock for transplant programs into other northern regions. Alaskan Trumpeter Swans could also be used since they have a similar migration pattern. But it has been suggested that they might differ from Grande Prairie and continental United States birds at the subspecific level (Banko and Mackay 1964). Hansen (1973) concluded that unless an explanation for the apparently static nature of the Grande Prairie population of Trumpeter Swans can be offered, a transplant program should not be initiated.

My study has been undertaken to determine if there is a limited amount of suitable breeding habitat available to the Grande Prairie Trumpeter Swans.

UPDATE

To determine the important parameters of Trumpeter Swan habitat, a series of lakes have been chosen for close examination. Lakes which have consistently been occupied by breeding swans and lakes which have not been used are being investigated. Parameters being considered include:

a. lake size, shape, and depth,
b. fluctuations in water level,
c. chemical composition of the water,
d. composition of the aquatic vegetation, and
e. composition of shoreline vegetation.

The importance of large areas of flooded sedges (Carex rostrata) is evident in that over one half (57%) of the Trumpeter Swan nests were located in this type of vegetation. Two aquatic plants (Potamogeton richardsonii and P. praelongus) may be important to young cygnets as they have been observed feeding on these plants, particularly on the flowers and seeds. Also, on two lakes where there was total brood mortality, these plants were found to be scarce. Because this is by no means conclusive evidence, the situation will receive additional investigation.

Detailed behavioural observations of breeding Trumpeter Swans were undertaken in early May 1978, and were continued throughout the summer. The observations were undertaken to determine if there are significant differences in the behaviour of swans nesting in close proximity to humans and those which occupy more isolated lakes. During these observation periods, it became clear that interspecific aggression is far more common in this region than what Page (1976) has reported for the Red Rock Lakes area. Besides frequent Trumpeter Swan-Trumpeter Swan and Trumpeter Swan-Canada Goose interactions, the swans displayed aggression towards Whistling Swans, Mallards, Lesser Scaup, Red-winged Blackbirds, Yellow-headed Blackbirds, Black Terns, a Common Loon, a gull, and, in one instance, our survey plane. In turn, the swans were regularly harassed by Red-winged Blackbirds and Black Terns. It is thought that the Trumpeter Swan-Canada Goose interactions may be especially significant if either species successfully prevents the other from breeding. There are several lakes within this study area where this particular situation is being followed closely.

SURVEY INFORMATION

Fourteen nest sites were visited during May. Fifty-eight of the 79 eggs in these nests hatched between the date of 6 June and 3 July. This high hatching success (73%) is quite favourable. Seventy-three percent of the cygnets survived the critical first 2 weeks following the hatch.

A total of 219 Trumpeter Swans were counted during aerial surveys conducted in early July in the Grande Prairie region. This was 26 swans more than were counted at the same time last year. While the number of cygnets (80) was slightly lower than the record 96 cygnets of 1977, the number of swans which were in pairs rose from 39 to 44. Since it is these birds which are the breeding and potential breeding swans, the outlook for this population currently seems encouraging.

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AN EVALUATION OF TRUMPETER SWAN BREEDING HABITAT IN THE GRANDE PRAIRIE REGION OF ALBERTA

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HISTORY

Trumpeter Swans (Cygnus (Olor) buccinator) were nearly eradicated by early North American fur traders and settlers (Bent 1925). In 1932, the total known Trumpeter Swan population consisted of 69 individuals, most of which inhabited the "Tri-state" area of Montana, Wyoming, and Idaho (Banko 1960). Because of careful management of the Red Rock Lakes National Wildlife Refuge (established in Montana in 1935), successful introduction of small breeding populations into several United States locations (Monnie 1966), and the discovery of large flocks of Trumpeter Swans in Alaska (Monnie 1956), the Trumpeter Swan is no longer considered a rare and endangered species (U. S. Fish and Wildlife Service 1970). Present population estimates suggest Trumpeter Swans number approximately 5,000, of which 4,000 breed in Alaska and 1,000 breed in Canada and the continental United States (Evenden 1969). A small number are held in captivity. The restoration effort in the continental United States has popularly been considered a milestone in conservation efforts (Truslow 1960; U. S. Fish and Wildlife Service 1970).

While remnant populations of Trumpeter Swans at the Red Rock Lakes Refuge, Yellowstone National Park, and Alaska have received extensive investigation (Banko 1960; Hansen et al. 1971; Paullin 1973; Page 1976; Shea pers. comm.), relatively little is known of the 100 to 180 Trumpeter Swans comprising the population in Alberta. These birds nest within a 5700-square-kilometer (2200-square-mile) area lying immediately north and west of the City of Grande Prairie.

The Canadian Wildlife Service (CWS) initiated a banding program in this region in 1954 and has conducted aerial surveys each autumn since 1957. The banding program has shown that the birds winter in the northwestern United States along with the Red Rock Lakes and Yellowstone Park Trumpeter Swans (Mackay 1957). Colour neck banding, in accordance with international protocol (Sladen 1974), was initiated in 1973 (Pryor 1974). While investigations of habitat have not been extensive (Mackay in prep), Banko and Mackay (1964:164) report the Grande Prairie population "seems to be restricted by a shortage of proper habitat and the large space required by a breeding pair."

Unlike Trumpeter Swans in the United States whose breeding habitat has been incorporated into refuges, or were refuges prior to transplant programs, the Grande Prairie Trumpeter Swan population nests in an area of expanding agricultural activity. This may cause alteration of those physical components of the habitat which Banko (1960) found to be characteristic of

Trumpeter Swan breeding habitat (Bellrose 1976). Also, increased human disturbance may cause abandonment of breeding territories (Hansen et al. 1971; Page 1976). Annual CWS surveys (unpublished data) suggest that certain formerly used water bodies no longer support breeding pairs raising cygnets.

Hansen (1973) suggested using Grande Prairie Trumpeter Swans as introductory stock for transplant programs into other northern regions. Alaskan Trumpeter Swans could also be used since they have a similar migration pattern. However, it is suggested that they may differ from Grande Prairie and continental United States birds at the subspecific level (Banko and Mackay 1964). The undefined status of the Grande Prairie Trumpeter Swan population in terms of habitat requirements and availability, has, in part, impeded reintroduction of Trumpeter Swans into northern regions of their former range (Hansen 1973).

This study has been undertaken to delineate habitat requirements of the Grande Prairie Trumpeter Swan population. Breeding success, particularly as it relates to habitat variables, will be followed. The significance of non-breeding conspecifics also will be considered.

OUTLINE OF OBJECTIVES

1. Analysis of the biotic and physio-chemical parameters of selected water bodies to elucidate variables of Trumpeter Swan habitat in the Grande Prairie area.

2. Analysis of food habits and feeding patterns of adults and cygnets by faecal analysis and by sampling biota present at feeding sites.

3. Analysis of nest sites in terms of water depth, construction, vegetation in the immediate vicinity, and nest location in relation to physical parameters of the water body.

4. Analysis of intra- and inter-specific aggression of territorial breeding pairs as a possible explanation for an apparently static population.

RATIONALE

Characterization of selected water bodies.

Few water bodies in the Grande Prairie region have been characterized in terms of basic limnological parameters (morphometry, productivity, and chemistry). As previously noted, analysis of Trumpeter Swan habitat in the area is similarly incomplete.

Water chemical characteristics (total ion concentration, alkalinity, hydrogen ion concentration, and turbidity) will be measured because they have a known influence on plant communities (e.g., Provost 1947). Primary productivity of the selected water bodies will be measured by chlorophyll a extraction and analysis (Lorenzen 1967; Nicholls 1976). Water stability, basin size and morphometry, occurrence and distribution of emergent and terrestrial plant species, all known to influence habitat selection of Trumpeter Swan breeding pairs (Banko 1960; Hansen et al. 1971), will be examined. Submergent plants, the primary food of Trumpeter Swans (Page 1976), will similarly be inspected. Line transects (Paullin 1973) will supplement aerial photography (Kirby 1976) in the provision of data for vegetation mapping.

While water bodies abound in the Grande Prairie area (Odynsky et al. 1956, 1961), less than 30 percent were found to be utilized by Trumpeter Swans in 1977 (CWS unpublished data). Water basins known to be repeatedly occupied by breeding pairs, and those unoccupied or seldomly occupied (CWS unpublished data), will be compared employing multivariate analysis (Struman 1968; Green 1971).

Area of intense swan use.

In the Grande Prairie region, single pairs of breeding Trumpeter Swans occupy water bodies up to 800 acres in size (Banko and Mackay 1964). Page (1976) found that defended territories were larger than areas of daily use. Banko (1960) and Hansen et al. (1971) report that territories as small as 10 acres were able to support breeding pairs.

Mapping of emergent and submergent vegetation may demonstrate selection for specific aquatic regions should less than the entire defended territory be exploited by breeding pairs and their broods. Invertebrates form important food sources for cygnets during certain periods of development (Banko 1960; Hansen et al. 1971). Sampling of invertebrate populations and more intensive sampling of aquatic vegetation within areas heavily used by cygnets and adults may elucidate feeding habits and requirements. When compared to faecal analysis (Luther 1963; Owen and Kerbes 1971; Owen 1975), the distribution of species of plants may demonstrate food preferences of adults and/or cygnets. Elodea canadensis, the preferred food species of adult Trumpeter Swans in Montana (Paullin 1973), is reportedly rare in Alberta (R. C. B. Hartland-Rowe pers. comm.; Moss 1959).

Nest site analysis.

Kaminski and Prince (1977), analyzing Canada Goose (Branta canadensis) nests on muskrat (Ondotra zibethica) lodges, were able to detect characteristics which reflected nest site selection. They found that lodge size, density of surrounding vegetation, and maximum lodge height above water were significant parameters in determining lodge usage. A similar analysis of Grande Prairie Trumpeter Swan nest sites may demonstrate the suitability of water bodies to breeding pairs and perhaps provide an explanation for an apparently static population (Brown 1969).

Territoriality.

Trumpeter Swans are territorial birds, aggressive towards conspecifics and other large waterfowl (Banko 1960). In the Grande Prairie region, breeding pairs are not known to co-habit water bodies with Canada Geese (CWS unpublished data) and nesting by more than one breeding pair of Trumpeter Swans per water body is uncommon (Banko and Mackay 1964). This latter condition contrasts with the Red Rock Lakes Refuge where water bodies are known to support more than a single breeding pair

of Trumpeter Swans under conditions of partial or complete visual isolation (Page 1976). Whether this reflects habitat differences or degree of habitat saturation is currently unknown.

Recognition of individual swans or pairs for the delineation of territories will be possible utilizing neck collars previously attached (Pryor 1974, 1975).

Ducks Unlimited (Canada) currently is modifying habitat to promote the Canada Goose population in the Grande Prairie area. Should significant interspecific aggression between Trumpeter Swans and Canada Geese be identified, management implications may be suggested.

PROPOSED TIME BUDGET

The following represents an allocation of available research time to fulfill the previously outlined objectives. The itinerary of the first year (1978) represents a relatively broad basis which may provide directional input for research to be undertaken in the second year (1979).

Year I.

1. Observation of specific areas of intense use by Trumpeter Swans. This will encompass the activities of the birds on staging areas, breeding territories, and areas utilized by non-breeders.

2. Gross limnological characterization of selected water bodies. This will include:

   a. Chemical parameters.

      i. Conductance (total ion concentration).
      ii. Total hardness (calcium and magnesium concentrations).
      iii. Alkalinity (carbonate, bicarbonate, and hydroxyl ion concentrations).
      iv. pH (hydrogen ion concentration).
      v. Turbidity (total dissolved solids).

   b. Physical parameters

      i. Water body size.
      ii. Degree of shoreline development.
      iii. Water depth and mean depth.
      iv. Stability of water depth.
      v. Orientation to prevailing winds.

   c. Biotic parameters.

      i. Primary productivity as measured by chlorophyll a analysis of planktonic communities.
      ii. Mapping of emergent and submergent species of plants.
      iii. Analysis of terrestrial vegetation surrounding the water body.
      iv. Sampling of invertebrate populations.

3. Analysis of Trumpeter Swan nest sites in terms of:

   a. Water depth.
   b. Height above water level.
   c. Density of vegetation in the immediate vicinity of the nest.
   d. Distance to adjacent shoreline and open limnetic regions.
   e. Construction of the nest.

4. Faecal collection and analysis.

5. Observation of the biology of Trumpeter Swans such as:

   a. Post-hatch territorial shifts.
   b. Roost sites if differ from nest location.
   c. Nesting success.
   d. Date of hatch.
   e. Periods of molt.
   f. Mortality.

Year II.

1. Detailed characterization of specific areas used by breeding pairs with broods including analysis of the composition of species of plants and sampling of invertebrate populations.

2. Gross characterization of specific areas used by non-breeding Trumpeter Swans.

3. Analysis of Trumpeter Swan nest sites. If muskrat lodges are found to be extensively used as nest sites, analysis could be expanded to include non-utilized lodges for comparisons between utilized and non-utilized lodges.

4. Gross characterization of water bodies where swans exhibited post-hatch territorial shifts and detailed characterization of specific areas exploited by the swans.

5. Observations of general biology.

METHODS

The following pages outline specific methods to be employed in fulfilling the aforestated objectives. Samples for chemical and biotic analyses will be taken in mid-May, late June, and August.

1. Observation of specific areas of intense use. On selected water bodies, observations of swan activities will be obtained during collection of habitat data. Additional information will be gained during 2-hour observational periods. Composite observations will provide data for the entire daylight period.

2. Gross limnological characterization of selected water bodies.

a. Chemical parameters. Using a Kemmerer water sampler, samples from small, relatively uniform water bodies will be taken at the surface and at middle and maximum depths at the deepest location in the water body. Larger, non-uniform water bodies will be sampled similarly at certain designated sites (e.g., deepest site or sites, near inlets and outlets, over shallow shoals, in protected bays). Uniformity of the water bodies will be determined during sampling of aquatic vegetation. Chemical analysis will follow Lind (1974):

i. Total hardness: EDTA titration using Eriochrome Black T black as an indicator at pH 10. Calcium hardness determinations will be performed at pH 13.
ii. Alkalinity: Sulphuric acid titrations with phenolphthalien and bromocresol green-methyl red indicators.
iii. Turbidity: Spectronic 20 comparisons with demineralized water sample at 450 nm, expressed in Jackson Turbidity Units.
iv. pH: Measured with a pH meter at site of collection.
v. Conductance: Measured with a conductance meter with compensation ion temperature differences.

b. Physical parameters.

i. Water body size and ii. Shoreline development. For initial comparison and selection of water bodies to be studied, these parameters will be measured using aerial photographs. By projecting representations of these water bodies onto paper, lake boundaries can be manually recorded. Area can then be calculated using polar planimeter techniques. Shoreline development can be determined by cartometric methods (Lind 1974).
iii. Water depth and mean depth. This will be determined using a weighted graduated cord at sampling sites of aquatic vegetation.
iv. Stability of water depth. Wooden posts positioned vertically in the substrate of the water bodies will be used to monitor water depth during the summer. The water level will be recorded on each occasion the investigator is at the water body.
v. Orientation to prevailing winds. As local geographical variables may affect wind direction relative to those recorded at C.F.B. Beaverlodge, wind direction will be estimated when the investigator is at each water body.

c. Biotic parameters.

i. Primary productivity. While collecting samples for chemical analysis, water samples will also be taken for chlorophyll a determination. After measurement of the photic zone, five samples from within this water column will be taken and preserved with Lugol solution (Edmondson 1959). Following filtration through 8 um membrane filters, chlorophyll a is extracted from the filtrant in 90 percent acetone. Quantitative analysis is performed using spectrometric determination at 663 nm (Nicholls 1976).
ii. Mapping of submergent and emergent species of plants. Line transects for mapping of submergent species will follow Paullin (1973). Using recognizable landmarks for orientation, marker buoys are deposited at regular time intervals from a constantly moving boat. One-square-meter plots are analyzed at each buoy for density and diversity of plant species. Position of plant species within the water column will be measured with a weighted graduated cord. Water depth will also be recorded.

To ensure adequate coverage of areas of emergent vegetation, sample plots (0.3 m x 0.3 m), lying on approximate extensions of transect lines will be chosen by a random method. Samples will be taken at 2- to 3-meter intervals across stands of emergent vegetation.

iii. Terrestrial vegetation. Transect lines will also be extended for gross analysis of terrestrial vegetation. Coverage of dominant species will be estimated by eye. Height of vegetation will be measured directly for grasses and low shrubs and by triangulation for trees (Whitmore 1975). Tree density will be measured using density boards (deVos and Mosby 1969). Area of undisturbed vegetation surrounding water bodies will be measured on aerial photographs.
iv. Invertebrate sampling. During the first year, invertebrate populations will be sampled using sweep nets and Ekman dredges. Five samples will be taken with each device at the locations of sampling for chemical and biotic parameters. Specimens will be preserved in 10 percent formaldehyde and analyzed using flotation techniques (Lind 1974).

3. Analysis of nest sites.

a. Water depth. As Trumpeter Swans uproot vegetation in the vicinity of the nest (Banko 1960; Page 1976), water depth will be measured in the undisturbed vegetation immediately surrounding the nest site (Pakulak and Littlefield 1969).
b. Height above water level. Measurements will be performed using a meter stick.
c. Density of vegetation in the immediate vicinity of the nest. Following Kaminski and Prince (1977), vegetation density and height will be measured at 0.1 m intervals along transect lines (0.05 m x 10 m) extending from the nests in the four cardinal directions.
d. Distance to adjacent shoreline and limnetic regions. These distances will be obtained from aerial photographs. Location of nests in relation to potential human disturbances will also be measured from aerial photographs.
e. Construction of the nest. While continental United States Trumpeter Swans are found to extensively utilize muskrat lodges (Banko 1960; Page 1976), Alaskan birds fabricate nests from available material (Hansen et al. 1971). In the Grande Prairie region, Trumpeter Swans are known to utilize both types of nests (Albert Doberstein pers. comm.).

Additional parameters measured while at the nest site will include nest base diameter, nest cup depth, nest cup base diameter, and nest crown diameter (Pakulak and Littlefield 1969).

4. Faecal collection and analysis. Since dried faecal material is unsuitable for analysis (Luther 1963), fresh samples will be obtained from nest and loafing sites and preserved in 10 percent formaldehyde. Five subsamples of each faecal specimen will be analyzed by comparison to epidermal surfaces of plants found at feeding locations (Owen 1975).

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NESTING ECOLOGY OF THE TRUMPETER SWAN IN YELLOWSTONE NATIONAL PARK

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Trumpeter Swans probably never were extirpated from Yellowstone National Park (YNP) although the first nest was not recorded until 1919. From that year until the Trumpeter was removed from the Endangered Species List in 1968, the Park's population was the subject of several studies by ranger personnel, and annual productivity was closely monitored. During the past 10 years, some unsystematic observations were made by employees who took a personal interest in the birds, and in some years the National Park Service (NPS) flew a September aerial survey to determine cygnet production. By 1976, when I began this study, the Park Service was concerned by the lack of cygnets in the Park and the possibility that the rising level of visitor use was somehow disrupting the nesting effort. I was asked to investigate the present status and habits of the Yellowstone Trumpeters in order to determine why they were producing so few cygnets, and to make management recommendations to the Park Service if I found any situations where human activities were impacting the swans.

The study area is predominately a forested volcanic plateau located at an elevation of 7,700 feet above mean sea level and dotted with numerous lakes and small ponds. Several nesting lakes in the northern portion of YNP occur at the 6000-foot elevation among glacial deposits that are vegetated by a sage-brush-grassland complex. Because it is ecologically continuous with the southwest corner of YNP, I also included much of the Targhee National Forest within the approximately 4000-square-mile study area.

RESULTS

In 1977, I located 21 nests, 16 in YNP and five in the surrounding National Forests. In 1978, I found 27 nests, including 18 in YNP and nine in the National Forests. Three of the 1977 YNP territories were vacant in 1978, but five new territories were active, a net gain of two. Four additional territories on the periphery of the study area were included in 1978. These quite possibly had been used in 1977. I flew the study area every 2 to 3 weeks throughout the nesting season and received additional aerial observations from two NPS contract pilots who flew the area almost daily. I believe all active nests were located. During the 2 years, 30 different territories were active.

Because investigating the existing levels of human disturbance was an aspect of my study, I made very attempt not to create additional disturbance as I gathered data. Some clutches could not be examined without causing disturbance, but many nests were checked from the air or immediately after hatching. In 1977, clutch size averaged 4.8 at 12 nests. In 1978, clutches averaged 3.8 at 20 nests. To some extent, the smaller mean clutch size in 1978 may relate to the very late cool spring and later initiation of nesting. Nest initiation occurred between 25 April and 30 May. Hatching spread from 14 June to 4 July in 1977, and from 25 June to 13 July in 1978.

Of 45 nests examined, 10 were built on beaver lodges, 21 were piles of vegetation heaped by the swans onto small solid islands, and 14 were offshore mounds of aquatic vegetation rising out of the water. No use of muskrat houses was observed although a few nests could have had a muskrat house core that was completely buried.

The majority of swans did not use the same nest site both years. At lakes that had nesting pairs both years, seven pairs used the same nest site and 10 pairs rebuilt at new locations.

Causes of nest failure in 1977 included flooding (1), infertile eggs (1), and unknown (4). Fifteen of the 21 nests (71.4%) hatched at least one egg. In 1978, late melting snow dramatically raised the water level in most ponds after incubation began, destroying at least four nests. Other factors were predators (1), infertile or no eggs (5), incubated full term, no hatch (4), and unknown (2). Only 11 of 27 nests (40.7%) hatched at least one egg.

Seventeen of the territories were isolated from human disturbance until at least 16 June by late melting snow, difficult stream crossings, and weather that discourages back-country use. The remaining 14 territories were visited by humans while the swans were incubating and raising broods. Productivity was slightly higher at the nests that were accessible to humans (Table 1).

Table 1. Trumpeter Swan production in active territories in Yellowstone National Park and adjacent National Forests, 1977-78, as related to human accessibility.

	Nests accessible to humans (n=18)	Nests inaccessible to humans (n=30)
Total cygnets hatched	38	49
No. cygnets hatched/active territory	2.11	1.63
Total cygnets fledged	8	13
No. cygnets fledged/active territory	0.44	0.43
% cygnets surviving to fledging	21	27

The 52 cygnets known to have hatched in 1977 suffered 71 percent mortality within the first 180 days of life, with only 15 remaining alive and possibly fledging. Of the 17 cygnets alive in September 1977, five were obviously retarded in development compared to their siblings and at least two were killed by predators prior to fledging. Five carcasses were necropsied at the Veterinary Research and Diagnostic Lab in Bozeman, Montana.

Of 34 cygnets hatched in 1978 from the 27 active nests, 18 died within the first 10 days. Four complete broods totaling 13 cygnets died within the first week. As of 15 August, 11 cygnets (32%) survived. Seven freshly dead cygnets were necropsied.

All necropsies were inconclusive. No pathogenic bacteria or significant parasites were found. No abnormal tissues or lesions were found. Eggs sent to the USFWS Wildlife Disease Lab in Madison, Wisconsin, and to Patuxent Wildlife Research Center were negative for lead, Newcastle disease virus, avian influenza, pathogenic bacteria, and contained no significant pesticide levels.

The necropsies and field observations indicated that the newly hatched cygnets were extremely weak and unable to cope with normal post-hatching stresses. Working with Joseph DeSarro of Cody, Wyoming, I observed newly hatched cygnets from three clutches that were artificially incubated. One clutch was from Red Rock Lakes National Wildlife Refuge and had been removed from the nest early in the incubation period. The other eggs were removed from two nests in YNP when the embryos were fully developed and vocalizing in the shell. All three clutches hatched cygnets that were very weak and had deformities of the neck, legs, and feet, accompanied by rapid shaking of the head. The two YNP cygnets were force fed poultry starter and their legs were splinted into a normal position. With this treatment the deformities disappeared within a week. In the wild these weak and crippled cygnets quickly would have died.

Three of these cygnets eventually died and the necropsies revealed no conclusive cause of death. None of the deformities were apparent after death. Similar deformities could easily have been present in the wild cygnets that were found dead and simply were not evident once rigor mortis occurred. I observed newly hatched wild cygnets exhibiting a similar shaking of the head and difficulty walking, although they swam adequately. If wild cygnets are suffering from a similar backward curling of the toes they would initially be capable of swimming. But as the muscles strengthen and the toes curl more tightly, they soon would be incapacitated.

The Veterinary Research and Diagnostic Lab personnel suggested that a nutritional deficiency among the breeding adults could be causing poor embryo development and viability. Possibly the swans are lacking adequate levels of some essential micro-nutrients or perhaps the winter diet is not sufficient to bring the females into optimum reproductive condition.

I conclude that although human presence occurs at about one-third of the nesting territories, it is not responsible for the poor cygnet production. Flooding of nests and cygnet deformities seem to be the two major obstacles to successful reproduction in Yellowstone National Park and vicinity.

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PANEL

Current Research and Research Needs

Moderator: James A. Cooper, University of Minnesota, St. Paul, Minnesota

Panel Members: Bruce Turner, Canadian Wildlife Service, Edmonton, Alberta
Ruth Shea, University of Montana, Missoula, Montana
Bill Sladen, The Johns Hopkins University, Baltimore, Maryland
George Brakhage, U. S. Fish and Wildlife Service, Washington, DC
Rick McKelvey, Canadian Wildlife Service, Delta, British Columbia

COOPER: Thank you very much. I would like to introduce the panel -- two of the individuals you have already met -- Bruce Turner, CWS, and Ruth Shea, University of Montana. George Brakhage will be on the panel. George is the Assistant Chief, Office of Migratory Bird Management of the Fish and Wildlife Service, having worked with Canada Geese extensively in the past, as well as other things, such as lead shot. And we have a substitute, actually a very fortuitous situation, CWS personnel, in Rick McKelvey. Rick is with CWS in Vancouver, and chatting earlier today, I realized that Rick is doing some very interesting work on winter ecology on Trumpeter Swans in the Vancouver Island area. So Rick has volunteered at a very short notice to be on the panel. At this point, I'd like to do a little introduction and have the panel come up. We'll go down as they are listed, perhaps with Rick going last, if he would like, giving a very brief summary of what each individual feels is a very significant area for research for Trumpeter Swans.

Before I do this, however, I want to bring to the attention of Society members and other individuals in the audience the existence of a list of priorities that have been developed by The Trumpeter Swan Society for research. This was done under the leadership of Dr. Bruce Batt, Assistant Director for Research at the Delta Waterfowl Research Station and a committee for the Society. . . . Now, I'll go through them very quickly so we have some idea of the areas that have been identified broadly by the Society as areas where research is needed. We separated them into applied and basic areas, but we also feel that there really is no easy way to do that; that oftentimes someone working on a very basic study, or considers it basic, discovers something that's very significant to a management program, and that there have been many times when an individual working on a management program has discovered essentially something that is very helpful to individuals interested in evolutionary biology and other areas of avian study. So, I will go through very quickly -- in the basic area we have a lot of work still to be done on breeding biology. We know very little about the age-related productivity of Trumpeter Swans, pair bonding, the length of pair bonding, the influence of spacing mechanisms, territoriality, and so forth.

Excuse me, I just got a note that I overlooked another panel member. I should have looked. Dr. Bill Sladen is also on the committee and all of you are familiar with Bill from his introduction earlier, and I do apologize for the oversight.

We also need very much work on population dynamics. As Roger Page's work at Red Rocks and his modeling indicated, there is certainly a lot to be learned in terms of survival, the impact of various factors such as lead poisoning and so forth, on the survival of the adults as well as survival of cygnets to fledging. Migration -- Dr. Sladen pointed out the very significant findings when we deal with neck bands and trying to identify individual wintering sites for breeding populations -- this is an area in which Bill has need of further work. And feeding ecology, where we observed from the discussions that cygnet survival is very poor and there certainly is a need for identification of significant food resources for the young. But, as Ruth has already indicated in her paper, there is also a need to identify food resources and nutritional needs of adult birds.

In the area of taxonomy, Bruce Turner mentioned, and we think it significant, that we look further into the taxonomic makeup of the Trumpeter Swan. Species that have as wide a distribution as the Trumpeter originally had, such as the Canada Goose, in North America, and also the Sandhill Crane, have been found to have a number of subspecific populations, and we suspect that this may exist in the Trumpeter Swan.

In the applied areas, we believe that in any restoration effort that efforts be made to follow very closely the population numbers and the movements of the birds. We also think that there should be careful documentation of release methods and that these be made available through publication, and that also we deal still with learning more about captive propagation, so that individuals can be produced for release-restoration purposes.

So, with that introduction, I would like the panel to come forward and we will go through a very brief coverage of each individual and their feelings on the priority research, and then open up for discussion for the audience as well as the panel.

I would ask that we start on the right with Ruth, and I really want to congratulate her on the very interesting findings that she's had in Yellowstone to date. I think that there are some very outstanding questions that she's asked. The methods in which we might answer some of the questions she's asked are certainly elusive, but I would like Ruth to start and then go with Bruce, then to Rick, and then to Bill, and finish up with George.

SHEA: Well, I've got another area that concerns me more than the current problems with the deformities, and that is in the wintering ground that has been mentioned briefly this morning. There is basically a 7-mile stretch of river in Idaho that winters most of the Grande Prairie flock, and probably any other breeding swan in Canada who comes down our way. I'll be talking more about that in my paper tomorrow. This area falls within the jurisdiction of about four different management agencies and there is just nothing known about it. Mr. Banko did some work 20 years ago and I did some small observations last fall, and that is the whole data base for the wintering grounds. We're going to run, very quickly into some management problems and not have the data to back up our recommendations.

Basically, I feel what we need is a concerted, international cooperation, since this affects both U. S. and Canadian swans -- habitat assessment of the preferred wintering sites to learn what the food resource is that's attracting these birds,

means to monitor long-term changes. Just in what I've seen, compared to what Winston Banko wrote, there seems to be some dramatic changes in the vegetation species present -- I don't know if good or bad. But, they seem to exist. This whole area is a big unknown right now.

The other concern with this is developing methods to move these birds and disperse them out of this one wintering area. I would propose that The Trumpeter Swan Society put our heads together and come up with proposals on how we could spread out wintering swans, basically identifying what is good habitat, then looking further south and locating suitable sites. We need the expertise of others who have been involved in transplant programs to new wintering sites to try to see what would be feasible in this regard. But to me that's the highest priority right now for this interior migratory flock.

COOPER: Thank you, Ruth. Bruce.

TURNER: Yes, a point which has already been mentioned concerning the characterization of the Alaskan and the interior population on the basis of blood protein. The fellows back in Alberta are now in the process of banding up in that area -- the Grande Prairie area -- and they will be taking about 40 blood samples. Certainly, the opportunity is there to do the study right now, provided we can get samples from Alaska or from B. C. I would certainly hope that this could be incorporated into the study.

Another area which concerns me is very high first-year mortality of the Grande Prairie population. Birds which we've collared move into the Tri-state area and we find the survival rate is about 42 percent, which I consider very low. Over the years, the birth rate and the death rate of the population seems to coincide. As the birds migrate successfully to the wintering area but do not return to Grande Prairie, they're either being lost on the wintering area or on route in the northern migration. I think we definitely need work to assess the physiological condition of the birds on the wintering area, and as Ruth indicated, do a total assessment of the habitat that is there now and is being used.

Another area of study would be identification of future transplant areas, which Ruth has mentioned again. What I think may be a viable approach for a transplant program would be to establish a population, maybe at the southern extremity of the range where overwintering habitat is not limiting, and once that population is established, take adults and young birds, bring them north, and when they leave in the fall, they should go back to the same area. The adults will stay and the young birds should come back to the northern areas. Now, the reason I suggest this is if we go into a transplant program using birds from Grande Prairie, and if the overwintering habitat is limiting at the present, then any benefits derived by a transplant flock would only be at the expense of the Grande Prairie population.

Another area which could be addressed is the interaction of the Grande Prairie and the Red Rocks birds to see whether or not there is an interbreeding between these two populations. Hopefully, we'll get insight to that with your collaring program, Gene, along with the birds which we've collared in the Grande Prairie area.

COOPER: Thank you, Bruce. Rick.

MCKELVEY: My recent interest in swans has been in their winter feeding ecology. Since the B. C. coast harbors at least 2000 wintering birds, I feel that area is our most important interest with swans right now. My work to date has been involved with food habits and trying to assess the impact of the swans on their food habitat. It has been plagued with difficulties, and I don't really have a good handle on what their effect is on the habitat. It appears that the habitat is ample for the birds that we have and perhaps could support more. I think Bruce's idea of introducing birds in a wintering area and therefore assuring them an area that is adequate is perhaps a good way to go about reintroducing birds. As for reintroducing them into B.C., I'm not sure that is our priority yet. I don't know if anybody knows what their historic range really was in B. C., other than just a wintering area. I guess basically that's all I can tell you about what I'm doing right now. As I say, my studies are in their more or less initial stages. I think we need to get more information on the value of the foods. I've tried this to a limited extent. It's a difficult problem getting "metabolizable" energies of birds, especially if you are not working with hand-reared birds, which I wasn't. I have some information which I will be presenting on Saturday about the food quality, and while I've been unable to find much literature that can tell me whether what the food is supplying is adequate or not, more work is needed in this area. In Ruth's recent talk, she mentioned that some of the young birds were limited perhaps by micronutrients. I think that we need to do research in B.C. on this aspect also to see if the population overwintering remains healthy throughout the winter, or if its breeding ability is affected by the wintering conditions.

COOPER: Thank you. Bill.

SLADEN: I was particularly interested in the comments on disturbance, and I think is one of the things that we really need to look into very carefully in the future. I have a little personal theory that the swans not only can recognize small planes, but they can recognize specific planes with specific colors. I've handled a lot of these birds, both Trumpeters and Whistling Swans, and I've learned that after we banded birds they just disappeared completely. We were, of course, catching them at a very susceptible time of the year when they're molting. Over and over again I'm impressed with this. I'm hoping that John Sarvis, the Refuge Manager of Izembek, will be able to look into this. He has two planes, one private plane which does not molest his Whistling Swans, and a Fish and Wildlife plane that does. And I think that he might be able to -- and it's the same pilot -- I think he might be able to come up with some interesting data. He can reverse the types of plane quite easily, if he wants to . . . .

Also, I was impressed at Red Rock Lakes, and that's a long time ago that I was last at Red Rock Lakes -- it was 1967 -- the tremendous disturbance of those airboats. I know that's the only way you can get around, but the airboats do create an incredible amount of disturbance, and if you're doing a lot of surveying with airboats, and I can't imagine that the swans don't object to that up to a point, because they associate the airboats with a certain amount of . . . . I'm sure some people will be able to raise that question.

Second point is the importance of preserving winter habitat. I showed two slides of British Columbia -- and hope that the Canadians can answer for the British Columbian habitats -- but I would like to again put in a plug for some of the Washington habitats that need to be preserved, and particularly Lake Barney, where two broods that we banded with Burns and Bob Richey in Kenai, and 09BY that we banded at Walter [sic] Lake in Kenai, have been seen regularly -- well, they were seen

regularly throughout the winter, but 09 is being seen all the time in the winter. Nobody knows where that bird is going back to in Kenai, and that points out another really important thing, and that is that we should be spending more time looking for birds we're banding on the breeding grounds. I hope the Canadians can talk more about this tomorrow.

And finally -- marking methods. I think we should confine our marking methods and particularly neck bands, to a very small sample. Again, I'm interested to hear what Canadians have. I have a feeling that they're making too large a sample of their very limited number of birds in Alberta. It's easy for us in Alaska to get a small sample. My minimum disturbance of birds in marking them in Whistling Swans is 1 percent of the total population. I think these important things we should discuss and perhaps exchange information on them. Thank you.

COOPER: Thank you, Bill. George.

BRAKHAGE: Having been away from research for more than a decade, it would be presumptuous of me to give detailed advice to The Trumpeter Swan Society about research needs -- but I'm going to to it anyway.

I agree with some of the things Jim Cooper mentioned just a bit ago about the research priorities identified in 1975 by the Society, particularly about giving first priority to "basic" research. In terms of breeding biology, we should be comfortable that all of the essential points are pretty well understood, e.g., time of egg laying, clutch size, incubation period, age of breeding, etc. We want to avoid being surprised some day by the discovery of some new element of breeding biology that is of fundamental importance.

I'm inclined to think that it is now time to focus attention on some aspects of swan biology that are bit more difficult to study. What are the spacing mechanisms that regulate breeding densities, or lead to depressed productivity such as at Red Rock Lakes and, one of these days, perhaps at Lacreek? Ruth Shea's work is very good, and I think we ought to focus more attention on the nutritional needs of swans, particularly cygnets. There are some parallel situations, Ruth, where Canada Geese are not doing well. They are showing some of the same symptoms you noted in swans, and nutritional deficiencies are also suspected as the root cause.

In terms of population dynamics, we should understand the factors that are affecting net productivity -- not just the number of eggs layed and the number hatched, but the net addition to the population. We should have a good understanding about the time, cause, and extent of mortality -- by age groups, if possible. Is predation a serious factor? Are we having disease problems of any sort? How does illegal kill and harassment affect population growth and size?

In terms of movements, it is unlikely that new mother lodes of Trumpeter Swans will be discovered. The occupied breeding range may be expanded a bit by finding a pair or two here and there, but significant additions are unlikely. We need to know more about how to improve winter distribution. What causes birds to seek new locations? Is there anything that managers can do to encourage wider winter distribution? Are we satisfied with what is known about the location of non-breeders? Can Trumpeters ever adjust to high density human populations and the associated disturbance or harassment?

In terms of habitat, we should be certain that the Trumpeter Swan's needs are known for breeding, molting, and wintering purposes. What are the deficiencies in amount? in quality? How secure are these habitats? We've heard some unsettling things about what may happen to Alaska swan nesting habitat that is entering private hands and thus subject to some form of exploitation. Some are concerned about how the presence of people affect breeding and wintering Trumpeters, although Ruth believes that human disturbance in Yellowstone National Park is not much of a problem.

Lastly, in terms of basic research needs, we should understand the systematics of this bird early on. Are there any significant taxonomic differences between Trumpeters breeding in Alaska and those in the interior? It's important that we have the answer to that question before we undertake to mix Alaska birds with those from interior breeding ranges.

I'm reminded of a Sandhill Crane study conducted by a fellow named John Baldwin, Trinity University of Texas. He has learned some interesting things about the physiological adaptation of several subspecies of cranes. He has determined that the thermoregulatory capacity of chicks of the four subspecies studied varied to a significant degree. Those from Florida were poikilothermic at hatching and required 24 hours to become homeothermic. Those from further north (Wisconsin) or higher elevation (Idaho) were heterothermic at hatching, requiring 9 to 12 hours to become homeothermic, and those from the colder areas (Alberta, Alaska) were homeothermic at hatching. This suggests the wisdom of using Florida cranes for restocking efforts only in warm climates because of the likelihood that in colder areas chicks will fail to develop thermoregulatory capacity in time to survive the first 24 hours of life.

Thus, in summary, there are five areas of "basic" research that deserve attention: basic breeding biology, population dynamics, movements, habitat requirements, and taxonomy.

There are at least four areas where "applied" research is needed. We need to develop a systematic way of monitoring the population status of Trumpeter Swans. A periodic survey is needed that will provide information on current status and trends in population numbers. We need to determine first if something is going on before taking corrective action, and we need to know it in time for the action to be effective.

We need to know more about captive propagation, the second area for applied research. What are the best techniques? How does captive rearing affect survival and behavior of these birds? Should we be following the lead of Wild Turkey managers who learned long ago to use only pure wild stock reared naturally for restocking purposes?

A third area of applied research has to do with establishing new populations in vacant breeding habitat. What criteria should be met before attempting such projects? I recall from experience in Missouri with resident Canada Geese just how important those criteria can be. In this case, the ingredients for a successful "goose pie" were:

1. Selecting the right race of birds -- we used Branta canadensis maxima, the giant subspecies of Canada Goose;

2. Assuring "generous" recruitment, with generous underlined twice -- in Missouri, this was accomplished by encouraging the birds to nest in elevated wash tubs and thereby reducing predation of eggs by raccoons;

3. Providing enough good habitat year round to accommodate nesting, brood-rearing, molting, feeding and wintering activities; and

4. Preventing excessive exploitation early in the stocking effort -- it was important to develop a full array of age groups that resulted in locally-produced birds contributing to population growth, and to provide a pool of birds from which replacements could be sought for lost mates.

During the last 15 years, these ingredients have proven their worth. Where the four criteria were met, stocking efforts succeeded; where they were not met, the efforts failed. Thus, I think it important that criteria be established for populations of Trumpeter Swans.

And finally, we need to decide what should be done about Mute Swans. They are a problem in some areas where they compete with other swans for food and space. They may eventually pose a disease problem, and hybridization could become of concern.

In conclusion, the Trumpeter Swan research field is wide open. The Service supports the research priorities previously established by the Society. In my view, we ought to settle the question of whether food or nutrition problems exist. Secondly, let's learn all we can about the factors affecting recruitment of young and survival of all age groups, especially cygnets. And last, let us remember that the welfare of Trumpeter Swans is dependent upon the amount and quality of their habitats. We can learn all manner of interesting things about the breeding biology of the bird, but it will all be for naught if their habitat disappears.

COOPER: Thank you very much, George. At this point, I really have little to add since this distinguished panel really covered the whole gamut, and I'm really happy to hear the types of things that are being said. I think that there's a diversity of research needs and that it is a challenge to us now to put bright young minds together with the bright old minds and I have to say that many of the observations that I've made have been made many times before. It's simply a matter of getting the right people together and the team together and the money together. We certainly have the interest of doing it . . . as I sit in the University, I see so many bright young minds with so much energy that will essentially be the stewards of this population and this species in the future that we need to get on with the chore of doing research. We must -- and I really like to hear what George is saying -- eventually get back to the land, to the habitat, rather than remain in academia for debate, and this is where the Society working with agencies is very significant. So, with that I'll open it to the audience. We have approximately a half hour unless we want to cut it short and there are lots of ideas here and I'm sure that we can get a good discussion going.

ROBBINS: On your map, Mr. Sladen, there's the ice-free day area, there's no swans below this, I understand. Why or what is your opinion as to why? Say in the lower 48 states, I'm speaking of.

SLADEN: This is Hank Hansen's map. . . . I think Hank will answer that one.

HANSEN: Restate the question.

ROBBINS: Why are there no swans, apparently, below the area encompassed by your line within the 145-day ice-free period? Is there not habitat below this area that swans could live in and nest? . . .

HANSEN: I don't know. . . . Keep in mind this is developed from all the information that I could find . . . in searching the literature. And there are no records to indicate that Trumpeter Swans ever nested below there. They would have a southern limit as well as a northern limit, which would probably have something to do with climate. It may be that it's too warm, conditions are just not conducive -- of course, like other waterfowl, they are inclined, for the most part, to migrate . . . .

ROBBINS: There are areas [in the lower 48 states] that would be capable of taking care of these swans, even year-round.

HANSEN: The area might be, but the swans are just not genetically evolved to nest there. That would be my evaluation.

ROBBINS: Well, there are several people, say zoos and what-have-you,that have nesting swans in the lower part of the 48 states, and seem to have pretty good luck with them. I was just wondering why that possibly there's some areas there that you might say are going to waste. . . .

HANSEN: But, according to the swans, they may not be going to waste.

ROBBINS: Oh, well, that's true.

BRAKHAGE: I suspect one of the reasons we don't see Trumpeter Swans nesting down there is an absence of suitable nesting habitat. We've done a pretty good job of draining the country, and we're still draining at a substantial rate. If large, truly extensive marshes remained, there's a possibility the birds could survive and reproduce. I think Hank is probably right -- the genetic signal which triggered nesting in a certain spot probably has long since been destroyed. I'd look first to the quality and quantity of nesting habitat.

KERNS: We touched a little bit earlier on possible competition on say the breeding grounds and all with other types of waterfowl, how about, is there evidence of any problems in the wintering grounds of the swans not wishing to compete or being outcompeted by geese, either Canadas or ducks or Snow Geese, or whatever? Is there any evidence of this, or that this might be a problem area where if you develop say a wintering area for swans and then the other birds move in, will they possibly push the swans out?

SLADEN: I would like to just make a brief comment following up what George has just said about the Mute Swans. We have a big problem in Maryland in the Chesapeake Bay with Mute Swans in that they have increased since 1962 from one pair that got released during a hurricane to now a population of over 360 birds, just in the last 15 years or less. They are resident all year-round in the Chesapeake Bay. We have had massive die-off of aquatic vegetation, which is an essential food for Whistling Swans. We support something between 30,000 and 60,000 Whistling Swans in the winter, and I'm sure this is going to be an increasing menace. I'm very delighted to hear George saying something has got to be done about the Mute Swan, because quite a lot of people have been saying this for a long time. The problem is, how and what to do about it. At any rate, this is a very important aspect. And, incidentally, talking about hybrids, in a field with Whistling Swans, in the State of Washington, near Mt. Vernon, we saw what we're pretty sure of a hybrid between a Whistling Swan and a Mute Swan. We have a sketch of this. They are a menace, but no more of a menace than this crazy idea of releasing Mallards into Chesapeake Bay to increase the hunters' pleasure when the Mallards are hybridizing with our native Black Ducks. This to me is the most preposterous thing that I've ever thought about. So, we should do something about the Mute Swan.

ROBBINS: Possibly we ought to have an open season on them.

SLADEN: People get very emotional about ducks and particularly about the big white bird with the long neck.

COOPER: I certainly second that in terms of the Mute Swan.

LADD: Just a follow up on that, Bill. Don't you feel that some of the folks back in the Chesapeake Bay and New York/New Jersey area feel just as attached to those Mute Swans as most of the folks here do about Trumpeters?

SLADEN: Well, yes. I agree up to a point, but not when everything is explained . . . . I'm not talking about Rhode and Long Island -- they've got to sort their own problems out there. The Mute Swan is not taking over a niche that is occupied by the Whistling Swan in the winter. I'm talking about our area where we do have a lot of wintering Whistling Swans and for all we know may have the occasional Trumpeter coming down from the Yukon.

LADD: But this is getting at the root of a problem back there.

SLADEN: I don't think it's a problem. I'm sure in the Cheapeake Bay it's no problem. It's just a matter of talking to the public -- it's the same with neck bands -- if people think the neck bands are going to strangle a bird and they're put on badly, it's bad. Just to give you one illustration, an article that I wrote for National Geographic Magazine which was circulated to about 11 million people -- we didn't have one adverse comment about neck bands. And yet, if you say it in the wrong way, you can get a lot of adverse comments. You have to overcome these by proper public information. I don't see there's any problem with eliminating the Mute Swans. My suggestion is that they're all caught when they're at Eastern Neck National Wildlife Refuge, which they're going to molt now. They're not cooked or eaten or killed as suggested by George, they're all pinioned and sold to little ponds all the way around the area and the proceeds go to more swan research.

COOPER: And the progeny go back into the land. I agree, Bill, and I'm just kidding here, but I think Skip has brought up a very significant point that while we can sit and say that the introduced Mute Swan has potential for competing with Whistling Swans and certainly Trumpeters. . . . Certainly in Minnesota we see the bird and in portions of Michigan it's in the wild. It's more common even across the eastern states. There's a public interest and many of the people are unaware that there is a Trumpeter Swan. Many of them are unaware that there is a difference between the Whistling Swans and the Mute Swans. So, we do have a public relations problem that's really going to have to be worked on, and it'll have to be worked out slowly. The potential for competition, I think, is quite great.

SLADEN: May I say just one comment. Yes. Please don't say, "Worked out slowly." I'm all for keeping the existing territorial birds in the Chesapeake Bay, but to go on allowing them to go on increasing exponentially as is happening in the Chesapeake Bay is very bad. In other words, you can eliminate all the subadults when they molt, and you can leave the territorial birds for the people to enjoy, but if you are going to allow these birds to increase all the time, as they are in British Columbia, then you are perpetuating your problem. So please don't say, "Very slowly." Say, "Do something about it, get a policy, and retain a few for public interest." But, don't let them go on increasing because they are going to be a problem.

BRAKHAGE: I've observed, Bill, that there are those who have the same things to say about Whistling Swans. You mentioned that you needed a good educational program to convince folks that Mute Swans are a nuisance and ought to be controlled in some way. There are also advocates saying that the Whistling Swan in the Atlantic Flyway has probably saturated some of its winter habitat to the point where it's doing violence to it. Maybe we ought to think in terms of controlling Whistling Swans. Please note the Fish and Wildlife Service is not proposing Whistling Swan control at this time.

BURGESS: I don't think that the gentleman's question was adequately addressed, when he asked about the possible competition between Trumpeter Swans and other waterfowl, because we got off into Whistling Swans and Mutes. There's one thing we ought to keep in mind, the natural, wild Trumpeter Swan. So far, they're strictly aquatic feeders. Therefore, they do not compete with many of the field-feeding waterfowl. So, it only leaves a few, like the Canvasback, the Redhead, the scaup -- some of the diving ducks -- that they could possibly compete with, and many of those are going into areas where we never expect the Trumpeter to winter. . . .

SHEA: Jim, I'd just like to comment on the wintering area in the Tri-state region. Our fields are under about 5 to 6 feet of snow, so the only habitat for any waterfowl is the open water, and here we have -- nobody knows how much competition -- but they are side-by-side with Canada Geese, Mallards, Buffleheads, goldeneye, and Whistling Swans. These are mixed flocks of Trumpeters and Whistlers. The Whistler numbers fluctuate year-to-year and maybe they would indicate just how much stress -- years when the Whistlers don't stay, we might have a good idea that things are not too good versus years when half the swans there might be Whistlers. Just some indicator of what competition is occurring. The Trumpeters don't seem to leave no matter how bad it gets.

COOPER: I think that's a good point, because we can think of situations -- and Harold's point is good, too -- situations where there's clearly a separation . . . shorelines and drop-offs in water depths, and so forth. But, in some of these habitats, they may be so modified that some of the species that are very adept in switching to different food sources may create some competition. So, I think it's a very good point.

MCKELVEY: On the B. C. coast, the principal food is the root stocks of plants, which are essentially unavailable to any other birds but the swans. However, and this may be preceding at least one other paper a little bit, there are some build ups into agricultural areas on Vancouver Island where considerable grazing occurs and use of residual agriculture crops, but as yet I haven't seen any competition with other birds on those. But there could be in the future.

COOPER: Skip.

LADD: Bill, can you pinpoint when the Whistlers back on the East Coast essentially converted to agricultural crops?

SLADEN: Well, they haven't converted, and that's the point that I would like to stress. I think you can predict that things are not very good in the water if swans move into the fields. The Whoopers are in the fields in Scotland and they're the equivalent of Trumpeters. I've seen Trumpeters, as Rick just said, in fields in British Columbia. This is an indication that there's something wrong. The Bewick Swans moved into the fields in Holland when the polders started getting contaminated, and the Whistlers moved in Chesapeake Bay. But, they moved into the fields a few years before because of the disgusting state of Lake Erie. So, I think it's an indication of habitat. Now, a lot of our Whistling Swans are not spending too long in Maryland, and they are going down to Mattamuskeet National Wildlife Refuge. The population in the last 5, 6 years has peaked from 5000, is now peaking at 26,000. We're getting 2000 Whistling Swans dying of lead poisoning as a result of they're going down to Mattamuskeet. They prefer aquatic vegetation if they can get it. They're moving -- highly mobile and very adaptable birds. . . . So, the ones moved into the field in 1972-73, round about that time . . . and this indicated something very wrong in the water. Now, when the aquatic vegetation is trying to recover, we have 800,000 or 700,000 Canada Geese, and something like 50,000 or 40,000 Whistling Swans coming into graze on that vegetation right at the beginning of the winter -- definitely something is going to happen, and it's wrong for anybody to suggest that you shoot the Whistling Swans just because they are adapting very well and because they are feeding in the fields on agricultural lands because there's not enough aquatic vegetation for them. What we've got to do is to preserve winter habitat, and there are a lot of good things going on in Chesapeake Bay to conserve that Chesapeake Bay winter habitat.

LADD: The point I'm trying to get at here, and it's come up in discussion about all different kinds of waterfowl, Mallards, as an example . . . habitat, where there are changing conditions for food -- the Whistler has apparently adapted -- does anyone foresee the Trumpeter as adapting or changing in one way or another . . . . There appears to be some changes there in B. C. Is this a probability . . . .

SLADEN: I think this is a very important aspect of future research -- feeding preferences. The Swedes have done quite a bit of work on this, and there's no question that the swans prefer aquatic vegetation, and no better example than when they first come into Chesapeake Bay. They're in the water and then they move into the fields. Before they start moving in mass, they only move into the fields at the end of winter and in spring.

MCKELVEY: I can perhaps add to that, too, from my work on Trumpeters. At first I suspected that they were limiting their winter food resource by over utilization, but the areas that I've looked in, the food is super abundant. Perhaps there's higher quality food somewhere else, such as in the fields. I've noticed that the major build-ups are just prior to migration when green grass is just starting to return -- fall-planted pasture crops are starting to grow up and will be fairly high in nutrient values. They may be higher than what's available on the estuaries at that time, and thus prefer them. I don't have any information yet on their food value, but I do have some for the estuaries which I will be presenting on Saturday. I would like to hear if anybody else knows of comparable work that I can check into to see or to compare my results with to see what the food value of this stuff is.

COOPER: This brings a point to mind. I had a friend at Amherst College a number of years ago, he's since moved to Hampshire College, did a very outstanding study of Blue Jays. He reared Blue Jays from nestlings and exposed these birds just to specific colored butterflies and specific shapes. He actually had birds starve to death with food in front of them. These birds indeed become imprinted upon a food item, and were not searching out the environment at random, but searching for that food item, even though it was in lesser abundance than other food items. This shows again, being somewhat interested in behavior, we do have these factors going on. We may indeed have individual birds being, I hate to use the word "imprinted," but certainly their preference for a specific food is related to the abundance of food that is in existence in the environment when they are going through this initial period of learning. It may well be that certain birds are seeking out agricultural crops. Indeed, if we look at the Snow Goose situation, and Johnny Lynch should be here to describe it, we had a major change in the food source and wintering food of the Lesser Snow Goose, switching from the estuaries to the agricultural fields. So there's certainly fertile work, and again this reflects back, if you're going to do this kind of work with Trumpeters, we've got to have propagated birds to do these experiments to get a better handle on what's going on in terms of food preferences.

HAMMER: Boyd, in the Carolines, has done a fair amount of analysis in the nutrient content of aquatic plants. . . . You go through some of his work, the nutrient content of most aquatic species is miserable, just terrible, in comparison to any of these things that we get on the uplands.

BRAKHAGE: Don, I have to disagree with you. Some research was done at the Gaylord Laboratory in Missouri on managing moist soils for native plants.

HAMMER: Wait a minute, George, I'm not talking about seed heads, I'm talking about wet . . . .

BRAKHAGE: I understand. Green, aquatic vegetation. Enormous quantities -- 20 pounds a day, something like that. But there are other choices, and I'm suggesting maybe those seeds are one of them. Anytime waterfowl commence field feeding, they are reflecting a deficiency in their habitat. When Canada Geese move to the fields, it reflects a deficiency in their habitat. Forty years ago, a Canada Goose would have starved to death in the middle of a corn field because corn was not a part of their diet. It was not a part of their diet for the simple reason that up 'til about 40-some-odd-years ago corn was picked by hand. There was no waste in fields. There was no reason for a goose to go to a corn field to find food because it wasn't there. With the advent of the mechanical picker, food became available, and eventually geese found it when they did not have adequate amounts of food in their natural habitat. Mallards and Pintails are field feeders these days. . . . We've made waste grain available to them, they've learned about it, and are using it. When Whistling Swans go to the fields, it tells me that there's something wrong with their wintering habitat. When you see waterfowl feeding on waste grain in fields, then habitat is a problem.

ROBBINS: Do you think it's possible that some of the pollution is settling in and changing the taste of these plants? . . .

BRAKHAGE: It's likely a matter of availability rather than the quality of foods.

COOPER: Any other questions?

SLADEN: May I make one brief comment on Ruth's findings, which I think are extremely interesting on the birds on the whole. The birds that are closer to humans, if I'm expressing it right, or not so inaccessible,were sort of a little bit more successful, although they caught up later. I think this is something that really needs to be looked into very, very carefully. I recall some experiments we did with penguins in the Antarctic, and that is that a population -- we were studying a rookery of 300,000 birds, which was almost one mile long -- in one area . . . our helicopters were coming constantly backwards and forwards, and where we were really doing a lot of disturbance, they just moved out from that particular section of the rookery. Another area where we only visited them once a year, they were extremely distressed when they were visited again. But, in an area where the birds were getting use to us and associated us with no molestation, or whatever you like to call it, they were doing very well. I think this is something we should bear in mind, and probably will want to discuss later, and that is, if the disturbance is wisely done and under proper strict guidance, as we know of certain areas Bob Richey was talking about in the Kenai, it may not be too harmful for the birds.

SHEA: Bill, can I -- just a comment that I didn't mention in the paper is -- a happy note for disturbance -- is I've seen evidence that pairs learn gradually to -- if there's no shooting or anything of that nature involved -- they get use to people to the point where they will attack. I have active pairs defending their nests and happily watched one chase a couple of tourists 30 feet across the field before they got out. Also we've had two pairs that lost a member of the pair that were in highly disturbed areas, and either of the remaining mated swans remated or a new pair moved in. But, the area was not lost as has been sometimes predicted in highly disturbed areas when a pair is broken up. Nobody will move in. But this didn't seem to be the case in just a small sample.

COOPER: Thank you, Ruth.

TURNER: Could I make a comment concerning disturbance from the airboat? We found in Grande Prairie that the affinity of a pair to a certain lake does not change whether or not you band. We've gone into certain lakes, banded a pair of birds, or the young, and the swans returned the next year. There's several lakes on which this has occurred, and I would not expect the birds to breed anymore than 4 or 5 years on the lake, given the survival rates that we have. Temporarily, it may have a severe impact on the young, but it doesn't seem to affect the tenacity of the adults to a particular lake.

COOPER: Thank you very much, Bruce. I'd like to use this as a kick off to really encourage those individuals who are considering banding. I certainly have some reservations about neck bands. I've used a lot of them on Canada Geese and I still have reservations about them in terms of getting information on individual birds. Certainly, major movements, yes. They're visible. About the only way to do it. But we certainly should look into mechanisms and methods, and I think maybe the colored leg band has some potential for individual identification, because we can do so much more in assessing disturbance if we have some way of identifying individuals. Do the individuals that move off of a lake breed successfully somewhere else, or is it just happen-stance that another pair shows up a little ways away? You can't really be certain. We certainly have seen in Canadas major movements both from disturbance areas and from areas where there has been little to no disturbance. So, when we're considering marking and banding, I think we should really look into using some method of individual identification that has potential, certainly on the breeding ground, for identifying individual birds. Simply, in the wintering situation, what Ruth is suggesting, in terms of birds coming back to the same site -- do we know this for certain? Are they the same birds? Are we dealing with a fixed situation that's related to family relationships and behavior, or is it very adaptable? Maybe there are different birds each year. So, I do encourage all of you who are banding and marking swans in any manner to think about mechanisms by which individuals can be identified, and follow individual histories. I think we gain the greatest amount of information from these sorts of records.

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Friday Morning - September 8

Chairman: Henry A. Hansen
U. S. Fish and Wildlife Service, Honolulu, Hawaii

MANAGEMENT CONSIDERATIONS

NONGAME WILDLIFE PROGRAMS OF THE U. S. FISH AND WILDLIFE SERVICE

Harvey K. Nelson and George K. Brakhage
U. S. Fish and Wildlife Service
Washington, DC

We are pleased to have this opportunity to discuss the U. S. Fish and Wildlife Service's nongame wildlife programs with members of The Trumpeter Swan Society.

While the Convention between the United States and Great Britain for the Protection of Migratory Birds, signed in 1916, indicated that Trumpeter Swans were migratory game birds, along with Whooping Cranes, Eskimo Curlews, and yellowlegs, we treat them a bit differently these days. For the purpose of this talk, "nongame wildlife" is defined as those native wild creatures not sought for sport or commercial purposes.

HISTORICAL PERSPECTIVE

Historically, much of the Service's wildlife program has focused on game species. This is understandable considering that the genesis of wildlife conservation in North America was a result of diminished populations of game birds and other game animals. Public concern for the decline of the Passenger Pigeon, Wild Turkey, antelope, bison and certain species of waterfowl led to conservation laws aimed at the control of market hunting. Particularly noteworthy was passage in 1918 of the Migratory Bird Treaty Act. This legislation gave life to the 1916 Convention between the United States and Great Britain for the Protection of Migratory Birds.

During the drought years of the 1930's, the drastic decline of waterfowl and the deterioration of their habitats led to enactment of the Migratory Bird Hunting Stamp Act. The income from sale of duck stamps to waterfowl hunters provided funds to develop a national habitat preservation program, now called the National Wildlife Refuge System.

Later in the 1930's, passage of the Pittman-Robertson Act provided badly needed revenue to support a variety of state conservation programs. The funds came from hunters who purchased sporting goods and ammunition. A partner relationship developed between hunters, who were concerned about diminished game populations, and the state and Federal conservation agencies they supported through taxation, voluntarily sought. Thus, most of the early conservation programs were oriented toward game species. Nongame wildlife often benefited from these programs, particularly those aimed at preserving habitat, but there was little general recognition of this.

CHANGING PUBLIC ATTITUDES

We have witnessed in recent years a change in public attitudes toward wildlife. People are beginning to recognize the interrelationships between human environmental impacts and the role played by wild creatures, and to think about ecosystems. Rachel Carson's Silent Spring called attention to the effects of biocides and their magnification in food chains that end with you and me. Environmental awareness came of age.

Nongame birds are recognized now as important components of a healthy ecosystem, and they are gaining significant economic clout. George Laycock reported in the May 1977 issue of Audubon magazine that each year Americans spend $170 million for bird seed, $7 million for field guides and reference books, $190 million for photographic equipment, and $115 million for binoculars. The 1975 National Survey of Hunting, Fishing and Wildlife-Associated Recreation indicated that almost 50 million people spent 1.5 billion days observing wildlife in 1975. Another 15 million people spent more than 1.5 billion days photographing wildlife during the same period. Nongame critters are in the big league now!

The nongame issue is much more than a matter of balancing the interests of hunters and non-hunters, or acknowledging that there are more nongame than game species. It is enlightened recognition that we must view all wildlife as integral parts of an ecological whole, and that by doing so we serve the best interests of all Americans - hunters and non-hunters, urban and rural dwellers alike. Equally important is how we recognize and understand their basic habitat requirements.

Federal participation in nongame efforts gained impetus when Bob Herbst became Assistant Secretary of Interior for Fish, Wildlife and Parks in 1977. Shortly after his confirmation by the Senate, he had this to say about nongame activities:

> "There are many song birds and animals that are important to all of us, and I think we should have programs to provide habitat and projects to improve habitat for these kinds of species."

The Service has accepted Bob Herbst's challenge. We are not diminishing our efforts with game species - that would be unfair to a constituency that has been in the forepart of conservation battles for many years . . . and has provided the support and funds to carry out the conservation job. What we are doing is attempting to improve the balance between game and nongame interests. New resources are tending to favor nongame activities in what have traditionally been game programs. An example of this is the use of Land and Water Conservation Funds for preserving "nationally significant and unique wildlife ecosystems," and for the benefit of endangered wildlife. As Aldo Leopold observed, "The first prerequisite of intelligent tinkering is to save all the pieces."

CURRENT NONGAME ACTIVITIES

In carrying out its authority for managing wildlife, the Service has applied the principle that resident, non-migratory species are essentially the responsibility of the States. Conversely, the Federal role stems from: (1) the inter-state and international aspects of migratory species, (2) specific legislation, and (3) the ownership of land. Our current activities reflect that premise.

Nongame activities in terms of Service programs budgets range from very high to very low. On the high side (50% or more) are the Endangered Species, Animal Damage Control, and the Environmental Contamination Evaluation Programs. On the low side are Migratory Birds, Mammals and Non-Migratory Birds, and the Fisheries Resources Programs.

While sometimes it is difficult to determine whether an activity primarily benefits game or nongame species, subjective judgements suggest that 30 percent of the Service's Resource Management Appropriation is devoted to expenditures benefiting nongame wildlife. In FY 79, this will total almost $54 million of a $180 million appropriation.

Many Service activities are obviously of benefit to nongame wildlife. The Endangered Species Program, for example, deals exclusively with living things which may not be exploited for sporting or commercial purposes. Much of the Service's law enforcement effort involves nongame species, particularly that directed toward the protection of eagles and other raptors, surveillance of importation and exportation of endangered or threatened wildlife or products thereof, and preventing the importation of exotic species that may adversely affect native ecosystems, create economic hardship, or threatened human health.

The National Wildlife Refuge System provides habitat for all species of wildlife, a large percentage of which is classified as nongame. Habitat research is often aimed at the preservation or enhancement of ecosystems that benefit all wildlife. The Service is actively involved in seeking mitigation for habitat that may be lost or degraded by water resource development projects. We are involved in raptor management, marine bird studies, rehabilitation of oiled birds, marine mammal research and management, and a host of other activities that frequently involve nongame wildlife. A more liberal view on falconry has resulted in the establishment of extended hunting seasons.

Of specific interest to this group, the Service maintains and operates Red Rock Lakes National Wildlife Refuge for the benefit of Trumpeters, and significant efforts are made for this species at several other refuges. While not a major budget item, the Service considers the needs of the private sector when formulating policies for the use of Trumpeter Swans, a renewable natural resource. Our intention is to place enough Trumpeter Swans in the hands of private propagators to make the species readily available to aviculturists or for public display.

FUTURE NONGAME ACTIVITIES

The future of Service nongame programs rests in the hands of Congress. Nongame legislation has been proposed by this Congress in both the Senate and the House. Senator Hart's (Colorado) bill (S. 1140) was passed by the Senate last May. H.R. 10255, introduced by Messrs. Forsyth and Leggett, has been reported by the full Merchant Marine Committee, but further action halted after a letter writing campaign was triggered by the U. S. Chamber of Commerce. The Chamber was concerned that the nongame legislation may contain some of the same features as the Endangered Species Act, particularly in regard to the Section 7 consultation procedure.

Passage of this legislation is possible but unlikely in this session of Congress. If it is passed, token funding will likely be authorized in FY 79, with full implementation to occur in FY 80. The legislation most likely will involve direct Congressional appropriations rather than some form of excise tax. The sums being considered are substantial, ranging from $10 million to as much as $40 million annually.

But under any circumstances, it is our intention to continue applying new resources to nongame activities. In the Migratory Bird Program, for example, more than $400,000 will be added in FY 79 to develop nongame bird population monitoring techniques, initiate population studies, and reduce the impact of oil spills. Almost $2.9 million is being added to the Endangered Species Program for critical habitat evaluations and Section 7 Consultations, and budget increases have been requested for other Service programs involving nongame wildlife, particularly for marine bird research and management activities.

For Trumpeter Swans, we intend to continue with our policy of making birds available to aviculturists for propagation and display purposes. We will continue to support the natural expansion of the Trumpeter's breeding range. We will urge our Regional and Area Office staffs to make certain that the welfare of Trumpeters is considered in land-use decisions. As funds become available, we will support key research. Surveys will be conducted periodically to monitor population status. And, finally, the Trumpeter Swan programs at units of the National Wildlife Refuge System will be continued.

We appreciate this opportunity to present a brief overview of the Service's nongame wildlife programs. There is a lot more action in this area than many of you perhaps realize. Much remains to be done and we expect to continue adding emphasis to these activities in response to strong expressions of public concern.

Thank you for your courteous attention.

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THE NEED FOR JOINT COOPERATIVE ACTION IN LAND USE PLANNING FOR SWAN HABITAT PROTECTION

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The need for cooperative action in land use planning for habitat protection in Alaska is directly related to the land ownership pattern. The emergence of that land ownership pattern has brought "bad news" and "good news."

The bad news is that it has happened too fast and often under the wrong conditions. It has been too fast in that it has only been 20 years since Statehood when the first significant amount of land left Federal ownership. Yet in that 20 years, 40 percent, or approximately 150 million acres, has left Federal ownership. The vast majority of this land has been selected by the State of Alaska under its Statehood Act entitlement (104.5 million acres), and by Alaska Native corporations under the terms of the Alaska Native Claims Settlement Act (ANCSA) of 1971 (44 million acres).

From the standpoint of habitat protection, the land patterns that have emerged have been occasionally unfortunate because the lands have been generally "selected" for reasons not related to, and often incompatible with, habitat protection - swan or otherwise. Generally, selections have been made primarily for more important economic resources such as oil and gas, or timber, while wildlife habitat considerations have generally not been of equivalent significance in land selection patterns.

The good news is that the past 20 years have been more of an enlightened era within the United States with respect to greater environmental awareness and ecosystem management concepts. Additionally, wildlife itself has been, and remains, a very important element of Alaska's history, culture, and lifestyle. Thus, while wildlife habitat considerations themselves may not have been dominant in emergence of land ownership patterns, the importance of this resource is probably more widely recognized in Alaska than in much of the rest of the country.

Against this background I would like to briefly discuss four areas related to cooperative land use planning for habitat protection: (1) some problems that exist in Alaska, (2) some solutions to those problems, (3) the State of Alaska's land use planning process, and (4) state cooperative planning programs.

SOME PROBLEMS

Perhaps the biggest problem is that the only significant Federal land use planning which has occurred in Alaska has only really happened during this decade under the time deadlines set by section 17 (d) (2) of ANCSA. That section authorized the Secretary of Interior to withdraw up to 80 million acres of Federal land within Alaska for study for possible inclusion in the national park, forest, wildlife refuge, and wild and scenic river systems. That process, begun in early 1972, is moving toward completion as the "national interest lands" ("(d) (2)") legislation moves through Congress. The problem is that this "planning process" is occurring after a 70-year period during which the homesteading and other public land laws were operative within Alaska; after military withdrawals; after the State had selected approximately 70 million acres of its entitlement; and after the Native corporations had selected most of their 40 million acres.

The State of Alaska itself has had a somewhat similar problem in that a 1963 law permitted boroughs (municipal governments) to select 10 percent of the vacant, unappropriated, and unreserved State land within their boundaries as an economic basis for local government. Until recently, these municipal land selections were made and approved by the State with no particular land use or resource planning. However, with the passage of new municipal land selection legislation in the 1978 legislative session, Alaska now has specific criteria which spell out the State vs. local government interests in State lands within organized municipalities. Wildlife habitat, for example, is identified as a resource of State concern, and lands primarily important for their habitat resources are to remain in State ownership.

Another problem concerns the ownership of the bottoms of navigable waters. Under the terms of the Submerged Lands Act of 1952, Alaska, like all states, owns the lands under navigable waters. These rights vested instantly at the time of Statehood in 1959, but as yet only a handful have actually been identified. Since only the courts may ultimately decide the question of navigability, it will be many years before the ownership of these critically important habitat areas are finally determined. In the meantime, the question of State ownership of potentially navigable waterbottoms winding their way through Federal and Native lands is causing some problems with respect to cooperative planning and management.

A fourth problem area concerns water appropriation rights. At bar before the U. S. District Court in Anchorage at this time is litigation which has resulted from a claim by a Native corporation that ANCSA vested in the Native corporations the appropriation rights for water on lands selected pursuant to that act. While the State of Alaska is and will continue to vigorously oppose this interpretation, it is easy to see that if the Native corporations prove to be right, the protection of wildlife habitat, particularly waterfowl, may be seriously affected.

SOME SOLUTIONS

There are several ways to deal with the problems cited above, some tried and tested, others new and imaginative. Perhaps the most common is that of cooperative agreements among major government landowners -- for example, the agreement among the U. S. Forest Service, the Alaska Department of Fish and Game, and the Alaska Department of Natural Resources for the Copper River Delta east of Cordova. Here, in an area of important Trumpeter Swan habitat, these three agencies have had an effective cooperative management agreement in force for many years.

A similar but far less common approach is that found in the Yukon-Kuskokwim River Deltas. Here, in an area with tremendous waterfowl habitat significance, the U. S. Fish and Wildlife Service has suddenly found itself with very large Native inholdings as a result of ANCSA. Thus, rather than cooperative agreements between government agencies, we have an agreement between a Federal agency and a group of private Native corporations that controls millions of acres within existing or proposed wildlife refuges.

The most recent major cooperative agreement is in the form of a State-wide commitment to cooperative planning and management among the Federal Departments of Agriculture and Interior, the State of Alaska, and the Alaska Natives represented by the Alaska Federation of Natives. This "umbrella agreement," signed in June of 1978, commits the four parties to cooperation on a State-wide basis wherever land and resource planning and management would benefit by cooperative management. At the time of this writing, areas are being identified in which such cooperative planning and management among the four parties will be initiated.

A fourth, and certainly the newest and most innovative concept, is that of a "land bank." As a result of the very large conveyance of lands from the Federal government to the Alaska Natives under ANCSA, some very significant land problems have arisen. From the standpoint of the Federal and State governments, it is a hope that private ownership of such vast acreages will not result in unnecessary degradation and needlessly hurried development. From the standpoint of the new Native landowners, it is a concern for the tremendous responsibilities that land ownership brings with it. As a result of these mutual concerns, the "(d) (2)" legislation presently before Congress provides for the establishment of a land bank program.

This voluntary program offers Native corporations certain benefits if they agree to put all or a portion of their lands in a land bank for a minimum initial period of 10 years. During this period, and for any subsequent periods that the lands remain in the bank, no development may occur unless it is accomplished on the basis of a joint cooperative management agreement with the surrounding Federal or State landowner. In return for this commitment, banked lands will be immune from Federal, State or local government property taxes. In addition, wildfire protection will be supplied by the Federal government, and such lands would be immune from adverse possession - an important consideration considering the remoteness and large areas involved. Although the Native corporations appear to be the primary beneficiaries of this program, it will be broad enough to encompass any private landowner willing to agree to the terms of the land bank program.

THE STATE LAND USE PLANNING PROCESS

The State of Alaska land use planning process is not especially unique or different from any other similar well-developed planning process. It begins by identifying a logical planning area, and then includes within the planning process all landowners and interested parties within that planning area. The usual resource inventory is accompanied by various scenarios for growth and development, and then optional plans are developed based upon the various scenarios.

If there is a distinct flavor to Alaska's planning process, it is in the heavy emphasis on public participation. Alaska is still a state which looks to the individual, and counts heavily upon public input, particularly from those affected by the land planning and management decisions. We have learned that the ultimate management program will only be successful if the people affected by that program feel that they have an active and substantial role in its development and implementation.

Once a land use plan has been decided upon, the lands are classified on the basis of that plan in one or more of 16 classification categories. Basically, these may be broken down into two distinct types - those to be retained more or less permanently in State ownership, and those which may be disposed of to municipal governments or directly to private ownership.

STATE COOPERATIVE PLANNING PROGRAMS

The State has several programs important to cooperative land use planning that affect habitat protection. The first, mentioned earlier, is in the form of specific agreements with Federal agencies or other landowners where ownership is well defined and stable. The Copper River Delta agreement is an example of this type.

The second program is that of joint planning with appropriate Federal agencies where the results of such joint study may result in significant changes in land ownership. For example, joint studies between the Bureau of Land Management and the State of Alaska may result in the identification of areas agreed to be appropriate for State selection from the Federal government. In this way, some cooperative land use planning occurs before the actual land ownership pattern emerges.

Under the terms of the new municipal land selection legislation, a specific process is established which requires both a joint planning process and joint consideration of municipal selections before they may be acted upon by the State. This requirement has gone a long way toward establishing a healthy spirit of cooperation between the State and its municipal governments in land management matters. The benefits of this joint process have been manifested primarily in two ways. First, areas of greater than local significance, such as important habitat areas, are identified and do not ever leave State ownership. Thus, many potential problems never occur because these key areas will always remain under State control. Second, following closer scrutiny of their past land selections, many municipalities have indicated a desire to relinquish inappropriate selections and to make new ones based upon the more appropriate criteria in the new legislation. For example, the Matanuska-Susitna Borough just north of Anchorage has indicated a desire to relinquish approximately 70,000 acres of earlier selections within the Susitna Flats Wildlife Refuge.

To private landowners, the State offers planning and resource expertise for cooperative planning efforts. We are hoping here to work particularly closely with many of the individual Native village corporations which control 70,000 or more acres of land, yet which do not have the financial resources or expertise to develop their own resource management plans.

Lastly, Alaska is well on the way toward the use of land exchanges as an effective means of consolidating land ownership patterns on the basis of rational land planning. Perhaps the best example of this is the multi-million acre Cook Inlet Land Exchange of 1976. Although quite complicated, the exchange provided the Cook Inlet Regional Corporation, one of the 12 regional corporations established by ANCSA, with lands considerably more appropriate to private ownership and development than lands it had previously selected. In this process many areas of fish and wildlife habitat concern remained in Federal or State ownership, thus insuring continued protection of these important areas. While it is very unlikely that other exchanges of this magnitude will occur, exchanges in the neighborhood of 10 to 40 thousand acres will not be uncommon in Alaska during

the next decade, and many of these will be executed on a basis of joint cooperative action with an eye toward protecting key wildlife habitats. As a result, swans and other wildlife can only benefit.

* * *

RELATIONSHIPS BETWEEN TRUMPETER SWAN DISTRIBUTION AND CABINS IN THE SUSITNA BASIN, ALASKA

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"Hiline Lake: 45 minutes flying time from Anchorage; 26 acres with 1,025 ft. of lake frontage; large trees; no marsh; beautiful building sites; good subdivision potential." This ad, in a recent edition of the Anchorage Times, typifies the boom in recreational site development which has occurred in parts of Alaska.

After flying a State-wide Trumpeter Swan survey in 1975, King et al. (1976) said this about the possible effects of cabin development on swans: "In the Cook Inlet unit disturbance from recreational cabin building may be a problem. Adjacent to the road system there are cheek-to-cheek cabins around all the major lakes and no swans were seen on any of these lakes. Throughout the rest of the Cook Inlet area every lake large enough to land a float plane has one or more cabins mostly built in the last ten years since the State selected these lands. A few swans were seen on lakes with cabins; however, this was the exception and numbers of lakes with good-looking habitat, some of which had swans in 1968, are now swanless."

Hansen et al. (1971) also discussed some implications of human disturbance and its effects on swans. However, they did not specifically address the effects of human disturbance which results from cabin construction.

The purposes of this paper are to: 1) quantify the relationships between swan distribution and increased human disturbance which results from cabin construction in the Anchorage area; and 2) discuss some long-term implications of this and other sources of Trumpeter Swan habitat alteration.

ACKNOWLEDGEMENTS

I am grateful to James G. King, Donald E. McKnight, Peter E. K. Shepherd, and my wife, Karen, for reviewing this paper. Lita Lewis provided typing skills and patience. Jim King prompted me to address this problem and he provided data freely from State-wide surveys in 1968 and 1975 (King 1968 and King et al. 1976). A portion of the costs necessary to write this paper were paid by Federal Aid in Wildlife Restoration, Project W-17-9. The remaining costs were paid by sport hunters in Alaska.

AREA DESCRIPTION

The Susitna Basin Trumpeter Swan habitat unit lies to the west and north of Cook Inlet and is bounded by Redoubt Bay on the south, the Alaska Mountain Range on the west and north, and the Talkeetna Mountain Range and Cook Inlet on the east. King (1968) estimated that there were 5,625 square miles of potential Trumpeter Swan habitat in the area. The Basin is a composite of land covered by spruce, birch, and aspen, lakes and muskeg-covered lowlands, large coastal river deltas, and numerous river valleys beginning at glaciers and ending at salt water. This region is in a rain shadow and the combination of warm, dry summers and numerous large lakes make the Susitna Basin a summer playground for residents of the Anchorage area where over half of all Alaskans live.

METHODS

To evaluate the hypothesis that cabin construction was altering the distribution of swans, it was necessary to know the locations of swans observed in the 1968 and 1975 surveys relative to cabin locations at the time of each survey. Although the exact locations of swans were plotted on 1 inch:1 mile maps, cabin sites were not recorded in either survey.

Land status records were reviewed at the State Division of Lands, Bureau of Land Management, Chugach National Forest, and the Matanuska-Susitna and Kenai Boroughs. However, these records proved inadequate to allow determination in most instances where, when, or even if cabins had been built.

On July 6 and 7, 1978, I conducted an aerial survey of the Susitna Basin. At the sites where swans were seen in 1968, 1975, and 1978, the following data were recorded: number of swans seen, number and approximate age of cabins, distance between swans and cabins, and the presence and approximate age of roads or other developments. Land status records supplemented some of the visual observations. A subjective determination was also made of whether a float plane could operate on lakes or streams where swans were seen.

When comparing individual swan observations for each of the three surveys, I assumed a single-use area occurred when adult birds were 1.0 mile or less part and adults with young were 2.5 miles or less apart. The size of family group territories was provided by Hansen et al. (1971). This assumption does not necessarily mean that the same birds returned to a given location over a 10-year period. It does, however, indicate habitat acceptable to Trumpeter Swans.

One practical limitation of the 1978 survey was that cabins were readily detected only on the same lake that swans occurred or within 0.5 miles overland from the birds. Cabins were recorded, however, when observed at distances up to 2 miles overland from the swans.

RESULTS

On the basis of the criteria described, swans were seen at 343 different swan-use areas during the 1968, 1975, and 1978 surveys. In 1978, 303 (88 percent) of these areas were inspected and swans were present at 170 sites. Cabins were present at 30 (10 percent) of these 303 locations.

In Tables 1 and 2, the reuse rates of swan-use areas are provided for adult birds, adults with young, and all birds. In both 1975 and 1978, swans were seen in 47 percent of the swan-use areas observed first in 1968 and in which no cabins were present through 1978 (Table 1). Fifty-seven percent of the swan-use areas with no cabins present, which were observed in 1975, were occupied by swans in 1978. Adults with broods had an average return rate of 62 percent, while the return rate for adults without young averaged 46 percent. Hansen et al. (1971) recorded an average annual return rate of 80 percent for mated pairs to established nest sites on the Kenai Peninsula.

Table 1. Reuse rates for Trumpeter Swans in areas with no cabins present.

Year resurveyed	1968 Survey (%)			1975 Survey (%)		
	Adults only	Ad/yg	All birds	Adults only	Ad/yg	All birds
1975	39	67	47	-	-	-
1978	44	54	47	54	65	57

All years average: adults only = 46%; ad/yg = 62%; all birds = 50%

Table 2. Reuse rates for Trumpeter Swans in areas with cabins present.

Year resurveyed	1968 Survey (%)			1975 Survey (%)		
	Adults only	Ad/yg*	All birds	Adults only	Ad/yg*	All birds
1975	25	75	35	-	-	-
1978	13	40	22	37	0	32

* Small sample

All years average: adults only = 25%; ad/yg = 38%; all birds = 30%

Determining the reoccupancy rate by swans of areas associated with cabins was complicated by several factors. In some instances, swans were observed near existing cabins, while in other instances cabins were built between survey years. Also, the relative age of cabins may have been incorrectly determined in 1978. As seen in Table 2, for occupied swan-use areas in 1968 with one or more cabins nearby, 35 percent were reoccupied in 1975 and only 22 percent had swans in 1978. For occupied swan-use areas in 1975, the reuse rate in 1978 was 32 percent compared to 57 percent for areas with no cabins. The lowest incidence of swan reuse (13 percent) occurred for adult birds in areas surveyed in 1968 and again in 1978.

The number of cabins had a marked effect on the return rate of swans, as demonstrated in Table 3. Where one or two cabins were present, the rate of reuse was 48 percent, compared to a 50 percent rate for areas without cabins. However, in areas with three to five cabins the reuse rate was 36 percent. When six or more cabins existed, the probability of swans returning to that area was only 8 percent.

Table 3. Number of cabins related to Trumpeter Swan use, 1968, 1975, and 1978 surveys.

No. of cabins present	Reuse of Swan-use areas	Avg. no. adult swans per use area
1-2	48%	1.3
3-5	36%	0.5
6+	8%	0.15
Average	30%	0.95
No cabins present	50%	2.3

For all surveys, an average of 2.3 adult swans was seen per observation in areas with no cabins. As seen in Table 3, in areas with cabins, an average of 0.95 adult swans was seen per observation. Depending on the number of cabins present, there were from 43 percent to 93 percent fewer swans present in areas with cabins, compared to those areas without cabins. Although individual situations vary, it seems apparent that the amount of human disturbance associated with one or two cabins is not sufficient to displace swans. However, when three or more cabins are present, the area rapidly becomes unacceptable to the birds.

In 1978, 15 percent of the 170 observations of swans occurred on lakes large enough for float plane operation, while 18 percent of the total birds were seen in these areas. This habitat type is selected against by adults with broods, paired adults without broods, and single adults. However, adults in flocks (three or more birds) appear to prefer this habitat type as 33.1 percent of grouped birds were seen on larger lakes.

In 1978, five instances of new roads were recorded in swan-use areas. In two instances, cabins had been built on the road and in both cases swans were displaced. The roads had no apparent effect on swan distribution in the other three instances.

DISCUSSION AND PREDICTIONS

Although the number of cabins near the 303 swan-use areas evaluated in 1978 has increased from 21 to 75 (257 percent) since 1968, swans have continued to increase in the Susitna Basin. Direct comparisons of populations between survey years were impossible due to different sampling intensities and survey design. However, for adult swans only, a population increase of 33.6 percent was indicated between 1968 and 1975. Between 1975 and 1978, an increase of 22.7 percent occurred. When young of this year were included, I projected the population in 1978 to be 766 birds, compared to 617 in 1975. These figures were based on 79 percent habitat coverage. The actual population in 1978 was conservatively estimated to be 800 birds.

On the Copper River Delta, Alaska, pairs of Trumpeter Swans with nests or young were more sensitive to human disturbance than adults without young (Peter E. K. Shepherd, pers. comm.). In the Susitna Basin, the reoccupancy rate of areas with cabins was 25 percent for adult birds and 38 percent for adults with young. However, only 10 family groups were observed in areas with cabins. Furthermore, only four of the observations occurred in areas where three or more cabins were present.

The proportions of pairs with broods in 1968, 1975, and 1978, were 32, 36, and 42 percent, respectively. This may indicate increasing productivity. However, 1978 was an early year for ice and snow melt while 1968 and 1975 were average (J. G. King, pers. comm.). This probably contributed to the greater percentage of pairs with broods in 1978.

As explained previously, cabins were readily located if they occurred on the same lake or 0.5 miles or less overland from swans. However, cabins were recorded up to 2.0 miles overland from the birds. It appeared that swans were apt to be displaced when cabins occurred on the same lake where swans were found, regardless of the size of the lake. However, an overland separation of even 0.5 miles appeared to be an adequate buffer to human disturbance. This is reasonable because even one-half mile of muskeg or dense spruce forest presents a formidable obstacle to human travel during summer months.

It is inevitable that the Susitna Basin Trumpeter Swan population, as well as other expanding populations across Alaska, will eventually reach levels limited to a large extent by human disturbance. At that point each successive expansion of permanent human disturbance will reduce the number of Trumpeter Swans in Alaska.

Roads will be established, power lines erected, new communities created, and perhaps thousands of new cabins built within Trumpeter Swan habitat. For example, a voter initiative, which is currently blocked in the courts, provides for up to 30 million acres of State land to be given to Alaskan residents. Up to 160 acres could be obtained by each citizen, depending on residency. Even if this initiative fails, Alaskans are demanding -- and politicians are responding -- that more land should be transferred to private ownership.

Fortunately, a large proportion of the Trumpeter Swans in Alaska prefer habitat that has little appeal to most urbanites seeking recreation during the summer months. Cabins built in the future will, in most cases, be restricted to larger lakes and rivers which afford aircraft access. Even if roads open up habitat, few people will build cabins for summertime recreation in mosquito-infested swampy areas with poor building sites, no view, and little or no water recreation potential. Such areas are preferred by waterfowl, including Trumpeter Swans.

I believe that there will be Trumpeter Swans in Alaska 10, 100, and 1,000 years from today. Whether there will be more or fewer will depend on the dynamic balance struck between economic, political, and social needs and attitudes. For example, although the State may transfer millions of acres of land to private individuals, concurrent events dictate that management authority for up to 120 million acres of (d) (2) lands will be placed under various Federal resource managing agencies.

At this point in Alaska's history, Hansen's et al. (1971) statement has never been more appropriate: "Perhaps the most we dare hope for the future of the trumpeter swan as well as for many other of earth's threatened species is a partially satisfying 'half-load' predicated upon the current man/environment relationship."

I, for one, am confident that if we who are interested in the welfare of the Trumpeter Swan remain vigilant, there will be a balance struck and the welfare of the Trumpeter Swan will be assured. The challenge will be to use knowledge such as that presented here, to temper the actions of those who have little regard for nature or understanding of its complexities, and to insure that such a balance is truly achieved in the future.

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THE PACIFIC COAST TRUMPETER SWAN MANAGEMENT COUNCIL: A PROPOSAL

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It is now clear that the Congress of the United States cannot legislate the protection of any major portion of the Trumpeter Swan habitats in Alaska. It appears that about 85 percent of the Trumpeter Swan habitat as determined by the 1975 U. S. Fish and Wildlife Service census has or will be transferred from the public domain to the State of Alaska and to Alaska Native corporations under terms of the Statehood Act and the Alaska Native Claims Settlement Act. The d-2 legislation under even the most ambitious proposal will include only small portions of peripheral swan habitats.

It is also clear that what was known as "Seward's Folly" and "Walrussia" in 1867 has, by 1978, become a major destination for fortune hunters and settlers seeking new homes. Agriculture, strip mining, oil extraction, wilderness homesteads, wilderness recreation homes, hydro development, urban development, power lines, pipelines, roads, and railroads are all major probabilities in the next few years, within the Alaska Trumpeter Swan range. There is tremendous pressure from Alaskans to make land available to private citizens for personal uses. This pressure could overwhelm attempts for enlightened land classification and result in some sort of "land rush."

The Trumpeter Swan was thought to be on the verge of extinction in 1930. By 1968, the population had increased sufficiently that it could be removed from the "Endangered Species List." Some 80 percent of all Trumpeters nest in Alaska. About 60 percent of the total world breeding population will be on the non-Federal lands of Alaska. These non-Federal lands also include the major potential for future expansion of human activity in Alaska.

If poor land management should cause a serious decline of the Alaska Trumpeter, it is likely it would be returned to the Endangered Species List. The provisions of the Endangered Species Act would then have to be applied causing restrictions in the use of lands of any ownership and an increase of public expense for an effective restoration effort. Ugly and expensive controversy could erupt as with the unfortunate snail darter in Tennessee.

It is obviously in the best interest of everyone -- Federal organizations, State organizations, Native organizations, industry and private citizens -- in Alaska to keep the Trumpeter off the Endangered List. Every land managing agency with responsibilities for land-use decisions on Trumpeter Swan habitat will need to consider swan conservation if we are to succeed in efforts to perpetuate a healthy Trumpeter breeding population. Coordination of management plans will be necessary.

In other parts of North America, a council concept is functioning well to coordinate the enormously diverse interests in the management of the heavily hunted migratory waterfowl species. Each of the four flyways has such a council with attendant technical committees. The needs and desires of all are heard by the councils. Scientific information is evaluated, and a sound and fair management program results.

I would like to suggest the formation of a Pacific Coast Trumpeter Swan Management Council. The Council should include members from each State and Federal agency that has jurisdiction over Trumpeter habitat. Native corporations whose lands include Trumpeter habitat also must be included. Other members should be representatives of sportsmen's groups, conservation societies, and environmental societies in Alaska. It will be necessary to have similar representation from the Province of British Columbia, the Canadian Wildlife Service, and the State of Washington so that the entire range of the Pacific Trumpeter is included. A Midcontinent Trumpeter Swan Management Council should also be considered.

The first duty of the Council might best be development of an overall swan conservation strategy. Needed next would be management plans for various areas, cooperative agreements between landholders, establishment of a technical committee of professionals and initiation of a research program. An annual report should be provided for keeping everyone informed on the progress of Trumpeter conservation. Council funding should be by participants. Expenses of the Council could be counted as an insurance cost against the greater social and financial cost of letting the Trumpeter slip back on the Endangered List for lack of attention.

It is fortuitous that a major portion of the organizations that should be on the Pacific Coast Council are represented here at this timely meeting of The Trumpeter Swan Society. There are several panel sessions yet on the agenda. It is my hope that the matter of Trumpeter Swan Management Councils can be discussed and a logical first step towards their creation be taken before this meeting adjourns. If we can do that, I think all of us here could feel we had participated in an exciting and important step toward insuring the future well-being of America's largest and most lordly bird.

* * *

IMPACT OF HUNTING AND DISTURBANCE ON THE INTERIOR TRUMPETER SWAN POPULATION

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Abstract: Hunting has had very little, if any, adverse effect on Trumpeter Swans in interior Alaska, and disturbance has been minimal due to the remoteness and inaccessibility of most nesting and concentration areas. Future land use patterns in the Interior are not likely to conflict with Trumpeter Swan habitat because of the areas' low appeal for human use. The western and northern distribution limits of Trumpeter Swans coincide predominantly with the edge of the boreal forest with the overriding limiting factor, especially in the northern distribution, being the number of ice-free days in a year. There is some limited overlap in Whistling Swan and Trumpeter Swan distribution.

* * *

MOOSE RIVER SWANS, DUCK HUNTERS, AND THE BUREAUCRACY

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After 3 years of letter writing to various government agencies, it was satisfying to read this July that the first mile and a half of the lower Moose River in Sterling, Alaska, on the Kenai Peninsula, is now closed to all waterfowl hunting.

In May of 1975, I first wrote the Alaska Department of Fish & Game when I read an article in the Anchorage Daily News about the Fish & Game planning a waterfowl habitat and viewing area for Westchester Lagoon in Anchorage, at a proposed cost of $25,000.

I thought, they do care about waterfowl. So I wrote them suggesting that the Moose River could be made into a bird sanctuary at absolutely no cost.

I gave the following reasons for a sanctuary, reasons I had previously submitted to the U. S. Fish & Wildlife Service when they had requested "Waterfowl Hunting Regulation Impact Comment" in April 1975:

1. Trumpeter Swans and other swans rest and feed in this area both spring and fall, and in the fall are continually harassed by the shooting of ducks in their midst. I have found one dead Trumpeter washed ashore at the Moose River bridge.

2. This is one of the very few places where Trumpeter Swans can be viewed from a paved highway.

3. There are too many buildings and people living in the vicinity of this stretch of river for safe shooting.

4. The lands on both sides of the Moose River are being subdivided and many more people are moving in. We submit that a permanent bird sanctuary where people would be able to take pictures without shotguns blastings all around would be a peaceful oasis in this more and more crowded world.

The State agency answered that it was a Federal problem because the Federals are in charge of migratory birds, and also that the State could do nothing unless they owned the land so they could build access roads, shelters, and furnish garbage containers, etc.

The Federals, however, had a different story. I finally received a letter from them as follows:

> "Although the area is used by 200 to 300 trumpeter swans during the spring of the year, our Anchorage Area Office advises that only a few swans are present during the fall. Consequently, we do not believe that a sanctuary is necessary for the few birds that are there during the time that hunting is permitted.
>
> "The trumpeter swan is no longer classified as an endangered species. In addition, Federal waterfowl hunting regulations usually do not provide for local closures unless a compelling management need exists. Thus, we believe that the creation of of a sanctuary on the described portion of the Moose River should more appropriately be a prerogative of the State of Alaska, or the Borough of Kenai. . . ."

(I wrote the Mayor of the Kenai Peninsula Borough about the matter, enclosing a stamped self-addressed envelope. No answer was ever received.)

Here are exerpts from my answer to the U. S. Fish & Wildlife Service letter:

> "With all due respect to your observers in your Anchorage Office who state that very few trumpeter swans spend time here in the fall, --- I have lived along the bank of Moose River for 28 years, and I have noticed that many swans spend their nights on Moose River and I have also noted that as soon as the duck hunters start blasting at daylight large flocks of swans take off for other parts. Has it occurred to anyone that the swans are not going to hang around while shooting is going on, even though this always was a feeding and resting spot for them in the old days, both spring and fall?
>
> "Last year I wrote the State about this and they informed me that it was under Federal jurisdiction. Now you tell me that this would be a prerogative of the State or the Kenai Borough.
>
> "Right now there are about 30 buildings located within 1/4 mile of this stretch of river, and this year there are 6 new dwellings under construction along the river. It is getting just too crowded for safety, considering that kids shoot ducks with .22's (which is illegal), as well as with shotguns.
>
> "I have been advised to get signatures on a petition to close this area. I have little faith in the force of petitions with the bureaucracy. If something sensible should be done, then no petition is required. If it's not sensible, then a petition is useless.
>
> "We are glad to hear that trumpeter swans are no longer endangered species."

After 2-1/2 years of letter writing I received a letter from the State Fish & Game which said in part:

"If the area is closed to shooting it should be done by the Kenai Borough and not the Board of Game. . . .

"The Game Division is by no means opposed to public viewing areas. In fact, if public lands along the river existed from which the general public could view swans, we would endorse a Board of Game action to close the area to hunting concurrent with a request to the Kenai Borough to eliminate all discharge of firearms. We would also develop an area from which people could view swans and other waterfowl. However, a check of land status maps showed that all lands in the area are private, except of course the river itself.

"If we created a viewing area it would not be fair to land owners along the river because it would be their land which the public would be using to view the swans. Even then we couldn't eliminate the boat, float plane and other human use in and along the river which also disturbs waterfowl -- probably as much or more than hunting does in this instance. . . ."

Quoting from my answer to this letter:

"In the last half of October we had Trumpeter Swans, both young and old, on the river every day until October 30th. On October 22nd, we counted 36 Trumpeters feeding and resting in open leads. There was too much ice for the duck hunters to hunt from shore at that time. Within 600 feet of the swans there were large earth-movers working, a dumptruck hauling gravel, and carpenters hammering on a new house. None of this bothered the swans. . . . But in the afternoon a boat load of duck hunters floated down the river blasting away at the few ducks left. All the swans took off -- probably for the outlet of Skilak Lake since all the nesting lakes were frozen.

"Moose River and the Kenai River at Skilak are about the only two places open with available and accessible feed after the lakes freeze. Enough current flows to keep spots open where the water is shallow enough for feeding.

"Your letter states that there is no public land from which the general public could view swans. There is a road paralleling the river on the west side. The first 1/2 mile from the Sterling Highway is a dedicated public road 100' wide (more in some areas). In this area there is also a public turn-out and viewpoint at the side of the road, which I built last summer. There is space here for several cars. From this point one can view more than a mile of Moose River.

"In addition, I have made a 100-foot wide right-of-way available to the public, running from the existing road down to the river's edge and along the north side of the natural gas pipeline."

In January of this year, personnel from the Alaska Fish & Game visited us and helped us write up a proposal to close this part of Moose River to all waterfowl hunting. On July 1, it was officially put into effect.

* * *

THE TRUMPETER SWAN POPULATION OF GRANDE PRAIRIE, ALBERTA

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INTRODUCTION

The population of Trumpeter Swans breeding in the Grande Prairie district of Alberta, Canada, is a remnant of the historic population which formerly nested throughout the north, west, and central parts of North America. The Grande Prairie flock is one of three major wild breeding populations in North America and comprises the only major nesting population in Canada. The past history of the Trumpeter Swan in North America is well documented by Banko (1960) and Hansen et al. (1971).

Long considered an endangered species, the Trumpeter Swan was removed from the rare and endangered list in 1968 following documentation of 3,000 swans in Alaska. Nevertheless, the interior population, and particularly that segment breeding in Canada, remains extremely low.

During the 19 years for which data are available, the Grande Prairie population has demonstrated minor fluctuations on an annual basis and has remained remarkably static over the past years despite the protection the species has enjoyed. The purpose of this paper is to analyze past population data in conjunction with survival rates determined from a recent neck-collaring program, to model the possible future performance of the species, and to elucidate ecological factors which may be influencing population numbers.

METHODS

Aerial surveys were conducted around mid-September every year since 1959. May and July surveys have also been conducted in recent years. As the fall survey is conducted about the time the cygnets attain flight, it provides a good estimate of the number of swans leaving Grande Prairie each year. Although adults and yearlings are theoretically separable by plumage

characters, these differences are too subtle to be detected on aerial counts. Therefore, the swans were classified as either adults or cygnets with adults being categorized as follows:

a) pairs with cygnets,
b) pairs without cygnets,
c) single, and
d) flocked.

The population status was projected using the model described by Page (1976), which requires knowledge of clutch size, hatching success, cygnet survival to fledging, and survival rates for all age classes from fledgling to adult. Clutch size and hatching success have been reported by Burgess (1972) and cygnet survival was calculated by comparing May, July, and September surveys. Survival rates for all age classes from fledgling to adult were determined through neck-collaring, a method which proved successful due to the small number of birds which were quite observable on the well-defined breeding and wintering areas. For purposes of modeling, the starting population was calculated by applying these survival rates to the previous years' September cygnet counts. All fractions were rounded to the nearest integer.

Long-term population data which provided an annual census of total numbers and cygnet production enabled calculation of birth and death rates which were also used to model population growth. Birth rate during year "t" was expressed as the ratio of the number of cygnets to the total population, while death rate was expressed as a ratio of difference between the total population in year "t" and the subadult and adult population in year "t + 1" to the total population in year "t." Population growth was then extrapolated with the exponential equation of growth:

$$N_t = N_0 e^{rt}$$

where N_0 is the initial or starting population, e is the base of natural logarithms, t is time, and r is the net difference between birth rate and death rate.

RESULTS AND DISCUSSION

Long Term Population

Table 1 shows the number of successful breeding pairs, the number of pairs without cygnets, the single and flocked component, and the total number of cygnets each year from 1959 to 1977. The low number of breeding pairs recorded during the mid-sixties occurred as a result of high water levels (Mackay, pers. comm.) which flooded the traditional nest sites and consequently inhibited nesting and/or reduced nesting success. The total number of pairs did not change appreciably during this period, but the impact of this period of poor production on the demography of the population is reflected in the reduced number of breeding pairs observed in 1969 and 1970. Despite pronounced oscillations in the number of successfully breeding pairs, the total number of pairs has fluctuated little from year to year, but has increased gradually from 1971-77. Population changes during the 1959-77 period are depicted graphically in Figure 1.

Table 1. Autumn population components of the Grande Prairie, Alberta, Trumpeter Swan population from 1959-1977.

Year	Prs. with cygnets	Prs. without cygnets	Total prs.	Single & flocked	Total no. adults & subadults	Total no. cygnets	Total population
1959	10	8	18	51	87	40	127
60	9	5	14	42	70	38	108
61	12	4	16	57	89	41	130
62	8	11	19	35	73	36	109
63	9	5	14[1]	62	89	27	116
64	7	9	16	58	90	14	104
65	2	21	23	18	64	5	69
66	7	14	21	19	61	24	85
67	7	13	20	4	44	24	68[2]
68	11	11	22[1]	32	75	31	106
69	6	7	13	47	73	13	86
70	9	5	14	48	76	24	100
71	11	13	24[1]	31	78	36	114
72	10	13	23	21	67	37	104
73	19	10	29[1]	11	68	55	123
74	13	15	28[1]	43	98	49	147
75	12	19	31	22	84	37	121
76	14	22	36	8	80	41	121
77	25	8	33[1]	26	91	80	171

[1]Single adult observed with young included as pair under "Total prs." but counted as single under "Total no. adults & subadults."

[2]Incomplete survey.

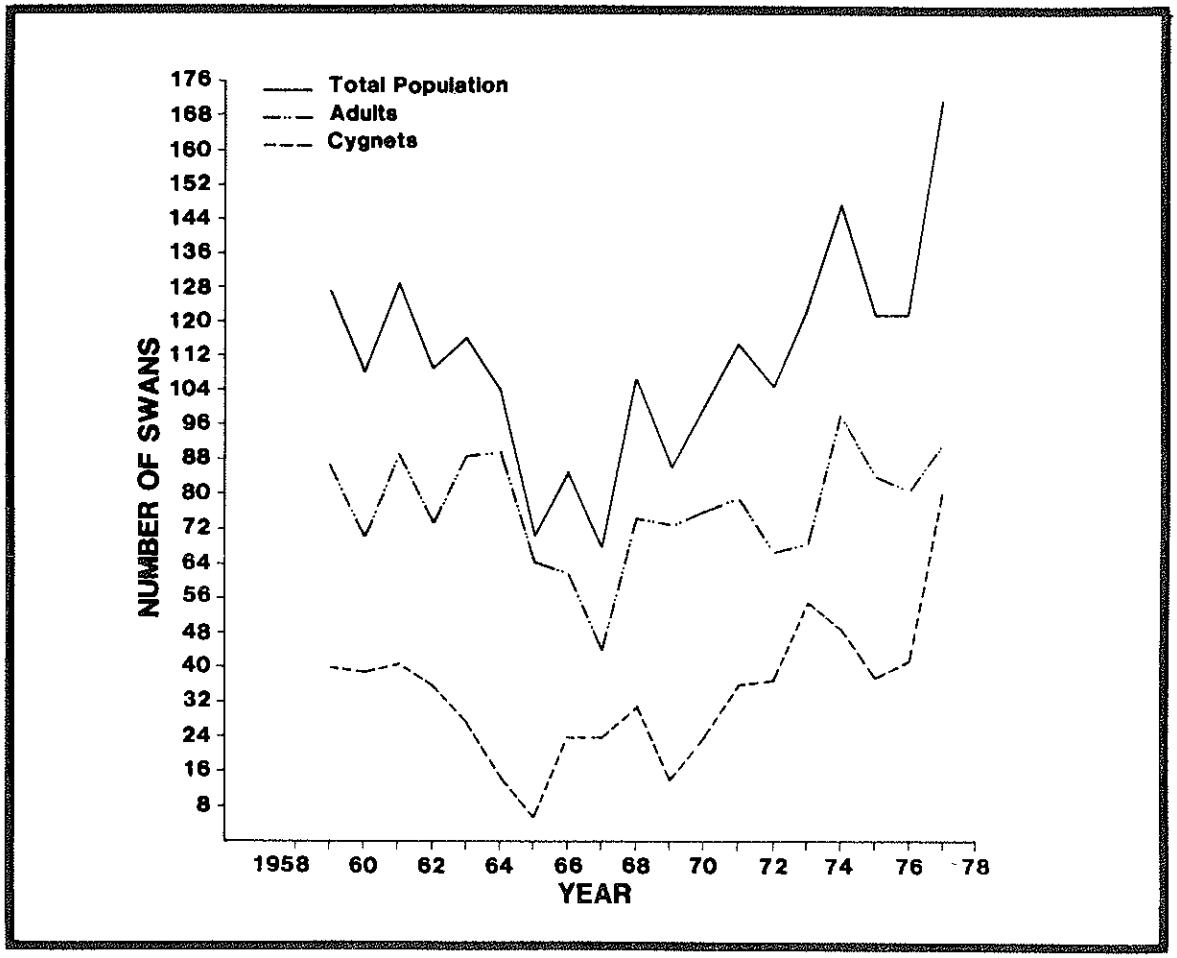

Figure 1. Long-term changes in the Grande Prairie, Alberta, Trumpeter Swan population.

Population Model

The model described by Page (1976) was used to project the swan population to 1996. The values applied to each parameter are given in Table 2. A clutch size of 5.4 was used instead of the 5.8 value reported by Burgess (1972), because the latter was determined from a small sample in one year and it is higher than those previously recorded for the species (Hansen et al. 1971; Page 1976). However, the 0.857 hatching success recorded by Burgess (1972) agrees favorably with that noted by Hansen et al. (1971) for the Trumpeter Swan nesting on the Kenai Peninsula in Alaska. The survival rate from hatching to fledging was calculated to be 0.599 and is considerably higher than that reported by Page (1976). The survival rates from fledgling to adult as determined by the neck-collaring are given in Table 2. Since there are three known instances of swans losing collars during the 3rd year after banding, the survival rate is probably an underestimate and the value for age 3 and over is considered constant at 0.824 (Table 3). These survival rates agree favorably with those reported by Scott and the Wildfowl Trust (1972) for the Mute Swan and by Page (1976) for the Trumpeter Swan with the exception of the low survival from fledging to one year of age.

The impact of poor production in any one year on subsequent breeding populations is apparent because 33 percent of the breeding population is comprised of swans aged 5 and 6 years of age (Table 3). For example, the survival rates indicated that the combined recruitment to the breeding population from the 1964 and 1965 production was three swans. Based on its reproduction potential and the observed survival rates, a pair of swans must breed for 4.3 years to replace the pair unit.

The calculated population for the starting year of the model (Table 3) agrees very closely with the actual observed population in 1976 (Table 1). The model predicts that the population will increase from 15 reproductively mature females and 82 total subadult and adult swans in 1976 to 25 eligible females and a total of 128 subadult and adult swans in 1996 (Table 4; Figure 2) for an average annual growth rate of 0.028.

Analysis of Birth and Death Rates

The mean values of the birth and death rates between 1959-1976 are 0.2833 and 0.2886, respectively. The annual oscillations which appear to be interrelated as fluctuations in the birth rate are usually followed by similar variations of the death rate (Figure 3). This is clearly demonstrated by a graph (Figure 4) of 3-year moving averages of the birth and death rates, both of which decreased in the early sixties to a low in 1965 and subsequently increased during the late sixties. In 1970, the death rate stabilized coincident with a continued increase of the birth rate. An amelioration of weather conditions and attendant habitat improvements on the wintering area could produce this effect and account for the population growth experienced in recent years.

Table 2. Survival rates of neck-collared local[1] and adult[2] Trumpeter Swans in the Grande Prairie, Alberta, population from 1973-1977.

Age	Number alive going into period	Number surviving period	Survival rate
1	98	42	0.429
2	31	22	0.710
3	15	12	0.800
4	8	4	0.500
Adult	17	14	0.824

[1]Neck-collared as fledgling.

[2]Neck-collared as adults.

Table 3. Parameters and values used in population model for the Grande Prairie, Alberta, population of Trumpeter Swans.

Parameter no.	Parameter value	Meaning of parameters
1	1996	Last year to be calculated
2	5	Age category of female's reproductive maturity
3	500	Limit on number of nests
4	5.4	Eggs per nesting female
5	17	Number of one-year age categories
6	1975	First year to be calculated
7	0.857	Survival rate egg to hatchling
8	0.599	Survival rate hatchling to bandable
9	0.571	Mortality for 1 th age category
10	0.291	Mortality for 2nd th age category
11	0.176	Mortality for 3rd 17th age category
12	8	Starting population for 1 th age category
13	7	" " " 2nd " " "
14	7	" " " 3 " " "
15	4	" " " 4 " " "
16	3	" " " 5 " " "
17	2	" " " 6 " " "
18	1	" " " 7 " " "
19	2	" " " 8 " " "
20	1	" " " 9 " " "
21	1	" " " 10 " " "
22	0	" " " 11 " " "
23	0	" " " 12 " " "
24	1	" " " 13 " " "
25	1	" " " 14 " " "
26	1	" " " 15 " " "
27	1	" " " 16 " " "
28	1	" " " 17 " " "
Total (females only)	41	

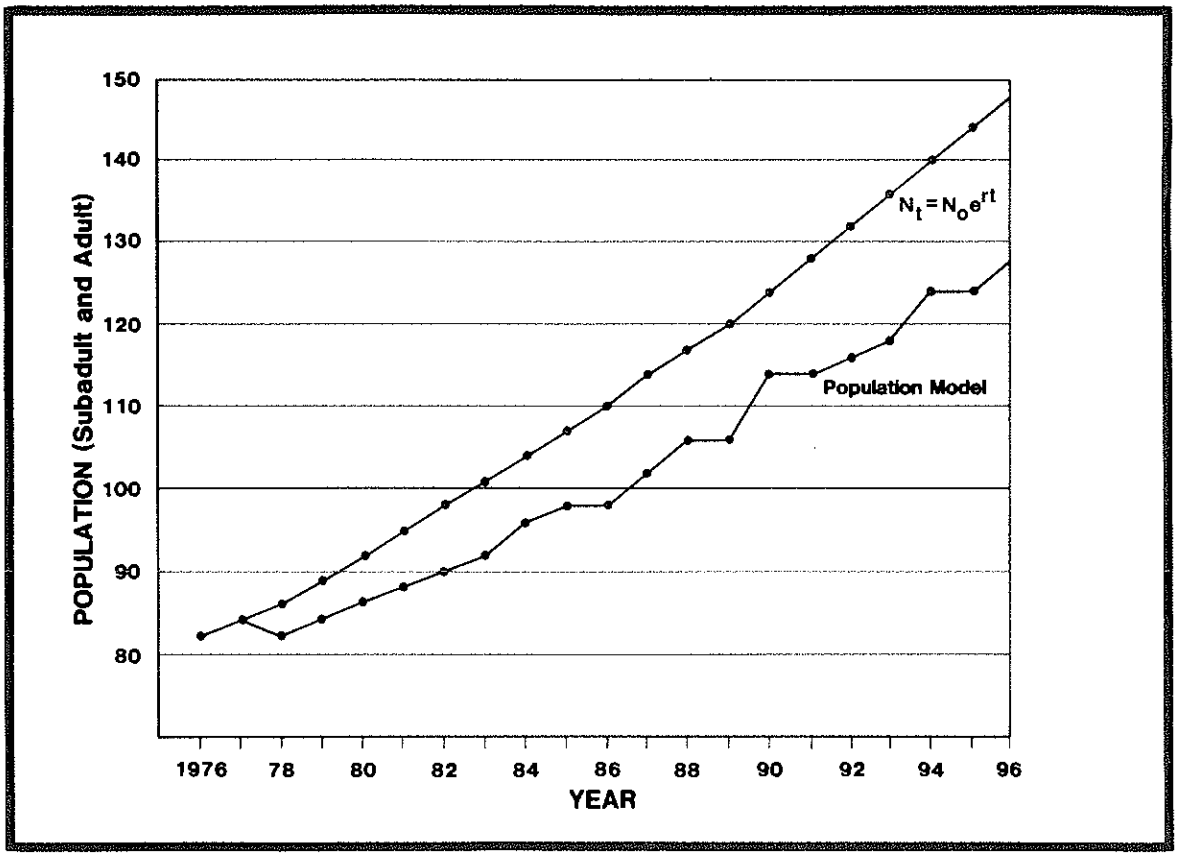

Figure 2. Projected population by model and logistic equation of growth for the Grande Prairie, Alberta, Trumpeter Swan population.

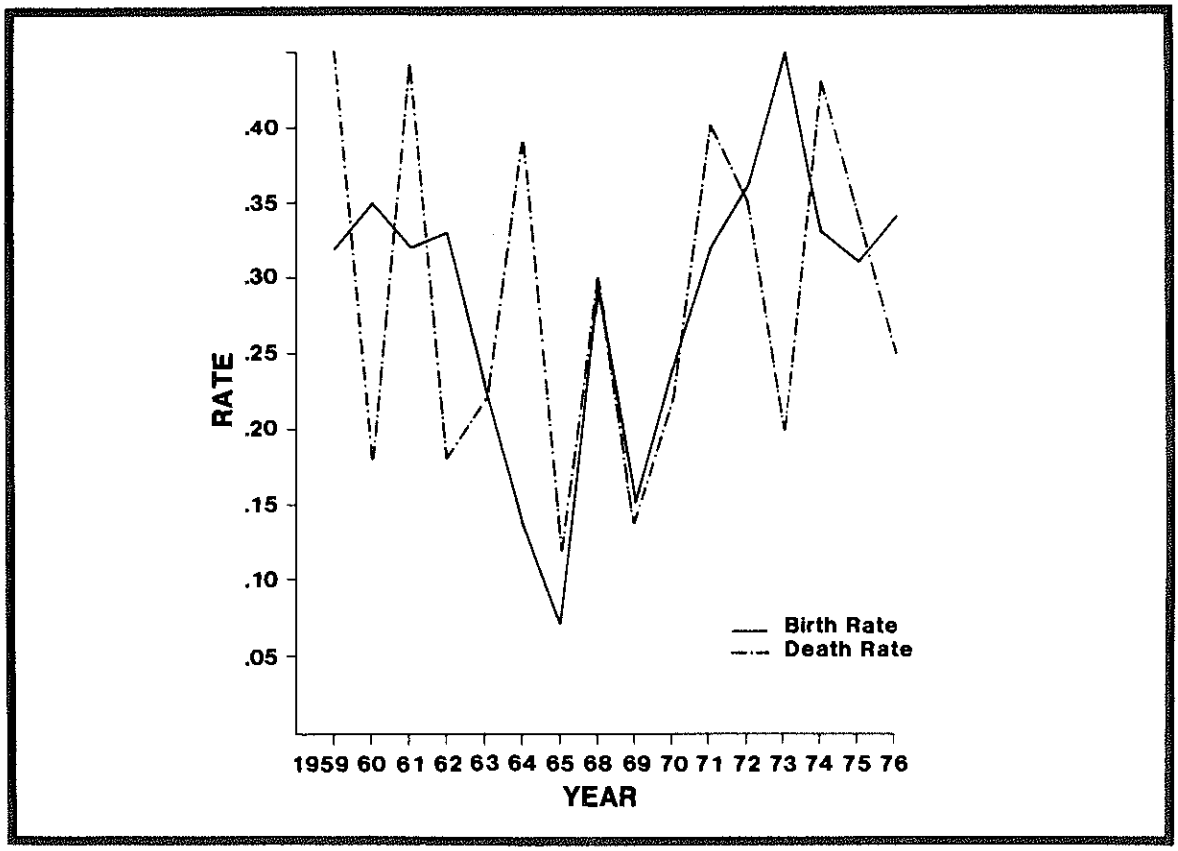

Figure 3. Comparison of annual birth and death rates of the Grande Prairie, Alberta, Trumpeter Swan population.

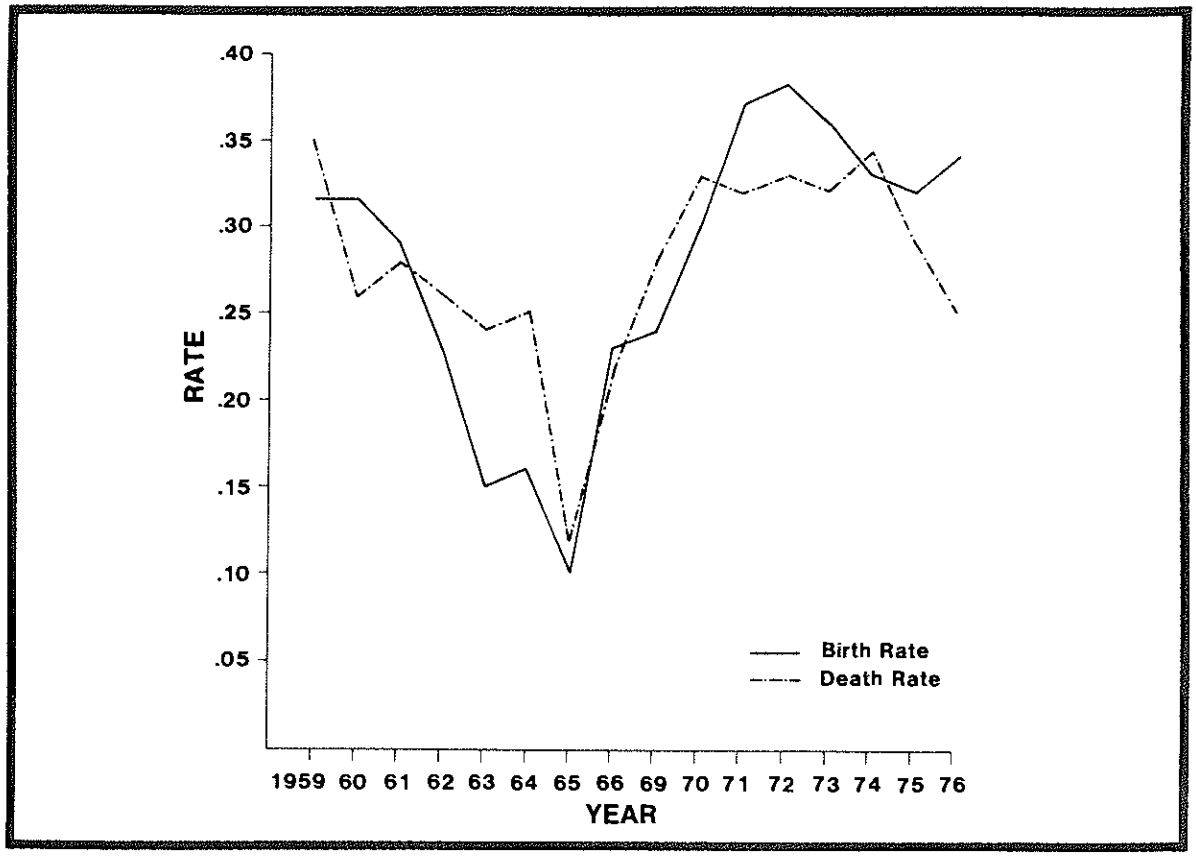

Figure 4. Three-year moving averages of birth and death rates of the Grande Prairie, Alberta, Trumpeter Swan population.

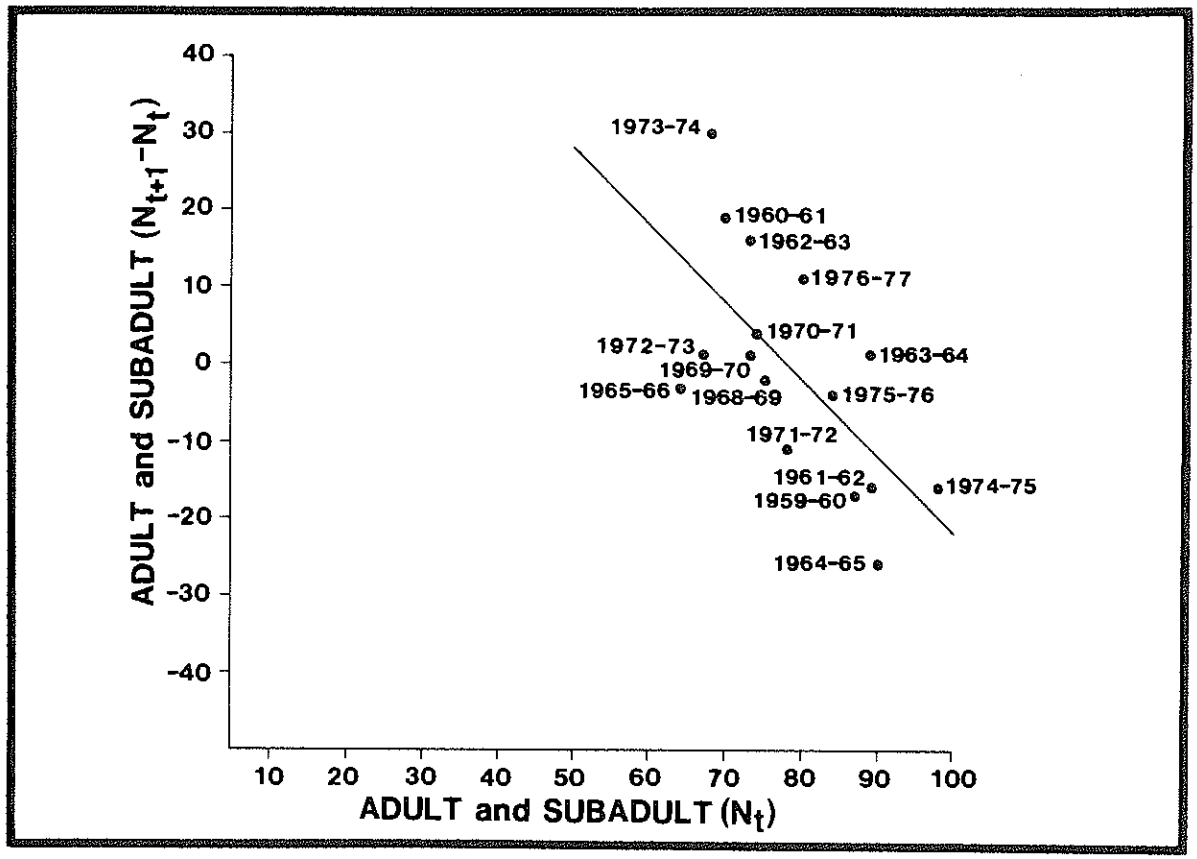

Figure 5. Relationship between the size and annual fluctuations of the subadult and adult component of the Grande Prairie, Alberta, Trumpeter Swan population.

Table 4. Population projection by age of female and by calendar year for the Grande Prairie, Alberta, population of Trumpeter Swans.

Age	Calendar year																				
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Year 1	8	9	9	10	10	10	10	10	11	11	11	12	12	12	13	13	13	13	14	14	15
Year 2	7	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	10	10	10
Year 3	7	6	5	5	5	6	6	6	6	6	6	6	7	7	7	7	7	8	8	8	8
Year 4	4	6	5	4	4	4	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6
Year 5	3	3	5	4	3	4	3	4	4	4	4	4	4	4	5	5	5	5	5	5	5
Year 6	2	2	3	4	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4
Year 7	1	2	2	2	3	3	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
Year 8	2	1	1	2	2	3	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
Year 9	1	2	1	1	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2
Year 10	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	2	2	2	2	2	2
Year 11	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Year 12	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Year 13	1	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Year 14	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Year 15	1	1	1	0	0	0	0	1	0	0	0	0	1	1	0	1	1	1	1	1	1
Year 16	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Year 17	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eligible	15	15	16	17	17	17	17	18	19	19	19	20	21	21	22	22	23	23	24	24	25
Nesting	15	15	16	17	17	17	17	18	19	19	19	20	21	21	22	22	23	23	24	24	25
Eggs laid	41	40	44	45	45	45	47	49	50	52	52	54	55	57	58	59	61	63	64	66	67
Hatched	35	34	38	39	38	39	40	42	43	44	45	46	48	49	50	51	52	54	55	56	58
Bandable	21	21	23	23	23	23	24	25	26	27	27	28	28	29	30	31	31	32	33	34	35
Total	82	84	82	84	86	88	90	92	96	98	98	102	106	106	114	114	116	118	124	124	128

POPULATION REGULATION

The data indicate that the Grande Prairie population of Trumpeter Swans has increased during recent years as a result of a stabilized death rate coincident with an increased birth rate. The projected population growth will be realized only if the carrying capacity of the breeding and/or wintering grounds does not become a limiting factor. However, further analysis of the data subjects that density-dependent regulatory mechanisms resulting from habitat limitation already may be operative in the population.

In Figure 5, the subadult and adult population (N) in year t is plotted against the difference between N_{t+1} and N_t. A high population in any one year is usually followed by a population decrease the following year and conversely a low population is usually followed by an increase. The data analysis reflects a high negative correlation, and suggests density-dependent regulation of the population ($P < 0.005$). This may account for the low survival of the less competitive cygnets whose mortality appears to vary as a function of the size of the subadult and adult component, which tends to regulate between 70 and 80 birds (Figure 3).

With the population growth experience in recent years, pairs of swans have pioneered new lakes on the breeding ground and have reproduced successfully. This implies that population growth may be limited by an interrelation of factors associated with the wintering area and/or the northward migration because survival on the southward migration is high. Studies currently being conducted on the wintering ground may elucidate to what extent this is occurring.

Habitat limitations on the wintering area have major implications for any future Alberta transplant program involving subadult or adult swans from Grande Prairie. It is expected that these birds if transplanted would return to the traditional wintering area. Therefore, any increase in a transplanted flock would likely exert deterimental effects on the Grande Prairie population.

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Moderator: James King, U. S. Fish and Wildlife Service, Juneau, Alaska

Panel Members: Michael Smith, Alaska Department of Natural Resources, Anchorage, Alaska
Bruce Turner, Canadian Wildlife Service, Edmonton, Alberta
Jim Bartonek, U. S. Fish and Wildlife Service, Portland, Oregon
Dan Timm, Alaska Department of Fish and Game, Anchorage, Alaska
Pete Shepherd, Alaska Department of Fish and Game, McGrath, Alaska

KING: We have a very distinguished group here today on this panel. I'm impressed. Some of them you've already met, and maybe some not. I'm sure the out-of-towners have noticed that a good many of the local people are watching with a great deal of interest the election results that have been appearing in the paper and on the news. . . . You've probably gathered also that we tend to be fans of the Hammond Administration, and one of the reasons for that is that Hammond has brought people like Mike Smith into the State government, and we feel we wouldn't have that sort of people with a change of administration. Mike, of course, is a wildlife biologist, and worked for the Game Department, and as you heard this morning, has got some really imaginative things going in the State Division of Lands. So, we're glad to have Mike here. Bruce Turner has also been a very effective participant in this meeting, and is an acknowledged authority, and has done a great deal of detailed work with the Trumpeters in the mid-continent in Alberta. On my left is Jim Bartonek. Most of you know him. He's got a long association with Alaska, but we lost him, at least in part, to the rest of the Pacific Flyway last year. He's now the Pacific Flyway Representative, stationed in Portland, Oregon. He is a very accomplished field biologist, and just recently got into a political job. Is that the right term?

BARTONEK: Sounds fine. I hope the pay's commensurate.

KING: And Dan represents the waterfowl interests of the State of Alaska in a very capable fashion -- Dan Timm next to Jim -- and as you heard this morning, has a very strong and effective interest in the non-game species, which is most encouraging. And Pete Shepherd, whom you also heard this morning, has had a long association with Trumpeter Swans. He's sort of an expert in bush Alaska, and Fish and Game uses him for all their thorniest problems in the rural areas because the going never gets too rough out in the hinterlands for Pete to make the scene. He's an expert on furbearers and big game, as well as waterfowl. So, we have a lot of people here that are directly associated with the management in Alaska, and a good spread of talent. With that I'd like to -- let's see, would you like to lead off with a few words, Mike? We'll work down and everybody have a little time.

SMITH: Say, Jim, I think I'll take the opportunity to ask that you might either start with Bruce or start at the other end because, as I mentioned this morning, it was only when I appeared here that I realized I might be asked to speak on the panel. So, I think I can pick up fairly quickly, but I'd just as soon not lead off.

KING: Pete, do you want to lead off? Or shall we start in the middle?

SMITH: Sorry, Pete.

SHEPHERD: I'd like to beg off too here for a minute because . . . .

KING: Dan has broad shoulders.

TIMM: I'm not sure we can divorce Trumpeter Swan management from providing habitat for Trumpeter Swans, but I'll try. It's the area of involvement that the Alaska Department of Fish and Game would be in as pertains to Trumpeter Swan management. I'll outline these things, and maybe a few things we've done in the past. I'm sure you'll ask questions about the things we haven't done, but the Department certainly acknowledges that it's in the best interest of State, Federal government, Natives, and citizens at large, that the Trumpeter Swan should remain in secure status, and certainly not become threatened or endangered. Such a status has all sorts of unpleasant ramifications connected with it. The Department of Fish and Game's statutory authorities are primarily limited to the animals themselves. I'll read you our authorities granted by the Constitution. We have the authority to "manage, maintain, improve and extend the fish, game and aquatic plant resources of the State in the interests of the economy and general well being of the State." And further laws have pretty well limited our authority with some exceptions, as I said, to the animals; for example, setting hunting seasons. The Department of Natural Resources has the primary land management authority in Alaska. There are a few exceptions. We have direct management authority on refuges, critical habitats, and anadromous fish streams. And the Commissioner of Fish and Game can also enter into cooperative agreements with other State and Federal agencies. We get a hand in land management in that fashion, except it's other people's land.

As per Federal law, it is illegal in Alaska to shoot swans -- any species of swans -- but illegal take does occur. I'm generally aware of maybe a half a dozen cases made each year on swans being shot during the general waterfowl season -- people mistaking them for Snow Geese. I'm sure the actual incidences are many times that. But of course, judging from the results of swan surveys by Jim King -- both for Trumpeters and Whistlers -- the Trumpeter population certainly isn't being limited by the illegal kill. As for the Whistling Swan population, I'm not sure of the precision of Jim's breeding pairs surveys, but the population appears to be static, perhaps carrying capacity. The only place I'm aware of in the State that we have purposely tried to eliminate the take of swans as mistaken birds, is in the Juneau area where we closed the season on the Snow Geese. There can't be any mistakes for swans or geese because it's illegal to shoot Snow Geese there now. That action, I might add, was taken at the prompting of perhaps the most avid waterfowl hunter in the Juneau area. But as Sig described, read the paper from Walt Pedersen earlier today -- it frequently takes immense prodding to get government to do anything. We recognized that problem down there [Moose River] a long time -- just kind of ignored it -- until members of the public really forced us to get off dead center, which we did. Fish and Game's involvement in population surveys has been limited to,

of course, this little thing that I did with the cabins, and we as part of the cooperative agreement with the Forest Service on the Copper River Delta, we flew three surveys -- 1968, 1972 and 1974 -- spring surveys. And of course, the other management activities involved in issuing of permits for taking of adults or eggs of primarily Whistlers, but we get requests for Trumpeters also. Of course, this is part of the dual authority with the Fish and Wildlife Service.

Perhaps one thing that I might suggest . . . I wonder if we should be setting a desirable population objective for Trumpeter Swans either for the State of Alaska or for individual populations; because as disturbance increases and encroachment on Trumpeter habitat increases, we're more and more going to have to be deciding how firm a stand we should take on this particular area or this group of lakes, or whatever. If people want to go in, if Division of Lands wants to sell land for cabin sites, wants to put a road through, or whatever, we can say, "No, can't do that; Trumpeter Swans are there." Well, how many Trumpeter Swans do you want? What effect is it going to have? What's your goal? We've got maybe 4500 now. Are 9000 better? How about 15,000, or would we be just as happy with perhaps 3000? I don't know. I don't like to do that myself (set objectives). I don't like to put population objectives particularly on, even on goose populations. But there's a practical need for that, and it's becoming more and more evident. Just exactly what do we want to accomplish? I just throw that out as a suggestion, perhaps. Population levels, I think, could well come -- desirable levels could well come from The Trumpeter Swan Society.

KING: Thanks, Oan. I'm sure that's an important consideration. My first thought was, we don't have control of the Trumpeter. It's setting its own population at the moment. If we let it drop back to 3000, could we hold it there? Jim, would you like to give us a few comments from the Federal side?

BARTONEK: Policy towards management of Trumpeter Swans must ultimately reflect the wishes of the public. George Brakhage presented earlier in this conference the Fish and Wildlife Service's management policy on Trumpeter Swans which is rather passive when compared to that effort for the endangered Aleutian Canada Goose. The comparatively passive efforts towards Trumpeter Swans is understandable because the population is stable and because heretofore there has not been a great concern by the public as to how the Service is or is not managing the species. New information about this species could change current policies and practices. New information could come from the states which are likely to initiate many non-game wildlife activities should Congress provide the necessary assistance in funding. The Trumpeter Swan Society could, if it chooses, provide the impetus and suggest new directions in policies and the management and research efforts of those Federal and state agencies having responsibility for managing swans and their habitats.

I suspect that there is no person in this room who believes that Trumpeter Swans should not be maintained at least at their present status, and most here would like to see them increase in numbers and have a wider distribution. However, the desire to have these swans increase and spread is not universally shared by the public. Some wildlife administrators and biologists are apprehensive over the expansion in range of any rare or scarce species because of the potential problems associated with managing, especially hunting, other species. While previous speakers have suggested the desirability of classifying Trumpeters as endangered or threatened, I do not believe that such designation is warranted. Nothing, however, would preclude states from giving these birds such special protection. If the Society believes this protection is necessary, they should educate the public and then petition the states and even the Federal governments (including Canada) for protective classification.

It is apparent to me that what is needed by everyone is a management plan for Trumpeter Swans. Such a plan would lay out for all to see where we are headed and how we are proposing to proceed. The plan should detail goals, short- and long-term objectives, identify the procedures and schedule for achieving them, assign responsibilities, and provide for periodic review of progress. Most of the concerns expressed by various speakers at this conference would likely be addressed, i.e., the desirability of expanding the range of Trumpeters, preserving critical habitat, and collecting certain kinds of information, and priorities and responsibilities would be assigned. A management plan would provide for all the guidelines we should follow and we could be reminded to follow should we not meet our obligations. Certainly, The Trumpeter Swan Society could play an important role in influencing the nature of a management plan.

KING: Thank you, Jim. Bruce, could you give us a few words from the Canadian Wildlife Service point of view?

TURNER: Well, I'm certainly in no position to talk about policy, but I can say rather unequivocally that Canadian Wildlife Service has no jurisdiction over the habitat base in the Grande Prairie area. It's strictly a provincial concern and a private concern. Much of the land is privately owned. There is one lake that is designated as a Federal sanctuary, but jurisdiction over the area is weak because it's privately owned, and the fate of that piece of property is solely up to the discretion of the landowner.

I agree with Ron [Mackay] that the population is dangerously low, and probably should be identified as an endangered population on the basis of the figures which I showed you this morning. The breeding populations fluctuate between two and 25, which in my opinion, is dangerously low. I think that the potential for the population to expand in that area is good, but at the same time, the habitat which is currently occupied is very critical.

The point which Jim [King] brought home this morning about a management committee, to me, has tremendous merit, not only for the Pacific population, but also for the Interior population. The Interior population, is considerably lower. There seems to be more government bodies involved in the Tri-state area. And the same would apply for the breeding area in Canada in terms of Canadian Wildlife Service, the Alberta Fish and Wildlife Division, Alberta Environment, and the Peace River Regional Planning Commission. So, there is tremendous merit in that, and I just hope that this area can be pursued, maybe at a later point during the meeting, about a management committee or sub-committee established for the two populations. The point I mentioned concerning Canadian Wildlife Service, Alberta Fish and Wildlife Division, Alberta Environment, and Peace River Regional Planning Commission -- there's a definite need for increased liaison, particularly with Alberta Environment and the Peace River Regional Planning Commission. I've been working fairly closely with the provincial authorities and we're taking steps in that direction.

As I indicated yesterday, most of the swans breed on privately owned land, although there is a sizable amount of breeding habitat occurring on land which is still subject to disposition of the Public Lands Act. All of the lakes which occur on these areas currently have a 500-yard buffer zone which precludes any road construction, drilling operations, or seismic

operations of the oil industry. So, I think that is a very positive step for the area. In terms of the population itself, and my personal objectives with the population, I plan to continue aerial surveys to monitor the status of the population, and how the encroachment of agriculture is affecting the distribution of the birds. That will be comprised of a July survey and a September survey. The current collaring program which we have will be terminated at the end of this graduate program.

KING: Thank you, Bruce. Mike, I apologize for not filling you in a little better, but one of the major concerns that's come up over and over again here is habitat welfare. Nobody is better prepared to speak on that subject, I'm sure than yourself.

SMITH: Thank you, that was a perfect lead in. I might say before I get into my comments any further, when I first began working with the Department of Fish and Game, I was in the Habitat Section. In fact, I took Pete Shepherd's position when Pete decided Anchorage was a little bit too big and moved out into the bush. I very early on became hopelessly addicted to the need for habitat protection with respect to all wildlife species. My reason for leaving Fish and Game and going to the position of Director of Division of Lands was simply because I felt I could do more for wildlife by being in that position, which pretty much determines what happens to State lands, than I could ever have been based in the Fish and Game Department. It's on that basis of somebody now, who after 3-1/2 years can talk about what's happened with respect to land use and how that affects habitat, that I hope to make these following comments.

Dan's [Timm] question before -- what's the maximum population level for Trumpeter Swans -- is really interesting because I think I can use that as an example of the type of real world political questions and decisions that have to be answered on a day-to-day, or at least month-to-month basis within the Division of Lands, and how I think it ultimately affects wildlife populations. Any land manager, particularly a land manager in a position that people in the Division of Lands finds themselves in now -- that is, under what appears to be fairly intense public pressure for major land disposal, and yet a national constituency talking about protecting land -- has got a very fine line to walk. And these are two strong constituencies, each of which must be answered. In order to answer those questions, decisions have to be made, at times, within some very tight time frames. And if I can say one thing, I think particularly to wildlife biologists, and I feel like I can be somewhat critical, having been raised and teethed as a wildlife biologist, there are times when decisions have to be made that none of us like to make, and as professionals we're asked for answers upon which major decisions are going to be made, and you feel like you just can't make them. Nobody in Wildlife Biology 101 ever said that somebody's going to call you on the phone and say by the close of business today I've got to know what's the most important 10,000 acres of swan habitat in the Yukon-Kuskokwim Delta area or the Upper Tanana, or something like that, because I've got to make a decision which may affect it. Hence, the response that occasionally comes in, which is frustrating, is, "My God, how can I say what that is?" I guess my suggestion is, you do the best you can, because like it or not, that decision's going to be made at 4:30 that day. This type of situation can be somewhat ameliorated. I think we've gone a long way toward ameliorating it now in our planning process by making sure that the people that are concerned with this, i.e., representatives from the Department of Fish and Game, are aware of the time frame of what's happening in land use decisions in the future, whether it's a month, 6 months, a year, 3 years, and can begin to move research to the extent that they can manage decisions to aid and abet that type of decision.

I know that when the Native Claims Settlement Act was first passed in the early 1970's, when I was still with the Department [of Fish and Game] and it was obvious that large areas were going to be put into some of the d-2 withdrawals, that people who were concerned with hunting really decided that we needed to get some more information on these areas. Suddenly the goat populations and sheep populations that were going to be censused for the first time in areas that were not going to be affected by this legislation were just dropped, and we started going into areas where we were going to be asked these questions. A lot of information has come out in the last 6 or 7 years that we never would have had had we kept going in the way we were going. Therefore, I think it's very important that agencies or organizations, such as The Trumpeter Swan Society, that are concerned about the species and the integral relationship it has with its habitat, find out what's happening with respect to the ultimate future of that habitat. Is there a program underway that's ultimately going to result in that land being in private ownership? It's often shortened in cities, I should say. It's a little bit each year. But patterns develop. And if that's the case, and you've got important habitat in the way of civilization as it's marching out, or whatever happens, you've really got to be out there early to protect those interests, because as I say, the real world is that these things are going to happen. When it comes right down to the question of somebody that's got a 2-million-dollar project and somebody that can stand up and say, "Gee, there's a couple of Trumpeter Swans in this area," I know where my sympathies lie, but I know very often that the real world political decisions are that the swans just aren't going to win. So, when an agency like the Division of Lands looks at an area like the lower Copper River, the Cordova area, and there are some determinations to be made about lands that will be made available for public use, private ownership, other areas that will be used on a more multiple-use/sustained-yield basis where we may have to have timbering or may have to have mining, that's the time when people have really got to get out there very quickly and establish, and be ready to draw a line on the map, and say, "Yes, if we could have this, we're ready to live with this," and then defend it in the future. And if that means you're going to say you're only going to have a population of 1400 in that area, or whatever, then that's what you go for. You did the best you can and you make that determination. But, if the response is, "Well, gee, we just don't know; we won't know for another 10 years," 10 years later that decision is going to be made.

I am optimistic in Alaska, however, with respect to the outcome in land use planning, because we're lucky in that when we have these face-offs, they're usually not an absolute "yes" or "no" with respect to one particular thing. It isn't always the question of a highway versus, say, Trumpeter habitat. Usually now, as we're hitting these areas, doing these studies, land has not been committed. There is a considerable amount of land out there. The Delta study I mentioned earlier this morning is an example. We have a bison herd up there, and most of the range for that bison herd has been recommended through that study, with great local support, that it be put aside as some type of refuge. That's because there was still ample land to be made available for people, for residences, for recreation, for timber harvesting or mine development. These trade-offs can be made now. It's not a question of, "Well, gee, if we protect habitat here, we're never going to have any mining, because there's other areas to timber and mine over here." And as the people make the decision now, there's deference here to some recreation or preservation of habitat and over here to development concepts. But these are ingrained in that area, and before the real conflicts come up, it's going to be 15, 20, or 30 years, and the people are going to have learned to live with that. They're going to have been raised in this area and they're going to respect those bison, and they're not going to want anybody messing around with that. So, I think we've got a real good chance to do it. But I say again, you've got to realize that you have to be ready to stand up when the question is asked, to say what your druthers are, because that's what will be plugged in to the decision-making process.

KING: Thank you, Mike. Pete?

SHEPHERD: Let's carry on a little on this habitat protection which I feel is one of the most critical issues in the Interior. The State does have a vehicle for selection of critical habitat areas. In the Interior there are several that are concentrated areas of Trumpeter Swan use, which incidentally are very important moose and furbearer habitat in our own State lands. I think the possibility of selecting some of these areas may be a great future. Another thing that I'm sure everybody is aware of is, Interior Alaska has always been under, every summer, a lot of wildfires. Wildfire, while not always destructive to habitat, can cause temporary problems. Now, last year I ran into a problem -- and the State has been working very closely with BLM on wildfire, either suppression or letting fires go -- on the north fork of the Kuskokwim we had two Trumpeter Swan nests in an area of very intense wildfire. Also, this area is a highly important furbearer area. Conferring with BLM, an agreement was made to put the fire out with everything they had, and fortunately they were able to stop this fire before it destroyed the nests and the young -- well, the eggs weren't hatched in the Trumpeter nests in this area. This is not to say that a fire wouldn't be beneficial to the area, but at the time it would not be beneficial to the Trumpeter, because the fire was so hot it was burning the marsh grasses in the entire swamp area. So, I say that the agreements with other agencies, such as fire suppression agreements with the BLM, would be necessary and continue to protect and maintain Trumpeter habitat.

Another point is the possibility of farming along some of the river flood plains, which of course falls into the category of land planning. Many of the oxbows and river scours do develop into top quality Trumpeter habitat in the Interior. This would have to be taken into consideration when selecting lands for farming. Timber cutting is a possibility on some of the major river systems, such as the Kuskokwim River, and most of that timber at present is owned by the native corporations. This would require some agreements with corporations and joint management agreements with the other agencies, as we have heard today that there has been made just recently, to see that nesting areas were left with at least a little of the original habitat surrounding them. I think it all boils down to the fact that it's not only a State responsibility, but it's a responsibility of many agencies to get together and protect some of this habitat.

KING: I'm glad you brought up the critical habitat.

SHEPHERD: For instance, I can mention . . . there is a vast area across from Fairbanks which we categorize as Sub-unit 20A, which at one time supported a moose population, probably close to 10,000 moose, here in Alaska. In 10 years, this population has decreased considerably due to many factors. On the same area, there is a large number of nesting Trumpeters and subadult Trumpeters. It is also a very important fur area, and most of it's in State land or in military lands. This is one of the possibilities I was mentioning as an [critical] area -- it's actual use would be for the resources that are there now. The Kantishna River drainage is another area that has some State land, which is a concentration area of Trumpeters, and part of the Minto Lake Flats, which is State land, has nesting Trumpeters on it. This area has a possibility maybe in the future of being selected as some sort of State management area.

KING: The critical habitat designation has to go through the legislature, is that right?

SHEPHERD: That's correct, and I think maybe Mike can explain it further.

KING: I think that would be nice if we could hear a little bit more about that.

SMITH: The State's classification system, until about 6 weeks from now, has not and will not have any classification set aside specifically for wildlife. With 6 weeks, we hope to finally adopt regulations which will take care of that. It's one of those things I felt very strongly about when I took this position. What we envision doing as we go through our planning classification process, is taking those areas that are important for wildlife habitat purposes and classifying them for retention in State ownership, with wildlife habitat protection or wildlife resource use, being the dominant use, you might say. And other uses which are not incompatible with that being permitted as the need arises. Those areas which are really critical, and we're not talking about areas like the size of Unit 20A, which is 100,000 acres, actually probably more than a million, but rather areas that are very critical, say winter moose browse, what have you, or something like Trumpeter habitat, and having those be proposed to the legislature for legislative protection. That's the ultimate. An administrator can't get in the way of that type of thing. But, politically you've got to limit those to those that are really important, because if you don't, if you try to just legislate every little bit of land use, you're not going to get there. People are just going to get tired of seeing that. This leads to a point that I meant to mention before, and didn't, and it's in line with my suggestion earlier that you've got to be ready to stand up and say what our interests are if you try to identify particular areas.

One of the most important things that a resource specialist can know is the relative value of a particular area with respect to all other areas within his province, state, whatever, as far as his resource is concerned. For instance, I can't find in this State a 10,000-acre area, which if I said I wanted to open it for mining, or wanted to make a park out of it, or something, I can't find two resource experts who are going to fight each other because there's some mineral potential there, but there's also some habitat there, and you can always find this type of argument. And after about a year of trying to mediate between these two, it just became an impossible situation. And so what we did, and the way our system is set up now, and it has worked beautifully, is to say to the miner or say to the timber man, "Look, of all the lands in the State, where is that 10,000 acres to support [you]? Is this your most important 10,000? Is it your last 10,000? Where is it?" You force them to prioritize before you have to answer these questions, and after that, it's usually a very simple question. Somebody comes in and they want to open an area up for mining or stripping of coal, or something, and they find out that on a percentile basis it ranks somewhere in the 70th percentile for good coal lands in the State. And the biologist is sitting across the table and says that's in our top 10 percent of waterfowl habitat. You know who's going to win the argument. The waterfowl guy's going to win the argument. He's going to lose some areas which are down low on his priority list to coal or some other resource, but he's going to win the big ones and the important ones. It's happened time after time after time. Now, Pete mentions this point about 20A, which I find interesting, about it should perhaps be used for the benefit of the resources that are there now, wildlife resources, and yet we're under tremendous pressure and are looking right now at massive disposals of land for agricultural purposes in those areas. Good agricultural lands are often synonymous with other types of good habitat. But, in the area east of Rex and Nenana, going into the Wood River areas, we're looking at disposals for basically the field season of 1980, and this is where the input from the Department of Fish and Game is going to be very important. How important is that area in the whole Tanana Valley to moose, to furbearers, to those swans? And if it's high enough up on those priority lists, as compared to other places, there's going to be a much stronger argument for those key

areas not being disposed of. And, depending on where the agricultural people put their priorities, that's going to make the decision easier or harder. I can't say where it's going to come. But, that's the importance of being able to say how that compares to every other area you've got, because if you try to argue on a case-by-case basis you can always find something valuable.

KING: I fly transects across all that area you were just mentioning -- the Wood River, and then on west of the Nenana River to the Kantishna. It always looked to me like if I was going to plow something up, I would want to go west of the Nenana rather than east, because it's much better drained land.

SMITH: It may well be. I'm not that familiar with the sample soils assessment.

KING: The Ag people aren't looking at that?

SMITH: Well, they are. I'm just not familiar with it. We have that information. In fact, the Soils and Conservation Survey is out this summer doing some soil analysis in more detail in some of these areas that we're taking a look at.

KING: Well, I think we'd like to have some participation from the audience now. Before lunch, Bob Richey brought something up, and I wonder, Bob, would you like to start off.

RICHEY: Just in passing I did mention some area with Jim. Both Jim and I have gone on some of these Trumpeter Swan surveys, and I think there have been several comments here on the necessity of public input, I'm sorry that Walt [Pedersen] isn't here to sit in on the panel, because I think his input probably would concern the public input, and how important that input is to the management concerns we may have on some of these lands. I do have a couple of comments in this regard. I know that on the refuge [Kenai National Moose Range] we might be involving under the Alaska Native Claims Settlement Act, we might have up to 160,000 or 170,000 acres that might be "lost" to all the management control that we presently enjoy on that area. What I'm saying is that some of the surface as well as subsurface area will be definitely lost. A village now is still in litigation and it may take up to three additional townships from the refuge. But we're also under the Cook Inlet land exchange or swap -- might be involving another 70,000 acres of subsurface. That means that if the Natives wish to go in and work some of this subsurface area, we're going to be in conflict with these surface waters with up to 12 or more Trumpeter Swan nesting sites. This is something that maybe the general public needs to know, and groups such as The Trumpeter Swan Society, and their input's going to be very important on what we do or what we don't do in some of those areas. But, what I discussed with Jim was the importance, as I mentioned yesterday, of the west side of Cook Inlet and that Trumpeter Swan area over there which seems to have in square miles, at least, vastly more birds nesting and more production than on the Kenai. I'm talking about this 360 square miles, rather than 10,000 perhaps, and wondering what can be done. This is on State land, and it's an area that Mike related to, not that particular area, but areas like it throughout the State that might be flagged as to their importance to habitat and the species. I'm thinking directly across from Kenai there, whether or not that could be considered critical habitat, as perhaps you have a critical habitat area designated off Kachemak Bay. I believe that's critical habitat . . . .

KING: Got any response to that?

TIMM: Kind of an extension of what Mike was talking about just recently. This past week, I spent about half a day going through inch-to-the-mile maps, and as Mike was saying, I'm delineating critical swan areas on State lands, in this case, which we're requesting DNR [Alaska Department of Natural Resources] not to sell or dispose of -- put in private hands. I was doing it along with the sheep people, moose people, caribou, etc., and I'd just got done writing this paper on cabins, and, gee, here's a chance to put some of that information into play. I sat down and circled a fair number of these larger lakes that don't have cabins on them right now, thinking that I circled probably twice as many as need be and thinking that the number will get cut by half or two-thirds. Perhaps if the State doesn't dispose of these areas, why there will be a fair number of these larger lakes left over there without cabins put around them. I thought about that area, too, as a potential for critical habitat, but it's such a large area. More important areas we've gotten refuge classification, except for Redoubt Bay, and that's important for swans; there were 141 swans on that area in 1975. It's been proposed for refuge and the legislature turned it down the last 2 years.

SMITH: Jim, I'd just like to say something. Bob, was it the Redoubt Bay area you were talking about, basically?

RICHEY: No, I don't believe so. That's over in the Kustatan area, Mike, between McArthur River and Kustatan River . . . . is that Redoubt?

SMITH: Yes, that's the one. For those of you who aren't familiar, starting about 5 or 6 years ago, Fish and Game began requesting the legislature produce refuges, starting northeast of Anchorage, and basically going right around the Cook Inlet and headed down the coast. They started with the Palmer Hay Flats, and they went to Goose Bay. They've got the large one, the lower Susitna River Wildlife Management Refuge. They've got the one just south of the McQuawk [sic] Indian Reservation -- what's that, Trading Bay? The Trading Bay Refuge, and the only other major one now is Redoubt. I am cautiously optimistic that that will become a refuge within the next 1 or 2 years. One of the reasons it has not moved is that the Kenai Borough, which is the municipality, nice local government control mainly on the Kenai, which boundaries extend across, is opposing any type of permanent withdrawal right now, until their land entitlement issue is settled. We've been working very hard on that the last 2 years, and I'm very happy to say, the legislature this year passed the legislation which established their entitlement, which was the first big question. And now we're in the process, in fact we're just talking to the Borough here this morning, of trying to identify which lands they will get. And once they know that they're going to get their entitlement, then I think that they will probably support that proposal. That will be a big political obstacle out of the way. They have no reason particularly to want to own it. It's not good land as far as they're concerned, but it's just that they're holding all their options open getting every lever they can. But that's why I say, whether you like it or not, if you're interested in wildlife in this State, you're interested in politics. I don't mean the dirty, seedy side. I mean that there are legitimate constituencies out there that are concerned about some things, and wildlife is intimately woven with it, and you've got to realize this and be ready to work. That may mean that some habitat on the Kenai Peninsula which is good, which is not as important as the Trumpeter stuff, may have to go to the Kenai Borough for some ultimate other use to save that Trumpeter habitat across the way. And this is what I said. You've got to realize. You've got to take your priorities, go for the big ones. So, we may lose a little bit of winter moose browse along some of those rivers on the Kenai Peninsula that we would otherwise like to keep. But, we may also keep the whole west side, the Redoubt Bay area, in a range.

TIMM: We lost Redoubt this year, but we got the Copper River Delta-Orca Inlet-Controller Bay tidelands as critical habitat -- 460,000 acres.

SMITH: Right. That's true.

KING: Bill.

SLADEN: What you're saying about Susitna Flats and Kenai, we go back to thoughts of doing some research. I reckon that's the same habitat, in fact, probably the young birds from the Kenai go out to the Susitna Flats. We haven't really got positive evidence of this yet from our neck-banding program, which we've done for three or four seasons now in Kenai We need to know exactly how that whole population in that area works before we can make any very sensible recommendations.

Second point I wanted to ask Mike about was, when you talked about a State wildlife refuge, which you were I presume, does this mean that all these refuges allow 100 percent hunting only?

SMITH: I might just take a second to backtrack and correct something that Dan said earlier when he indicated that Fish and Game had management authority on refuges. They really don't. Maybe if they like to think so, that's good because everybody's happy. Refuges as created under Alaska statutes are still a responsibility of the Department of Natural Resources, Division of Lands and Management. However, our management flexibility is definitely restricted by the fact that the legislature said that the highest use of that area is for wildlife and related habitat. Therefore, once we have the oil and gas leases, as we have under most of these refuges, because often sedimentary basins that are good for waterfowl are good for oil and gas, we still have to allow a person to fulfill the terms of his lease. We issue the permit, we do the monitoring in the ground generally, but the environmental stipulations, protection stipulations, are generally put there by Fish and Game, and we're pretty much bound to stay with it, and we make every attempt to do just that.

Now, with respect to the hunting on these lands -- the hunting, the setting of bag limits, methods and means of take, are not at all the responsibility of the Department of Natural Resources. That is completely the Department of Fish and Game. So, on those lands, as on all other State lands, and all private lands, the Department of Fish and Game does have that responsibility and they handle that themselves. We do not.

SLADEN: But, when you're talking about a refuge in the east, and correct me if I'm wrong, a Federal refuge, a lot of the land is non-hunted. It's just entirely left to the animals.

SMITH: I'll pass off to more experts, but I know there was hunting on some of them.

SLADEN: It's a little different in Alaska, isn't it? I'm just trying to fit in some of the words that have been spoken about with swans breeding and successfully raising their families as a result of surveys from hunting. I just wanted to get that point clarified. Are there any refuges that can be put aside in Alaska that can be exclusively for protecting the birds without any hunting?

SMITH: There could be, but that would be a call of the Department of Fish and Game, or I should say the Fish and Game Board that actually sets the bag limits. But the Department would be pre-eminent in making that recommendation, so that Dan would be the person to respond to that.

. . . . . .

WILLUMSEN: For the geese, now take for instance in Regina, our area, Fred Barrett, about 25 years ago, he started to create a nesting area for the Canada Geese. There wasn't any at that time. He brought them in. Today, there's geese by the thousands. In my district, I started with one pair and we now have hundreds of them. And now, Ducks Unlimited is creating nesting areas and habitat for the Canada Geese, and we have geese in Alberta -- there is no end to them. Why can we not do the same thing with our swans? Why can we not create habitat for them and then distribute them throughout the area, because eventually the wild areas are going to be utilized? There won't be any wild areas. So, let's start and distribute them and create habitat for them in more or less similar areas. That would be my idea. I've been raising swans for years and you can raise them anywhere. Trumpeter Swans are the most gentle of all birds. Let's distribute them. Let's get them down to the prairie country. If we can raise the geese, why can't we do the same for the swan? And now with the Whooping Crane, with the transplants taking place now, it's quite a tremendous success, I think. We should do the same for the swan. We shouldn't rely on the north only.

KING: Who would like to respond to that, or would you like to direct your question to somebody specifically? Have we got a response from the panel?

TURNER: Well, I could respond to part of that question. With regard to habitat improvement, we've tried unsuccessfully in Grande Prairie with nesting stuctures. There were at least three lakes on which pairs occurred consistently. We didn't know what age these birds were, but superficially [the lakes] looked suitable for swans. There weren't muskrats around in the same numbers that occurred on the other areas, and we thought maybe there was a scarcity or lack of a suitable nesting site. So, we constructed some nesting platforms, but the swans did not respond to them at all. But there were problems involved in that, as well, with fluctuating water levels. Concerning your comment about establishing a population of swans in the prairie region, I think Grande Prairie could serve as a source flock for transplants, but the critical factor to be considered is where are the birds going to overwinter? I would certainly not be in favor of any transplant program which would result in the birds going to the traditional overwintering area, the Tri-state area, right now.

WILLUMSEN: When we had the meeting in Grande Prairie, you will remember, we were taken out to right in the middle of town and one pair of swans were nesting right in the middle of town. So that shows how docile they actually are.

TURNER: Yes, I'm sure they can be raised in captivity.

KING: I think that's a point that we really haven't considered greatly in Alaska, Lars, and maybe we're not ready for that yet here, or our perspective is a little different at the moment. But, it is certainly something that's going to have to be considered in the future, I'm sure. Thank you.

MARY LOU KING: I want to ask Mike Smith something, and give an example. For instance, in Juneau you could probably attend three meetings every night on something to do with our environment, and you don't know what's going on and you never know until it's too late, or almost never. For instance, Jack Hodges discovered that they built a candy-striped dock for tourist boats 5 feet from an active eagle tree. Well, they didn't even know about it, and that's his area of concern. And the same thing in relating it to swan habitat -- how are these people who are interested in Trumpeter Swan habitat going to know what the State Lands people are doing, like the Kenai Chamber of Commerce is holding up a refuge area, but the refuge manager didn't know that the Chamber of Commerce is holding it up. He didn't even know about it, because the swan people don't tend to be politically oriented, right?

SMITH: That's kind of the message I'm saying. You've gotta be. It's just a way of life, at least at this time in the State to understand what's going on. Let me ask you a question. Is that candy-striped dock -- is that that Westours dock?

MARY LOU KING: That's it.

SMITH: Is that right?

MARY LOU KING: There's an eagle tree right there!

SMITH: I could spend 10 minutes telling you the story of that Westours dock. Anyway, there is no way that anybody can see the whole big picture of what's going on. I supposedly sit somewhere up here and am able to watch them, and there's no way even I can do it. What happened on that situation is the request came in that the dock be put there. It was looked at by our people and thought to have enough merit to at least go out to start asking other people. So, the municipality was asked, the Juneau Borough was essentially asked as to what their opinion was. The Department of Fish and Game was asked what their opinion was. The Department of Environmental Conservation was asked what their opinion was. They were all given the opportunity to comment. When I signed that classification order, as I read every one of those things, I had down, "no adverse comments were received." And when the Department of Fish and Game in writing says to us that there are no wildlife concerns--at that point, I have nothing, I mean, unless I have some personal knowledge, which compared to obviously everything in the State is extremely limited, I have to say, "Okay." Now, where is the breakdown? I don't know. I would say that someone in the Department of Fish and Game darn well ought to have a map of where eagle trees are around Juneau, and when that kind of request comes in, should say, "Hey, wait a minute. This is right next to an eagle tree," an active one I would assume.

MARY LOU KING: Then you're saying Fish and Game should have a map showing where the critical Trumpeter habitat is.

SMITH: What I'm saying is . . . well, very much so. Right on. And we would expect when we write to South-central District, which is this whole south-central Alaska here south of the Alaska Range -- when we write to the Department of Fish and Game in Anchorage asking the Habitat Section for comments on a seismic operation that's going to be over there in, say, the proposed Redoubt refuge area, we will darn well expect the comment we're going to get back to them [the operating company], "Okay, if you've gotta move equipment through here, the area in the circle is where you keep equipment out." But if they [Fish and Game] come back in and say they have no problem with the plan of operation of the proposed company, there's not much we can do, but to just say, "Fine." They're the State's experts.

MARY LOU KING: Well, is there any way that, for instance, if the council were organized, or any other group having interest in other things, is there a way to get information from [Division of] Lands directly, or does it have to be like, do you have to be politically oriented to Fish and Game to get your information?

SMITH: That's a good point. There's two ways to do it. One is to try to insure that the agency, the professionals that are suppose to be aware of this, are in fact. The other way is to indicate to the Division that a group has particular concern. As far as I'm concerned, if the group were to tell me that they were very interested in any activities that occurred along the strip of water between downtown Juneau and Saint Terese, or out at Echo Cove, or wherever, and that any State classification actions or proposed disposals, that they would be notified, I will guarantee you that anything that comes out of our shop will automatically have that point on a mailing list, and you would be aware of what happens. We obviously can't notify everybody about every activity, but when somebody steps forward and requests that, very much so. I promise that we can do that.

MARY LOU KING: Thank you.

KING: Skip.

LADD: Mike, you bring up an interesting point on the fact that Fish and Game should have that information available and make it available to Lands before these decisions are made. We have a situation in Alaska, just like everywhere else, where you have kind of dual responsibilities between, say, Fish and Wildlife Service in the Federal government, and Fish and Game in the State government. And, as Mary Lou brought out, Fish and Wildlife Service has done one heck of a lot of work on eagle nest identification in southeast that is much more extensive than what Fish and Game has done. Had some of these decisions been brought to the attention of the Fish and Wildlife Service at the same time that it was brought to the attention of Fish and Game, I suspect that eagle nest would have been identified. So, how does the Division of Lands gain input, say, from Federal agencies, namely, Fish and Wildlife Service, on some of these decisions that may affect national species or migratory bird species that are a national responsibility?

SMITH: Again, it depends upon what kind of action occurs. But, basically on State lands, the State has its own counterparts to the Federal agencies, i.e., Fish and Game vis-a-vis Fish and Wildlife Service, and in that situation, we went to our people, and assuming that what Mary Lou said is correct, [they] did not know about it. I guess I fault three-quarters Fish and Game and maybe one-fourth Fish and Wildlife Service that if you've got all this information, how come your counterpart agency which is responsible ultimately for selecting more acres, and managing more acres than the entire refuge system in the United States, doesn't know where eagle trees are. So, I put a 25 percent there on Fish and Wildlife Service and the rest I would say Fish and Game should certainly not be doing that kind of thing without, in fact, I'm very surprised

that they do not have a map. In fact, I'm surprised that it actually isn't in the hands of our Southeastern District Office with those trees actually identified on it. I'm scribbling out a note right now to make sure to take care of that problem.

LADD: Then, what you're saying is that when some of these decisions are made, or when you look at these decisions, there is no mechanism for the State to provide the information to Federal agencies, is that correct?

SMITH: For the State to provide, do you mean when some action is going to happen? Yes. There's nothing right now, except a perceptive district manager would take care of that. He might make that contact and set up some type of liaison to do that. But there's no formal structure right now.

KING: Tom?

ROTHE: With my background as a biologist, it seems to me that one of the key problems we're facing here is habitat, as we've been discussing recently, but also parallel development of good basic research that's also worked into applied research, however you define those things. Listening to things, from learning about the prairie population and the Alaska population, to birds in the mountain states, what I'm wondering about, and I'm addressing this primarily to Jim Bartonek and Oan [Timm], is since we do have the benefit of so many swans here in Alaska, first of all, why haven't we perhaps invested a little more time in research on breeding biology, on breeding ecology, on dealing with nutritional problems, that are [being mentioned] in these meetings, and also, perhaps a little more emphasis on any related productivity? I would like to sort of get an answer from the Federal side and the State side. But, one thing also bothers me about the things Jim said, that perhaps there isn't a national urgency or public concern right now, but I'm wondering if it isn't an objective of the public not being aware of the status of the prairie population compared to the Alaskan population. And also, I was a bit disturbed by Fish and Wildlife Service taking the viewpoint of -- well, certainly we've been mandated to act on public concerns, but also it's rather disappointing that perhaps we haven't taken a stewardship role, looking down the line a little bit farther.

BARTONEK: I believe that you have answered some of the questions yourself. You are correct that the Service has not provided the wherewithal to obtain all the information that is needed to manage swans, and the same could be said of other species. Take the Yellow-billed Loon, for example. What better place than arctic Alaska to study the Yellow-billed Loon? Yet, there have been only token efforts towards studying the nesting ecology of this species and comparing its requirements with those of the other two species of coastal loons. There are about 375 species of birds that regularly inhabit Alaska and most have been similarly ignored. About 35 species of birds in Alaska are hunted and have been recipients of most State- and Federal-funded studies of wildlife. Of these 35 species, perhaps a half a dozen, maybe a dozen, have been studied sufficiently so that there is a good understanding of their habitat requirements and population status. Why have we studied some and not others? Well, because the public (often the hunting public) has demanded that we manage more closely those species that we have the greatest potential for mismanaging. I agree with you that we should be conducting more investigations on Trumpeter Swans and other species, but at the expense of which ongoing studies?

Program planning has provided direction to the Service to meet long-term objectives in management of migratory birds. However, some of our activities are poorly planned, addressing the "crisis of the moment" that is typical of government. The Service is attempting to weed out "hobby research" and certain management activities that contribute little to the overall migratory program and are often costly in money and manpower. Indeed, the Service should be (and I contend is) a steward of the wildlife resources. The Service has been responsive to the Endangered Species Act because the public, through Congress, demanded that society had better do something differently than was done in the past. The Service will be developing its non-game wildlife program to meet other public needs. The changes in how and what governmental agencies do is seldom made in a vacuum. What I am stressing is that The Trumpeter Swan Society can importantly influence public demands upon the Service if it feels that it is essential to the well-being of swans.

My answers to your questions are not wholly satisfying to me, but I can rationalize why the Service has not provided support for certain studies that are deemed important by certain groups but has supported others. Only 6 years ago, we knew infinitely less about approximately 52 species of marine birds in Alaska than we did about Trumpeter Swans. We have gained a better understanding of these birds than previously known because of the "shot in the arm" of government provided by public interest. Who knows where the next "shot" may be directed. Public pressure has recently made the Fish and Wildlife Service give greater attention to management of Sandhill Cranes. On the whole, I suspect that we know much more about Trumpeter Swans than we know about cranes even though the latter is more numerous and more widely distributed. The point I wish to make is that when you have only so much money to spend on wildlife investigations and habitat protection you are going to need a Solomon to divide it among the various needs. Without a Solomon, I would spend my money on certain species perceived to be threatened and about which we know less than we do about Trumpeter Swans.

Mike Smith was castigated because his staff in the DNR [Alaska Department of Natural Resources] did not know of an eagle nest in a particular area being considered for development. Each and every agency need not have the staff with this information, but the Fish and Wildlife Service could provide the DNR and others with that information on eagle nests throughout Southeast Alaska. The Service, however, could not provide that kind of information for south-central Alaska and the Aleutian Islands because comparable attention has not been given eagles in these regions. Is the Service at fault for placing emphasis on Southeast Alaska or should we have spread our energy more widely and superficially?

The questions you raised as to why the Service is not doing more for Trumpeter Swans cannot be answered to everyone's satisfaction.

ROTHE: As far as the Federal involvement goes, perhaps it's just something to throw out to the group that the Kenai Moose Range seems like an excellent place to do some intensive studies, and in fact benefit the prairie populations from what we learn, especially in the feeding ecology.

BARTONEK: Currently, both the Service and state wildlife management agencies generally rank Trumpeter Swans as being of relatively low priority when competing for funding of other wildlife projects. Periodic swan surveys, operation of swan refuges, and minor funding of research projects shows that swans are not being ignored or neglected. The Service is not likely to change what it is doing with swans unless somebody like your Society, a new President, or a new Secretary of the Interior points the new direction. Former Secretary C. B. Morton, who lived on Cheasepeake Bay and had a particular interest in swans, was undoubtedly responsible for the Service undertaking investigations on Whistling Swans in the area. If the Service increases its efforts on Trumpeters, it could be at the expense of some other effort, e.g., more swan studies on the Kenai National Moose Range could be at the expense of less garbage being picked up on the Range.

Most studies on waterfowl, including those on swans and those pioneered by Pete Shepherd in Alaska, are only reconnaissance studies. Just enough time was spent in the field, usually the 2 to 4 years necessary to meet M.S. or Ph.D. requirements, to take the cream off the top of the information on a particular species. Seldom are studies multidisciplinary so that all facets of the ecological requirements can be appreciated and of sufficient duration that the dynamics of populations of long-lived species, like swans, can be understood.

ROTHE: Dan, is that sort of what you're under too -- budgetary and priority restraints?

TIMM: Yes. I really feel that work Pete [Shepherd] did, Will Troyer, and Bob [Richey] is doing on the Kenai right now is -- the things they've found are really adequate for managing Trumpeter Swans in Alaska right now. I can see disturbance becoming more and more of a factor, and that aspect probably affects Trumpeter Swans. Could probably be touched on a little more, but in view of other demands for money tying things up here, it's now academic as far as I'm concerned. And it's doing well . . . .

KING: I think our time is about to run out, but I see some people that appear to have some real urgency to make a short contribution.

ST. ORES: Just a little bit about the philosophy of prioritizing wildlife habitat -- some of the dangers inherent therein. It has been my experience over the years that as soon as you draw your list from 1 to 100 in competition with development, you immediately lose the bottom 50 percent. After that's gone, you reprioritize the remaining 50 percent from 1 to 100, and as development for that budget continues, you lose 50 percent of that. Carried to extremes, you end up -- let's say if you're talking about wetland habitat -- with two wetlands left, and someone says, "Which one is most important?" Maybe this is the only way we can preserve habitat, Trumpeter Swan habitat, by prioritization. We ought to be looking for another way, other than that priority because it is a very dangerous thing to be using. Whether it be a gubernatorial order, all swan habitat is taken care of, or what. If you could get an agreement, or an understanding, or a promissory note, or contract that said once the first lower 50 percent was gone nothing else would be touched, that would be all right, but it doesn't work that way.

SMITH: Let me say, if you lose the first 50 percent and you totally reprioritize without having gotten anything for losing that, i.e., the lower 50 percent of the developer's list also was lost to him, then, one of two things is happening: either your input hasn't been very creditable, or the constituency that you represent is so powerless in the halls of the legislature that you're not going to win anyway.

ST. ORES: The only difference is, the developer has nothing to start with, where the Trumpeter Swan does. So, there is now a taking and a giving. There's always less and less to want more and more of. Do you get my point?

. . . . . .

KING: Ruth, you had a comment.

SHEA: We had the comment before about passive management. What I hear about management plans in Alaska is enlightening compared to what we have down in the Tri-state area. I'd like everybody in the Society to be aware, and I need to focus attention, that in terms of priorities, we only have one main wintering area, and we're not talking about planning for it. I get requests to the effect that, "We're planning to clearcut the Targhee National Forest, how many feet do swans need left around a lake?" We're to the point that maybe Alaska will get to in the future. The crunch is here, where division took place years ago when swans were not a major item of concern. The only areas under Federal protection are Red Rocks Refuge, which is stuck with a grain feeding operation, and Yellowstone Park, which is marginal. The main winter habitat has no management . . . . I've learned that the Fish and Game Department thought our Mute Swans were Whistling Swans. That really scared me. So, I just want to direct attention, in terms of management concerns, there is no management. The main wintering area right now is in an Idaho state park. They're hoping to manage it as a natural area, but they're not quite sure. The public doesn't know that yet. They don't know that they're not going to be allowed in there in wintertime. And we don't know what kind of political pressure will arise when they learn that. Can we stand up and say, "Yes, maintain this," or will it go under a wave of taxpayers' revolt if they won't pay for a state park that's dedicated to swans. There's just a lack of public education about the problems with management down in the wintering area. The Trumpeter Swan Society needs to get that information out, being so many agencies that own the land are not aware that that's even the only wintering area. They were surprised to learn that this summer. So, it's a long way to go, both in information and recommendations to them on what swans need management-wise.

BARTONEK: I would like to comment on that, Ruth. From the discussions I have heard today, there is a definite need for a management plan for the eastern population of Trumpeter Swans, as soon as possible. Because problems do not appear as great for the western populations there is not the similar urgency for such a plan. Region 6 of the Fish and Wildlife Service is unilaterally developing a Trumpeter Swan management plan. Development of such a plan is worthless unless all management agencies in both the U. S. and Canada are parties to it and agree to adhere to the prescribed guidelines. The Trumpeter Swan Society should make their input to any plan that is developed. Bob Croft of the Fish and Wildlife Service in Denver indicated that they would make the effort to develop a plan for the eastern population.

KING: I hate to cut this off, because I'm learning lots myself. I think it's a valuable discussion, but coffee is cooling off, and so, maybe if you clap loudly enough, the panel will make themselves available for some coffee break discussion.

* * * * *

Moderator: Dave Spencer, Arctic Environmental Information and Data Center, U. of Alaska, Anchorage, Alaska

Panel Members: Louis Jurs, Bureau of Land Management, Anchorage, Alaska
Sig Olson, U. S. Forest Service, Juneau, Alaska
Dick Hensel, National Park Service, Anchorage, Alaska
Carl Propes, Alaska Federation of Natives, Anchorage, Alaska
Ben Hilliker, Alyeska Pipeline Service Company, Anchorage, Alaska
Dan Timm, Alaska Department of Fish and Game, Anchorage, Alaska
Skip Ladd, U. S. Fish and Wildlife Service, Anchorage, Alaska

SPENCER: As we've gone through the previous panel discussion, it has become somewhat apparent that this discussion will be a continuation of generally what has gone before. It's pretty hard to talk about habitat needs without considering management also, and vice versa. The habitat for the Trumpeter Swan is highly specialized and occupies a very large area of the State, and cuts across many jurisdictions of land. In this panel, we will have representatives of many of the agencies that are directly concerned with the management of the habitat. Carl Propes will be representing the Alaska Federation of Natives, Sig Olson the U. S. Forest Service, Dick Hensel the National Park Service, Skip Ladd, the U. S. Fish and Wildlife Service, and Dan Timm, again, the Alaska Department of Fish and Game, Ben Hilliker, the Alyeska Pipeline, and Lou Jurs, the Bureau of Land Management.

I think we'll start off here with the major land managing agencies. We'll begin with the one that has a dual responsibility for migratory birds and land management - Skip Ladd, who is the Migratory Bird Coordinator for the U. S. Fish and Wildlife Service.

LADD: Thank you, Dave. I wasn't certain what to expect as part of this panel, so I did prepare a somewhat semi-formal presentation, and I will present most of that and hope you will bear with me.

[W. N. Ladd, Jr., USFWS, Anchorage, Alaska. Fish and Wildlife Service programs for Trumpeter Swans with special emphasis on habitat protection.]

The Fish and Wildlife Service is unique among Federal agencies with regard to Trumpeter Swans in that it is the agency responsible for carrying out the mandates of the various international migratory bird treaties with Great Britain (for Canada), Mexico, and Japan. These treaties demand the protection and maintenance of most migratory bird species, including Trumpeter Swans. But neither the treaties nor their implementing legislation provide all the tools necessary to assure adequate protection for the listed species - particularly in regard to protection of important habitats.

The recently ratified migratory bird treaty with the Soviet Union largely remedied the shortcomings of previous treaties by requiring the United States Government to take the maximum possible measures to protect habitats that are determined to be of "special importance" to those species listed in the treaty.

Unfortunately, the Trumpeter Swan is not listed among the species included in the Soviet treaty. This treaty does, however, contain a special provision whereby initially unlisted species can receive the same benefits of the treaty as do listed species if they belong to the same family as a listed species. This may ultimately allow the Trumpeter Swan and its habitat to enjoy the same degree of protection under the Soviet treaty as is afforded to listed species.

Before looking at our Alaskan programs, you should be aware of some of our national direction from which our programs here receive their impetus. The Service has identified five major goals under its Migratory Bird Program. Several of these seem to be especially applicable to Trumpeter Swans.

(1) The first goal of the Migratory Bird Program is to "Prevent any migratory bird species from becoming threatened." While the species that are approaching "threatened" status have not yet been defined, I suspect that the Trumpeter may be a good candidate for this "watch closely" category in view of its relatively low population numbers, high vulnerability, and its restricted range. Designation as "approaching threatened" will depend largely on the destructive pressures exerted upon its habitat, particularly here in Alaska.

In order to achieve this first Program goal two objectives have been established:

(a) Identify by 1982, and annually thereafter, those species that demonstrate unstable or decreasing population trends in any significant portion of their range; and

(b) Initiate plans by 1982 to restore species found to be in critical condition, with special consideration given to preservation of essential habitats and accommodation of species delisted from endangered or threatened status.

(2) A second Program goal is to preserve habitats that are needed to achieve population goals. Two objectives established to achieve this goal are of particular interest to Alaskan Trumpeters:

(a) Identify by 1979 important waterfowl habitats, in addition to those already planned for Service acquisition, that require protection against loss or degradation and by 1980 develop and implement strategies to preserve inadequately protected waterfowl habitats; and

(b) Identify and develop a priority listing of military, Indian reservation, Forest Service, and other Federal lands that have potentially high migratory bird values and by 1980 enter into or amend cooperative agreements with these agencies to adequately protect and manage important habitats.

ALASKA PROGRAMS

So much for national goals and objectives. Of greater interest to this conference are the Service's efforts in Alaska. Let's briefly review the management steps I think are necessary to achieve the ultimate goal of habitat and population maintenance and then relate these to our Trumpeter program in Alaska. The four steps are:

(1) Population enumeration and distribution;

(2) Habitat delineation;

(3) Habitat management and protection; and

(4) Cooperative management agreements.

Population Enumeration and Distribution

Until 1968, Trumpeter Swan studies and surveys in Alaska were very site-specific, primarily in the Copper River drainage and the Kenai National Moose Range (KNMR). Then in 1968, Fish and Wildlife Service biologist Jim King designed and initiated the first extensive survey to determine the population status of Trumpeter Swans throughout their suspected range in Alaska and to establish baseline information by which future population trends could be determined. The survey was repeated in 1975. The population at that time was estimated to be 4,170 birds, a 24 percent increase since the 1968 survey, or an annual increase of 3.1 percent. The Service intends to conduct the Trumpeter population survey at 5-year intervals with the next one scheduled for 1980. If land use changes accelerate the destruction of habitat or significantly increase the level of disturbance of nesting Trumpeters, it may be necessary to increase the frequency of the survey.

Population and production surveys are conducted annually on the only land presently owned by the Service that has a nesting Trumpeter population, KNMR.

As for population distribution, outside of the breeding areas, little was known prior to the early 1970's about the migration routes and wintering grounds of Alaska's breeding Trumpeters. Several hundred had been banded with the traditional metal leg bands, but these produced only a handful of recoveries. As discussed yesterday by Bill Sladen, in 1972, the Fish and Wildlife Service cooperated with Dr. Sladen and the State in a Trumpeter Swan neck-banding program. During the 1972-73 period, 78 Trumpeters were collared and 16 percent have been resighted on wintering grounds from Vancouver Island south to the mouth of the Columbia River, thus confirming that at least part of Alaska's Trumpeters winter as far south as southern Washington. So, in terms of habitat protection for Alaska's Trumpeters, we have to be concerned about land use changes and habitat losses within Alaska and along the Canadian Pacific Coast, in Puget Sound, and the Pacific coastal zone of Washington and, possibly, Oregon.

Habitat Delineation

Once the population has been surveyed and distribution determined, the next is delineation and evaluation of currently occupied habitat. Jim King has accomplished this in conjunction with his periodic population surveys and has located and mapped all known important Trumpeter Swan breeding habitat and determined the relative importance of each habitat unit throughout its Alaskan range.

In addition to the State-wide habitat delineation, the KNMR staff has also located, assessed, and mapped its important Trumpeter Swan habitat, as Bob Richey has already discussed.

Habitat Management and Protection

Once delineated, strategies to protect and manage habitat must be developed. At the present time, the Service controls only a small fraction of Alaska's Trumpeter breeding habitat (about 6%), which is on the KNMR. So, our opportunities for direct habitat management are very limited. In the case of the Kenai nesting area, management of people, rather than manipulation of habitat, seems to be the most important element for managing Trumpeters.

Protection of additional Trumpeter Swan habitat is a fertile field for the Fish and Wildlife Service as well as other Federal, State, and local agencies. As we have heard from several speakers, sweeping changes are now occurring and even greater changes will likely occur in Alaska's future land status and use. Some 105 million acres of Federal land are being transferred to State ownership and 44 million acres are being transferred to Alaskan Natives as a result of Statehood and the Alaska Native Claims Settlement Act (ANCSA). Anywhere from 30 million to 120 million acres of land may be transferred from the public domain to the Forest Service, National Park Service, and Fish and Wildlife Service, as conservation lands as a result of Alaska National Interest Lands legislation. Ironically, nearly 90 percent of Alaska's breeding Trumpeters occur in the four areas that either have the largest human populations, are the fastest growing, or have the highest recreation potential in Alaska. These are Fairbanks, Gulkana or Glennallen area, the Cook Inlet region, and the Gulf Coast-Copper Delta area.

When all the dust settles from the d-2 legislation, probably no more than 13 percent of Alaska's Trumpeter Swan breeding habitat will be under Federal control, with possibly 7 or 8 percent under Fish and Wildlife Service control. Those areas that may be under Service control are the Kenai Peninsula, and parts of Koyukuk and Nowitna River areas. At best these three areas support about 450 Trumpeter Swans, or about 10 percent of Alaska's population. The Copper River Delta area is under Forest Service control. But, that is in question now since it has been proposed for transfer to the Fish and Wildlife Service as a refuge under the House-passed H.R. 39.

We can accomplish habitat maintenance through a variety of methods, such as direct acquisition, conservation easements, cooperative agreements between agencies, land exchanges between agencies, land classification, such as Alaska's new classification of wildlife habitat, and replacement of lands removed from the National Wildlife Refuge System as provided for in ANCSA.

The Fish and Wildlife Service recognizes the need to identify migratory bird habitats that are not adequately protected and maintained and to develop a variety of approaches to insure they are perpetuated. To this end, we are in the process of developing what we call a Habitat Preservation Concept Plan for Alaskan migratory bird habitats. Trumpeter Swans will be one of the featured species in the plan. It will identify and describe important migratory bird habitat State-wide, show land status and pinpoint immediate and potential threats to each area, rank the areas by priority, assess various options for maintaining the habitat, and, finally, recommend one or more alternatives for each habitat unit. We feel this will be the first major step toward maintaining important Trumpeter Swan habitat that is not sufficiently protected as a result of d-2 legislation.

The Service, through contract with the Arctic Environmental Information and Data Center, delineated, evaluated, and mapped wildlife habitat State-wide several years ago. Habitat for all major wildlife groups, including Trumpeter Swans, was mapped and relative density and importance determined. This effort was essentially a synthesis and interpretation of all existing information on populations and their habitat throughout the State. The information was initially designed for use in selecting replacement lands for the acreage selected for transfer to Alaskan Natives from within existing refuges, but it should also be useful for developing future habitat maintenance programs throughout the State. I have here the swan habitat map prepared under the contract. It depicts high, medium, and low density swan habitat and pinpoints "key areas," such as that in the Copper River Delta.

Cooperative Management Agreements

The last item I will mention is cooperative management agreements, an example of which is our agreement with the U. S. Forest Service and State of Alaska for management of the Bering River-Controller Bay Trumpeter Swan Management Area within the Chugach National Forest and adjacent State lands. It is located just east of the Copper River Delta. While the management area is small, it supports some 6 percent of Alaska's Trumpeter Swan population. Under the agreement, the Fish and Wildlife Service is primarily responsible for:

(1) Enforcing migratory bird regulations and surveying populations;

(2) Conducting wildlife research in cooperation with the other parties;

(3) Assisting the Alaska Department of Fish and Game in its waterfowl management activities; and

(4) Providing technical assistance to the Forest Service for waterfowl habitat improvement.

In return for this assistance and that of the State, the Forest Service has agreed to recognize wildlife as the primary resource of the area in their multiple use management plan, to protect waterfowl and other wildlife breeding, nesting, and feeding habitat within this area, and to mitigate any damage to the habitat.

The Fish and Wildlife Service has a long way to go toward fulfilling its obligations under this recently signed agreement. We intend to work toward that end during the coming year. Also, we hope that the area might be expanded in the future to include additional prime Trumpeter Swan habitat in the Copper Delta-Bremner River area. We feel this cooperative agreement is a significant step in the right direction, however, and intend to pursue this type of management cooperation in other areas and with other agencies. It was gratifying to hear Mr. Shively of the AFN [Alaska Federation of Natives] indicate yesterday that at least NANA is interested in developing cooperative habitat agreements with the government agencies.

Wrap-Up

In closing, I would like to leave you with several thoughts. The Fish and Wildlife Service in Alaska has the unique responsibility, in cooperation with the State, for assuring that some 80 percent of the world's population of Trumpeter Swans is protected, managed, and maintained, preferably at their present or even higher levels. While the Trumpeter population in Alaska appears to have increased at an average annual rate of over 3 percent during the past 10 years, there are a number of factors that could reverse that trend overnight. Trumpeters have a low breeding potential and thus lack the resiliency of many other waterfowl species to adapt to or rebound from rapid land use changes, human disturbance, and serious man-caused or natural population losses. Resource development and recreation are being promoted forcefully in Alaska now, and these, with their resultant land use changes, may have devastating effects on Trumpeters. Look, for example, at the former range of this species in the lower 48 and compare it to the present range. I don't want to cry "wolf," friends, but Alaska seems to be facing the same situation that faced the midwestern states a hundred years ago when the drainage of potholes, cultivation of native prairie, strip mining, and general encroachment of man on the semi-pristine breeding habitat of the Trumpeter Swan began in earnest. If we in the Fish and Wildlife Service, the State, other Federal agencies, and the private sector are unsuccessful in our collective efforts to maintain a healthy, thriving Trumpeter Swan population in Alaska, we run the very real risk of this species being listed again as endangered or threatened. I mentioned at the beginning that our legal mandates for protection and management of migratory birds do not carry with them all the tools necessary to do the job. The Endangered Species Act does, however, contain some extremely potent tools to insure adequate protection. Tools for the most part, while essential, cause us all painful headaches, particularly for those Federal agencies whose activities or permit programs affect endangered species habitat and those private individuals who allegedly benefit from Federal development programs. Let's quickly look at some of the implications of listing under the Endangered Species Act.

First, the Secretary of Interior may, by regulation, treat any species as endangered or threatened if it closely resembles a listed species. For example, hunting of Snow Geese in areas where Trumpeters occur, such as southern Alaska and the Puget Sound area, would be a likely candidate for restriction if the Trumpeter was re-listed.

Second, Section 7 of the Act directs that all Federal agencies shall utilize their authorities in furtherance of the Act and shall insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of an endangered or threatened species or result in the destruction or modification of habitat determined to be critical. This is a real mouthful and anyone who has ever heard of the Tellico Dam and the snail darter knows the force behind Section 7 of the Endangered Species Act. Any Federally issued permit, for example, for wetland dredge and fill or road construction, would be subject to Section 7 consideration. Any project receiving Federal assistance, either financial or technical, would be subject to Section 7. Examples of these would be Federal aid wildlife or fish restoration projects proposed by the State, and Federally-funded assistance on Native and Indian lands. Oil and mineral exploration and development on Federal lands and

hydroelectric development requiring Federal Power Commission approval would all be subject to Section 7 scrutiny.

Airspace in the vicinity of Trumpeter breeding areas likely would be restricted, as is the case with Peregrine Falcon eyries on the North Slope. This would greatly restrict fly-in recreational activities in many areas of Alaska. All of the activities I've mentioned hit close to home for Alaskans. In addition to these, private propagation of Trumpeters would no doubt be more restricted than at present.

So, I close by issuing a charge to all Federal and State agencies, as well as to the private sector, that it should be our objective to cooperatively strive to maintain Alaska's Trumpeter Swan population and its essential habitat at a level that is healthy and viable and which has no chance of being re-listed as threatened or endangered ever again. In my opinion, habitat and habitat maintenance is the name of the game.

SPENCER: Fine, thank you, Skip. There are eight of us here, and the time is fairly short, so if we can be moderately brief so that the audience will have time for some questions, we can get through in time. The Bureau of Land Management, of course, has been in charge of a greater land area in Alaska, and although this is going to change in the near future, they'll probably still remain the dominant agency as far as management of Trumpeter Swan habitat. Lou Jurs will cover the management that will apply to the Trumpeter.

JURS: I will be brief, Dave. Another disclaimer -- I'm not a waterfowl biologist, I'm a Wildlife Program Leader for the State of Alaska for BLM. I am a biologist from Nevada by training, but I don't pretend to know anything about Trumpeter Swans other than they're sure pretty when I see them. However, that doesn't bring us to our habitat problem.

The largest block of existing BLM land right now that harbors Trumpeter Swans, and that we're likely to retain after the d-2 situation has cleared the air, is the area colored in dark green that is on the map over there around the Gulkana River area. There is quite a bit of habitat in that area and quite a few birds. At this particular time, here and elsewhere in Alaska, BLM is in the process of undertaking a land use planning effort in which wildlife habitat of all types -- not only for Trumpeter Swan, but for everything else you can think of -- habitat values of these particular species, are plugged into land management matrices and habitat values are considered in making land use decisions. At this particular time, the effort, which occurs in stages, is at the first stage, which is the regional planning effort. At this stage, which is at quite a large mapping scale, you don't really identify on-the-ground management problems, but you do identify those areas within a particular management unit. This particular area happens to be in our south-central unit that is worthy of more intensive management further down the road. Having just come from a planning meeting at the Anchorage District Office with the fellows that are working on this, I know that they have identified within this broad framework plan a habitat management plan for Trumpeter Swans in what we call the Denali area, which lies between the Glenn Highway and Denali, in this vicinity. There has not been an effort on the part of BLM to inventory and identify specific Trumpeter Swan habitat at this time. It has been as an adjunct to other efforts, but we haven't really had the chance, money, or manpower to go out and actually have this as a specific project.

Through the environmental assessment procedures, we're required to consider wildlife habitat values when assessing impacts from competing resource uses. I know of a couple of occasions in our Glennallen resource area where geophysical exploration, for example, for oil and gas, has been either postponed or moved to another area because of Trumpeter Swan nesting. Another problem with this particular area is that it's a very, very popular recreational hunting area. You fly over that country, and there's an awful lot of all-terrain vehicle tracks visible leading out through there. It's pretty popular for moose and caribou hunters. Moose and caribou season opens the latter part of August and there are still birds on the ponds at that time.

I guess about all I can impart any further is that BLM is involved minimally with Trumpeter Swan habitat at the present stage of funding, manpower, and planning. It's pretty peripheral. But as our land ownership patterns firm up and as we get further down the pipe on our specific management directions in land use management, it will get pulled down to tighter and tighter management proposals. I have to leave before the panel gets through with their complete discussion and if it's all right with Dave, maybe we can depart from the schedule to allow me to address any questions, and then you folks can go on.

SPENCER: Any questions for Lou? Yes?

BUCARIA: At one time or another your agency, our agency or service, many other agencies, are confronted with these concept and use patterns. How do you propose to approach resolving the problems relative to swans or some of the other species to get away from this 50 percent problem [see comments by St. Ores, Panel on Management Considerations]?

JURS: Well, it's kind of a standing joke in our agency, and I imagine in others, too. There's managers on one side and there's specialists on the other side. Specialists, of course, provide the technical information to the managers to enable them to make "a good resource management decision." What we attempt to do, of course, is provide information in such a way . . . that when the decisions come down on where they're going to allow roads to be built, or where they're going to build campgrounds, or what areas are going to be set aside for exploration of minerals, that the wildlife values get a fair shake. The real world being what it is, sometimes we do and sometimes we don't.

BUCARIA: Maybe I am premature on this one. Looking at the map scale there and realizing what we work with in terms of this map here and subsequent to the '64 earthquake, and realizing that we're trying to group our mapping capability in Chugach, this seems to be a very basic thing relative to identifying specifically, because if the managers don't have site-specific information relative to this kind of question, we've got a problem. What does the BLM have in mind relative to improving the quality of the documentation of data? Because if we're restricting -- if we are working with small scale maps -- it won't be able to provide the necessary information for decision making.

JURS: One of the things that probably should have been brought up while I was talking about this Denali area -- BLM is involved in a pilot program right now involving the use of remote sensing for, among other things, identifying various types of wildlife habitat based on topography and vegetation, mostly. This is one of three pilot projects, one of which is occurring here in Alaska on the Denali Highway; one's in Idaho in the great basin situation; and the other one in Arizona in the hot desert situation. This is the end of the second summer up there. We are in the process of trying to classify areas, types of habitat, in order to tell the computer what it's looking at. So, on a LANDSAT or a high altitude aerial photo, when it comes by, you ask the computer to tell you what type of habitat you are looking at, and it can tell you. And

one of the things that we are plugging in is trying to identify, number one, the parameters that indicate Trumpeter Swan nesting areas, as well as other habitat areas. We are pretty sure that this analysis via LANDSAT and high altitude color, infrared photography, can tell us pretty much what areas are Trumpeter Swan habitat, just by plugging in water depth, lake shore vegetation, and various things that swans require -- size of the lake, etc. So, when this comes out to be a final product, this will really help. At the present time, we're just doing like you are. A guy flies over an area and sees swans on a lake, he marks it on the map. If he sees young of the year, he marks that on there, too. This is just kind of a catch-as-catch-can situation.

SPENCER: Yes, Bill.

SLADEN: I have to ask a naive question -- I get confused enough in my own State of Maryland with all the Federal agencies. Does the BLM have a positive program with the State and U. S. Fish and Wildlife Service? Because you didn't mention it and Mike Smith didn't mention it this morning. BLM has never been mentioned, and your name was listed.

JURS: I'm sorry. We live with it every day and it just probably slipped my mind. Yes, we are not only required by regulation and policy, we also have Memoranda of Understanding and Cooperative Agreements both with the State and the Federal fish and wildlife management agencies, and specific instances with Forest Service and other agencies as well.

SLADEN: So you're working very close with the State and with . . . .

JURS: The field people, especially at ground level -- we work quite closely with each other. Thank you.

SPENCER: Any more questions? Now, we'll hear from Sig Olson with the U. S. Forest Service. Sig has been leading their wildlife program for many years. They're concerned with quite large areas of habitat here in Alaska, the two large national forests, which include both breeding habitat and wintering habitat for Trumpeter Swans. Sig.

OLSON: Thank you, Dave.

[S. T. Olson, USFS, Juneau, Alaska. Providing for Trumpeter Swan habitat on National Forest lands in Alaska.]

One of the most important resource values on Alaska's National Forests is the wildlife and its habitat. With the exception of a few species restricted to the far north and the arctic portions of Alaska, almost every species of wildlife native to Alaska is found on National Forest lands. We are fortunate, indeed, to count the Trumpeter Swan among these. Southeast Alaska hosts a few wintering groups at several locations such as the Sarkar and Sweetwater Lakes on Prince of Wales Island and Mitkof Island near Petersburg. Areas such as the lower Stikine River, Duncan Canal, and Rocky Pass are utilized during migration periods. A small number of breeding pairs utilizes the lakes and ponds of the Yakutat forelands. None of these areas in themselves is very extensive. They are, however, collectively very important because they represent a segment of that tenuous thread of distribution which ties the various populations together along the west coast of Alaska and British Columbia. The most important Trumpeter populations on National Forest lands occur, however, in the vast coastal delta marshlands of the Controller Bay-Copper River Delta area. Here, approximately 16 percent of all Alaska's Trumpeter Swans, or some 680 birds, summer. Of the total number of swans found along the coast of the Gulf of Alaska, about 79 percent occur on National Forest lands. It is very apparent, then, that the Forest Service has the important responsibility of ensuring the continued welfare of this outstanding species.

Although, at first glance, the occurrence of the swans themselves seems to be the salient feature, in reality it is their habitat that is of basic importance. How well or poorly their habitat is managed is key to the continued existence of Trumpeter Swans as a viable, thriving component of the wildlife spectrum of the western states, Canada, and Alaska.

The Forest Service is charged by Congress with the management of all the natural resources found on National Forest lands. Primary among these values is wildlife habitat. Our stated objective is as follows: "to maintain and develop suitable habitat for wildlife and fish by coordination with the management of other National Forest resources, and directly by specific improvement projects. Threatened, endangered, and sensitive species will receive highest priority." To obtain this objective, the following selected policy statements illustrate the intent of the Forest Service:

1. Determine, after full consideration with the states, the location and extent of developments of habitats needed for fish and wildlife species.

2. Develop and maintain wildlife and fish habitat through (1) coordination with all other uses of the land or water; (2) mitigation of significant damage, no matter how caused; (3) prevention and abatement of pollution; and (4) direct cultural practices.

3. Maintain wildlife and fish populations in balance with habitat capacity to preclude habitat and other resource damage.

4. Carry out direct wildlife and fish habitat improvement measures in such a manner as to preserve or enhance the esthetics and quality of the environment. . . .

5. Full consideration will be given to the management and habitat needs of small game and non-game wildlife species. Ecological niches for all species present or potential to a given area will be maintained unless some overriding conditions dictate otherwise.

The care and feeding of Trumpeter Swans, however, involves much more than stated objectives and a set of policy statements. Although the Forest Service has the responsibility for managing wildlife habitat, we do not have the authority to manage the swans themselves. This falls under the jurisdiction of the Fish and Wildlife Service. In addition, this responsibility is shared with the Alaska Department of Fish and Game, who are also concerned with the management of waterfowl populations within the State.

Thus far I have referred only to management of the Trumpeters and their habitat. Management programs are only as good as the knowledge used to carry them out, thus the need for an information base is of vital importance. This needs constant updating in order to accommodate changing conditions and situations which face any resource manager. The need, then, for a research effort is most apparent to provide not only basic data but a continuum of new information.

At this point, the question must be evident: "What, then, is the Forest Service actually doing to put all the fine sounding phraseology to work toward the business of providing for Trumpeter Swans?"

First, a bit of history is in order to provide a little perspective relative to Trumpeter Swans and Smokey Bear! Prior to 1970, the extent of our knowledge was that Trumpeters were pretty rare -- we had some in Alaska and were lucky to have a few birds wintering in southeast Alaska. It was always a treat to see a small flock of swans in Blind Slough near Petersburg or Sweetwater Lakes on Prince of Wales. We knew there were some swans on the Copper River Delta, and nearby areas, but nobody really knew how many or where they were. Consequently, a swan sighting was an important event. Nevertheless, there was a growing feeling that something positive should be done to assure their future. Each passing year Forest Service personnel turned up more evidence that the Copper River Delta was perhaps one of the more important waterfowl areas in Alaska and that Trumpeter Swans occurred there in significant numbers compared to elsewhere. This was bolstered by the observations of people like Mel Monson of the Fish and Wildlife Service, who discovered Trumpeters on the lower Bremner River, Jim King and Hank Hansen of the Fish and Wildlife Service, and Pete Shepherd of the Alaska Department of Fish and Game, who did some of the early swan surveys and studies on the lower Copper River.

It was becoming obvious that the Forest Service had inherited some significant responsibilities and that unless it did something tangible, an important segment of the small population of swans, at this point believed to be endangered, could at some point in the future be in jeopardy.

This little vignette thus brings us back to the question: "What exactly is the Forest Service actually doing for the management and conservation of the Trumpeter Swan on National Forest lands in Alaska to date, and, perhaps more importantly, what will happen in the future?

As mentioned earlier, the occurrence of Trumpeters on Alaska's National Forests has always merited special attention. In areas of high use and relatively high numbers some significant actions have been undertaken. In southeast Alaska on the Tongass National Forest, where swans occur in limited areas and small numbers, management opportunities are also limited.

On the Chugach National Forest, where significant breeding populations occur, it is a different story. The Copper River Delta Game Management Area was designated to protect the only known breeding grounds of the Dusky Canada Goose and the existence of one of the largest known concentrations of breeding Trumpeter Swans in North America. This 330,000-acre special management area was created in 1962 when the Forest Service, the Alaska Department of Fish and Game, and the Alaska Department of Natural Resources signed a cooperative agreement which recognized wildlife as the primary resource. No other land uses would be permitted which would jeopardize or damage in any way the primary wildlife resource values. Any resource uses permitted would be coordinated in such a way that the habitat, particularly waterfowl habitat, would be protected or improved. To this day, this has been the guiding principle in the management of this area. As stated earlier, a good data base is necessary to assure accomplishment of a proper job of management. Accordingly, the Forest Service has fostered a variety of studies, surveys, and research projects by various agencies and universities over the years. Not all of these have been aimed primarily at the Trumpeter Swan. Many featured other waterfowl species, such as the Dusky Canada Goose. Most of them, however, are concerned with the ecology of the area and, in particular, the effects of the 1964 earthquake which has had dramatic ecological consequences on habitat. All these studies directly or indirectly provide knowledge which will assist the resource managers of the various agencies to do their job.

At the present time, John Thilenius of the Forest Service's Pacific Northwest Forest and Range Experiment Station is initiating a comprehensive research program on the Delta which will provide insight into the basic understanding of the structure and function of the ecosystems of the Copper River wetlands. Basic knowledge of what the wetlands are like, what they produce, and how they function will be a primary objective. Understanding these wildlife-environmental relationships and processes will provide the basis for evaluating unplanned events, both natural and man-caused. It will also help determine the necessity and/or feasibility of habitat manipulation and the evaluation of the effects or benefits that may result. The results of this effort will be combined with complementary research, surveys, and studies by the Alaska Department of Fish and Game, the Fish and Wildlife Service, and others on wildlife species and their habitat.

Wetlands biologists on the Chugach National Forest, in cooperation with the Fish and Wildlife Service and the State, are obtaining annual spring population (breeding pair) counts and production surveys on National Forest areas to assess the status of the swan populations. This information will be used in deciding on possible boundary changes in management plans. Detailed contour maps are being developed to better understand the effects of natural and man-caused events on the Copper Delta and Bering River areas.

In the mid 1960's, Jim King became convinced there were more swans in Alaska perhaps than previously believed based on reports from various observers as well as his own wide experience. In 1968, he conducted an extensive survey which revealed the existence of significant numbers of Trumpeter Swans along the coast of the Gulf of Alaska. It became apparent with the increasing resource development activity along the coast that important Trumpeter Swan habitat would be threatened. Accordingly, the Forest Service, the Alaska Department of Natural Resources, Alaska Department of Fish and Game, and the Fish and Wildlife Service established the 168,000-acre Bering River-Controller Bay Trumpeter Swan Management Area in 1978 under the terms of yet another cooperative agreement very similar to the earlier Copper Delta agreement. The primary emphasis, however, is on the Trumpeter Swans and their habitat. A comprehensive plan will be developed to provide the basic research, surveys and studies, and management framework of wildlife sharing the same habitats.

Thus far, I have described what is being done on special management areas. Trumpeter Swans, however, occur elsewhere on National Forest lands in smaller numbers, in sometimes very localized situations. What of these?

Under the present method of land use planning on National Forests in the Alaska Region, the land areas are divided into resource units based generally on ecological similarities and drainage characteristics. Prior to conducting any land uses in an area, the resource values are identified. Interdisciplinary teams then determine the possible impacts or effects of proposed land uses on the various resource values. Recommendations are then made to assure that adverse effects are prevented or minimized to the extent feasible. In some cases, there are recommendations precluding any development activity in

certain areas. Thus, even those small scattered groups of Trumpeter Swans mentioned earlier are the subject of special coordinating measures which assure their continued welfare. The areas utilized by swans are identified and measures specified to protect their habitat and control disturbance when necessary. These situations are handled on a case by case basis and few problems have developed. An example of protective measures employed is the relocation of a road to minimize disturbance.

The Stikine Wildlife Management Area, a 17,000-acre unit, located on the mainland on the Stikine River Delta, provides nesting and feeding habitat for migrating waterfowl each spring and fall. This area is supplemented by the Rocky Pass and Duncan Canal areas on Kupreanof and Juiu Islands. While these are not designated management areas such as the Copper Delta and Stikine, their extremely high wildlife values are recognized.

Summary

National Forest lands in Alaska provide important breeding, nesting, feeding, and wintering habitat extending from Southeast Alaska through the coastal wetlands of the Gulf of Alaska.

Forest Service management objectives provide for the protection and maintenance of wildlife habitat. Policy dictates that habitats will be identified, protected, and maintained through coordination with other uses.

In those areas, such as the Gulf coast, where 79 percent of the Trumpeter Swans are found on National Forest lands, special management areas have been established in cooperation with the State of Alaska and the Fish and Wildlife Service. Here, Trumpeter Swans and other waterfowl are the primary values recognized. Elsewhere in the Alaska Region where swans occur locally, special provisions are included in land management planning to provide for the protection necessary to assure that their continuing use of these lands is not impaired.

Further, management of swans and their habitat is done in cooperation with both State and Federal agencies. A strong Forest Service research program is being developed along with surveys and studies by other agencies to upgrade the data base vital to effective management.

It is my belief that the future of Trumpeter Swans on National Forest lands in Alaska is assured.

SPENCER: Thank you, Sig. We'll call next on Carl Propes. Carl is a land manager for the Chugach Native Association, and he'll be speaking for the Alaska Federation of Natives, I understand, which necessarily includes a very wide range of interests in the management plans.

PROPES: Thank you. I want to say first that I very much appreciate the opportunity to be here. I'm, as Dave mentioned, working primarily with Chugach Natives, which is one of Alaska's 12 regional profit corporations set up under the Settlement Act. However, I have also been selected by the Alaska Federation of Natives to be here today, because I think they recognize that it's the Chugach region in which such a large percentage of Alaska's Trumpeters occur down at the Controller Bay/Northern Gulf of Alaska area. And also because Chugach, in a lot of areas, has really been the front runner in at least conceptualizing how Trumpeters and other sensitive species and habitats will be managed once the lands are conveyed to the Native corporations in Alaska.

The first point I'd like to make is something that, I guess I should say, angered me a little bit. I haven't been here for much of your convention, but I've heard several people refer to lands being transferred out of Federal ownership and into private ownership here in Alaska, lands which are prime habitat for Trumpeters, as a loss of some kind. Or, at least I've gotten the feeling that the protection that they'll be afforded under private ownership will be somewhat less than under Federal ownership. Well, on the one hand, I don't want to at all degrade the efforts of the Fish and Wildlife Service and the Forest Service and others who are presently managing Trumpeter habitat. I think the Native corporations in Alaska at least deserve a chance as land managers of Trumpeters. It's sort of cliche-ish to say it, but of course the Natives have been managing Trumpeters for much longer than any agency now managing them in Alaska has, and they are on the up and up. And our people, at least, have never subsisted off of Trumpeter Swans. They've never hunted the Trumpeters purposely. From what I'm told, they're not very good eating, which I guess is really the reason why. And I don't know if any subsistence hunting of Trumpeters does occur elsewhere in Alaska. It doesn't that I'm familiar with.

I don't have much of a speech to give, except to really enlighten you to some of the facts that we're aware of when we face the future task of land management. Primarily, and I'd be kidding you if I did not tell you, the regional corporations especially will own lands and their resources as an economic asset. We hope to be able to list them on our balance sheet as valuable assets of the corporation, hopefully the most valuable -- and it's only the commodity resources of the land that will make them that valuable. So, it would be naive for me to say that we will manage all of the lands primarily for their noncommercial resource values. That's not true. I think most corporations in the State, once they receive their lands, will examine them for development possibilities, and I can tell you what the results are going to be. Probably 90 percent of the lands will not have commercial possibilities, certainly not at the present and certainly not for some time. So, then we get into some kind of other dominant land management regime. And in doing that, Chugach [Natives] certainly recognizes that we're not competent wildlife and waterfowl land managers. We don't have the experience, and as a profit corporation, we can't justify going out and hiring a team of biologists. However, since that is the dominant aspect of the land, we certainly will call on all the agencies that have been involved in that sort of management in the past. And in the few short years that we've existed, we've set a good record of this. I would echo what John Shively told you yesterday, that while we are not involved in cooperative management agreements as of yet, at least cooperative management agreements per se, we certainly will be in the future. It was the Native corporations, or at the urging of the Native corporations that the land bank concept was included in d-2 legislation now before Congress. And Chugach for one certainly intends to make use of that, affording the day-to-day management of its prime wildlife habitat to the Federal and State land management agencies that have the expertise in that field.

Getting down to the specific area of the Bering River/Controller Bay/Northern Gulf of Alaska habitat -- some of you may be familiar with it, but probably most of you aren't -- we ("we" meaning Chugach) now have a series of amendments before the U. S. Senate that would perpetuate a land trade between the Federal government, the Forest Service, and our corporation deeding over a maximum of some 56,000 acres of land in the Bering River coal field area to our corporation. That is primarily the reason why I am here before you today, because we have been warned that there could be opposition from waterfowl interests

and others to us receiving that land, and we don't feel that any opposition of that sort is called for. So, I'm kind of here to clear the air. There are two specific examples in Chugach's history that I can point to that indicate that we do know the difference between "good" and "poorly" in management. One of our village corporations had the opportunity to select lands in the Copper River Delta Game Management Area, up to 70,000 acres of land there. But that corporation, which exists in the community of Cordova, elected not to take any land because it recognized that that particular land could be managed better under public ownership. Secondly, in the amendments that I mentioned that are now before the United States Senate, we have offered to enter into cooperative planning for the lands that we would obtain under the amendments so that no development of coal fields or any other of the commercial resources of those areas could be undertaken until a plan is developed that's mutually acceptable to the Fish and Wildlife Service and the Forest Service, the State of Alaska, and ourselves. So, in our estimation that will protect the area very well. And even if we had the inclination to develop it in a manner that was not beneficial to the Trumpeters and other waterfowl species there, that we wouldn't be able to do anyway. That's all I have to say.

SPENCER: Thank you, Carl. Ben Hilliker, as many of you know, was in a major management role in the Department of Fish and Game for many years, and for the last 7 years or so has been with the Alyeska Pipeline Corporation. It's not very likely that there are many Trumpeter Swans right on the pipeline, but it has gone through a great deal of Trumpeter Swan habitat, and I imagine the consideration for its protection has occupied Ben's attention considerably. Ben.

HILLIKER: Thank you, Dave. Jim King may in fact be the leader or whatever of the Alaska Trumpeter Swans, but I can assure you he's also persuasion personified. Last Monday evening, I was enjoying myself at home and he suddenly reminded me after being Outside [out of the State] for a business trip and a few short days of vacation, that I was to serve on a panel, and with that in mind, I'm on the panel today. I didn't have the benefit perhaps of the forewarning that some of the others had, but Jim, I'll try to do my best for you and hope that what I have to say may be of benefit to the rest of you here in the audience.

As Dave has said, I've been with Alyeska for the last 7 years. I've been in the capacity as environmental coordinator, biological coordinator, what have you. Prior to that I was with the Alaska Department of Fish and Game, and in preparing over the last couple of days for this panel, I kept looking at the paper about habitat, providing for habitat, and it's been very difficult to try to extrapolate or to make something meaningful to you relative to Trumepter Swan habitats as associated specifically with my efforts the last 7 years with Alyeska Pipeline. But, be that as it may perhaps just some comments about Alyeska and what we were involved in, where we're going, what we plan to do -- maybe with your expertise, perhaps you can figure out exactly how our efforts will relate to Trumpeter Swan habitat.

Early on in any project, and primarily with our project, you're involved in these days and age with environmental problems, the National Environmental Policy Act -- and in this context, and as you know, there was developed a rather extensive environmental impact statement involved with the Alyeska group -- planning and design, mobilization of logistics, construction, etc., etc. I would like to comment that during the design review stage, when Alyeska was involved, after going through preliminary design and looking at a route across Alaska from Prudhoe Bay to Valdez, the planning and design was then subjected to what I would consider very intense government scrutiny, both on the State level and certainly the national level. At that time, many of the habitat considerations, as far as route selection and how we were going to go about things, gave us an input and the benefit of the agencies to review what we particularly had in mind.

To re-familiarize you, Prudhoe Bay was discovered (the oil field) in 1968, estimated reserves on hand or in the ground, about 9.6 billion barrels. There were several geological features that would be involved with the Trans-Alaska Pipeline route selection. Earlier and preceding that, if you'll recall, there was the Manhattan Tanker Project determining, attempting to determine, the feasibility of tankers using the Northwest Passage. That was dropped. Got back to the selection of a pipeline system across the State -- looking first of all for an ice-free port, recognizing you had point one picked with your oil field, the best route, the various routes that you could take to an ice-free port. Cook Inlet has had an oil development here since 1957. There's tanker traffic in and out of Cook Inlet, but in the wintertime, as we all know, there are considerable problems associated with tanker traffic in and out of there, dealing with pack ice and that sort of thing. Valdez was eventually picked as the most logical place. It has an excellent port. Therefore, we had a site on the North Slope, we had a site on the bottom, and in between we started with our route selection . . . talking about going through Anaktuvuk Pass as an alternate, coming through Dietrich as an alternate, but the one that was finally picked, the Yukon River crossing -- attempting to find the most optimum location on the River at which to cross. Certainly, the Yukon Flats and the waterfowl population -- the Rampart Study provided a lot of basic information as to what exists there. Downstream, in the area of Hess Creek, picked a particular location there. It passes then through the Alaska Range and the Chugach Mountains on into Valdez, Thompson Pass, obviously, right outside of Valdez. Following the Richardson Highway, which extends from Glennallen down to Valdez and subsequently on up to Fairbanks, gave us the logical points at which to pinpoint our pipeline route.

At this point in time, when we started talking specifically about a route, about a location, is when a lot of the input from the agencies came about -- as I mentioned before, State and Federal agencies, some type of input as to areas to look out for. I could mention a few of them. We were told specifically about the Peregrine Falcon areas at Franklin Bluffs, at Sagwon; the dall sheep lamb areas in and around the Brooks Range near Chandalar Shelf; more Peregrine nests down in the Delta area; the caribou migration routes up from the Porcupine Herd to the Arctic Herd; the Nelchina caribou herd, which our pipeline route definitely crossed. And, I shouldn't go on without mentioning the fisheries -- fish streams. Our pipeline route follows generally the flood plain of five major river systems in Alaska and also crosses, I think, about 400 streams of various sizes all along the route. After that input was received, we got some better ideas of one of the original routes we had selected. We were talking about going through Atigun Canyon. For biological reasons, the dall sheep and the lambing areas, we routed the line outside of the Canyon. There was the problem that you're aware of at this pump station location, Pump Station Two was subsequently moved to make sure there was no Peregrine involvement, and some other route evaluations [were considered] as far as proper alignment for the finished pipline. Again, at that time, a lot of the habitat considerations we received from the agencies.

The planning and design stage, further into that, another area for input from the agencies, we talked about one of the major problems associated with the line. We're talking about hot oil pipeline -- oil produced at Prudhoe Bay from about the 10,000-foot level coming out of the ground at about 180° to 190° F. Being produced through permafrost and during its transportation from Prudhoe Bay to Valdez, we're only going to lose 50° to 60°. So, we're talking about 110-degree oil at various locations along the line -- nearer to Pump Station One, of course, higher temperatures.

Draw yourself a line across Alaska, about the area of Glennallen, and you start getting permafrost. The permafrost, and the conditions associated with permafrost, led to the design and the eventual construction practice of elevating approximately half the line, the half of the line at interrupted areas across the State till we get about into the Nelchina Basin. From there on south, the line is pretty much buried below ground. The above ground pipeline [was placed] on vertical support members -- those of you old football players, it's a goal post, sort of an "H" design configuration with a Teflon shoe on the top. The pipe is put in a clamp that allows the pipe to slide back and forth on the horizontal support member. The line itself going across the landscape is laid out in a trapezoidal design which allows for heat extraction and expansion of the pipeline. In going through and getting the design ready, getting the pipeline route picked, a number of the animal considerations, the critical habitat, I think we had a panel on that earlier this morning, a lot of these things started coming out. Data were collected and analyzed and developed to make sure that the design and subsequent operation construction of the pipeline when we got done were going to take into account as many of those critical situations as at all possible.

I believe there was a mention made earlier about the sea bird efforts as part of the agreement and grant of right-of-way that Alyeska did receive from the Interior Department and from the State of Alaska. Part of the efforts, joint Fish and Wildlife, were additional studies. I believe some of those studies involved sea birds on the coast tanker routes from Valdez to the south 48 and beyond.

Certainly, the design review, planning, the logistics, the mobilization of the project, required a lot of time, a lot of effort. We were 5 years in the construction. For those of you who like figures, the latest figure projected is a cost of about 7.8 billion dollars, and of that 7.8-billion-dollar cost figure, it's estimated that about 10 percent has been involved in environmental parameters, answering environmental questions of one kind or another. So, roughly 780 million dollars of the 7.8 billion has been involved in environmental questions of one kind or another. Now, with the pipeline in operation, producing approximately the designed 1.2 million barrels of oil per day, certainly the habitat considerations have not gone away.

One of the things that I'm involved in now is [habitat] restoration -- putting the pipeline system to bed. What Alyeska requires across the State is roughly a 54-foot wide right-of-way. The construction of the pipeline with the camps, the airports, etc., involved about 50 or 60 square miles. The pipeline itself, including the terminal during final operations when the line is in its final operations mode, will require as I recall about 15 square miles.

One of the ongoing projects is oil-spill contingency planning. I have brought, if you are interested, a copy of the General Provisions of the Alyeska Oil Spill Plan. The Alyeska Oil Spill Plan considers three sections, Port Valdez, the pipeline, and the outer Prince William Sound area. These are the general provisions of those three sections. If you're interested, I would encourage you to come take a look at it. In addition, the pipeline section itself, inasmuch as there are 12 pump stations from Prudhoe Bay to Valdez, we broke down the area between the pump stations into section plans. The section plans specifically go back, absorb much of that data we received earlier on critical habitat areas, fish spawning locations, and with those data, we came through and put containment sites, potential places for oil to go. This was done on a foot-by-foot basis throughout the sections. With this plan, the person in the field, if he knows precisely where a pipeline break has occurred, could go to that location and with the book, or at least by having someone in a pump station, as an example, directing him from the book, he could say, "At that location you've got nine highway culverts that could be blocked; you've got a containment site on the Tequel River 4 miles to the south; you've got an additional containment site 4 miles further south than that; your cleanup operation involves the following things; and your critical environmental questions are as follows." And those are all detailed here in this plan.

I don't think I can say too much else. I would like to thank Jim [King] for the opportunity to be here. It's good to see many of the old faces that I worked with in the waterfowl program, and certainly I'm sure that what I've said has stimulated questions and I'll be more than happy to answer them if I can.

SPENCER: Fine. Thank you, Ben. We'll next hear from Dick Hensel. Dick's a biologist with the National Park Service. I do know that he hasn't been over there very long, but I can assure you he's been in Alaska quite a long time, and that he knows a great deal about the State and its habitat. Dick.

HENSEL: Thank you, Dave. That's true I haven't been with the Park Service all that long; it's a grand total of 4 weeks. I hardly qualify as an expert on Park Service planning or policy, but nonetheless I'm happy to be here. I'm filling in for Jim Larson who was called back to Washington, DC, recently.

My comments will be brief due to the fact that existing park lands in Alaska contain no swan populations. As a consequence, there is no management plan or policies per se covering the Trumpeter Swan. Given the passage of d-2 legislation, I'm sure this is going to change, because we anticipate acquiring lands that offer good Trumpeter habitat, in the McKinley area, specifically the north and south extensions, as well as the proposed Wrangell Park. I would certainly think that policies will evolve that will at least cover two aspects, one of which would be a very detailed gathering of population data on these areas, and secondly, a policy that would concern regulations governing recreational uses. This I think would be pretty much predicated on what the U. S. Fish and Wildlife Service has found on the Kenai National Moose Range where there has been some instances of conflict. I would think that the Park Service would take the stance that recreational activities would be prohibited on areas that are supporting nesting swans. I recall the question that Dan Timm posed earlier concerning the establishment of a population goal, and perhaps as a sequel I might pose this question. I would certainly think that somewhere along the line we need to address what the habitat can support. I think therein we would have the parameters by which we could certainly arrive at population goals or the desired population model. This is about all I have, Oave. Thank you.

SPENCER: Thanks, Dick. We started off with the agency that has a dual role in managing land and also in managing wildlife, and we'll finish up with another such agency, the Alaska Department of Fish and Game. They are vitally concerned with everything that all the other land management agencies do on their habitat, because that's the way they pursue their program. So we'll hear frm Dan Timm, now.

TIMM: Again, Dave, very brief -- said much of what I intended to say in the last session. The Department of Fish and Game mainly manages the animals, Department of Natural Resources primarily manages land, the exceptions are perhaps refuges, critical habitats. We've got about a million acres in critical habitat and refuge where Trumpeter Swans occur either in nesting or migration staging. In 1975, there were 83 Trumpeters on those areas. I mentioned the Redoubt Bay area across

from the Kenai as a possible refuge in the future, or at least we're trying to get it. There were 141 swans on that area in 1975. So, we're talking about something like 225 swans on areas, quote-unquote, "controlled by Fish and Game." We've said many times, 60 to 87 percent of the Trumpeter Swans are going to be on lands owned by the State after d-2 is resolved. I can assure you that Fish and Game will do what it can to insure that Trumpeter Swans get their fair due in the future.

I'm glad you waited till after 4:30. I can introduce this resolution as a member of the public rather than the department. I'm not even going to read it. I'll give it to Dave or Ray for consideration tomorrow, but basically it would be from the Society to both Fish and Game and the Department of Natural Resources recognizing many Trumpeters occur on State lands, are of national, international concern. Some of the things that I talked about on the disturbance and cabin situation are in there, and just asking the State to consider the Trumpeter Swan in making land-use decisions. Also, in the future, it might be desirable for the Society to comment on, for example, this Redoubt Bay Refuge Bill. Perhaps a resolution could go to the State Legislature, but I think when the time comes we'll have to judge the situation because right now the legislature is kind of paranoid about hampering from the Outside, so to speak. It might do more harm than good in some cases, but it is certainly a possibility for the future. That's about all.

SPENCER: Thank you, Dan. We have time for a few questions now. It's getting late in the afternoon. One thing does occur to me here in looking over this panel -- there is one land managing agency that isn't represented here and that is the military, which controls a good bit of land in Alaska. I think we have some military representatives here. I wonder if any one of them would care to comment on Trumpeter Swan habitat on military lands.

WEAVER: Excuse me, Dave. They are presenting a short paper tomorrow morning. That's not on the program. We're happy to have them.

. . . . . .

BURGESS: I don't know exactly how the proposal would concern us in itself, and whether this is good or bad for the Trumpeter Swans in that area [Copper River Delta - Chugach], but I do know that we're concerned with the disturbance that would be associated with both the access road to the fields and to whatever means you plan to obtain this land to get the coal out. And so I want to ask, are you people talking about ways and means of reducing the disturbance to all wildlife, perhaps, but particularly Trumpeter Swans, if this exchange comes about?

PROPES: I think our approach was this -- we recognized that within the legislative context, meaning that in order to put something together this year for the Congress, we certainly didn't have enough time to address all of the stipulations that will eventually have to be addressed, if you have a conflict between coal development and Trumpeter habitat. So, to deal with it simply, we set up this cooperative planning mechanism that prohibits us from any development, unless it's acceptable in every aspect to the Federal and State land managers that have a direct interest in this. So, for instance, as we go down the road, say 10 or 20 years, and we are actively getting into coal development at that time, then access and reclamation, water quality, and fences and powerlines, and what have you, will be specifically addressed, and the Federal and State land managers will have to be satisfied that we're doing it in the best possible way, and that there won't be any reduction of Trumpeter habitat or of population.

BURGESS: I think we're particularly concerned with your means of getting coal out. . . . going through an area that's a good Trumpeter Swan nesting area. My other question, I guess, this is to Dan [Timm]. We've got a lot of agencies involved both in the Delta cooperative unit and also in the swan cooperative unit, and I understand that probably your agency [ADFG] is the only one concerned with enforcement of regulations. The other agencies, as I see it, well, Fish and Wildlife Service of course in swans has important authority, but I expect that the main enforcement burden falls on your shoulders. Is this right? On your agency's shoulders? State Troopers or whatever.

TIMM: It's actually the Department of Public Safety, the wardens are divorced from Fish and Game.

BURGESS: So you have actually another agency involved in this.

TIMM: Yes, waterfowl regs . . . I know that Federal game agents get down there fairly often.

BURGESS: Do you feel at this time that the enforcement section is capable of protecting that area, protecting swans in that area? As of now? It's a pretty accessible area, actually.

TIMM: Yes, there's been a family . . . that I can think of right along the highway for years and years. But, they find swans dead, too, once in a while.

BURGESS: I'm not concerned so much with subsistence -- people living off of it -- so much as I am with pot shooting.

TIMM: Yes, I think the enforcement level was adequate to maintain a static population.

BURGESS: Would you like to have more?

BUCARIA: Unfortunately, I was not present during some of the panel presentations. I understand no one had brought up the topic of involvement of local people, and that topic had been covered relative to the effort on the Kenai to a degree. I think there's a lesson to be learned from this type of involvement, and one I think we're all aware of, and that is the grass roots movement will probably accomplish more in the long run -- both for individual goals and for national goals, perhaps. The question comes to mind just in my brief tenure on the Chugach Forest in the Copper River Delta -- one of the things we observed there, and I think these things stand out in this regard through some of the efforts that have been put forth by Federal agencies in terms of desecration of signs, in terms of shooting of eagles, and in terms of the occasional Trumpeters that are found by the wayside with bullet holes, etc. And these may be isolated cases, but tend to magnify and dramatize some of our problems. My concern is for the youth, having been a former teacher at the high school level -- concern for the youth in that they receive appreciation for the resources. At a conference like this we have no questions to grasping the needs for the various species and in the past we have learned from the mistakes, and problems have been resolved, somewhat resolved -- have been at least attacked towards their solution. But the question that I have is, have we other than our own individual agency efforts, have we really sparked a national movement to try and solve this problem which because of its social value in changing times, the lack of opportunities for getting out and tramping and appreciating and viewing some of

these things by a large part of our population, has the Society, have our agencies really addressed this question sufficiently? Maybe we could toss that around.

SPENCER: Anybody care to respond?

HILLIKER: Perhaps a comment or two . . . . I consider the environmental impact process, including the review, an opportune time, perhaps the epitome of an opportunity for public input. Certainly that's the way it turned out to be in the Trans-Alaska Pipeline process, not only here in Anchorage and in Alaska, but all over the United States . . . . So, there is at least reference to my project. Public input certainly was not overlooked. One other point -- I think the environmental impact statement process and the National Environmental Protection Act, epitomizes the fact that there is public concern about a variety of environmental problems.

BUCARIA: I recognize the value of the impact statement. I've written impact statements for the Federal Power Commission, for the Bureau of Land Management, Alaska OCS Office, probably will do some for the Forest Service. I contributed statements to the Bureau of Land Management in the Lower 48 and to agencies here in Alaska on numerous occasions. As a school teacher during 1969-1970, we were at the peak of the popular movement for bringing public awareness. I get the impression now that there's been a saturation, at least at some levels. At the level I'm speaking about, there are isolated young people who perhaps involve themselves and others, and people such as ourselves, but I'm talking about something that will build a little more personal concern. I'm talking about problems relating to teen-agers, perhaps up in Kotzebue, perhaps down in Cordova. I'm talking about something that will catch on and be a fabric, within the ingrained fabric of social structure. I'm a little concerned about what I see on the streets . . . .

OLSON: I would like to say something. I think what you're referring to, Garvin, is a conservation education effort that would supplement all the planning that we've been talking about, all the provision for habitat, etc. In speaking for the Forest Service, we do have an environmental education program. We have tried to extend this into the schools to foster this awareness that I think you're pleading for, searching for. How successful it's been, I can't really say. I don't think the Forest Service has been alone in this. I think all the agencies are striving for this goal. However, it may be that we are neglecting it. This may be something that has to be stepped up, given more consideration than we have in the past so that the thoughtless destruction of individual animals, birds, what have you, the littering of our countryside, etc., we can minimize this with better education. And maybe the Society here needs to think also in those terms as part of its program to further and reach its goals.

SPENCER: Any further questions? If there are none, why, we'll conclude this program and thank the participants very much.

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Saturday Morning - September 9

Chairman: Harold H. Burgess
U. S. Fish and Wildlife Service, N. Kansas City, Missouri

WINTER DISTRIBUTION, HABITAT, AND HABITS

DISTRIBUTION AND ABUNDANCE OF WINTERING TRUMPETER SWANS IN SOUTH-COASTAL ALASKA

M. E. "Pete" Isleib
Cordova, Alaska

Twenty years ago, Gabrielson and Lincoln (1959)[1] gave the then limited volume of data available on the breeding and wintering status of Trumpeter Swans in Alaska in their monumental ornithological work, The Birds of Alaska. These data principally included breeding Trumpeters in south-central Alaska (Cook Inlet - Copper River regions) and Gabrielson's observations of 300 and 350 wintering swans near Prince of Wales Island in southeastern Alaska in 1944 and 1945, respectively.

In February 1962, I observed seven Trumpeter Swans overwintering in the open fresh water habitat of the Kenai River at the outlet of Skilak Lake in the Kenai National Moose Range. Considering that The Birds of Alaska (Gabrielson and Lincoln 1959) was only 3 years off the press and the lack of any other published data on wintering swans, I thought my observation quite significant and a product of some quirk of nature to find Trumpeters lingering at this latitude. Subsequently, I became interested and involved in publishing the Status, Distribution, and Abundance of All Birds Occurring in the North Gulf Coast - Prince William Sound Region of South-coastal Alaska (Isleib and Kessel 1973).[2]

During the course of my field work and over the past 5 years, a much clearer picture of the wintering swan situation became apparent, than what I thought was some quirk of nature back in 1962.

I was asked to discuss the "Distribution and Abundance of Trumpeter Swans in South-coastal Alaska" for the Sixth Trumpeter Swan Society Conference. The paper is based on the observations of scores of outdoorsmen, both professional and casual. My best sources of information are pilots and trappers. In compiling this information, I have asked myself and others the big "W questions": who? what? where? why? how many? and, last but not least, which?

We know who and what - Trumpeter Swans and winter distribution. And besides giving some names and figures, the where and how many, I will try to give some insight into the why's and the which's.

The question, where?

Trumpeter Swans appear to try overwintering wherever suitable or marginally suitable habitat exists in southern Alaska. These habitats need not be natural. By this, I refer to habitats created by heated water outflows, hydroelectric sites, and salmonoid aquaculture hatcheries that as an aside create new open freshwater zones with emergent aquatic plants.

Trumpeters are known to winter as far west as the Bering Sea drainages of Bristol Bay. Yesterday, Pete Shepherd mentioned wintering Trumpeters in the Togiak Lake region. During some years, Trumpeter Swans overwinter on the Kenai National Moose Range. And, I have heard hearsay reports of other overwintering - or overwintering attempts - on the drainage systems on the western side of Cook Inlet.

I do not know if any Trumpeter Swans occur with Whistling Swans, that are now well known as wintering birds at a few locations on the Alaska Peninsula. But, I, for one, expect this as a future possibility.

Regularly reoccurring groups of overwintering birds appear (from west to east on the south coast) at Eyak Lake/River system near Cordova. West of Cordova (Cook Inlet region), successful Trumpeter overwintering does not occur every year. East of Cordova, several lake/river systems regularly host swans, notably the Martin, Bering, and Situck.

Swans are able to successfully utilize these lake/river systems because the lake waters cool slower than straight drainage systems and often remain unfrozen during periods of intense cold. In future censuses of overwintering swans, primary emphasis should be placed on these lake/river systems, especially those having lake outflows with known emergent vegetation and water depths of one meter or less.

How many?

This is a rough question to answer with the irregularities of the Alaskan winter. For example, the Eyak Lake/River system has fluctuated for the past 10 years from a low of eight Trumpeters to a high of 40. In 1971, the swans were forced to move to salt water because of complete ice cover for a 10-day period following an extended cold spell. What they did and what food resources were utilized, I do not know. Some of the birds made repeated forays during this period to their frozen usual feeding grounds, only to sit on the ice or perhaps fly by.

Other reported counts include up to 17 Trumpeter Swans on the Martin system, 20 on the Bering system, and 170(?) in the Yakutat Foreland and Situck area.

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[1]Gabrielson, Ira N., and Frederick C. Lincoln. 1959. The birds of Alaska. Stackpole Co., Harrisburg, PA, and Wildlife Mgmt. Inst., Washington, DC. 922 pp.

[2]Isleib, M. E., and B. Kessel. 1973. Status, distribution, and abundance of all birds occurring in the north Gulf Coast - Prince William Sound region of south-coastal Alaska. Univ. of Alaska Biol. Papers No. 14. iv + 149 pp.

Based on the sketchy data now available from mainly non-biological personnel (most sensible biologists are writing up the summer's field notes during these winter twilight days), and tempered with my limited knowledge of the individuals reporting and the locations in question, it appears that the Eyak Lake/River system near Cordova can be used as a model, or temperature gauge, and that that system represents 10 percent of the Trumpeter Swan population wintering in all of southern Alaska west of the southeastern panhandle. This, explained simply, means that we are dealing with 80 to 400 successful overwintering Trumpeters; 150 to 200 birds averaged over a 10-year period.

You might question this geographical area's ability to sustain higher wintering densities of Trumpeter Swans. I would guess that we already are near saturation for suitable habitat niches, unless someone can train the birds to prefer eelgrass, or additional habitat is developed as a byproduct of warm water outflows, as mentioned earlier.

As an aside, to those interested in other swans, Whistling Swans have attempted overwintering in the Eyak system 3 out of the past 10 years. This past season, five Whistlers (a pair with three cygnets) overwintered successfully along with 26 Trumpeters. Previously, there was one successful Whistler and one unsuccessful, the latter found dead of unknown causes.

Earlier in this discussion, I mentioned a "which" along with the other W's. By this I mean, which swans are wintering where?

Our one and only Bill Sladen has given us some answers, or at least something to chew on. Last summer (1977), he collared three of the Trumpeter Swan cygnets that were reared on a small lake adjacent to Eyak Lake, which lies less than one nautical mile from the Eyak wintering site. For the winter that followed, this family group moved over the intervening mile and lingered successfully, with the exception of one cygnet which swallowed a fishing lure.

Presumably the same pair of Trumpeters nested on this small lake this summer and reared seven young. It will be interesting to note if these nine birds "migrate" that one mile and are among the Eyak wintering Trumpeter Swans.

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THE WINTER HABITAT OF TRUMPETER SWANS IN THE VICINITY OF PETERSBURG, ALASKA

Jeffrey Hughes
U. S. Forest Service
Petersburg, Alaska

Blind Slough is an important wintering area for Trumpeter Swans in southeast Alaska. This area is within the Tongass National Forest and is administered by the U. S. Forest Service. There are approximately 300 acres of mixed-sedge flats which have historically served as winter habitat for 50 to 200 swans. Cultural developments and increasing numbers of people in Southeast seem to preclude the serendipitous swan management practices of the past.

A hydroelectric plant involving an aqueduct, powerhouse, and transmission lines is located adjacent to the Trumpeter Swans' wintering habitat. This facility generates 6 to 7 million kilowatt hours, or approximately 25 percent of the electrical power consumed by the city of Petersburg. This development was constructed in 1924 and refurbished and enlarged in 1956 and again in 1977 with apparently no impact to the swans.

A State-owned fish hatchery was completed along Blind Slough in 1971. Permanent living quarters for six to eight hatchery personnel and their families are maintained near the main facility. The number of wintering swans has apparently not declined since completion of this project.

The three developed recreation sites in the Blind Slough area receive approximately 8,900 recreational-visitor-days of use, according to Forest Service records. These leisure-time activities include camping, picnicking, swimming, fishing, hunting, and various winter sports activities.

Conflicts between recreationists and swans comprise the greatest threat to the species. Each autumn, an average of two swans are killed by thoughtless hunters. The State has responded positively to this problem by closing most of Blind Slough to waterfowl hunting this fall. A cooperative project of the Alaska Department of Fish and Game and the U. S. Forest Service to improve waterfowl identification and hunting ethics should also help alleviate this problem.

Innovative swan/people management strategies must be created employing increased knowledge of this species' winter habitat requirements for this area. Recreationists present the greatest challenges to swan management. Resource agencies need to progress beyond hunter education courses and attempts to develop a public awareness and appreciation of the Trumpeter Swan. The various State and Federal agencies involved in resources management acknowledge the Trumpeter Swans wintering in the Blind Slough area and accept responsibility for their welfare. There are no plans for developing additional or for enlarging existing cultural facilities at this site. We approach the future with confidence in our ability to resolve all multiple-use conflicts that may arise.

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WINTER DISTRIBUTION, MORTALITY FACTORS, AND HABITAT CONDITIONS OF THE TRUMPETER SWAN IN BRITISH COLUMBIA

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Delta, British Columbia

INTRODUCTION

The Trumpeter Swan (*Olor buccinator*) in British Columbia has been of interest to both professional and amateur ornithologists for many years. Since at least the early 1920's observations of numbers and distributions have been recorded, particularly of wintering birds, in various parts of the Province. Recent interest in the recovery of the Trumpeter Swan population has resulted in more intensive studies. An autopsy program was initiated in the late 1960's, and winter feeding ecology studies commenced in 1977.

As a result of this interest, a picture is emerging of the ecology of the Trumpeter Swan in B. C. We are beginning to understand what swan habitat requirements are and what factors may be affecting population size. The purpose of this paper is to present some of the results of research contributing to this picture. Known winter distributions and population size are presented, causes of mortality are discussed, and preliminary data on habitat conditions are reviewed.

The assistance of the British Columbia Provincial Museum and the British Columbia Fish and Wildlife Branch is greatly appreciated. Thanks also go to P. Sanders, who assisted with an earlier draft, and to the reviewers.

METHOOS

Distribution

Distributional data were obtained from the files of the Canadian Wildlife Service, the British Columbia Provincial Museum Sight Record card scheme, and the British Columbia Fish and Wildlife Branch. Estimates of population size in an area were based on averages of recent numbers. The dates of peak counts were considered when assessing population size. Peak counts made during migration periods were excluded.

Mortality Factors

Since 1966, the Canadian Wildlife Service has been submitting birds for autopsy to Dr. A. C. MacNeil, of Agriculture Canada, in Vancouver. To date, 82 Trumpeter Swans have been autopsied, 71 wild birds and 11 captive-raised swans. Analysis of autopsy reports for the wild birds produced four categories of causes of death: infections, parasitism, shootings, and accidents.

Habitat Conditions

While studying winter feeding ecology of Trumpeter Swans, I have been able to observe swan food habits and to assess the quality of some of their foods. Preliminary results are presented here for standing crop biomass, gross energy, crude protein, carbohydrate, and crude fiber level. Standard analytical procedures were followed in determining food quality, with analysis performed by technicians at the Canadian Wildlife Service, Simon Fraser University, and the University of British Columbia.

RESULTS

Distribution

An analysis of available records shows that there are several distinct areas in B. C. regularly used by wintering Trumpeter Swans. These include two inland areas:

- Prince George-Vanderhoof area in central B. C., and
- Lonesome Lake, in the Chilcotin district;

and four coastal areas:

- Queen Charlotte Islands,
- Mainland Inlets,
- Fraser Valley, and
- Vancouver Island.

A short description of each area is presented followed by a review of the winter population size.

Prince George-Vanderhoof

The Prince George-Vanderhoof region lies on the southern boundary of the boreal forest. It is an area of flat or gently rolling surfaces usually below 1,000 m. There are several large lakes in the area thought to be the remains of glacial lakes from the last ice age (Holland 1964). The mean January temperature is between -25° and -29° C and the annual snowfall is between 40 and 230 cm (Krajina 1965). Despite this harsh climate, parts of the larger lakes and fast rivers remain ice-free. It is these open areas that are used by wintering swans.

Recent records (British Columbia Provincial Museum Sight Records (BCPMSR)) indicate that 25 to 50 swans wintered in the Prince George-Vanderhoof area between 1976-77 and 1977-78. Earlier reports to the Canadian Wildlife Service (1969) mention "up to 200 swans wintering" in the area. Similar reports from the Provincial Fish and Wildlife Branch, also in 1969, show records of up to 300 swans in the area. It seems likely that the later observations are of migrating flocks. Though the Canadian Wildlife Service report does not indicate the month of that observation, the Fish and Wildlife Branch report was of a March observation, a probable time for migration.

Lonesome Lake Area

Lonesome Lake is the wintering location of a Trumpeter Swan flock that has gained international recognition. It is also perhaps the site of the single largest concentration of wintering swans in Canada.

Lonesome Lake lies in the Chilcotin district of B. C., a diverse area of several climates and forest types. The mean January temperatures in the Chilcotin are between 0° and -23° C, and the snowfall may be over 250 cm (Krajina 1965). Most of the small lakes freeze during the winter, but some of the faster stretches of river remain open.

It was one such stretch of fast water, on the Atnarko River, that originally attracted the Lonesome Lake swans to the area. However, a naturally occurring slide in the late 1920's reduced the river flow and eliminated the swans preferred habitat. Because the Trumpeter Swans were considered an endangered species at that time, a feeding program was initiated at Lonesome Lake.

With the advent of the feeding program, regular counts of the swans were also initiated. The peak numbers wintering there have shown a steady increase from 30 birds in 1931-32, to a peak of 512 in 1970-71. Since 1970-71, the numbers have declined somewhat, perhaps in association with a limitation in the feeding program (see Fig. 1).

Queen Charlotte Islands

In contrast to the inland areas, the winter climate of the Queen Charlotte Islands is warmer and wetter. The Islands are, however, very mountainous with little habitat suitable to wintering swans. Lakes of any size below freezing level are rare, and salt marsh development is confined to the lowlands in the north. Probably as a result of the limited extent of habitat, wintering swan numbers are also low. Data on the size of the population are sketchy, but it appears the flock consists of about 100 birds. From 1947 to 1959, counts made by the Canadian Wildlife Service wardens varied from seven to 26 birds (Ward, unpublished). An aerial survey by the Fish and Wildlife Branch in 1974-75 recorded 117 birds. In 1976-77, only 47 swans were seen, but poor flying conditions may have artifically depressed that count.

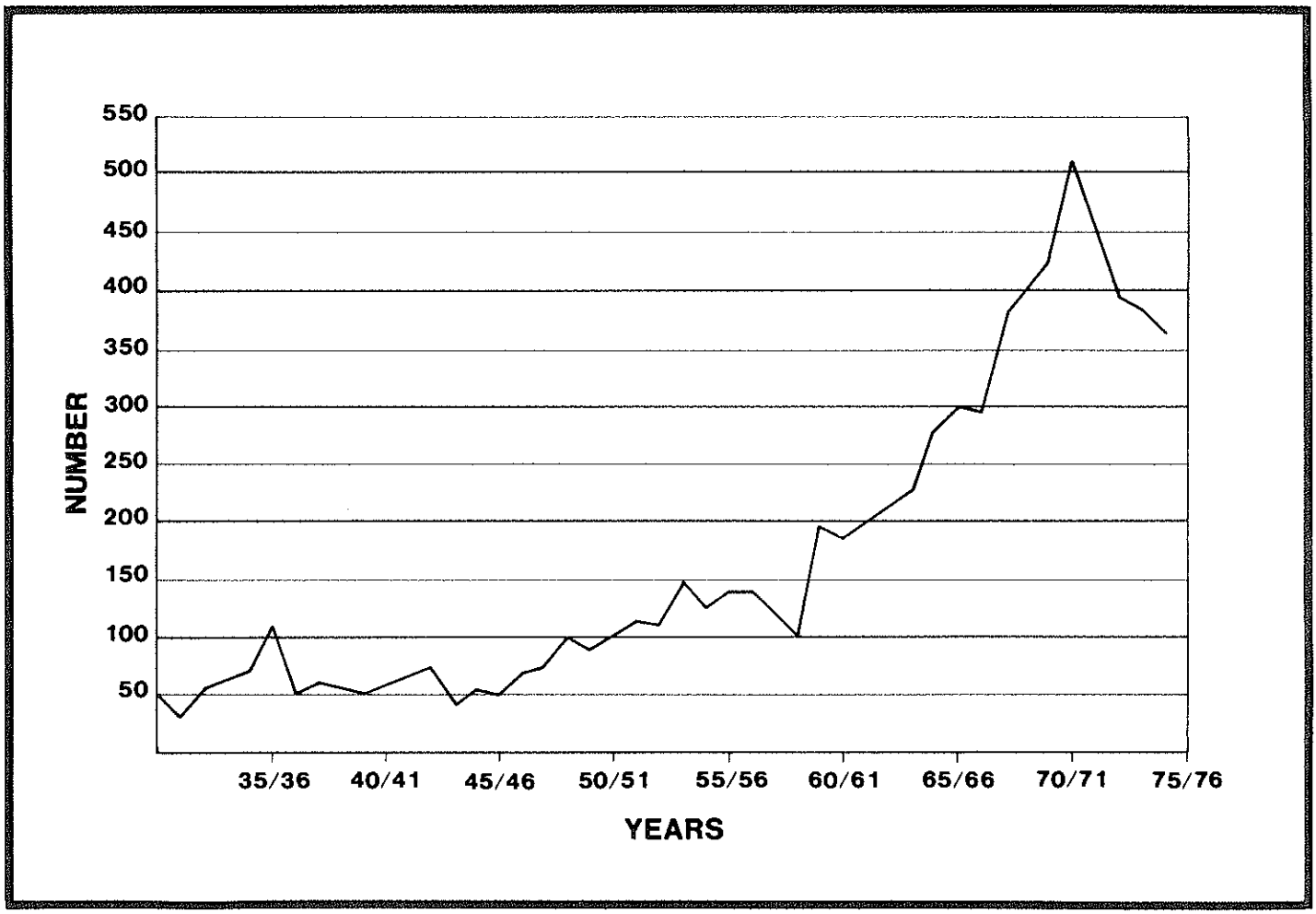

Figure 1. Peak winter counts of Trumpeter Swans at Lonesome Lake, British Columbia, 1931 - 1975.

Mainland Inlets

The winter climate in the long inlets so common on the B. C. coast is generally mild, except in their upper reaches. There, the colder interior climate and the adjacent alpine areas modify the maritime climate so that freezing conditions may occur near sea level. Salt marshes formed where rivers enter the inlets may be affected at certain times, but generally remain unfrozen.

Only recently have any of the inlets been extensively surveyed for concentrations of wintering birds. In 1975-76, a survey by the Canadian Wildlife Service found 33 swans wintering in the inlets between Powell River and Bute Inlet. A more comprehensive survey in 1976-77 recorded 234 swans between Powell River and Knight Inlet, and 341 swans in the inlets north of the top of Vancouver Island.

Fraser Valley

The Fraser Valley, situated in the southwest corner of the Province, is home to more than half of the human population of B. C. As a consequence, the natural environment has been greatly modified. But what remains of the original wetlands still supports a sizeable population of wintering swans.

The winter climate is mild and damp with freezing temperatures prevalent for only a short time. Lakes and marshes used by swans are seldom affected.

The actual number of Trumpeter Swans wintering in the valley has been difficult to determine. The winter range of the Trumpeter Swan and the Whistling Swan (O. columbianus) overlap here, and at least half of the swan sightings appear to be of Whistling Swans. Data from the Canadian Wildlife Service, B. C. Fish and Wildlife Branch, and the Provincial Museum seem to indicate that up to 200 swans winter in the Valley. Trumpeter Swans may then account for about 100 birds.

Vancouver Island

Vancouver Island is generally rather mountainous, but it is almost completely bordered by low coastal plains. On these plains there are many river estuaries, most with well-developed salt marshes. Combined with mild winters, they make Vancouver Island the site of the largest concentration of wintering swans in the Province. A survey conducted in 1977-78 counted a total of 1,065 swans, of which at least 900 are believed to have been Trumpeter Swans (McKelvey, in press).

Other Areas

Trumpeter Swans have been recorded in small numbers in two other parts of British Columbia: in the Okanagan Valley and in the Terrace-Prince Rupert area.

The Okanagan Valley once regularly supported a small population of wintering swans (Munro 1949). However, a lead poisoning incident in 1925 decimated that population, and the area did not see regular use by swans again until 1976-77. That year, four swans overwintered, and 10 returned for the next winter (BCPMSR).

Sightings in the Terrace-Prince Rupert area usually occur in early winter or late March. Both these dates are probable times of migration, and it is likely the flocks reported are migrants. However, there are lakes in the region that could support wintering swans. More observations will be required to properly rate this area.

A summary of the contribution of each wintering area to the total population in B. C. is shown in Table 1. It appears that British Columbia is the winter home to at least 2,000 Trumpeter Swans.

Table 1. Approximate number of swans using the known wintering areas in British Columbia.

Area	Number	% contribution
Prince George-Vanderhoof	75	3.7
Lonesome Lake	350	17.2
Queen Charlotte Islands	100	4.9
Mainland Inlets	500	24.6
Fraser Valley	100	4.9
Vancouver Island	900	44.2
Okanagan Valley	10	0.5
Total	2,035	100.0

Mortality Factors

Since 1966 autopsies have been performed on 11 captive-raised swans and 71 wild birds. Results of the findings of those autopsies are summarized below and reviewed by areas of return in Table 2. Unfortunately, most of the autopsy reports contained no information about age or sex. Nothing can be said of age- or sex-dependent causes of mortality.

Captive Birds

Ten of the 11 captive birds submitted were immature, some still in the downy stage. Diagnosed causes of death were: five cases of aspergillosis; one case of impaction; and one case of multiple parasitism, including tapeworms and thorny-headed worms.

In three of the young, the cause of death could not be determined conclusively. One had hepatitis and one internal injuries of unknown origin, both of which probably contributed to death. Impaction was the reported cause of death in the only adult submitted.

Wild Birds

There were four main causes of death reported for 69 of the wild swans, with only two dying of unknown causes. These were: shootings (13%), accidents (16%), various types of infections (20%), and parasitism (51%).

Despite the protection afforded swans in B. C., a surprising proportion is still shot. The largest percentage of these are sent to us from Vancouver Island, also the site of the largest wintering concentration. This is rather interesting in that the only wintering concentration of Snow Geese, with which the swans might be confused, is on the Fraser Delta. Most swan shootings, therefore, must be intentional.

Most accidents appear to result from collisions with power lines. However, one death in this category was caused by entanglement in fishing line, and one died of a ruptured aorta.

The infectious diseases reported included air sacculitis, aspergillosis, nephritis, hepatitis, and enteritis. Air sacculitis and aspergillosis usually appeared to be fatal, while the later infections did not appear to be directly fatal but were found in combination with other conditions.

Parasitism in varying degrees was reported in 69 percent of the wild birds autopsied. It may be even more prevelant than indicated, since when the cause of death was obviously an accident or a shooting, no parasite examinations were made. The most frequently seen parasite was the gizzard worm (Amidostomum sp.) found in all parasitized birds. Other parasites included tapeworms (Hymenolepis sp.) and heartworm (Sarconema sp.).

MacNeil and Barnard (1978) report that of 504 free-flying waterfowl they examined for parasites, only one Whistling Swan and three Trumpeter Swans were infected with heartworms. Compared with the findings of others (Holden and Sladen 1968; Irwin 1975; MacNeil 1975), they concluded that the occurrence of Sarconema sp. in B. C. was lower than in other areas. However, in the winter of 1977-78, three of eight swans autopsied contained heartworm. So, more data is required before definite conclusions can be made concerning the occurrence of heartworm in B. C.

Only one case of fatal lead poisoning has been recorded. Lead was reported in two other birds, but was not considered the primary cause of death in those cases.

Mortality causes and locations of recovery are summarized in Table 2.

Table 2. Major causes of death and locations of recovery of Trumpeter Swans autopsied by C.W.S., 1966-78.

Location of recovery	Cause of death				
	Shot	Accident	Infection	Parasitism	Other[1]
Vernon			5	1	5
Prince George-Vanderhoof		1	3	5	1
Queen Charlotte Islands	1			5	
Vancouver Island	6	6	5	8	1[2]
Fraser Valley	1		4	5	
Others & unknown	1	4	1	12	1

[1]Other causes - includes unknown & miscellaneous causes.

[2]Lead poisoning.

Habitat Conditions

Feeding ecology studies have been conducted at two locations on Vancouver Island: Comox Harbour on the east coast, and Port Alberni, in the center of the Island, connected to the west coast by the Alberni Canal.

Comox Harbour

Comox Harbour is a large southeast-facing bay with a very limited amount of swan habitat. Water quality is affected mainly by the Straits of Georgia, which is itself only two-thirds the salinity of the ocean. The substrate is silt and sand of variable depth over boulders about 25 cm in diameter.

Vegetation consists of eelgrass (Zostera marina) in the center of the harbour; rockweed (Fucus sp.) towards the beach in areas where boulders are exposed; a community dominated by arrowgrass (Triglochin maritima) and three-square bulrush (Scirpus americanus) just below the high tide line; and a grass community visually dominated by hairgrass (Deschampsia sp.) above the high tide line.

Human influence at the harbour has been remarkably slight. Generally, the estuary is protected by a border of trees, and developments have been limited to a sewage lagoon near the Courtenay River.

Port Alberni

The area of swan use at Port Alberni is a delta formed by the Somass River as it enters the Alberni Canal. The substrate is a very fine silt about one meter deep underlaid by hardpan. It supports emergent vegetation dominated by a sedge (Carex lyngbyei) growing in almost pure stands. Less commonly occurring are stands of cattail (Typha latifolia) near the upland, and hardstem bulrush (S. acutus), growing throughout.

Human influence on the Somass estuary has been extensive. Log dumping, booming, and scouring have polluted portions of the salt marsh with debris. Untreated pulp liquor was formerly discharged directly into the Alberni Canal, but it is now aerated in lagoons built on the salt marsh. Domestic sewage is also pre-treated in a lagoon similarly constructed in the salt marsh.

Food Habits

In both study areas, rhizomes and other underground plant parts appear to be the preferred food of the swans. At Port Alberni, the plant most often utilized is Carex lyngbyei. I have also seen evidence of swans feeding on the rootstalks and rhizomes of hardstem bulrush and on portions of cattail root.

At Comox Harbour, the principle food items are the rhizomes of arrowgrass and three-square bulrush. These two plants are probably taken in about equal quantities, although the bulrush, being slightly more scarce, may be the preferred food. Eelgrass may be utilized, but to an unknown extent. Fresh leaf blades floating in with the tide are taken incidentally while the swans swim about or feed on rhizomes.

Pasture land adjacent to Comox Harbour is used regularly by a certain number of swans. Grasses also contribute to the total diet of the flock but their relative importance has not yet been determined.

The method of feeding is similar at both study locations. The root mats, being tough and fibrous, are most easily broken away at an edge. Consequently, feeding occurs mostly at the edges of channels, or at the edges of devegetated or sparsley vegetated areas.

Food Quantity and Quality

I have estimated the dry weight of food available at Comox Harbour, where the root mat is intact, to be approximately 1.42 kg/m^2 to a depth of 15 cm. However, the area of intact root mat is as yet unknown. It is frequently interspersed with areas of discontinuous plant growth of very irregular area. The total area of vegetation at Comox Harbour is approximately 8 hectares of which no more than one-third is root mat. The food is high in fiber (38.9%) and of moderate protein content (7.03%). Last year, this area supported a peak population of 264 swans.

The dry weight of food available at Port Alberni is slightly higher than at Comox Harbour, 1.75 kg/m^2. The area of root mat is considerably larger, approximately 40 hectares. The fiber content is significantly higher at Port Alberni (47.8%), but the protein level is approximately equal (7.14%). Last year, this area supported a peak population of only 80 swans.

Habitat conditions for both areas are summarized in Table 3.

DISCUSSION

Distribution

The wintering population of Trumpeter Swans in British Columbia is at least 2,000 birds. Most are concentrated on salt marshes along the coast, probably because food is available throughout the winter. The harsher interior climate, with lengthy periods of frost, limits habitat to a few of the larger lakes, and faster stretches of river.

Since the mainland inlets have only recently been surveyed during the winter, further surveys may reveal larger numbers of swans than seen there previously. In addition, some areas, such as the Prince Rupert area, have not been surveyed adequately. These may also support wintering swans, since the habitat is similar to that seen farther south.

Habitat capable of supporting wintering swans is also available in southern B. C. as shown by the return of swans to the Okanagan Lakes. Recent climatic conditions have been mild enough during the winter to prevent these lakes from freezing, allowing access to food. Emergent and submergent vegetation is plentiful and is becoming more so as the increasing human population accelerates lake eutrophication.

Table 3. Habitat parameters at Comox Harbour and Port Alberni, British Columbia.

	Comox	Port Alberni
Biomass (kg) per .003 m^3 core	25.86 ± 2.06 (n = 45)	31.86 ± 1.73 (n = 49)
Biomass (kg) per m^2	1.42	1.75
Gross energy (kcal)	4.76 ± .03 (n = 9)	4.83 ± .02 (n = 49)
% crude fiber	39.80 ± .84 (n = 5)	47.80 ± 1.67 (n = 7)
% crude protein	7.03 ± .32 (n = 45)	7.14 ± .35 (n = 48)
% carbohydrate	46.75 ± .96 (n = 46)	48.00 ± .29 (n = 48)

Mortality Factors

Compared to the findings of others (Holden and Sladen 1968; MacNeil and Barnard 1978), Trumpeter Swans wintering in B. C. are not being subjected to unusual causes of mortality. Parasitism seems to be widespread, but there is as yet no baseline data on the parasite load of the general population.

Accidental deaths, when associated with humans, and shootings are causes of mortality that need not exist. Collisions with power lines appear to result from a difficulty in judging where the lines actually are. The attachment of fish net floats to lines near Port Alberni, B. C., greatly reduced these collisions, a remedy that should be effected elsewhere.

The causes of death in the captive swans seem to be typical of those problems faced by aviculturalists. Aspergillosis is commonly associated with mouldy hay (Davis et al. 1971), while impaction, infections, and trauma are all symptomatic of faulty management (MacNeil and Barnard 1978).

Habitat Conditions

Although no thorough assessment of winter habitat has been made, the habitat at Comox Harbour and Port Alberni are probably typical of most coastal habitats. Salt marshes have developed wherever siltation rates are high and there is protection from wave action.

Due to the relatively simple structure of salt marsh vegetation the world over (Chapman 1960), swan food habits are also likely similar in other locations.

There appears to have been little work done on the nutritional value of salt marsh plants. Burton (1977), working on the Fraser River estuary found that the fiber content was about 22 percent and the protein level between 7.5 and 13.3 percent. Barnard (1974), working on freshwater marshes in the Fraser Valley reported the protein content of apparently whole emergent plants to be between 4.4 and 6.4 percent. Since both areas support concentrations of waterfowl throughout the winter, these levels of protein must be adequate.

The protein content of the vegetation at Comox Harbour and Port Alberni are comparable to the above. Presumably, therefore, these levels are meeting the requirements of wintering swans. However, since some use is made of adjacent farm fields, at least at Comox Harbour, better food may be available elsewhere.

A factor which I feel may be as important as food quality and quantity is disturbance. Disturbance is low at Comox Harbour and while food may eventually be in short supply, peak numbers continue to increase. Conversely, at Port Alberni, food is very abundant, but peak numbers continue to decline, perhaps because of disturbance.

Swans wintering at Port Alberni are extremely wary, except at Christmas, when the pulp mill is shut down for maintenance. The noise of the mill seems to make them much more cautious of the movements of humans anywhere near their feeding grounds. The increasing levels of disturbance may be of more importance than food supply and quality in determining acceptable habitat conditions.

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STATUS OF SWANS WINTERING ON VANCOUVER ISLAND BETWEEN 1971 AND 1977

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INTRODUCTION

The British Columbia Fish and Wildlife Branch has conducted aerial counts of swans wintering (January - February) on Vancouver Island, British Columbia, since 1969. The purpose of these counts is to provide information on total number of swans, areas of major concentration, the proportion of cygnets, and population trends. Two partial surveys (1969, 1970) and one complete survey (1971) of Vancouver Island indicated the presence of an increasing and expanding population of Trumpeter Swans (Blood 1969; Smith 1970; Smith and Blood 1971). A later survey in 1973 suggested a decrease in numbers, changes in distribution, and a much lower proportion of cygnets (Smith and Tretheway 1973). The purpose of this paper is to provide information collected since 1973 and to provide a brief assessment of trends in distribution, abundance, habitat use, and proportion of cygnets between 1971 and 1977.

This project was supported by the British Columbia Fish and Wildlife Branch. Many people participated, including G. Smith, W. Kale, I. Smith, D. Janz, M. van Alderwegen, B. van Drimmelin, and E. Schenker. S. Devereux provided information on Mute Swans on Vancouver Island. I am grateful for the help and comments made on earlier versions of this manuscript by W. Munro.

METHODS

The counts were conducted from fixed-wing aircraft during periods of cold weather in January and early February. An attempt was made to conduct each count over as short a time period as possible to reduce the errors caused by the shifting of swans from one locality to another. Typically, a quarter to one-third of Vancouver Island was covered each count day. In 1975, 1976, and 1977, counts were completed on successive days.

During the 1969 and 1970 winters, the surveys covered only portions of Vancouver Island. Counts were not conducted in 1972 and 1974, but in all other years since 1971 aerial surveys have covered almost all ice-free bodies of water on Vancouver Island known, reported to have, or likely to have contained swans. In 1971 and 1973, a few small areas were missed due to logistic problems. In such instances, an estimate was provided based on ground observations and/or past data.

Swans were classified as cygnets on the basis of grey plumage. All swans not cygnets, were classified as adults. Mute Swan observations were omitted from the data.

RESULTS

Abundance

The total number of swans wintering on Vancouver Island appears to have been relatively constant during the winters of 1971 to 1977 with most fluctuations apparently resulting from differences in annual reproductive success (Table 1). The differences between highest and lowest totals obtained during this period, 1062 swans in 1971 and 892 swans in 1973, was less than 20 percent. Excluding cygnets, the total range in number of adult swans was from 785 in 1973 to 824 in 1975, or a difference of less than 5 percent. I believe that the totals presented are reliable and represent a minimum estimate of the total number of swans wintering on Vancouver Island. Excluding 1971 and 1973, all data were obtained from direct observation on aerial surveys which were similar in timing and area coverage. Data for 1971 and 1973 contain some estimates for areas not surveyed. The accuracy of my count information can be represented thus: 1971 $\leq$1973 $<$1975, 1976, 1977. Further, the counts from the Nimpkish Valley in the interior of Vancouver Island were omitted from the data presented here. This area was not surveyed in many of the years. In the years it was surveyed the counts never exceeded 40 swans.

I believe that most swans observed during the surveys were Trumpeter Swans (Olor buccinator). Smith and Blood (1971) presented data and arguments which suggested that the majority of swans wintering on Vancouver Island were Trumpeters. My data appear to support this statement. I have not received any reports on Whistling Swans (O. columbianus) from the north

Table 1. A summary of the age composition and total numbers of swans wintering on Vancouver Island between 1971 and 1977.

Geographic area	Population composition	1971	1973	1975	1976	1977
Vancouver Island totals	Total	1062	892	1032	947	1012
	Adults	818	785	824	807	793
	Cygnets	244	107	208	140	219
	Percent cygnets	(23)	(12)	(20)	(15)	(22)
East coast subtotals	Total	336	285	392	429	520
	Adults	254	248	310	355	406
	Cygnets	82	37	82	74	114
	Percent cygnets	(24)	(13)	(21)	(17)	(22)
West coast subtotals	Total	622	501	550	423	405
	Adults	485	448	443	370	319
	Cygnets	137	53	107	53	86
	Percent cygnets	(22)	(11)	(19)	(13)	(21)
North coast subtotals	Total	104	106	90	95	87
	Adults	79	89	71	82	68
	Cygnets	25	17	19	13	19
	Percent cygnets	(24)	(16)	(21)	(14)	(22)

or west coasts of Vancouver Island. Further, all the swans wintering during 1977 at one major east coast estuary, the Salmon River estuary, were identified as Trumpeters (W. Campbell, pers. comm., 1978). Farther south, on the large Coutenay-Comox estuary, all birds (approximately 150) were identified as Trumpeters in 1977, but a small group of Whistlers was observed in this same area during 1978 (R. McKelvey, pers. comm., 1978). The area south of Nanaimo on the southeast coast of Vancouver Island is the major area where specific identification may be a problem. This area presently accounts for approximately 15 percent of the swan observations. Whistling Swans have been reported consistently in this area during the fall migration (Blood, et al.1975). Further, a minimum population of 60 Mute Swans is known to frequent the area.

Distribution

Earlier investigators (Blood 1969; Smith and Blood 1971; Smith and Tretheway 1973) attempted to define the distribution of the swans wintering on Vancouver Island on the basis of site-specific counts obtained at major wintering areas. I have not done this. I think that the survey methods combined with the daily mobility of the swans preclude such site-specific assessments. I have chosen to define distribution on the basis of swan counts obtained within fairly large geographic units.

The distribution of swans wintering on Vancouver Island had changed markedly since 1971. An examination of regional totals indicated that the number of swans wintering on the east coast had increased (Table 1). Ouring the same time period, the number wintering on the west coast had decreased. The number on the north coast did not appear to have changed significantly.

Proportion of cygnets

The proportion of cygnets varied from 12 percent to 23 percent between 1971 and 1977 (Table 1). The proportions within the individual regions varied from 11 percent to 24 percent, with the proportions tallied on the west coast being consistently lower than those of the east coast.

Habitat use

Swan observations were classified simply as to whether the swans were observed in freshwater or saltwater areas, the latter being almost always estuaries. The proportions of the total population of swans on Vancouver Island utilizing either freshwater or saltwater areas have, with the exception of 1973, been fairly constant between 1971 and 1977 (Table 2). In

1973, use of freshwater areas was considerably lower. These trends were similar for both the adult and cygnet segments of the population. Further, these trends were most evident on the east and north coast regions of Vancouver Island. On the west coast, the proportion of freshwater use was lower and did not vary much between years.

Table 2. A summary of the proportion (%) of adult swans, cygnets, and total swans wintering on freshwater areas within regions of Vancouver Island between 1971 and 1977.

Geographic area	Population composition	1971	1973	1975	1976	1977
Vancouver Island proportions	Total	22	13	21	22	26
	Adult	20	14	22	22	26
	Cygnet	28	4	18	24	26
East coast proportions	Total	39	20	36	37	37
	Adult	38	22	37	37	37
	Cygnet	40	5	30	48	36
West coast proportions	Total	8	7	9	6	13
	Adult	7	8	9	7	10
	Cygnet	10	4	8	5	14
North coast proportions	Total	31	19	33	33	31
	Adult	34	22	35	33	31
	Cygnet	28	0	26	30	32

DISCUSSION

I have drawn three conclusions from this assessment of swan count data: 1) the total number of swans wintering on Vancouver Island was stable between 1971 and 1977; 2) the proportions of the total swan population utilizing different habitat types was, with the exception of 1973, constant between 1971 and 1977, but some regional variation was evident; and 3) the distribution of swans had shifted markedly during the same time period.

This stable trend in total numbers differs from the increasing trend noted by Benson (1964) and Smith and Blood (1971). The latter authors suggested that the total number of swans on Vancouver Island may have increased 129 percent over the 3-year period, 1969 to 1971. They based their conclusions on data obtained from replicate surveys of portions of the east and west coasts of Vancouver Island. My assessment indicates that populations in these areas were likely increasing at that time, but in areas of the north and west coasts, which they omitted due to lack of replicate survey information, the number of swans was likely stable or decreasing. Thus, I think that the increase noted by Smith and Blood may have been considerably less than 129 percent. Further, I suggest that the wintering population of swans has stopped increasing and apparently has stabilized since that time.

Smith and Blood (1971) found that use of saltwater areas was greater in a severe winter (1969), and use of freshwater areas was greater in moderate or mild winters (1970, 1971). My data support their findings. I noted that between 1971 and 1977 use of freshwater areas was least in 1973 when all lakes on the east and north coasts of Vancouver Island were frozen. But, I could not discern any major differences in proportional habitat use between years when many, but not all, lakes were frozen (1971, 1975) and years when very few or none of the lakes were frozen (1976, 1977) (Table 2). I suggest that in all but the coldest winters, there are usually some freshwater areas unfrozen and available for the swans to use.

I expected to find some shifts in the distribution of the swans wintering on Vancouver Island, 1971-1977. Smith and Blood (1971) and Smith and Tretheway in an unpublished report (1973) described changes in numbers of swans observed at major wintering areas. They indicated that these changes were season-long and did not result from within season movement of swans from one area to another. Further, they were not able to assess the long-term validity of such changes. My results suggest that these changes are part of a continuing geographic redistribution of a constant number of swans. The following data description indicates both the sequence and magnitude of the changes in distribution.

The number of swans observed in the Tofino-North area of the west coast decreased markedly between 1971 and 1973, and has decreased only slightly since 1975 (Figure 1). During the same period, 1971 to 1973, the number of swans observed in the Alberni area to the south increased markedly. Between 1973 and 1977, the numbers in the Alberni area decreased considerably. Coincident with this observed decrease, the number of swans in the Comox-South portion of the east coast and the Renfrew section of the west coast south of Alberni increased.

These sequential and coincident changes in subpopulation totals, plus the similar magnitude of the changes, leads me to believe that the observed changes have resulted from an actual movement of swans. The magnitude of the changes appeared to be too great to be accounted for solely by reproduction. The trend appeared to be one of peak numbers moving southward down the west coast to the Alberni area, then moving either to the east coast or farther south to the Renfrew area. The Alberni area is at the western end of the largest, low elevation valley system extending from the east to west coast of Vancouver Island. Thus, it could possibly be a focal point for movement of swans to the east coast. The number of swans did not change greatly within the north coast and Campbell River-Kelsey Bay areas. Both these areas are isolated to some extent from the west coast by mountain ranges.

The reasons for these observed changes in distribution are not known. I suggest two possibilities. Firstly, the geographic distribution of swans on Vancouver Island has continued to expand southward since the early 1960's (I. Smith, pers. comm., 1975). Perhaps I have simply observed a continuation of this trend. The other possibility is that the changes have occurred in response to differences in winter severity between years.

The greatest changes occurred in the Tofino-North, Alberni, and Comox-South areas. In the Tofino-North area the number of swans decreased between 1971 and 1973 (Figure 1). In this area, the swans utilize a multitude of small estuaries located at the heads of narrow inlets. During the 1973 survey, a high pressure system of cold arctic air was situated over the coast of British Columbia. Typically, when such conditions prevail, there is an outflow of cold air from the mountainous region in the central interior of Vancouver Island towards the west coast through these narrow inlets. This results in periodic freezing of the estuaries and adjacent waters. This was noted in many of the inlets in the Tofino-North area in 1973. I suggest that the swans in this area, may, as a result of the freezing, have moved farther south along the west coast to the Alberni area which rarely exhibits any freezing of the estuary areas. This suggestion while explaining the initial change in distribution fails to explain why the number of swans did not subsequently increase in the Tofino-North area during the following milder winters, 1975 to 1977.

In the Comox-South area the number of swans did not decrease in the coldest winter (1973) despite a decrease in the use of freshwater areas (all lakes were frozen). Thus, the swans must have shifted to the east coast estuaries rather than the Alberni area. In the milder winters (1975 to 1977), the number of swans increased, coincident with a decrease in the Alberni area. This observation suggests that, although swans may have shifted from the Alberni area to the Comox-South area, the reverse did not occur.

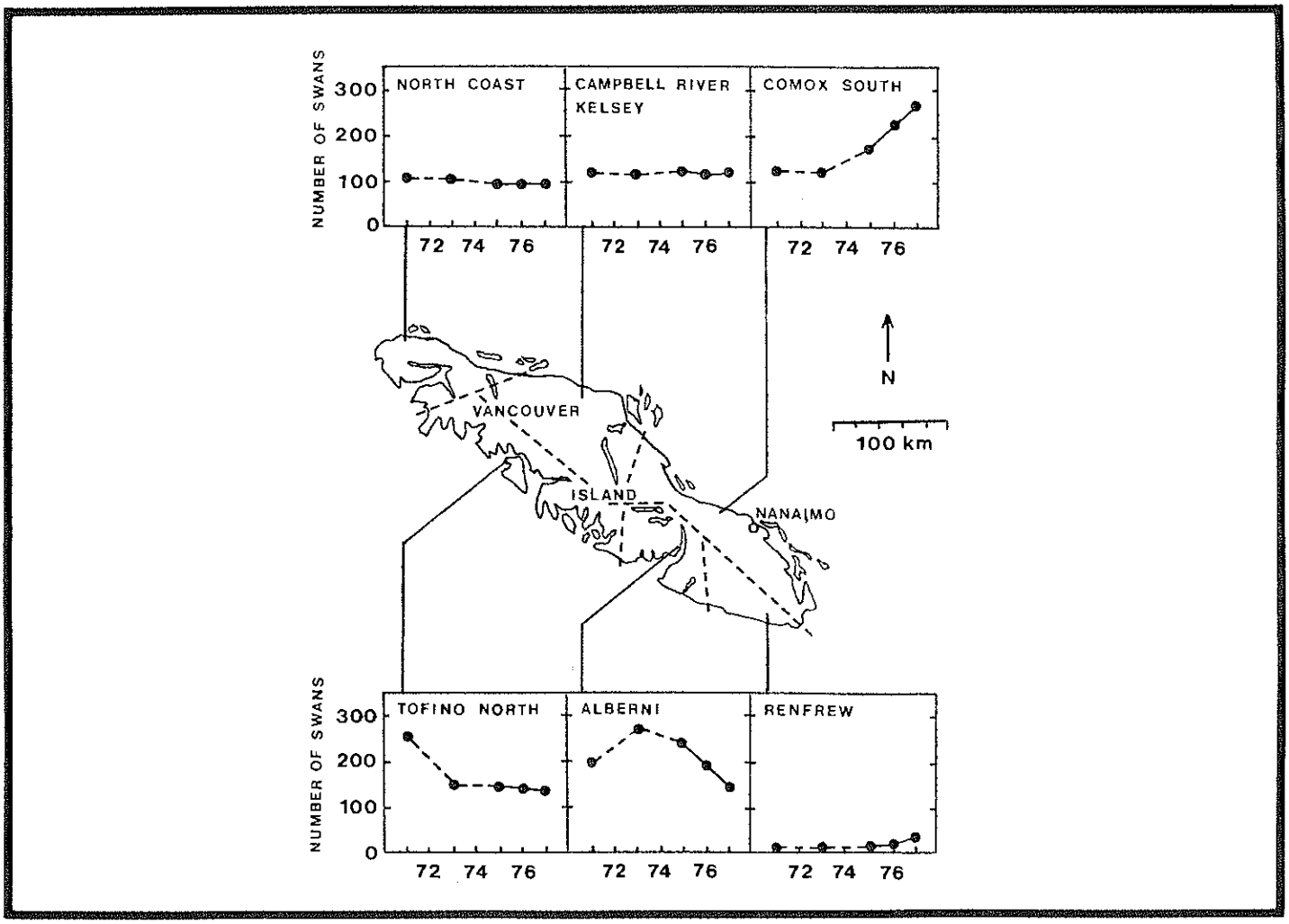

Figure 1. The number of adult swans observed within six regions of Vancouver Island between 1971 and 1977.

To investigate these apparent shifts in more detail, I converted the numbers of swans in the Tofino-North, Alberni, Renfrew, and Comox-South areas to proportions of a single large population (Table 3). I did not include the North Coast or Campbell-Kelsey observations since the number of swans in these areas was quite constant between 1971 and 1977. An examination of this proportion data substantiates the argument presented earlier: the swans appeared to have shifted from the Tofino-North area to the Alberni area between 1971 and 1973, and between the Alberni area and the Comox-South and Renfrew areas between 1973 and 1977. It appears that the main effect of the cold 1973 winter was to cause a shift from the Tofino-North region to the Alberni area and to result in a slowdown of a general increase trend in the Comox-South area (Table 3).

I believe I have observed a long-term south and east redistribution of swans on Vancouver Island alluded to by I. Smith (pers. comm., 1975).

Further, this movement has involved a stable population of swans. This hypothesis can be disproven, if during one or two severe winters, there is a reversal of the trends observed between 1971 and 1977.

Table 3. The proportions of the swan population on the east and west coasts of Vancouver Island (Campbell-Kelsey area excluded) observed in the Tofino-North, Alberni, Comox-South, and Renfrew areas between 1971 and 1977. The change in proportion from the preceding year is in brackets.

Year	Tofino-North (%)	Alberni (%)	Comox-South (%)	Renfrew (%)	Total area (%)
1971					
Proportion[a]	44.7	32.7	21.9	0.7	100.0
1973					
Proportion	28.7	48.0	22.1	1.2	100.0
Change	(-16.0)	(+15.3)	(+ 0.2)	(+0.5)	
1975					
Proportion	28.0	40.7	29.0	2.3	100.0
Change	(- 0.7)	(- 7.3)	(+ 6.9)	(+1.1)	
1976					
Proportion	24.5	32.5	39.0	4.0	100.0
Change	(- 3.5)	(- 8.2)	(+10.0)	(+1.7)	
1977					
Proportion	23.5	25.5	45.3	5.7	100.0
Change	(- 1.0)	(- 7.0)	(+ 6.3)	(+1.7)	

[a]Proportions were based on 611 swans in 1971, 575 in 1973, 614 in 1975, 604 in 1976, and 583 in 1977.

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THE WINTER DISTRIBUTION OF TRUMPETER SWANS IN THE STATE OF WASHINGTON

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Skagit County, Washington, offers significant habitat for a small portion of Alaska wintering Trumpeter Swans. Table 1 illustrates the magnitude and distribution of the Skagit winter population of Trumpeters.

Table 1. Distribution of wintering Trumpeter Swan population in Skagit County, Washington, 1977-78.

Date	Immatures	Total swans	Area
11-15-77	11	40	Judy Reservoir
11-28-77	6	38	Cook Road[a]
11-28-77	3	12	Barney Lake
11-28-77	6	12	Nookachamps
11-29-77	35	150+	Nookachamps
12-05-77	20	52	Nookachamps
12-07-77	70	242	Nookachamps
12-19-77	43	172	Judy Reservoir
01-04-78	28	146	Barney Lake
01-04-78	9	39	Judy Reservoir
01-09-78	25	127	Judy Reservoir
01-10-78	38	188	Barney Lake
01-26-78	16	284	Nookachamps
01-27-78	35	109	Nookachamps
01-27-78	28	165	Barney Lake
02-03-78	10	29	Nookachamps

[a]Cook Road is about 1 mile north of Burlington, WA.

The Washington Department of Game official January Trumpeter Swan inventory for Skagit County was 83 (unable to reconcile with Table 1 figures); for Pacific County, 57. Turnbull National Wildlife Refuge south of Spokane in eastern Washington reported 35 summer resident Trumpeters, which migrate to parts unknown for the winter.

Mortality for the past 2 years may be attributed to the following in order of importance: shot, aspergillosis, and lead poisoning. Of note, the Trumpeter wintering area has been placed in a steel-shot zone for the 1978 waterfowl hunting season.

Five collared Trumpeter Swan cygnets were observed among the Skagit County wintering birds (Table 2). These birds, along with one seen in 1973 in this flock were banded on the Kenai National Moose Range on the Kenai Peninsula immediately south of Anchorage, Alaska.

Table 2. Collared Trumpeter Swan cygnets banded on the Kenai National Moose Range, Alaska, observed near Mt. Vernon in Skagit County, Washington, 30 November 1977.[a]

Date banded	Neck & tarsus band code (blue/white)	USFWS band #	Sex	Kenai location
08-18-77	06VT[b]	619-00806	F	Hook Lake
08-18-77	07VT[b]	619-00807	F	Hook Lake
08-18-77	08VT[b]	619-00808	M	Hook Lake
08-19-77	10VT[c]	619-00810	M	1 mi. ese Warbler L.
08-19-77	11VT[c]	619-00811	F	1 mi. ese Warbler L.

[a]Observed in flock of 173 Trumpeter Swans, 35 of which were cygnets (immatures).
[b]Siblings from a brood of five (four of five banded).
[c]Siblings from a brood of five (two of five banded).

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MOVEMENTS OF TRUMPETER SWANS INTO AND WITHIN THE TRI-STATE AREA OF IDAHO, MONTANA, AND WYOMING

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This paper will partially summarize my field work in Yellowstone National Park (YNP) during October-December of 1976 and 1977, and observations in Montana and Idaho during November to March, 1977-78. Basically, I followed the movement of Trumpeter Swans, including 71 neck-banded birds from Grande Prairie, Alberta, within YNP and from there west and southwest into Idaho and Montana. The entire study area lies within 60 miles of YNP and includes primarily Federal and state lands. Agencies having management responsibilities include: National Park Service, U. S. Forest Service, U. S. Fish and Wildlife Service, Idaho Department of Fish and Game, Montana Department of Fish and Game, Idaho Department of Parks and Recreation, and the U. S. Bureau of Reclamation. Good future management of the wintering Trumpeters will require the coordination and cooperation of all these agencies.

Although migrant Trumpeters also utilize the South and Southeast Arms of Yellowstone Lake, the north shore of Yellowstone Lake and the Yellowstone River from the Lake's outlet to 16 miles downstream is the prime use area. I censused this area every few days from mid-October to early December, examining each group of swans with a 1300 mm Questar field telescope. I recorded species, age class, family size, presence of tarsal and neck bands, and remained until I succeeded in reading the code on the neck bands. Since the swans spent a great deal of time loafing on islands or shoreline, I had many opportunities to check each bird for tarsal bands. In Idaho, the swans were very difficult to approach and I concentrated on reading neck bands and determining species.

The first migrant Trumpeters appeared on the Yellowstone River on 20 October 1976 and 14 October 1977. Total swan numbers rose steadily, reaching a peak both years on 9 November. In 1976, the maximum one-day count was 295 (119 Whistling Swans/176 Trumpeters). The 1977 maximum count was 371, which included 59 Whistlers and 312 Trumpeters.

1976. The first adult Trumpeters appeared on 19 October and increased to a maximum of 221 adults on 15 November. Most families arrived later. Of the 135 Trumpeters present by 5 November, only 11 were cygnets. Most families arrived between 9 and 18 November when cygnet numbers climbed from 18 to 48 (215 adults; 48 cygnets). On 24 November, the 52 cygnets present were from 19 families with a mean brood size of 2.7.

1977. Events followed a similar pattern in 1977, but occurred one week earlier than in 1976. The first adults arrived on 14 October and increased to a peak of 254 adults on 10 November. The first family arrived on 23 October, but most families (17 of 22) appeared between 1 and 9 November. In that period, cygnet numbers rose from 12 to 74. The 74 cygnets comprised 22 broods for a mean brood size of 3.4 cygnets.

The field observations were made particularly interesting by the presence of neck-banded Alberta Trumpeters. In general, the arrivals of the neck-banded swans closely paralleled the behavior of the total flock. In 1976, the mean length of stay for three marked families was 22 days and 38 days for 11 adults, reflecting their earlier arrival. Twenty-three neck-banded individuals were located in YNP. All marked Trumpeters were still in the Yellowstone Lake area when I made the final census on 2 December. By that date, the river and lake were rapidly freezing.

Combining the maximum adult and cygnet counts reveals that at least 273 Trumpeters came through YNP in 1976. Although turnover was nil among the neck-banded birds, several distinctive families passed through, remaining only a few days. Including swans known to have been in the South and Southeast Arms of Yellowstone Lake, I estimate that at least 300 Trumpeters came to YNP.

In 1977, 45 neck-banded Grande Prairie Trumpeter Swans were found in YNP. Including unmarked mates and cygnets, this population totaled 74. A greater degree of movement through YNP occurred. The 11 marked family groups had a mean stay of 12.1 days. Five families stayed 3 days or less. Eleven paired adults without families remained a mean of 34.3 days. The five unpaired after-hatching-year swans had an average stay of 29.8 days.

During the 9 November 1977 maximum count of 312 Trumpeters, only 30 of the 45 neck-banded birds were present. Multiplying 312 by 45/30 to allow for swans that passed through the study area but were not present on 9 November, yields an estimate of 468 Trumpeters that came through YNP in 1977. That number is based on the unrealistic assumption that no Trumpeters were overlooked on 9 November.

At every opportunity, I examined swans for tarsal bands, but none were observed either year except on neck-banded birds. Flightless adults and cygnets have been tarsal-banded annually in the Tri-state region on Lima Reservoir and Red Rock Lakes National Wildlife Refuge (RRNWR) since the 1930's. Tarsal-banded swans were frequently observed at Harriman State Park and Hebgen Lake. I concluded that the vast majority of the Trumpeter Swans that passed through YNP were not from the year-round Tri-state population, but rather were from Canadian breeding grounds.

As Yellowstone Lake and River froze in December and the shallow feeding areas no longer were accessible, the Trumpeters dispersed. A few remained in the Park on the Yellowstone and Madison Rivers. These 54 swans represented a mixture of year-round resident and Canadian migrants.

Basically, the December movement is south and west from YNP to the headwaters of the Henry's Fork River in Idaho with some swans stopping off at Hebgen Lake, Montana, en route. A few neck-banded Trumpeters were also relocated along the Teton River near Driggs, Idaho, intermingled with Whistling Swans. One family that was not seen in YNP spent much of the winter at RRNWR, but their was no evidence of movement of Trumpeters from YNP to RRNWR.

By far the most important wintering site is a 7-mile stretch of the Henry's Fork near the village of Last Chance, Idaho. Formerly the Railroad Ranch, the area now is part of Harriman State Park and provides shallow, open waters, exceptionally lush aquatic vegetation (probably enhanced by seepage from upstream septic tanks), several secure loafing islands, and isolation from human disturbance. Unfortunately, the flow of water in this critical area is almost totally dependent on the

Bureau of Reclamation and the amount of water it releases over the Island Park Dam, 4 miles upstream. The future of this wintering area rests in large part on informed schedule of water release over the dam. A drastic reduction of flow during the winter could have a great adverse impact on the wintering Trumpeters.

Fifty neck-banded Alberta Trumpeter Swans were located at Harriman State Park. Thirty-three of these had come via YNP. Of the 15 distinct family groups neck-banded in Grande Prairie in September 1977, 13 appeared in the study area between October and February. Eleven were found in YNP, 10 at Harriman, and nine at both locations.

I suspect some Trumpeters winter further south. Seven neck-banded individuals that came through YNP in October and November were never relocated the rest of the winter. I received reports of Trumpeters wintering at two locations (Grand Lake and Westcliffe) in Colorado.

March 1978 was sunny and mild, making over-the-snow travel very difficult. Most Trumpeters had scattered and could not be located in the accessible areas after 10 March.

During February 1978, I searched the major waterfowl areas in Utah, Nevada, and central California, but did not locate any probable migrant Trumpeters. Nevertheless, I did receive several reports of Trumpeter Swans in these areas in past years and suspect that they could easily remain undetected among the much more numerous Whistlers.

In summary, the current evidence reveals that YNP and Harriman State Park are extremely important to the migrating segment of the interior Trumpeter Swan population. As riverside home development and winter recreational use increase in Idaho, these areas will be the only undisturbed sites remaining and it is likely that the wintering swans will become even more concentrated at the few adequate sites. A long-term effort to disperse the Trumpeters to other wintering sites is needed. I will address this topic further in the following panel discussion.

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THE TRUMPETER SWAN ON ARMY LANDS IN ALASKA

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INTRODUCTION

The mission of the U. S. Army in Alaska is to maintain an effective arctic and mountain fighting force along with an efficient regional defense system. Approximately 1.7 million acres of Alaska land is presently controlled by the U. S. Army for training and testing purposes. The largest portions of this Army-administered land comprise Forts Wainwright and Greely located in the Tanana River Valley south and southeast of Fairbanks, respectively.

At present, military policy is to complete the training and testing missions on Army lands while insuring minimal adverse impact to the environment. Since the primary task of the Army in Alaska is to develop operational proficiency in cold weather environments, most training is conducted during the winter months. Air Force training missions, also on Army lands, are conducted during summer months, but they are carried out on restricted ranges.

The Army in Alaska has a cooperative agreement with the U. S. Fish and Wildlife Service and Alaska Department of Fish and Game. These two agencies provide advice and guidance to the Army in developing and initiating fish and wildlife management policies and programs.

Past surveys have indicated as many as 65 Trumpeter Swans (Cygnus buccinator) utilizing available habitat of Fort Wainwright (King 1968). Sightings on Fort Greely include fall flocks of 23 Trumpeters (W. Quirk pers. comm.) in 1976 and 32 in 1978, in addition to at least three pairs without cygnets on 29 August 1978. Some limited usage by swans of Fort Richardson, a somewhat smaller installation near Anchorage, has also been recorded during summer months.

METHODS

A partial survey of Trumpeter Swan habitat on Fort Wainwright was conducted on 29 July 1978. Approximately 260 square miles of apparently suitable habitat was censused using a military helicopter (UH-1) cruising at 100 knots from elevations of 50 to 200 meters. All bodies of water judged large enough for swans were visually assessed. The number of adult swans and cygnets and their locations were documented on 1:250,000 scale USGS maps.

A second, more extensive survey was conducted on 1 September 1978, covering 700 square miles of habitat. This included 300 square miles of adjacent non-military land in addition to a 90-percent overlap of those Army lands surveyed on 29 July 1978. This census utilized a slower, more maneuverable aircraft (OH-58) with increased observational capabilities. The data from these two censuses were compared to 1968 and 1975 surveys of Fort Wainwright and surrounding areas conducted by King (1968, 1975).

RESULTS

On 29 July 1978, Trumpeter Swans were sighted on Fort Wainwright which included six adult pairs and eight cygnets. The census on 1 September 1978 resulted in the location of two more broods (one and three cygnets) and six additional adults for a total of 30 swans on the installation. The total count for the area (700 sq. mi., including 300 sq. mi. of adjacent non-military land) was 70 swans (45 adults, 25 cygnets). Included in this number was an extraordinary sighting along Tatlanika Creek (non-military property) of one pair with seven young and a neighboring brood of five. Additionally, on a surveillance

flight of Fort Greely on 29 August, three pairs of Trumpeter Swans without cygnets were observed. The breeding status on Fort Greely is only speculative.

These results indicate an overall production rate of 3.1 cygnets per brood (eight broods). The production rate for Fort Wainwright averaged 2.4 cygnets per brood. In 1968 (King) and 1975 (King), brood sizes for the Fairbanks area averaged 3.4 but remained a consistent 2.7 on Fort Wainwright.

DISCUSSION

The census values of 1 September 1978 appear similar to King's results for 1975. Together they represent a 13-percent reduction from 1968 for Fort Wainwright. The return rate for successful breeders of 1975 to 1978 approached an apparent 100 percent. Possible factors contributing to the slight reduction include: 1) increased use of the area by both military and non-military aircraft; 2) untimely training exercises; and 3) increased land use of the area by the Fairbanks civilian population. Conflicts between training missions and breeding swans have not been documented. Differences between sightings on 29 July and 1 September 1978 were probably due to techniques and an apparent influx of non-breeding swans.

CONCLUSION

Surveys assessing Trumpeter Swan habitat on Forts Wainwright and Greely reflect an increased effort by the Army to protect and manage its natural resources. As a result of these surveys, Trumpeter Swans are now considered in specific management goals. These goals, subject to common approval, include:

1. assess seasonal swan utilization of Army lands in Alaska;
2. conduct annual spring and late summer surveys to locate breeding pairs and determine production;
3. coordinate with training exercises to minimize interaction with swans;
4. investigate the utilization of artifical nest sites in remote lakes on Fort Greely; and
5. increase hunter education and participation in management programs such as waterfowl identification, wing surveys, habitat protection, and law enforcement.

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ANCESTRAL BREEDING AND WINTERING RANGES OF THE TRUMPETER SWAN (OLOR BUCCINATOR) IN THE EASTERN UNITED STATES

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Abstract: Synthesis of paleontological, archaeological, historical, and ecological evidence provides the basis for postulation of ancestral breeding populations of the Trumpeter Swan (Olor buccinator) in the eastern United States. Breeding populations are suggested for the Lower Mississippi Valley and northwestern Ohio and considered in other areas of suitable habitat outside the accepted ancestral breeding range. Extension of the accepted ancestral breeding range is suggested. Consideration of the evidence leads also to the suggestion of extension of the accepted ancestral wintering range into South Carolina and northern Florida.

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Moderator: Ruth Shea, University of Montana, Missoula, Montana

Panel Members: Pete Isleib, Cordova, Alaska
Jeff Hughes, U. S. Forest Service, Petersburg, Alaska
Rick McKelvey, Canadian Wildlife Service, Delta, British Columbia
Rick Davies, Fish and Wildlife Branch, Nanaimo, British Columbia
Don Hammer, Tennessee Valley Authority, Norris, Tennessee

SHEA: If we could get a statement of the major thoughts and concerns of each person and then open up fairly quickly to questions and make up for the lack of opportunity previously this morning, I think we'll try to follow that route. Don, would you like to start?

HAMMER: I think it's pretty obvious that I have the philosophy or feeling that perhaps the Trumpeter Swan was an inhabitant of areas other than the vast wilderness mountains in the Rockies, or else, in fact, they occurred perhaps throughout the Midwest, maybe even farther east, and wintered to the south of those routes. I'm not suggesting that we should reduce an effort, in fact, I would say briefly that we need a great deal of information on nutrition in the current wintering habitat of the Trumpeter Swan of the Interior flock, the Yellowstone area, perhaps even the Vancouver Island coast. But at the same time, I would suggest that we might look for other wintering areas and regions that were used by Trumpeter Swans in the past.

ISLEIB: As far as coastal Alaska is concerned, it's been bantered about that there's been Trumpeter Swans wintering on coastal Alaska for considerable length of time before our arrival in the area. Apparently, they are wintering as far west, or even further west, than their present breeding range, and wherever suitable habitat occurs along the coast. We really don't have a handle on it, though I did get some figures on the volume, especially in Southeastern, although some papers were given about Petersburg. I calculated possibly as high as 400 in the south coast. Southeastern coast may have double that in itself, but I would suggest that the agencies with some less than passive responsibility at least check out our volume if we're going to be concerned.

SHEA: I'm negligent as a moderator. I'm just assuming that you remember these people from when they gave their papers this morning, but Don Hammer, Pete Isleib, Rick McKelvey, Jeff Hughes, and Rick Davies.

MCKELVEY: Yes, I think that our concern in B. C. is nutritional status of the wintering birds, the ability of the habitat to support the numbers we have, and perhaps a coastal problem should be to find out where they all do winter, like I mentioned earlier. I can only account for 2,000 birds. That still leaves, with your calculations, about 1,600 birds unaccounted for -- where they winter. I think that would be very interesting to find that out, get a distribution map of their wintering areas. Also, we need to know more of their movements and why they're moving into the areas that they are, as Rick [Davies] alluded to in the Comox area. Initially, my work leads me to believe that the habitats they're using are sufficient, but they prefer to go elsewhere, and these other places that they're moving into may lead us to management problems, conflicts with farmers that I think we need to be aware of and keep up on to try to head this off. Habitat acquisition. I don't know what else you could do, how you can move 250 swans away from a lake without getting a lot of public flack, if nothing else.

HUGHES: I'd like to make two comments that may or may not be too germane to winter ecology, the first one being that in my 3 years at Petersburg I've gone to the high school and we've had hunter safety courses, waterfowl identification, we put up signs -- the media in a small community like that is really saturated. Last year, the box score was four swans, one Peregrine Falcon, and one Osprey. There are a lot of people out there who aren't getting the message, and Sig said to me last night, "Simple, Jeff, you failed as a teacher." And he may be right, but there may also be a group out there who isn't getting the message and will not get the message. What we need to do, I'm not sure. I think we need to come out of our standard approach to this problem, tell the people to develop an appreciation, and naturally they'll see as we see, and agree with us. We need to build an advocacy for Trumpeter Swans, as Jim Bartonek pointed out. I think we need to start looking at some dynamic people management strategies. Now that I've stirred that up, I'll say I don't have those people strategies, but I think we need to start thinking about them, and get away from the documentaries. I'm not deemphasizing these type things, the publicity things, but I think we need to look at some other means of getting to people who aren't getting the message. Along with this, I might propose that The Trumpeter Swan Society establish a committee on conservation and education -- that name just sort of rolled out very easily -- to work on problems of this sort, and perhaps to align The Trumpeter Swan Society with other groups which are oriented toward species management. One that I'm a member of that comes to mind is the Raptor Research Foundation. Obviously, we are getting some raptors knocked off in Blind Slough, same as we are Trumpeter Swans. We have a common purpose. I'm certain there aren't any people here who are disgusted by the sight of a Peregrine Falcon and neither are any of our raptor people -- they're all pretty agreeable to Trumpeter Swans. What I'm saying, I think we should try and get together with these groups and pursue our common goals here of an advocacy for the Trumpeter Swans.

The next comment that I would like to make, hopefuly more brief than the last, is on pinning down some of our migration ranges. We don't seem to have this documented very well. We've talked. There's been a lot of talk about reintroduction and restocking former ranges. I know when Rodney Druen started with Sandhills [Cranes], they did a lot of work looking at migration routes, and apparently, their success in great part was through the fact that they had their migration routes tacked down pretty well. They knew what family groups they were working with when they started tampering with Mother Nature, and cross-fostering . . . . So, I think that, as Richard said, we need to really get our winter ranges down and our migration routes down, and make sure we have a handle on that.

SHEA: Thanks, Jeff. Rick.

DAVIES: A lot of the things I was thinking of were already stated, but I will reiterate on Vancouver Island, we're looking at this problem of shifting distribution of birds. Hopefully, some of the work being done by Rick McKelvey will give us some insight into whether these changes in numbers and distribution in some areas are causing any change to the habitat, or possibly give us some of the reasons. In the area I'm familiar with on Vancouver Island, I don't think we have any problem with actually protection of habitat. We have a very good habitat protection section. There's quite a movement on for protection of estuaries from any type of development. The Fish and Wildlife Branch has input to most of it, and also we have a very strong Federal fisheries act now which says, "Thou shalt not do bad things to estuaries."

The point brought out about education -- on Vancouver Island we have mandatory education for hunters. We have found that infractions relating to shooting of swans, other protected species, has gone down dramatically since we instituted that type of program. There's always some people who don't abide by it, but we find that the CORE Program -- I call it CORE, I can't remember what that stands for (it's a hunter education program tied in with work and schools) -- we found that it's been fairly effective, at least statistically, in reducing the amount of infractions.

One problem we do have on the Island, which I would like to get some thoughts on from people here, I would like to know what the stand of The Trumpeter Swan Society is on control of Mute Swans. It seems to vary with the individuals I've talked to. We do have a problem -- I don't know if it's a problem -- we have a number of them on southern Vancouver Island, a population of about 60, and it appears to have possibly doubled in the last 5 years. We have considered sterilizing eggs, shooting swans. Everything we come up against -- usually the naturalist groups, local residents, even fishermen, around the area -- they're attitude is, "They're our swans, don't mess with them." They like them around. So, we have that problem. But, one thing we are looking at actively on the Island right now is enumerating all swans, trying to get reproductive parameters. I'll say again, I'd like to get more feedback from the group on suggestions on possibly how to reduce the number of Mute Swans we have.

SHEA: I'd like to also support that we consider this once again. It seems like 2 years ago we discussed this, too, and the last 2 years haven't shown a whole lot of concrete progress in the war against Mutes. They are now in the wintering area in the Tri-state region. We've got at least 60 in one group, and scattered individuals moving out from there up to 200 miles from the core area. If we're talking about habitat pressures, we certainly don't feel very willing to share the habitat with these Mute Swans. Yellowstone Park has stated publicly they're going to shoot any Mute that dares cross the boundary into the Park, but the state fish and game departments have not been quite as willing to take a public stand on that issue.

I'd like to get the questions going now since you haven't had a chance all morning to ask questions. Anybody want to start here? And please use the microphone in the center.

KERNS: Okay, I've got a question directed primarily to the people that have been involved with the winter surveys. My question deals with the accuracy of the winter counts. For instance, what percentage of the area do you feel you're covering that the swans are possibly using in the wintertime? What difficulties are you encountering with being able to count the swans? I'm sure that when you fly over, if on the ground you are probably able to count nearly every bird, but say from the air, do you have a significant problem if there's snow on the ground around the water, or if they're sitting on ice, is there a loss in the count there? . . . yesterday and the day before, we talked a little bit about the pros and cons of having a bunch of collared birds, marked birds -- would an intensive program of more marking help us out in this problem? Would we be able to get useful data by an intensive marking program?

DAVIES: I'll take that part on accuracy of counts. We do all our surveys, or the ones I've been involved in, in a single engine Otter flying 60 to 80 feet off the water, sometimes up to 120 feet, flying about 80 miles an hour. All birds we circle, and two or three times get complete counts. With the system set up by Ian Smith, it takes us 4 days say to fly Vancouver Island. That's 25 to 28 hours. I think we cover, really count every little bit of open water on the Island.

KERNS: Rick, do you feel you're very close to 100%.

DAVIES: I think on Vancouver Island, yes. I can't say that for the mainland inlets. I was only involved in one survey up there . . . it also takes a lot of flying time and we do miss areas in there.

ISLEIB: As far as the Alaska coast is concerned, as I alluded to earlier, we have very sketchy information as far as the counts go. I have them for the Eyak Lake/River system for 10 years, and hearsay and a few scattered observations from other locations. It has also been shown we have some counts from Blind Slough in Petersburg. Southeastern -- I didn't mention when I included south coastal, I did not include southeastern Alaska. Southeastern Alaska can hold several times, or at least a multiple of what the rest of coastal Alaska does. I have heard some rumor to the effect, I think Bruce mentioned it, that there may be a winter waterfowl survey through Southeastern. Is that right, Jim King?

KING: Well, we keep looking at that. We don't have a very good capability for doing it at the moment. As you know, it's a difficult thing to do. I guess our difficulty is to move farther northwest because of weather in the winter. . . .

ISLEIB: Well, even at 35 years ago, Gabrielson observed 300 and 350 Trumpeter Swans in the Prince of Wales Island area in Southeastern. There may be several hundreds, or even almost into the thousands range of Trumpeter Swans in the fiords and island area of Southeastern, and so we could be dealing with a considerable number that we have no data on.

DAVIES: Could I add something, Ruth? If you look at the totals that we have down the coast of B.C., you have 2,000 in B. C., you have an additional 500 in Washington, possibly. You're looking at maybe 60 percent of the birds. I think I'll agree with the gentleman there that the section of mainland inlets north of the Charlottes up to Alaska is probably the biggest area in the B. C. section where we don't have good information. And as you say in Alaska, we don't. That's probably where we could pick up a large number of birds in that area, as you get your total up to account for probably 80 percent of Alaskan birds.

ISLEIB: A point that wasn't mentioned earlier, but I believe Bill Sladen's collared birds from the Copper River area have been reported as far south as the Columbia River Delta. Am I correct?

SLADEN: That's correct, yes.

ISLEIB: All the way to the Columbia River, to birds that are totally resident on the Copper. So, we have a potential of birds going as far as they can go and to birds that don't have to go anywhere.

SLADEN: I'd like to make a comment on that.

SHEA: I just wanted to touch the second part of your question there about having these collared birds on the wintering area, using them as some indication of how good the count is. Last winter, the U. S. Fish and Wildlife Service flew the Tri-state annual winter survey, and I believe the total number of collars seen was . . . less than a dozen. I think it was eight or nine. Do you know?

STROOPS: Eleven.

SHEA: It was 11, okay. The next 2 days I spent on the ground checking and I came up with about 43 that were in that study area, and they just . . . the birds were there and I think the birds themselves were counted, but the collars just did not come out. I want to put in a plug, though, that in our winter counts we have a real problem. The number of Whistlers in the study area appears to fluctuate from winter to winter, and not only has the U. S. Fish and Wildlife Service flown winter surveys, but Idaho Fish and Game flies a January survey, and it appears that very little effort in the past has been made to go out after the survey and figure out which species of bird is being counted. And since the summer counts are no longer annual, I think any management decisions that are being based on winter counts, you know, we're including Whistling Swans in these population surveys, and that I think is a real problem in this region.

HUGHES: I'd like to make a comment on winter surveys before you go on. In the Petersburg area, we maintain year-round waterfowl surveys on the Stikine Flats and another large estuary, Farragut River. Large -- they're not large by Interior standards, here again, but in the winter, most of it's pretty steep country, and I think if we had a lot of swans they would be down in the salt water. And in our area -- from Juneau, Wrangell, Petersburg, Ketchikan -- there's a heck of a lot of air traffic through there. If there were large numbers of swans wintering, I think we'd probably know about it. We fly our area on the Stikine River and Farragut, and we aren't finding any with the exception of Blind Slough. I have to believe that, as I said, if there were large numbers out there -- large meaning groups of 10 or more -- I think they would be noticed. I really do. Don't you feel that, Sig, Jim, just in your comings and goings?

KING: We've been wrestling a little bit with the problem of where they were going, after we decided we had more ponds and breeding areas than we had originally thought. I think this morning session is really interesting because it's the first time a group of people have gotten together and discussed it. My feeling is, well, we're talking about what? -- something like 9,000 miles of coastline in British Columbia, and we figure about 13,000 in southeast Alaska alone before you get up into Pete's end of it. So, we're talking about a 20 to 25,000 miles of this indented, island-studded coastline. And it is exceedingly difficult to devise any method of consistently looking at all of that. But, as Jeff pointed out, big concentrations of swans do attract attention, and we just haven't got them. We're not getting them, of course, in big numbers, and that to me is why it's significant to hear a description of two of the little populations in Southeastern from Pete Isleib and Jeff. And I think that's the nature of them, that they're scattered in this immense country in little pads like that, and all people who have observed those know that the weather effects how many stay. They apparently are able to move a little bit, if the weather conditions are unfavorable in one area. They're wintering along the whole coast on a somewhat opportunistic basis. They flounder around from place to place according to where they can find freedom from disturbance and a food supply. The other feeling I got today is that we're making progress, short of having a massive air attack on the thing. We're really beginning to get a picture of what's going on, and by picking up bits and pieces . . . .

ISLEIB: Jim, do you have notes or access to Gabrielson's flight data from 1944 and 1945 in the Prince of Wales Island area? Check out that particular habitat he flew at that time.

KING: I haven't looked at that for several years, some years. There are old figures; some of them air figures and some of them from boat trips.

ISLEIB: I do get reports of individuals or just pairs, and like a couple of years ago there was an individual in the Seward Boat Harbor, for a while. You get where you would know that not regularly could you find a bird any time of the year -- there's a bird.

KING: We had an adult and a juvenile winter in Juneau several years ago and they stayed in freshwater ponds until the ponds froze up, then the swans moved to the mouth of the river. As soon as the freshwater became available, they came right back into the freshwater.

ISLEIB: There is a big problem with areas on the Gulf Coast with the returning migrants arriving so early in the spring, in March, that it is still midwinter for all practical purposes. As a matter of fact, we get most of our snowfall after that time. But people think they're overwintering. You might have large numbers of swans arriving in March, and they are really migrants, not overwintering birds. And sometimes the birds are so late into December before they leave the area, that they're not really overwintering there. They depart there. They may attempt overwintering, but then they depart.

SHEA: Are there further questions?

MACKAY: I'd like to corroborate what Jim just said. It's been 25 years since I've made any surveys up the coast of B. C., but this was one of my first responsibilities when I joined the Canadian Wildlife Service, to try and get a total count on Trumpeters in B. C. And all those inlets up the coast from Vancouver right up to Alaska have an awful lot of estuaries and ends of the inlets and the ends of the islands, little bays, and you find the swans along there in scattered family groups, maybe half a dozen here, a dozen there, 24 here, and all the way up. It's hard to survey those areas in the wintertime, I can tell you that.

OLSON: I just want to make one quick comment. I do think that there may be opportunities to get a little better handle on what is actually occurring throughout Southeastern relative to wintering swans. There is quite a bit more human activity out there now than there has been in the past due to the fact that there's quite a bit of logging going on, various other activities going on, road systems on some of the islands exist now, and logging communities exist. So that there is the air traffic that Jeff was pointing out and I think that a program of alerted people who -- the type of people that you were talking about, Pete -- could give us a little more insight than we get. It's still going to be tough to do a good job of swan inventory throughout Southeastern. But, I do think there are areas that are known, and that we can look at these a little harder than we might have been able to, say 5 or 10 years ago.

ISLEIB: I'm sure people like yourself and Jim who know scores of pilots and trappers and bushmen, that if you consistently go back and question them, like I have in certain cases for geographical areas, you can get an indication whether or not you should spend any more time.

OLSON: I think that's true. And there are known areas such as Sackard Lakes and Sweetwater Lakes, and a few areas that traditionally the old-timers know that the swans occurred there. And then I also think it's important that we realize that this sort of rubber band of expanding and contracting of areas that are used by birds as weather changes. I think that we have quite a bit of habitat available, but because of the changing weather it actually doesn't have a high carrying capacity when you get right down to it.

ISLEIB: As far as Alaska's and northern British Columbia's still concerned, we're still documenting what's there. We're still at ground one; we're still at stage one, whereas further south we're dealing with possible additional wintering grounds. We're trying to find areas for additional bird populations. That's an observation.

BLAU: My name is Forrest Blau. I have three separate comments and questions to address. One is a little gap in information that hasn't been addressed here which I feel I should at least add my two cents or five birds to -- and that is, I live down on the San Juan Islands in Washington State, which are just east of Victoria on Vancouver Island. There, occasionally, we do get overwintering birds. In 1976, on one very small pond of less than an acre in size, there were five Trumpeter Swans overwintering there. Also, because of that report being out in a local paper, a few other reports came in -- one from Orcas Island, which is the largest island in that group. That wasn't covered at all in the Washington State report. So, the San Juan Islands also get a handful of birds. There, I believe, almost all the birds are on private ownership in that particular case. There are documentations of that [with] pictures . . . .

I'd like to make this point to Jeff Hughes. You're making perhaps a plea to attempt educating people in Southeastern as far as hunting goes in regards to protected species, and endangered species. The thought jumped to my mind, having worked as a shipboard naturalist on Marine Highway System for the Forest Service, that is an excellent avenue of bringing out this type of information. You not only get all the summer tourists, but you also hit the day-to-day travelers that live in southeast Alaska. Every year, we do eagle counts, [from ships of the Marine Highway System], and between the Forest Service and cooperative agreements with the Fish and Wildlife Service . . . I think there could be swan posters as part of the orientation program that happens every year. Perhaps something like that would be brought up. . . .

The largest planning going on in the State. . . . What's happening, I feel, day-to-day with Southeast and what is going on, the formulation of the program is basically at the local level, and that's the thrust of the 1977 Alaska Coastal Management Act, the State Act. The thrust of it is to do local, which is called district plans, and can be municipalities, cities -- Anchorage has an ongoing plan and southeast Alaska -- the five plans ongoing now include Juneau, Haines, Craig-Klawock, Annette, and Ketchikan, the Borough of Ketchikan. In each of those areas, our department tries to work as best we can . . . to identify critical habitat, fish and wildlife populations within those study areas. There is a definite mechanism to address, perhaps not only endangered species, but protected species under this Act, and try to get them addressed at the local level. Information is dearly needed, and wanted, for all species, but there are mechanisms for protecting those that are in critical habitat problems, or endangered species. So, I have contacted a few people here, and know them personally, who deal with Trumpeter Swans, or other wildlife management. I have maps here with me for southeastern Alaska, for the whole area from Yakutat south, and I've brought information as far as numbers, Trumpeter Swans there, as well as winter habitat, critical areas which we can't have the locals and State planning address, and hopefully do a better protection job.

SHEA: Thank you. Sounds like we can really get something done if we just get with the right people.

ISLEIB: I might comment that it is ongoing right now. I'm on the Coastal Policy Council, and I'll be reviewing, or I'll be a portion of the Council that will be reviewing all these plans as they come forth . . . . That's one of the main criteria as far as environmental considerations, that these things are taken care of.

BLAU: I just wanted to bring to light in case you aren't aware of it, and you very well may be, that State Act talks about "uses of State concern," and within "uses of State concern" are "uses of national concern." That information is suppose to be gotten together by State agencies and given to the districts for their planning efforts. To date, funding in the program is just addressed to the Cook Inlet area, and southeast Alaska there are more district plans ongoing than any place else in the State. We haven't provided that information to the districts. I'm the person responsible from our department to deal with Southeast on this basis. There's a manpower problem and a mapping problem, etc. So, these district plans are suppose to come out and have these things in them. But, to date, the ones that I've reviewed and seen, there's a lot of questions in my mind as to how well they will meet certain sections in this . . . .

ISLEIB: I suggest that you also discuss some of this with Cal Lensink. When you are talking about areas of state, or local, or regional concern, you're also talking about critical habitat, local critical habitat, regional critical habitat, state or international critical habitat. So to get some definitions to work over this -- it's a good suggestion.

BLAU: Cal has come over to our office . . . .

SHEA: Skip Ladd.

LADD: This is a question directed either to Pete or the fellow who just spoke. In an area like Southeast, where you have a good deal of Federal land, how is the coastal zone planning group approaching that? In other words, their designations, and how will the Coastal Zone Management Plan eventually impact on those Federal lands?

ISLEIB: There is a Federal consistency requirement. Now, the municipality or the borough will develop the plan through consultants, or somebody else. They will develop the plan. Then it will come to State Council for approval, or rehashing. But, in the unorganized areas, which includes most of Alaska coastal area, especially all of south-central coast from northern Southeastern all the way to the Kenai Peninsula, it's unorganized. There will be no plan until a . . . for several years down the road -- at least a couple of years down the road, and they will be incorporated -- I don't know how in such a way, yet -- they're talking about a regional resource service area, getting people together within this unincorporated area, and coming up with some kind of a plan. It will be more or less State supported. But, the plan is supposedly a local plan that requires State consistency and Federal consistency. There's going to be problems with this.

LADO: Okay, just to follow up on that a bit, taking for an example, say, Forest Service land in the Tongass Forest in Southeast. If a local government were to develop some kinds of designations, for example, critical habitat for some particular wildlife species, how would that designation affect Forest Service operations, or vice versa, would the Forest Service be bound to, I guess, comply with anything that the Coastal Zone Plan said that it should comply within terms of protection of critical habitat?

ISLEIB: After it's approved, yes. Let's take Gateway Borough, in Ketchikan, which produced a plan for that area. Once it's finally approved by the State Council, it's pretty much rubber stamped by the Federal government, because the plan has been approved . . . . So, there's a Federal consistency requirement, but in making up that plan, the Forest Service has a very important part to play.

LADD: Okay, conversely, if we have, for example, a National Wildlife Refuge that was in a coastal area, Aleutian Islands might be an example, and the local government agency decided that the best use for a particular part of that refuge would be timber development, then would the Federal government and the Fish and Wildlife Service be bound to go along with that even though maybe they had input, and maybe their input was to recommend against that designation? I don't think they'd be bound to go along with that designation, from my experience with Coastal Zone Management in Washington.

ISLEIB: Well, they would if it got that far. But it wouldn't get that far. It wouldn't even get that far, because it would have to comply with all your management plans within the area. You're consistent already with existing laws and regulations. We're not superseding the regulations.

SLADEN: I have a few comments, mostly centering around neck bands. First of all, I am absolutely delighted to see representation from the military. I have one question . . . I'd like to ask one question first. I think that Jim King and I have been rather resisting neck banding any more Trumpeter Swans in the Alaska area, other than continuing with the Kenai and Copper River Delta. I think we ought to break this resistance down and try and get some neck-banded birds elsewhere in Alaska. Our results from neck banding are very, very much more successful with adults than with young, and I'm sure Ruth and the Alberta people will vouch for this. But there's one question before I go into the other questions and discussions, is about your Wainwright survey. First of all, I'm concerned about this 50-percent reduction and I was just wondering if it's the way that it was surveyed. For example, a helicopter is a very different machine from a Beaver that Jim King may be flying in, and how high do you fly over, what time of the year was it done in relation to Jim's survey, etc.?

SHEA: Bill, are you going to relate this to winter habits somehow?

SLADEN: No, I just have questions. These birds just disappear. You won't get an accurate census (then all the rest will be winter habitat). They can just disappear, even our Whistling Swans disappear in the tundra when we fly too low. Maybe you have some comments on that.

GRIESE: First of all, when I made the presentation I cut off a lot of the information we had. The 50-percent reduction took place between 1968 and 1978. The census that we conducted -- make that comparison we've done -- now we did a very similar survey over the same area and came up with approximately 10 more nonbreeders that had not been in the area previously, and that was conducted on the 1st of September. So, we suspect that depending upon the dates of Jim's census, the comparisons will vary a little bit. By using the September 1 data, comparing it to last year, or 1975 data, there's no great amount of change. Production has continued to be consistent from year to year, for the most part.

KERNS: Go ahead and talk a little bit about the methods we used.

GRIESE: What we used -- the first census we made was from a Huey helicopter that holds seven people. We had four observers, including the pilot. What we did was travel through the waterways . . . identifying ponds, lakes that would appear to hold swans, usually sizes of one acre or thereabouts, and larger lakes. We traveled usually between 200 and 400 feet elevation until we observed an area. We could see swans at that elevation, and went down to as much as a 100 feet or so to identify whether cygnets were present. But, I used approximately one mile each side of the helicopter, to identify the area covered, and looking at the maps that Jim had, or Dan Timm had . . . I prepared the data.

SLADEN: Thank you. Helicopters are superb machines for catching swans and maybe we should discuss this. I think it would be great to get some of your swans banded. There is another comment, from the point of the Yukon Territory, it would be really interesting to have some of those birds neck-banded. Particularly interesting, because we might see some of them over in the east. I think it's more likely they'd come down with the rest. But, if you have any ideas, I'd be very interested to know where you think those Yukon Trumpeters are actually wintering.

MCKELVEY: It's purely speculation, but it seems logical that they would probably be from the Grande Prairie group, and go with them. But it's just a guess. Since the birds were generally seen on the east side of the Tintina Trench, which is a continuation of the Rocky Mountain Trench, I feel they would likely go through the center of the continent, rather than coming to the coast.

SLADEN: It would be very interesting to have some of those birds banded. All the Whistling Swans, of course, come to the east from the northern slope and from the Mackenzie Delta.

HUGHES: Have you given any thought to some satellite tracking instead of neck collars?

SLADEN: There are some thoughts going on satellite tracking and swans could be easily the best birds to start with. There's some scheme afoot to do it on raptors, which I feel is very bad, because the raptors are not the best bird to test this out. I think swans and albatrosses are the best. But anyway, that has nothing to do with wintering habitat. Then comes to mind Dan Wilson [Trumpeter Swan Society member, Ladysmith, BC], [some of his observations could be verified] if only you could just band a few of your British Columbian birds. You could answer that question [about Trumpeters] going from east to west on Vancouver Island -- just a super opportunity to do that. We are getting displacement of our Whistling Swans 200 miles from the polluted Chesapeake Bay. We're finding those same birds to be feeding at East Neck Island National Wildlife Refuge, 200 miles further south in North Carolina. So, it's a perfect way to answer some of those questions. And, a question to you, Ruth. What percentage of the Alberta neck-banded birds did you resight? You've given us totals of neck-banded birds, but I'm very interested in the percentage of resightings, resighting rates, and in relation to young and old. . . .

SHEA: You mean from one year to the next, or several times through the winter?

SLADEN: Yes, we need to find out more about band loss, and you brought up an arbitrary figure of one-third. But, also we're very interested to know what success these neck bands are having insofar as resighting rates, both in adults and young, and whether they're doing the young any harm. We have no evidence as yet.

SHEA: I'll have to go through my data and let you have that later.

KING: Just a short comment about the neck collars. We have an international protocol, we don't have an Alaska protocol. We think that we're getting expansion of the coastal population, particularly in the Gulf of Alaska into the Interior. This is the reason for not collaring in the Interior. If we can get a really good sample of collars in these coastal areas before we've done any collaring in the Interior . . . well, it's hard to look at them in the Interior. There are not very many people that are doing it. So, we might want to consider that before you start any collaring program in Fairbanks area.

SLADEN: I think we agree with you, Jim, so why don't we continue that? But, I'd also like to make a plea for adhering to the international protocol. This is a little distressing to find that Alberta without any knowledge to us, and even knowledge to the Fish and Wildlife Service Banding Office, has been using orange, which we have especially kept aside for the Russians in Siberia. Now we're getting Bewick Swans and yellow-billed swans coming into western Alaska. I think we ought to really very carefully review any change of the international protocol. I put that out because I'm going to make a recommendation that we have a technical group coordinating this. I meant, to be coordinated on an international basis, but I find it is almost impossible to do this. So, I do put that out as an appeal, that we need to be all working very closely together on these marking methods. And this applies to dye as well as neck bands. Dye is a super method of defining wintering populations without having to put neck bands on them. We can answer many, many things with dye, as we have with our Whistling Swans.

ISLEIB: I might comment on Bill's last "dye" -- it's quite remarkable to stand out here near Potter Marsh near where Cal lives, 15 years ago, or maybe 16 or 17, and watch a big "V" of Whistling Swans come over the mountain against snow background, and all of a sudden a couple of pink ones show up. You can spot them out there many miles away. I don't know the details, now, but whoever was responsible had a great amount of imagination.

SLADEN: That was Tom Berry. When he heard the Russians were dyeing Snow Geese on Wrangell Island pink, he rushed out and dyed some of the swans pink.

SHEA: I'd like to make a comment on this dyeing of plumage. After searching southern areas for Trumpeters amongst a thousand or two thousand Whistlers, I felt that neck collars are not going to be the tool that will show us from an aerial flight that there is maybe five Trumpeters out there among a thousand Whistlers, unless we want these refuge managers in the southern areas to totally devote their time to searching for Trumpeters. But, at the level of effort that's being made presently, it would be necessary to dye the plumage on Trumpeters to get them to be noticeable among Whistlers, if they're there. I just mention this as a possibility -- if we go seriously into looking for new wintering areas, that the vastness of the areas, the number of Whistlers, and the difficulty of viewing, I think is . . . we may come up with a lucky neck collar that does the job, but the dyeing of plumage might have a greater return for the effort involved.

ROBBINS: I'd like to make a little suggestion that possibly some of these problems could be posted in local papers in areas . . . where these birds might be. Some of the ornithology magazines have little items in the back and everybody that sights a green owl or blue owl or whatever, notify so and so. Along the coast here where there was a question where some of these birds may be hiding, you could put an article in all of the local papers along that area, if there are any towns in that area. . . . A year and a half ago I didn't know there was a Trumpeter Swan Society, and it's much easier for these swans to hide in 25,000 miles of coast than it is for the Society to hide in the United States, I think.

ISLEIB: Yakutat's about 170, 180 miles away, Jim, from Cordova? That's the next village down the coast. There's a lot of shoreline.

ROBBINS: Yes, but many of these people see these birds. . . . They can tell 10 neighbors, but the 10 neighbors don't tell you, you know. But, if they read this in the paper, and they saw Fish and Wildlife, or say your name, they could drop you a line. Stress the importance of the people to know where these birds are.

ISLEIB: That's a valid point for Southeastern.

SHEA: I think for our area, too, we'll get a lot more done with public support . . . . The interest is there, they just need some information to start them off, both in sighting and in preventing this malicious shooting. We're having shooting right in Yellowstone Park of Trumpeter Swans -- well, one of the cygnets got blasted right from the road. We're getting public sentiment aroused, making that intolerable -- the guy gets lynched, which is a good solution.

DAVIES: I think one of the reasons why we've been able to set up a really good inventory system for swans on Vancouver Island was because Ian Smith, when he first became biologist, was quite interested in swans, and he got a sighting program going with all industry people -- logging industry, which is the main industry on Vancouver Island. He put things

in the paper, he gave talks at schools. What it amounted to was, each winter we would get in a sheaf of papers about that thick on swan sightings -- where they were sighted, how many, and just all sorts of information. That enabled him to identify just about every area where you'd have swans. It formed the basis of our whole survey system. And that was only one individual -- he got things going and it worked pretty good.

SHEA: We are down to the last 5 minutes, so if you have questions, get them in here fast.

LADD: I was just going to mention, there's another good example of using key folks around -- that're laymen, not necessarily professionals . . . to provide good biological information, and that's with Ducks Unlimited Key Man Program. They have a system of laymen, quite often farmers throughout the prairies in Canada that annually provide biological information on habitat conditions and waterfowl populations. The same type of a system of people could be established for Trumpeter Swans or any other particular species that you're interested in.

SHEA: Here comes the Top Cob.

ST. ORES: I'll respond to the panel's question on the Society's stand on Mute Swans. We did contact both Canadian Wildlife Service and the Director of U. S. Fish and Wildlife Service about a year and a half ago, as I recall, expressing our concern to them. We received a sympathetic response back from both agencies saying they agreed with our concerns, but in the meantime, apparently, at least to the best of my knowledge, there has been no action along those lines. It is time to stimulate now and ask for action. I have a letter on my desk, back in the office, along those lines, and I'll turn that over to the incoming Cob.

SHEA: I don't see George Brakhage running to say anything, so we won't ask Fish and Wildlife . . . want to say anything about Mute Swans? Are there any other comments or questions? Panel members? If not, that wraps it up.

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