OVERVIEW/COMBINED HISTORY OF AERIAL MIGRATORY BIRD SURVEYS in ALASKA

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Introduction

Alaska, because of its geographic position in our world, is a very important place for the North American continent's migratory birds, especially for summering waterfowl. This document is an attempt, by the author, to put in one place an overview and highlights of the combined, varied history of aerial surveys of migratory birds (mostly waterfowl), mostly in Alaska, by the U.S. Fish and Wildlife Service (USFWS), with references to where to look for more detailed information and a listing of some of the people involved. It is an attempt to 'tie together' and expand on some of the various parts, in a chronological/logical order, concentrating on the three Alaska field Projects and reflects my personal perspective.

I start with a brief thumbnail snapshot of the most important dates, events and people involved as written by James (Jim) G. King in the early 2000's. Gabrielson and Lincoln present a more detailed account of the early history of bird work in Alaska (Birds of Alaska 1959). From those, I attempt to expand and update the relatively recent major work by the Migratory Bird Projects of the U.S. Fish and Wildlife Service (USFWS) involved with aerial surveys in Alaska. Major work has been accomplished on and by personnel of the National Wildlife Refuges (NWR) in Alaska and also federal wildlife research agencies, but I do not attempt to include that in this overview. Apologies are extended to those accomplishments and people that I may have overlooked and missed. Also, memories can be deficient as time goes by. I am no exception and I include some memories of mine, in a few places, as I remember them. In any treatise of history, finding the appropriate edge for what to include and leave out is a challenge. Please consider my attempt and accept my shortcomings in this regard.

THE ALASKA WATEWRFOWL PROGRAM.

120 Years of Inventory and Habitat Protection by the U.S. Government - Reflections by Jim King

Waterfowl of the great Alaska marshes no doubt fascinated the first human observers even as they have everyone since. Written Alaska bird records began with the Vitus Bering expedition of discovery in 1741. The need to develop an understanding of the status and needs of Alaska birds began perhaps with Edward W. Nelson in the late 1800's.

The beginning of the 21st century finds remarkable continuity in the Alaska waterfowl monitoring program that has evolved and an even more remarkable inventory of protected habitats. This perhaps results from the high level of professional freedom those willing to work in Alaska have always enjoyed and expected. The small FWS waterfowl staff continues adding to the long term data sets while maintaining a leadership role in the adaptation of new aviation and computer technology.

As a participant for the past 50 years, this is my view of the most important elements in the history of Alaska waterfowl conservation. There have, of course, been many important local and regional studies that have enhanced our understanding of Alaskan birds and that will loom large when someone writes a

book on the subject. My apologies to a large number of important contributors too numerous to name here. My thanks to Bruce Conant for review and help with describing the more recent events.

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1877-81 – Young Edward W. Nelson spends 4 years in western Alaska. He spent the rest of his career with the Bureau of Biological Survey ending up as Director (1916-1927). Nelson was a primary negotiator for the Migratory Bird Treaty with Canada (1916) and the Alaska Game Law (1925). Nelson did not write a grand plan for a century of Alaskan waterfowl conservation, but rather developed some tools and attitudes that a series of biologists, guided by a sense of what birds need, have been able to use ever since.

1887 – E.W. Nelson's Alaska bird report published with an update by Henry E.M. Henshaw and the most complete Alaska bird bibliography so far. Nelson expresses concern for the heavily hunted Emperor Goose.

1909 – President T.R. Roosevelt's executive order establishes the Yukon Delta Reservation for bird protection, no doubt at the urging of Nelson.

1919 – Alfred M. Bailey dispatched to Alaska by E.W. Nelson to report on game conditions and make conservation proposals.

1922 – Yukon Delta Reservation abolished by President Harding due to lack of funding and staffing.

1924 – Olaus Murie and Hebert Brandt, at behest of E.W. Nelson, lead the first ornithological expedition to the Yukon Delta at Hooper Bay. Murie does first Alaskan waterfowl banding.

1925 – The Alaska Game Law establishes the Alaska Game Commission and the first semblance of an Alaskan conservation department.

1930 – Sam O White, Game Agent in Fairbanks, invents wildlife flying with his own airplane. White makes first attempt to restrain spring duck hunting around Fairbanks.

1937 – Hazen Bay National Wildlife Refuge, Kigigak Island (6,800 acres) off Yukon Delta, becomes the second Alaska NWR established for waterfowl, including Emperor Geese. This is now part of the Yukon Delta NWR.

1940-41 – Charles E. Gillam, first generation Flyway Biologist (not a pilot), continues waterfowl studies and banding east of Hooper Bay providing colorful reports.

1948 – Clarence J. Rhode (former Alaska Game Agent, former Aircraft Supervisor, experienced bush pilot and dedicated conservationist) becomes Regional Director (FWS - Region 6) and Executive Officer of the Alaska Game Commission.

1948 – FWS Director Albert Day begins to increase funding for Region 6 and initiates assignment of Federal Aid (Pitman/Robertson) biologists to Alaska, including Urban Nelson and Robert Scott, who begin developing a waterfowl program.

1948 – David L. Spencer (student of Aldo Leopold, prewar refuge biologist, wartime amphibious airplane pilot/instructor, first waterfowl survey pilot to Mexico and Guatemala and inventor of the segmented

transect for sampling prairie duck populations still used today) transfers to Alaska as Kenai NWR Refuge Manager and shortly becomes Refuge Supervisor for Alaska.

1948-73 – Theron Smith (lifelong Alaskan, WW II bomber pilot and bush pilot) develops the Alaska FWS Aircraft Division. Rhode's wanted as many of his staff flying as possible. Smith, with his own brand of pilot training/supervision, largely fulfilled that dream. He also developed a mechanic/technician team that modified airplanes for wildlife flying and built an HF radio network that had those in airplanes, vessels, cars, offices and anxious wives all over Alaska talking to each other.

1949 – D.L. Spencer does first experimental aerial duck surveys on the Yukon Delta and determined that the prairie duck sampling method will also work in Alaska. Spencer describes A*merica's Greatest Goose-Brant Nesting Area.*

1950 – Cooperative Wildlife Research Unit was established at University of Alaska Fairbanks. Neil Hosley (1st Leader) and John Buckley (2nd Leader) begin to get students interested in waterfowl.

1950-55 – Federal Aid biologists, U.S. Game Management Agents and University of Alaska students identify principle waterfowl production areas, establish survey transects, do some production studies, band some 16,000 geese and 8,000 ducks. Urban C. (Pete) Nelson does annual report on waterfowl breeding ground conditions in Alaska.

1955 – Henry A. Hansen (WW II fighter pilot, Washington State University Instructor and Game Department biologist) comes to Alaska as Supervisor of Waterfowl Investigations with a mission to coordinate all the Alaska waterfowl work.

1955-64 – Hansen with Pete Nelson documents goose distribution from Alaska; with Calvin J. (Cal) Lensink perfects the Breeding Pair Survey design that persists for the next 45 years; with Peter E.K. Shepherd initiates Trumpeter Swan studies that document their continued expansion; with James G. (Jim) King develops duck drive trapping techniques that produce recoveries from all across the US and Canada; with Robert D. (Bob) Jones develops technique for assessing annual Black Brant productivity at Izembek Lagoon and so on. Hansen did his work well as these efforts have continued to the end of the 20th century and beyond.

1955-02 – Perhaps most important, Hansen became a sort of missionary for waterfowl projects to the staff of the Branch of Refuges, Branch of Research, Alaska Department of Fish and Game and the University of Alaska, whose people are often stationed in remote villages and camps where they are very grateful for such contact. This is a role that wide ranging Waterfowl Project pilots have continued.

1958-59 – Clarence Rhode disappears in the Brooks Range, not to be found for 21 years. Alaska becomes a State. Region 6 abolished and a much reduced Alaska FWS operation becomes part of Region 1.

1959 – Ira N. Gabrielson and Frederic C. Lincoln publish *Birds of Alaska*, perhaps the best regional bird book ever by two of America's foremost ornithologists. Gabrielson, as FWS Director in the 1930's-40's, had directed himself to Alaska almost every summer where he traveled everywhere by Service vessels, airplanes and automobiles making voluminous notes and putting up some 950 study skins. Lincoln, who as first Director of the National Bird Banding Laboratory, had been first to describe North America's four Flyways showing Alaska at the top of each. Here he describes three more Flyway routes (an Arctic, a

mid-Pacific and Asiatic) all used by waterfowl and other species that nest in Alaska. The book includes a history of Alaska ornithology and 55 pages of references. For the first time since Nelson's book in 1887, there was a comprehensive reference on Alaska birds. Nelson's fascination was underscored and enhanced by Gabrielson and Lincoln.

1960 – An Executive Order from the Eisenhower Administration (Fred Seton, Interior Secretary) establishes waterfowl refuges at Izembek Lagoon, Yukon Delta (later to be named Clarence Rhode Refuge for the missing RD and renamed again as the Yukon Delta Refuge in 1980) and the Arctic National Wildlife Range. These refuges had been a long standing dream of Clarence Rhode, Dave Spencer and the Juneau National Wildlife Federation Board member A.W. (Bud) Boddy. Failure to get these refuges established by Congress had resulted in a successful appeal to Secretary Seton.

1960-63 – The Rampart dam study was accomplished. Conventional wisdom of the first half of the 20th century implied that duck nesting habitat in the far north was safe and that any conservation funds were needed in the southern mid-continent. Some 18,000 ducks were banded on the Yukon Flats, in a crash program in 1960-61, and provided direct recoveries in 34 US states, 6 Canadian provinces, 2 Mexican states, the Dominican Republic and Panama, changed that concept. Suddenly the proposed Rampart dam, that would flood 10,800 square miles of duck nesting habitat, producing a annual fall flight of some 1.5 million ducks, caught the attention of hunters and conservationists across North America. The International Association of Fish and Wildlife Agencies, with members from all states and provinces, strongly opposed the Rampart dam. The tiny Alaska Waterfowl Project had done a good job. It is not clear whether it was economics, politics, Native issues or ducks that stopped the Rampart dam, but repercussions from the ducks continued.

1964 – Jim King (former Game Management Agent, former refuge manager, FWS nurtured wildlife pilot/biologist) replaces Hank Hansen as Alaska Waterfowl Supervisor who transfers to the continental survey program in Washington, D.C.

1964-83 – Twenty more breeding pair duck surveys, as designed by Hansen and Lensink, were completed. Banding studies delineate the distribution of white-fronted geese to two western Flyways and diving ducks to/from the Yukon Delta to the eastern coast of Siberia. The first description of the major goose molting area north of Teshekpuk Lake in the National Petroleum Reserve, where 15 to 20 percent of the world's Black Brant molt, was produced. Three Trumpeter Swan censuses were flown which show an increasing population trend, thus they were removed from consideration under the Endangered Species Act. At the start of this period, FWS was at its lowest staffing level since WW II as the new Alaska Department of Fish and Game took over management of resident wildlife. The Waterfowl Project was called on to look at some other avian resources. An aerial sampling system was designed and flown, for bald eagles, in southeast Alaska with Game Agent Fred Robards. It disclosed a nesting population of some 7,000 bald eagles and led to a cooperative agreement with the US Forest Service that helped save thousands of eagle nest trees that hitherto would have been cut down as part of log sales. Experimental air and shipboard surveys in the Bering Sea disclosed that the use of wetland duck count procedures also worked for birds at sea. When the Outer Continental Shelf Environmental Assessment Program (OCSEAP), under President Nixon's 1974 Project Independence for oil was being developed, FWS was ready with an extensive seabird study proposal. This resulted in a new Service program, under Cal Lensink, that described millions of seabirds feeding in Alaska waters and produced a catalog of over 1,000 seabird colonies where some 40 million seabirds nest. Though there was no

demand for it at the time, 4 species of loons were added as a regular part of the annual breeding population pair duck survey creating a record that became a matter of considerable interest.

1970 – Gordan W. (Gordy) Watson (former River Basins biologist, pilot, resource economist) returns to Alaska as Area Director, a position that evolves into Regional Director for the newly established Region 7 based in Anchorage. The Waterfowl Investigations Project, of the former Region 6, remains in Juneau, but becomes part of the Regional Migratory Bird Program under the coordination position sequentially by Jim Bartonek, Dirk Derksen, Wilbur (Skip) Ladd and others.

1970-80 – With Alaska's federal lands rapidly being parceled out under the Alaska Statehood Act of 1959 and the Alaska Native Claims Settlement Act (ANCSA) of 1971, farsighted congressional leaders decided to look at what lands could be added to the National Park and National Wildlife Refuge systems. FWS Director Spencer Smith, thinking of how much Duck Stamp money it takes to buy an acre of wetland in the lower 48, advised that he wants a proposal for every acre of Alaska waterfowl production habitat possible. The Waterfowl Project submits a proposal for each of the duck breeding pair survey strata. In a follow up to the Rampart dam publicity, most state and the national conservation organizations support these proposals. The Alaska National Interest Lands Conservation Act (ANILCA), signed by President Jimmy Carter in 1980, includes 7 new refuges and additions to existing refuges of 22 million acres of prime Alaskan duck nesting habitat. The Rampart banded ducks served their fellows well.

1972 – N754 is an airplane for conducting waterfowl work that was developed by Theron Smith and chief mechanic Jerry Lawhorn of the Alaska Aircraft Division. They began experimenting with using turbine engines in FWS airplanes, first with a Grumman Goose and then with a deHavilland Beaver airframe. Trial flights in the beaver began in 1972. Eventually, N754 was modified to improve outward viewing visibility and increased endurance/range. The final product reduced pilot effort/fatigue and improved efficiency, becoming the best bush waterfowl survey airplane in the world. Survey costs were reduced as survey teams could cover a third more territory in a day.

1977-2000 – Rodney J. (Rod) King (Alaska trained wildlife pilot) joins Migratory Bird Management and eventually is assigned to Fairbanks. He monitors waterfowl on the Arctic Slope on state owned oil fields, the National Petroleum Reserve and the Teshekpuk goose molting area. When BLM produced an EIS for oil development in the Petroleum Reserve, the only broad scale water bird population and distribution data available came from his work. Rod also carefully gathered eggs for restoration of Trumpeter Swans in the Mississippi Flyway without damage to the Alaska nesting population. Ed Mallek (Alaska trained wildlife pilot/biologist) followed Rod as Project Leader of the Fairbanks Project.

1978 – Bruce Conant (ex-Navy pilot, Alaska wildlife pilot/biologist since 1972) was assigned to the Juneau Waterfowl Project in the first expansion of staffing since 1955. Karen S. Bollinger (research biologist) joins the Project and measures Alaska coastal and intertidal characteristics from 1:63,360 scale USGS maps. Steve Cain follows as wildlife biologist and then Debbie Groves (wildlife biologist, computer technician, exceptional aerial bird observer).

1983 – Bruce Conant assumes Waterfowl Project Leadership in Juneau as Jim King retires and accepts rehired annuitant status. Bruce is shortly joined by John I. (Jack) Hodges (wildlife biologist, biometrician, computer programmer, developing wildlife pilot).

1983-02 – The Juneau waterfowl team continues to archive repeatable data that will perhaps be most valued by those wrestling with conservation problems in the decades ahead. Continuity of the Breeding Pair Duck Survey, designed by Hansen, is meticulously maintained now through some 45 years. New visibility correction factors for the Alaska survey have been developed using helicopters. A simplified computerized method of transcribing and transmitting Breeding Pair Survey data, developed in Alaska, has been adopted by Flyway Biologists across the country. The Juneau staff now does the annual winter inventory for the West Coast of Mexico (and Baja). Four more comparable Trumpeter Swan censuses are added to the preceding 3, under the every 5-year plan, with all data computerized for easy production of map overlays, tables and graphs. Size of the Tundra Swan population has been measured by a pioneering plot survey. A baseline for water birds, summer and winter, in the vast and complex waters of southeast (Alaska) has been developed through 5 years of air and boat surveys. A review of breeding pair duck data back to 1964 shows that changing observers has less to do with annual totals than changing airplanes (i.e. using N754). The upgrading of N754 continues with new electronics including computer screens on each side that display a moving map that simplifies navigating on transects and plot counts. A recording system is developed that attaches a latitude and longitude to each observation so a map of every bird location can later be printed out. There is an increasing ability to promptly print out bird data, in a variety of useable forms, for those contemplating big (development) projects. First ever duck surveys in Siberia show eider species listed as threatened in North America are more abundant there. With an occasional shortage of pilots down south, Alaska pilots fly breeding pair surveys in the Northwest Territories, Alberta and Manitoba, providing closer ties with the Continental Survey Program.

1985-02 – The waterfowl program is expanded in Anchorage, eventually becoming part of the Waterfowl Branch under Russ Oates. William (Bill) J. Butler (Ex military pilot, biologist and Alaska wildlife pilot) develops detailed surveys to monitor (populations of) depleted geese on the Yukon Delta. William (Bill) Eldridge (Biologist, linguist) and others join the team. Christian (Chris) P. Dau (Alaska trained biologist/pilot, expert on Eider Ducks) eventually replaces Butler.

1992 – William (Bill) Larned (experienced Flyway Biologist from down south) joins the Waterfowl Branch to study Spectacled and Stellers Eiders that have been declared “Threatened” under the Endangered Species Act as a result of a petition by retiree Jim King. The details of the life style of these lovely birds are becoming much better known.

As Alaska’s waterfowl enter the 21st century, they are clearly in far better shape than anyone would have dared to predict at mid-century, let alone at the beginning of the 20th century, though they are not without problems. It seems clear that, as the people (populations of) of North America double again in this new century and as some of them look to Alaska for energy, water, minerals, farmland and wood, a strong autonomous Alaska waterfowl program, with continuing freedom to innovate, will be needed as never before.

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Twentieth Century - Early History.

As with most endeavors in life, there are not many grand plans. Most of the aerial waterfowl population survey effort just evolved through time. Aerial bird surveys in Alaska (and elsewhere) were no exception. Notable government grand plan exceptions are the Constitutions of the United States and Alaska, but even they had mechanisms built in to allow for change.

Heavier than air aviation began in earnest with the Wright Bother's experiments in the early 1900's (McCullough 2015). By the 1920's, aviation came to Alaska. It was a natural for a place with large distances and few roads (Potter 1945). Widely considered the dean of aviation in Alaska was Noel Wien (Potter 1945) (Harkey 1974).

In Alaska, Sam O. White began working in wildlife conservation as a game warden in the 1920's (King/*Flyways* 1984) (King 2008). As detailed by Jim Rearden (Rearden 2006) "He (Sam) was frustrated by the impossibility of adequately patrolling thousands of square miles by dog team, boat, and on foot. With his own money he bought an airplane. Pioneer pilots Noel and Ralph Wien taught him how to fly it. White then startled remote trappers and others by suddenly arriving from the sky." Thus, wildlife flying started in Alaska.

Sam White, pioneer Alaskan wildlife pilot.

Alaskan pilots (and passengers), from this new perspective in the air, noticed things on the ground and in the air. Lake names such as Coma Lake and Plum bob Lake are evidence. Especially large birds, such as swans, were observed from the air. Bird conservation work in the lower continent experimented with counting wintering birds from airplanes, notably with military aircraft on Chesapeake Bay (Perry/*Flyways* 1984).

Because of concerns about the status of continental waterfowl populations, in 1946, the U.S. Fish and Wildlife Service (USFWS) sent Aldo Leopold student Arthur (Art) Hawkins and pilot Robert H. (Bob) Smith to the Delta Waterfowl Research Station in Manitoba to lay the ground and air work for what eventually

would become the continental annual waterfowl population and habitat survey (WBPHS). In 2005, on the 50th anniversary of the survey's launch, Hawkins delivered a videotaped address to Delta students in which he said "It's especially important to remember that the birthplace of this historic achievement was the Delta Waterfowl Research Station and the birthdate was May 25, 1946." (Hawkins/*Delta Waterfowl* 2011).

Pilot Bob Smith (left), Johnny Lynch (right) and Ernie Paynter.

An important factor to recognize for making this large scale continental waterfowl survey practical was the availability of WWII surplus military aircraft (such as the Grumman Goose) and some WWII trained pilots (such as Dave Spencer, Hank Hansen, Art Brazda, Ross Hanson and others). Some other early pioneers in this effort to come up with a standard aerial survey for waterfowl include John J. (Johnny) Lynch (*Escape from Mediocrity/*Waterfowl 35 1984) and David (Dave) Spencer who worked in Canada and came to work in Alaska in 1948, (App. I). Dave, because of his forestry training, helped other early pioneers (App. I.) develop the line transect sampling design for aerial waterfowl surveys still used in USFWS continental surveys.

Johnny and Zoe Lynch in Louisiana.

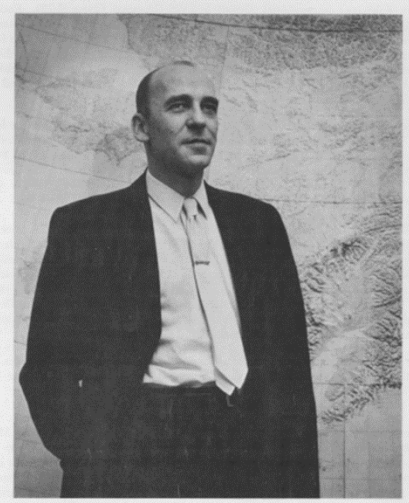
Dave Spencer with Aleutian Canada Goose.

I was stationed in Lafayette, Louisiana with Art Brazda, with the continental Flyway Biologist program, from late 1976 until moving back to Alaska in early 1978. While there I got to know and spend a little time with Johnny Lynch, a colorful icon of waterfowl research and surveys. His *Escape from Mediocrity* (Wildfowl 35) is a masterful description (somewhat 'tongue in cheek') of how the mid North American

continent's waterfowl habitat works and is managed to produce huntable populations of waterfowl. He traveled with Flyway Biologist Charles (Charlie) E. Gillham doing early waterfowl surveys in the far north (Gillham/*Flyways* 1984, Lynch 1984a). In 1957-58 he worked with Bob Smith on *Aerial Waterfowl Production Surveys in the Far North* (Lynch and Smith 1958). One gem of advice he gave me was "If you want to understand birds, you need to get up in the air with them". He also coined the phrase "Duck Widows" for wives, left at home, while mostly their husbands (in the early years) were off doing waterfowl work, for long stretches, in spring/summer/fall. I mentioned this term to Jim King after arriving back in Alaska. Jim decided that we needed a 'Duck Widow Award' (*Distinguished Mom Award*), which we produced in Juneau (App. XLII.) and gave to our wives in a little ceremony.

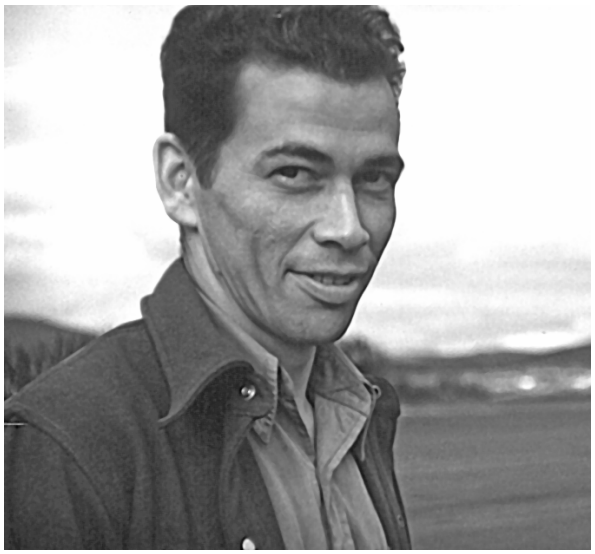
Charlie Gillham initiated waterfowl studies on the Yukon Delta in Alaska in 1941 near Hooper Bay (Hansen/*Flyways* 1984, Gillham 1947). This was interrupted by WWII, and no more waterfowl work was attempted there until 1948.

Clarence Rhode came to Alaska and was hired by the U.S. Fish and Wildlife Service, moved to Fairbanks and worked with Sam White. He flew as a commercial pilot during WWII, moved to become Supervisor of the newly created USFWS Aircraft Division in Anchorage and eventually moved to Juneau to become the Alaska Regional Director of the USFWS (King/*Flyways* 1984).



Clarence J. Rhode

It was Rhode's dream to have all of his field people, who wanted to, become airplane pilots (King 2008). Rhode hired Theron (Smitty) Smith as Aircraft Division Supervisor in the early 1950's to bring this dream to reality (King/*Flyways* 1984, King 2008). Soon after, Theron hired Jerry Lawhorn, an innovative and highly experienced aircraft mechanic, to head up and supervise the mechanics in the FWS hangar/shop. They eventually envisioned and built N780, the stretched Grumman goose for extended over water surveys and N754, the specially modified deHavilland beaver, both for conducting high quality and safer aerial bird surveys.



Theron Smith (Smitty), Aircraft Division Supervisor. Jerry Lawhorn, Chief of aircraft maintenance.

In Alaska, Robert (Bob) Scott, Dave Spencer and others experimented with aerial bird surveys, with small aircraft, in the 1940's based on their experience and what they were learning was happening with this work down below. While Dave Spencer was hired and working on the Kenai National Wildlife Refuge, his history and experience with continental aerial bird surveys down below was an important asset and contribution to aerial bird surveys In Alaska, *America's Greatest Goose Brant-Nesting Area* (Spencer et. al. 1951). "Other important contributors to our general knowledge of waterfowl in Alaska between 1920 and World War II were O.J. Murie, Frank Dufrense, Ira N. Gabreilson, H.W. Brandt and C.E. Gillham" (Hansen 1956) as well as others.

USFWS Biologist/Pilot Bob Scott.

Juneau Waterfowl Project - The Hank Hansen Years – 1954-1964.

In 1955, Alaska Regional Director Clarence Rhode hired Henry (Hank) A. Hansen to start and organize an official waterfowl survey program for Alaska. Hank was a biologist with the Washington State Department of Game and Fish and had been a pilot in WWII and became the Supervisor of Waterfowl Investigations, a new program based in Juneau, home of the USFWS Alaska Regional Office. By 1957, waterfowl aerial surveys, developed and organized by Hank in Alaska, became part of the continental effort (WBPHS) to annually asses the status of continental breeding waterfowl populations.

Hank Hansen banding ducks on the Yukon Flats, Alaska.

Hank worked as project leader of the Juneau Waterfowl Project for 10 years. He initially borrowed pilot help from USFWS Alaska game agents to fly aerial waterfowl surveys around Alaska. Jim King related that agent pilots thought that newcomer Hank was a bit naïve to think that aerial surveys could be completed in a month, in spring, with the challenges of Alaska weather, but he proved them wrong and the surveys have subsequently been completed every year for over 50 years. Hank soon decided, that in order to enhance standardization, he would fly the whole spring survey himself and try to limit the number of observers. Early on, agent/pilot Jim King became involved and eventually followed Hank as project leader in 1964. Jim describes their early logistically challenging survey trips with Piper Pacer float planes (King 2008) which eventually led to the common use of amphibious float equipped aircraft for bird survey work which made refueling and overnight parking of aircraft easier and safer (Apps. III. and IV.)

The major waterfowl habitat in Alaska was classified in 1949 by Robert (Bob) Scott into five basic types; Coastal Tundra, Lowland Tundra, Upland Tundra, Muskeg, and Bottomland (Hansen1956). By 1956, the principle waterfowl breeding areas in Alaska had been outlined and areas measured on early 1:1,000,000 scale World Aviation Charts (WAC's) (App. VIX.). The early aerial survey design was divided

into five strata based on average duck population densities, per square mile, within these five basic types. Numerous habitat units were named and stratum size, type and location were determined from WAC maps. It was recognized that not all waterfowl habitat in Alaska was included in these five strata, notably all of the North Slope stratum I habitat.

By 1956, standardized aerial transects were laid out across the 4 major habitat strata, trying to perpendicularly cross major drainage valleys and coastal tundra habitat, to sample approximately one percent of the waterfowl nesting habitat. As down south, aircraft were flown at about 100 feet above ground (ABGL) and at an airspeed of about 100 statute mile per hour (MPH), while pilots (front left) and observers (right front) enumerated waterfowl by species (or major groupings) within a 1/8 statute mile wide transect area passing beneath them on their respective side of the aircraft path, the standard method developed down below. As opposed to the standard 18 statute mile segmentation of transects used down south, 16 statute mile segments were used in Alaska and, because of logistical challenges and highly variable weather conditions, surveys were not always flown in the early morning as prescribed down below. Observations were recorded into voice recorders (IBM Dictabelt recording machines), transcribed onto paper forms and eventually mathematically expanded into population estimates, by strata, for Alaska (Apps. XIV-XVII.). Early on limitations of the results were recognized from using different pilots, different observers, with different skills and training, different aircraft (Apps. III-VI.), changing weather conditions, and the recognized inability to see and record all waterfowl present. Hank attempted to reduce these limitations by eventually reducing the number of pilots/observers. These same limitations were also recognized by those doing similar aerial surveys down south. Hank also experimented with aerial surveys in adjacent Yukon Territory and northern British Columbia in Canada (Hansen/*Flyways* 1984).

Waterfowl survey work down below also developed aerial surveys to measure duck production, by counting duck broods and late nesting birds from their same line transects, but only counting within 1/16 statue mile on respective sides of the aircraft path. Hank experimented with this aerial technique in Alaska, but early on determined that these methods were entirely unworkable as a means for measuring duck production in Alaska.

Flyway biologists down south conducted annual winter inventories of ducks, geese and swans. Hank experimented with this goal, in Alaska, but determined that weather challenges, coupled with a general lack of species in hunting demand down south, made this objective not worth the effort.

One major important challenge that occurred during Hank's tenure as Alaska Waterfowl Supervisor was the proposal to build a dam across the Yukon River at Rampart, which would flood the Yukon Flats, create a lake the size of Lake Erie and flood out most of the waterfowl nesting habitat there, not to mention disrupting a major international salmon run. Documenting these major biological resources became an important objective of the USFWS in the early 1960's (Hansen/*Flyways* 1984, King 2008, Rampart Report 1964). A major duck banding effort was conducted there (King 2008) and the dramatic duck band returns from duck hunters across North America, as depicted on the cover of this document, was a major result that led to the defeat of this proposal and the eventual establishment of the Yukon Flats NWR and secured Alaska as a major waterfowl production area on the continental waterfowl map. On the ground duck production surveys, developed by Hank and others near Tetlin, were designed into the Rampart Study and conducted across large parts of the Yukon Flats. Sam White would be pleased to know that the Yukon Flats is now a NWR as early on he recognized the tremendous wildlife values of this

place when he was reported to have said that “he would gladly lay down his life to protect the Yukon Flats”.

As Hank moved on to a new role in the administration of continental waterfowl surveys in the USFWS down south, he left an important legacy of an organized, standardized aerial waterfowl survey program in Alaska. He built upon the experience and contributions of those before and inspired others to become part of the Juneau Waterfowl Project effort and to carry on and build upon his important start.

Hank retired from FWS in 1979 and lived with his wife Doris on Whidbey Island, Washington. Hank passed away in 2005 and Doris passed in 2019.

Juneau Waterfowl Project - The Jim King Years – 1964-1983.

James (Jim) Gore King started working for FWS full time in 1951, worked 11 years in FWS law enforcement as a Game Agent and 2 years as the first Refuge Manager of the Clarence Rhode NWR (now Yukon Delta NWR) before moving to Juneau, in 1964, to follow Hank as Project Leader of the Juneau Waterfowl Project.

Jim provides a detailed description of his years of work as the USFWS Waterfowl Investigations Supervisor of the Juneau Waterfowl Project, plus his years before and after, on behalf of the waterfowl resources of Alaska in his well-written *Attending Alaska’s Birds – A Wildlife Pilot’s Story* published in 2008. He was in good position to take over as Project Leader, upon Hank’s departure, because of his Alaskan pilot training and experience, his years of waterfowl work with Hank and his sincere interest in the welfare of Alaska birds.

Through the years, the major aerial waterfowl survey of the Juneau Project has been its portion of the annual Waterfowl Breeding Population and Habitat Survey (WBPHS), which became part of the annual continental survey effort in 1957, widely considered by waterfowl survey pilots to be the ‘bread and butter’ survey of the year. The survey has been restratified, redefined and transects slightly refined, through the years, as depicted in App. XXXIX. Strata were consolidated in 1964 - 1973 into two strata based on major habitat type (boreal forest and tundra). They became the coastal tundra (stratum 1/64 - 65 and stratum 37/66 -73) and interior boreal forest (stratum 2/64-65 and stratum 38/66-73). In 1974, these two strata were further separated into strata 8-11 for the coastal tundra and strata 1-7 for the boreal forest, with stratum 12 for the Old Crow Flats in 1966. All of these modifications abandoned the original duck population stratification (I-V) approach, based on population densities, in favor of major habitat types and areas (Apps. VII. – VIX.).

The survey is flown in a sequential order, well described by Jim King in his book *Attending Alaska’s Birds* (2008), based on the annual arrival of the spring season, known as ‘breakup’ in Alaska. This roughly coincides with the dispersal of nesting waterfowl on the various habitat types where they are spread out as singles, pairs and small flocks, represent nesting waterfowl and are easier to identify, count and estimate numbers. Typically the survey is begun out of Anchorage where the survey airplane received its annual 100 hour inspection in preparation for an about 100 flying hour trip. It then proceeded to Fairbanks and throughout the boreal forest habitat, except for the Copper River Basin which is at a higher elevation and saved for last. From the McGrath and Innoko River drainage area the survey

proceeded to the coastal tundra on the Alaska Peninsula, up the western coast to Kotzebue and then inland to Bettles. From there the Old Crow Flats was flown before finishing the Copper River Basin on the way back into Anchorage. This sequence was occasionally slightly modified to accommodate other survey considerations. Because of Jim's early career based in Fairbanks, he liked to celebrate getting started past Anchorage, where complications could occur getting the airplane and typically an annual pilot check ride, with a trip to the Mecca Bar on Second Street.

During aerial surveys, we typically checked flying weather and forecasts at the local FAA Flight Service Stations. In Bettles, this was easy as the Station was right next to the Bettles Lodge where we stayed. One morning there the flying weather looked pretty iffy, so we asked the longtime resident operator of the Station his opinion for VFR flying to the west. He took a long draw on his pipe and said "let's see what Kansas City thinks". He looked through a lot of info he had at his finger tips and said that they think it is not good and forecast to stay the same. A long pause and another long draw on his pipe. Based on watching the weather daily, for almost 30 years, from his location he said "if it was me I would go today and not wait till tomorrow". Golden words! We left and made it to our next stop. This is an example of the local human touch and what has been lost by closing and consolidating into 3 main Stations in Fairbanks, Anchorage and Juneau.

Soon after Jim took over, the exploratory surveys in nearby northern British Columbia and the southern Yukon Territory were discontinued, mainly because of overly late survey timing after completion of the Alaska survey. In 1966, the Old Crow Flats area in northern Yukon Territory, previously flown by the continental survey crew from the Northwest Territories (NWT), was moved to the Alaska survey crew area because it was reasoned that it would much easier to access by flying up the Porcupine River from Fort Yukon than for the NWT crew to fly over the mountains from NWT.

In the 1970's, Jim made good use of his experience, intimate and broad familiarity with Alaska waterfowl habitats and the years of duck population data from the annual spring survey (App. XX.) and *(An Evaluation of Alaskan Habitat for Migratory Birds* - King/Lensink 1971), by being a key contributor to the proposals for additional millions of acres of, primarily, waterfowl habitat protection as additions to existing and the creation of new USWFS National Wildlife Refuges, under the Alaska National Interest Lands and Conservation Act (ANILCA), signed into law by president Jimmy Carter in 1980.

Jim has a colorful description of working with Senior USFWS Administrators and Politicians back in Washington, D.C. on this whole concept including producing *To Have and To Hold: Alaska's Migratory Birds* (King 2008). Cynthia Wentworth, who worked with Jim and Cal Lensink back in Washington D.C. during these times notes, that Jim's, "interest was always in the wildlife" (King 2008). Because Jim knew the most important areas for migratory birds, he identified them on detailed maps, forming the basis for the geographic boundaries of the new wildlife refuges created under ANILCA. It is these wildlife refuges that are critical for maintaining and protecting Alaska Native subsistence cultures today (Wentworth pers. com. 2020).

Jim was the right person (along with Calvin (Cal) Lensink) in the right place, at the right time, with the right tools to seize upon this opportunity to help make this happen. To this author's mind, he threw a 'touchdown pass' for the team and earned his career salary for this successful effort. Jim credits Dave Spencer for getting him ready to contribute to this landmark accomplishment.

Jim describes, in detail, his major accomplishments in his role of Alaska Waterfowl Supervisor in his book (King 2008). Knowing Jim well, from my years working directly with him, I know that he is especially proud of his part in initiating work on bald eagles in southeast Alaska, where he designed and flew a new random plot aerial survey to measure the size of the breeding population (King et. al. 1972). He also developed and flew a complete census survey to measure the size of the summering population of Trumpeter Swans in Alaska. This effort identified Alaska as the stronghold nesting grounds for this imperiled species, which led to its removal from the threatened wildlife list and provided the basis for their eventual restoration elsewhere in North America. Jim also recognized the international importance of Alaska's little - known populations of sea birds. He conducted some of the first at-sea and aerial surveys of seabirds in Alaska.

Jim built on Hank's efforts to build up the Waterfowl Survey Project in Juneau. For many years he asked, unsuccessfully, FWS administrators to expand his annual budget with money and people. Finally, in frustration, he asked for some millions of dollars and a large number personnel. His success finally came when they approved the addition of one biologist/pilot position in Juneau and one for work on the North Slope of Alaska where newly documented reserves of oil was stimulating development. In 1978, Bruce Conant was hired to fill the position in Juneau and Rodney (Rod) J. King (no relation to Jim) was hired to work on the North Slope. Rod's position eventually led to the establishment of a Waterfowl Survey Project in Fairbanks in 1981.

When Bruce joined the project, Jim was still using the old, heavy IBM Dictabelt voice recorders for the annual spring survey (App. XIV.). Jim had them tuned up each spring, prior to the survey, at a local IBM office in Juneau. Jim said that, when he did, the person accepting them made a point of having other employees come over to see the antique machines. In the early years, a mechanical calculating Friden machine was used to calculate populations (App. XV.). Because of Bruce's experience down below, we graduated to using the small, lightweight Dictaphone cassette recorders (App. XIX.) for recording voice observations.

Because the Juneau survey project was (and still is) kind of a distant relative of the whole continental effort spread out across the lower 48, it had the luxury to innovate, within limits, without receiving total permission. One example was the development of a combined form for transcribing observations from voice tapes. The standard procedures for transcribing voice observations used in Alaska, as well as other parts of the continental survey, were to make tick marks and numbers on a field form (App. XVI.). Then the numbers from the math summaries, as Jim described as the good Christian cross notation, were transferred to a 3-158 form (App. XVII.) for data entry into a computer back at headquarters in Laurel, Maryland. We often completed these forms, in a hurry, early in the morning before setting off, for the day, to count ducks with the airplane. So, Jim and Bruce, in a bar in King Salmon, Alaska, came up with an idea to combine the forms into one to save having to do that step (and possibly introducing errors). As in other times in history, we designed the prototype on a bar napkin (App. XVIII.). Apparently, the first written concept/design of the Voyager aircraft, that flew around the world nonstop in 9 days in 1986, was done on a bar napkin by Rhutan and Yeager. We were reluctantly granted approval by the continental survey administration to experiment with our new concept form (App. XIV.).

Jim had an interesting approach to the routine administration work of the Juneau project. He told Bruce that, when routine/mundane paperwork requests from the Area Office in Anchorage would show up in Juneau (it was real paperwork in the U.S. mail back then) that Jim deemed not important, he would wad them up and throw them in the wastebasket. If they came a second time, he did it again. If they showed up a third time, he figured that they must be important and he tried to comply.

Another example of Jim's philosophy on routine government paperwork occurred on an aerial survey trip with Bruce. Rod King was then stationed in Anchorage and was near the source of these types of requests. Rod showed up to help on the survey and brought the paperwork request from Anchorage. I remember that Jim told Rod, in no uncertain terms, that if he worked for him, he would order him to not bother with this kind of request during an active aerial survey. Jim reasoned that pilots needed to devote all their attention to the work at hand for safety and quality reasons.

I have many pleasant memories of my time spent with Jim, especially on survey trips. Before using the turbine beaver airplane (N754), Jim would stop at Pastolik, on the river, on the outer Yukon River Delta, to add fuel he carried in two metal gas cans (popularly known as Blazo cans). When Jim stopped there the next year, the cans were gone and he always wondered what happened to them. We later learned that Chuck Hunt, who grew up in Kotlik just downstream and later went to work for the Yukon Delta NWR, picked them up to use and always wondered where they came from.

The spring aerial survey was laid out to commonly have prominent geographical features, like hills and mountains, at the end of survey lines, for sighting on. Before Jim's pending retirement, he decided that we needed to fly into the cauldron of Aniakchak volcano on the Alaska Peninsula as well as climb Kusilvak Mountain on the Yukon Delta where we glissaded down in snow at the suggestion of Christian (Chris) Dau who was with us.

I was blessed, learned a lot of the history of Alaska and how to safely fly around Alaska from years of working directly with Jim. He was fond of telling me that my training goes back to Noel Wein. I later relayed that at an annual pilot training meeting where I named it my "trail of mentors". Those being, I learned from Jim, he from Ray Wolford, Ray from Clarence Rhode, Clarence from Sam White and Sam from Noel Wien. Jim and I had many wonderful trips together, which I will always cherish.

Jim King with a 'rat canoe' used to conduct duck brood surveys with access via amphibious Cessna 180.

Jim retired from FWS in 1983 and lives with his wife Marylou in Juneau, Alaska.

Juneau Waterfowl Project - The Bruce Conant Years - 1984-2008.

Bruce Conant first came to work, full time, for the River Basins (later Ecological Services) FWS project in Juneau, Alaska, in 1972, as a biologist/pilot flying a standard piston powered deHavilland beaver aircraft. Here he met Jim King and, at Jim's encouragement, started flying some winter waterfowl surveys in southeast, Alaska with Daniel (Dan) Timm, Waterfowl Biologist with the Alaska Department of Fish and Game. In 1975, Bruce transferred to Laurel, Maryland, where he entered the Flyway Biologist Program as a trainee, and then to work directly with Arthur (Art) Brazda in Lafayette, Louisiana, from 1976-1978, where he flew aerial waterfowl surveys in northern Canada with Art and winter surveys in states nearby to Louisiana. In 1978, he transferred back to Juneau to work directly with Jim King as the first full time addition to the Juneau Waterfowl Project.

I was fortunate to be selected as the third Project Leader of the Juneau Waterfowl Project, following Jim King's retirement in 1983. My first, and by far most important administrative action, was to hire John (Jack) I. Hodges to fill my former biologist/pilot position. His selection was essentially my only hiring decision. Jack recommended both the hiring of Steve Cain and later Deborah (Debbie) J. Groves, following Steve's departure to go to work for the National Park Service down south, as our Waterfowl Biologist/Observer position. I was also able to convince my supervisor, Jim Baker, to let me hire back Jim King as a rehired annuitant Wildlife Biologist. My feeling is that we then had a really good team assembled to carry on the Juneau Project's legacy (Apps. XXIII, XXIV.).

Especially Jack, but also Steve and Debbie, brought analytical and computer skills to the Project that I lacked. A major component of the Juneau Project was the conducting and reporting on the Alaska portion of the annual continental WBPHS. A good example of our addition of Jack's skills showed in the changes we instituted to this survey. Because of Bruce's history with the Flyway Biologist program, we made a concerted effort to attend their annual spring meetings. In an early meeting that I attended as Project leader, the folks down there stated that, after a few years, they were ready to convert to the new paper transcription form that Jim and I had developed and proved could work well. Shortly before that meeting, Jack showed me a new computer program that he developed where we could transcribe our voice observations directly into the new laptop computers that were becoming available (App. XIX.). I showed the group the prototype computer with the program Jack developed and mentioned that they might want to wait to see how this progressed, which they decided to do and eventually adopted.

Jack describes his efforts to perfect this innovation well in his book (Hodges 2017). At first there was some healthy skepticism of this new innovation, so we had to print out paper copies of each transect/segment transcriptions as a backup. It took a while, but eventually this new approach was proven to work well, saved time and effort and was adopted as a new standard continent wide.

At a later spring meeting, I showed up with a new version of Jack's program, which I briefly showed to the group before having to leave to catch my flight back to Juneau. Global Positioning System (GPS) navigation was a new adaptation of the in use military system to civilian use (App. XXXVIII.). Before this program, which attached a GPS position to each oral observation, Jack and others had experimented with using continuous running tape recorders to come up with positions of voice observations along transect lines, which required listening to whole tapes of the actual time flown to obtain the geographical positions. Thus, the use of GPS to obtain positions of observations was a major advancement in the quality of line transect surveys, as well as other aerial surveys, and was integrated into the Alaska portion of the continental WBPHS.

Another example of the use of the Alaska portion of the annual WBPHS was our ability to compare left and right side observations. Because Jim and Hank were 'packrats' in saving old voice tapes and the antiquated equipment used to play them, we were able to hire someone to re-listen to them and capture the left/right observations. This led to Jack's paper detailing the comparisons, by observer/pilot and aircraft type used (Hodges, et. al. 1996). This was not possible for other crew areas, down south, because tape recordings were reused after each transcription. With the general use of the field computer transcriptions (later with GPS positions), pilot/observer observations were individually captured and stored routinely, not only in Alaska, but also across the continent.

Although with not complete coverage, a major aim of the WBPHS is to measure a population estimate of the major hunted species of waterfowl, mostly ducks, across the nesting grounds of North America. One element of this effort is to apply visibility correction factors (VCF's) to air observations, to compensate for those not viewed and thus not counted during air surveys. In the prairies these VCF's are gathered annually with on the ground surveys, compared to a few select air survey segments, and then applied to the whole prairie survey portion of the survey. Beyond the prairies, in 'bush' and tundra habitats, long

term average VCF's from the prairies were applied to compensate for ducks missed during the surveys there.

In an attempt to develop better VCF's in Alaska, we completed a 6 year (1986 – 1991) comparison study using helicopters in lieu of ground surveys where road access is not possible (Conant, et. al. 1991a). In 1985, with support by Innoko NWR, Bruce experimented with using a helicopter for this task from the Alaska Fire Service out of Galena, Alaska. After determining that this method was practical and should yield good results, we picked two areas for conducting this study. We used the 20 segments on the Yukon Flats for 'bush' boreal forest habitat (App. XXV.) and 20 segments on the Yukon/Kuskokwim Delta for tundra habitat. Fixed wing aircraft surveys were flown, as usual, over those areas during the operational survey. We were very fortunate to be able to use the services of William (Bill) Larned as observer on all 6 helicopter comparison surveys. Bill had recently arrived in Alaska, to work as Fire Officer for the Kenai NWR, from working down south as a Flyway Biologist for the continental program and thus was a very experienced waterfowl aerial survey observer. After completing this effort, in Alaska we began applying the 3 year average correction factors, 3 for boreal forest habitat and 3 for tundra habitat.

In an effort to evaluate the accuracy of waterfowl population sizes determined from the traditional Alaska portion of the WBPHS, the Juneau Project in concert with the Anchorage and Fairbanks Projects, redrew the boundaries of the eleven 'strata' (areas) identified and sampled annually with more accurate USGS 1:250,000 scale maps (Bruce and Jim). We then developed a multiple year, more expansive survey sampling system within these new waterfowl habitat boundaries (primary and secondary) to measure the populations to compare with the results from traditional Alaska WBPHS (App. XXVI.). The results of the comparison of the 4 traditional tundra areas, plus the added Arctic Coastal Plain area, from Rod King's work there, are detailed in *A Comparative Analysis of Waterfowl Breeding Population Surveys over Tundra habitats in Alaska* (Conant, et. al. 2007). The results of the comparison surveys conducted in the boreal forest habitat have not been analyzed.

Maintaining our close operational ties with the Flyway Biologist program, the Juneau Project supported the continental WBPHS effort by flying surveys in prairie habitat in southern Manitoba (Hodges 2017) and in boreal forest/tundra habitat in northern Alberta/Northwest Territories (King 2008) (app. XXXVIII.)

A major new effort was Jack Hodges designing and successfully flying waterfowl summering surveys in adjacent (to Alaska) eastern Russia. This was very challenging and is described in detail by Jack in his book *Above and Beyond* (2017) and the results in *Wildfow*l (Hodges and Eldridge 2001). A major accomplishment of Jack, and those who worked with him, was the documentation of relatively large populations of summering spectacled eiders, in Russia, which were threatened in Alaska. An important aspect, that made this survey practical, was the use of N754, a turbine powered aircraft that used turbine aircraft fuel, which is readily available in Russia, but not avgas required by piston powered aircraft.

Jack Hodges with N754 on survey in Eastern Russia with observer Bill Eldridge and Russia colleagues Evgeni Syroechkevsky (left) and Russian Navigator Victor Shlyaev (third from left).

Carrying on the quinquennial census of Trumpeter Swans summering in Alaska, that Jim King initiated, the Juneau Project coordinated and flew major portions of this effort 1985 - 2005 (Conant, et. al. 2002). As populations of Trumpeters increased, we relied on help from the Anchorage and Fairbanks Projects as well as from Alaska NWR personnel and eventually from the Flyway Biologists. Fulfilling a dream of Jim King, the Juneau Project produced and distributed a Trumpeter Swan Atlas with detailed maps of Trumpeter distribution throughout Alaska (Conant et al 1996). Beyond accurately measuring the growing size of populations of Trumpeters summering in Alaska, the detailed locations of observations on USGS 1:63,360 scale maps (also digitally) provided very accurate data for conservation planning. Jack Hodges eventually developed a custom computer program to enter GPS locations of all swan observations directly into computers, during surveys, in the aircraft.

Using the Trumpeter census model, a survey sampling method was developed for Tundra Swans based on collecting detailed locations on USGS 1:63,000 scale maps. The populations of Tundra Swans summering in Alaska were measured in 1991 (Conant et.al., *Wildfowl – Supplement No.1.* 1991)

It has long been known that waterfowl (as well as other birds) molt their wing feathers in mid-summer. Indigenous people developed techniques to drive and capture, especially flightless geese who congregate on 'molting lakes', mainly for food. There is a long history of biologists adapting this feature

to capture waterfowl (mainly geese and ducks) for banding (King 2008). Essentially, a trap is built on shorelines of lakes with nets and the target species are nudged into them with watercraft and eventually float equipped aircraft (Apps. XXX. – XXXII.). Improvements to this basic technique were developed through the years (Juneau, Fairbanks, and Anchorage Projects). The basic technique was modified to capture molting Vancouver Canada geese in saltwater and lake habitats in southeast Alaska.

There is a long history of Swans being captured (Swan 'upping' in England) for food and banding. When flightless, they can be captured from watercraft and by running down on land. A technique was developed to capture swimming Swans from float equipped aircraft by landing behind swimming Swans and positioning a person on the float with a dip net. The Fairbanks Project did this in interior Alaska. The Juneau Project was asked to use this technique, in adjacent western Canada, to capture Trumpeter Swans for banding and attaching satellite transmitters. In 2005, Rod Drewien joined Bruce Conant to expand this effort to the southern Yukon and northern British Columbia (Apps. XXXIII., XXXIV.).

The Juneau Project continued aerial surveys for breeding bald eagles with Jim King's random plot survey technique. We have stayed involved with the Juneau Raptor Project, revising and expanding the method along the north coast of the Pacific Ocean from British Columbia to the Alaska Peninsula (Hodges 2010). In conjunction with Alaska Audubon, we also provided the design and flying of the aerial survey for fall and wintering bald eagles on the Chilkat River near Haines, Alaska as well as providing the flying for monitoring the movements of radio-tagged bald eagles along the north Pacific Coast.

Duck production surveys were conducted annually, from the air, following the WBPHS procedures, outside of Alaska for many years. Hank Hansen determined early on in his tenure that these air surveys were not yielding good results in Alaska and attempts to fly them were discontinued. On the ground surveys techniques were developed and conducted by Hank near Tetlin, Alaska which yielded much better results, albeit for a much smaller area than air surveys could cover. Surveys were conducted by canoeing (App. XXIX.) or walking around the perimeters of lakes and ponds where duck broods would expose themselves to be seen, classified and counted by species. This technique was applied well during the Rampart Study. After that study was completed, Jim King conducted a smaller sample of those ground surveys on the Yukon Flats, as well as near Teltin, using an aircraft for access (Conant 1986). Bruce continued this effort and decided to expand the sample by soliciting the help of National Wildlife Refuge personnel in other boreal forest waterfowl nesting habitat (Hodges 1991). These nonrandom samples did not provide total duck broods produced, but could give an index to duck production, by species and stage of brood development. Eventually, it was decided to try to develop a random sample of duck production survey plots. This required the use of helicopters from which to make air observations on many plots where fixed wing aircraft access was not possible or practical. The results were promising, but the cost eventually ended this effort (USFWS draft report 2002).

Bruce Conant with the same 'rat canoe' (pg. 20), used for duck brood surveys with N754.

The outer coastal zone of the Yukon/Kuskokwim delta was well known as a very important goose nesting area (Nelson late 1800's, Gillham 1940's, Spencer, et. al. 1951). There are 5 segments of the Alaska portion of the WBPHS, in this area, that are densely populated with nesting geese. Early pilots and observers were challenged to keep up with counting and identifying all large bird species there. This was still the case when Bruce started flying this survey with Jim King. One needed to be 'on top of their game' to even try to keep up with it all, knowing that one could not even see, identify and talk fast enough into tape recorders to capture it all. Recognizing this and in response to the difficulty, Bruce and Jack wrote a memorandum, in 1984, to the Alaska Migratory Bird Specialist, recommending that a separate survey be developed and flown for this coastal zone that would just concentrate on goose observations (App. XLI.). This was accomplished and is detailed in William (Bill) Butler's section of this document. It is noteworthy that the challenge to keep up with goose observations in the coastal zone during the WBPHS became less challenging as goose populations declined in numbers during the 1980's.

Early on, it was recognized that southeast Alaska had important populations of waterfowl wintering there. Hank and Jim attempted to develop methods to measure this resource in this very challenging survey area, because of topography and typically difficult flying weather conditions. When Bruce arrived in Juneau in 1972, he experimented with some coastal shoreline surveys for waterfowl. After joining the Juneau Waterfowl Project, Bruce experimented with flying a random plot survey, for waterfowl, in northern southeast Alaska patterned after the random plot survey Jim King developed for breeding bald eagles. During 1982-84, comparison boat to aircraft surveys were conducted on one of those plots (Conant et. al. *in* Weller 1985b). This led to the eventual design and flying of a random plot survey for wintering waterfowl for all of southeast Alaska in 1996. That effort led to the flying of a wintering

waterfowl survey for the total shoreline of southeast Alaska by Jack Hodges and Debbie Groves from 1997 - 2002, which also captured GPS positions for all observations. The results of both efforts were published by Jack (Northwestern Naturalist Vol. 89, No. 2. 2008).

After being selected for the new biologist/pilot position in Juneau, to work with Jim King, it was determined that I should fly the Winter Survey of the West Coast of Mexico and Baja California (WCMBC) as observer with Dwayne Norman in 1978. Winter waterfowl surveys were conducted in Mexico, in cooperation with the Mexican Federal government, since the early 1900's (Drewien, et.al. 2019). Dave Spencer flew the first aerial surveys in Mexico with George Saunders in 1947 (Spencer *in Flyways* 1984) (Drewien, et. al. 2019) (App. II.). I flew with Dwayne again on the 1979 survey and eventually flew every one of those west coast surveys, as lead pilot, from 1981-2006. The main target species of those surveys was the Pacific (black) Brant, of which the bulk of those populations spend the winter in western Mexico. In 1994/95, we conducted multiple surveys at 4 wintering locations (1 on the western mainland and 3 on the Baja) to gain some understanding of how repeatable the surveys are and how variable the results captured were (Conant and Voelzer 1995). An interesting challenge of flying the survey aircraft N754, from Alaska, happened in 1995. Jack Hodges usually flew N754 down the coast from Juneau in December, with its often challenging weather conditions, so as to be in position near the border for the January Mexico survey. In late 1995, because of a dispute with the U.S. Congress, the U.S. Government was shut down negating any flights in government aircraft. When it finally opened back up, in early 1996, Bruce flew N754 down from Juneau in somewhat challenging flying weather. I made a concerted effort to not be in contact with administration so as to not have to short stop my flight down until close to the Mexican border. Nearing Oregon, the weather opened up from wind/rain/fog/and low ceilings to sunshine giving Bruce the feeling that it might be what a migrating bird could feel by making it down south to spend the winter.

It has long been known that the bulk of the Pacific (black) Brant population gathers at the relatively small Izembek Lagoon on the western tip of the Alaska Peninsula near Cold Bay, Alaska. Robert (Bob) Jones initiated, ground based, annual productivity surveys there patterned after those developed by Johnny Lynch in Louisiana. Attempts have been made by Jim King and others to enumerate, with aerial surveys, the fall population of Brant staging there prior to their mostly direct flight to Mexican wintering grounds. In 1984, the Juneau Project coordinated a concerted effort to both conduct multiple aerial surveys and, in concert with the Izembek NWR, to conduct aerial photography to enumerate the Brant and other species populations assembled there (Conant, et. al. 1984). This effort was improved and repeated in 1993 (Hodges 1993). In recent years, more numbers of Brant are spending the winter on Izembek lagoon and nearby salt water areas.

At the end of Bruce's career, the Juneau Waterfowl Project was contacted to see if we could fly some experimental fixed wing surveys for geese summering in western Arctic Canada. Ray T. Alisauskas, with Environment Canada, had been flying surveys there for many years using helicopters. We successfully conducted the first fixed wing, low level survey there in 2005, in this logistically and flying weather challenged area (Conant, et. al. 2007a) (Apps. XXXVI, XXXVII.). Subsequently, 4 more expanded surveys were completed in this area by the Juneau and Fairbanks Projects (Groves and Mallek 2011).

One critical aspect of being able to safely and successfully fly wide ranging aerial bird surveys in North America and adjacent Russia is the critical mechanical and logistical support provided by many. This is especially important in remote areas and in foreign countries. Flight crews need airworthy aircraft, fuel and places to stay and eat to make it all possible. Here are a couple of examples to illustrate this challenge from Bruce's experience.

The favorite aircraft, N754 (*History of N754* – Conant 2018), was permanently assigned to the Juneau Project in 1978. It is a superlative and very successful aircraft with which to conduct aerial waterfowl surveys throughout Alaska, adjacent Canada, over to eastern Russia and down the west coast of Mexico. A weakness it has are the brakes on the amphibious floats. When they failed in Fort Nelson, in northern British Columbia, while catching Trumpeter Swans, Bruce found an aircraft mechanic at the airport who would work on them. The broader aircraft community has a long history, especially in the north, of usually being very supportive of helping to solve aircraft problems, probably around the world, but especially in North America. Two aspects of N754 were extra helpful in this situation. First, N754 is a highly modified version of a deHavilland beaver, the original being the Canadian iconic aircraft. Second, N754 was never certificated by the U.S. Federal Aviation Administration (FAA) and was operated as a U.S. Government Public Use Aircraft. This meant that mechanics did not need to sign off on repairs made in the field which made it a lot easier to find someone to work on it. In this case, we had to wait for new brakes to arrive through Canadian Customs, and our mechanic installed them (with ravenous mosquitos) for some cash and a case of beer. Bruce learned a lesson and carried spare brake assemblies which came in handy when they failed again in remote Cambridge Bay, Nunavut Canada.

Mechanic working on installing new brakes on N754 in Cambridge Bay, Nunavut, Canada.

The other aspect, the need for food and lodging, is illustrated with the following letter Bruce provided for Fred Roetker, my first Nunavut aerial survey partner's retirement.

Fred, you and I have a long history of working together in the 'flying game' of USWFS. I have good memories of us flying together on the Alaska Waterfowl Breeding Population survey and a waterfowl survey on the west coast of Mexico. I'm sure that you have many memories of your own on the many surveys you have flown over the years. One survey we flew together, in N754 (the Garrett powered beaver) in Nunavut in 2005, stands out because of how it ended. I'm sure that you will recall the following.

Flying fixed wing surveys on Victoria Island, Nunavut, Canada out of Cambridge Bay was a bit challenging. We were flying in new country, with limited support in the far north, in often challenging weather conditions, as you know well. I remember landing on a gravel strip at an abandoned DEW Line site for a lunch break. Because we were flying N754, with turbine engine, we were able to fuel at the pump in Cambridge Bay. After fueling, when I fired up to move to parking, the airplane would not budge. One brake was locked solid, the airplane would not move an inch. The good news was that it happened at Cambridge Bay, not at the DEW Line site, and (because of a similar previous experience in Canada) I had a complete brake assembly with me in the airplane. We managed to find a local airplane mechanic who agreed to install it, but only with no paperwork. He got it done by late evening, and I believe it cost us about $300 cash and a bottle of whiskey. We celebrated in our hotel room with saved plates of food from the dining room and a bottle of wine that Carl Ferguson left in the front seat of N754, the morning we left from Norman Wells, NWT on our way north.

On our last day we waited at Cambridge Bay, because of widespread fog, until late afternoon to fly the last few transects and then head south. It was not great flying weather, but we finished the transects and flew direct towards good weather in Yellowknife. We arrived late evening, found a parking spot for the airplane, called for a cab to town and went through the one way outside gate at the FBO to wait for the cab. Mosquitos were horrendous and we were worried that the cab would not come. Finally, it did arrive and off to town we went. We found a hotel room and went down the street to get something to eat at a place recommended by the front desk. Things were looking up! We pulled on the front door with thoughts of a cold beer. It was locked and we just missed arriving before closing time. One of those 'oh s***' moments. We eventually found the only bar open, to get a beer and regroup. Unfortunately, it was disco night, the place was packed with loud music. We found a seat at the bar only to find out that their cooler was out of commission. So we settled into warm beer (better than none), deafening music and planned our next move. The bar tender advised that the only place open for food, at that time of early morning, was a little 'greasy spoon restaurant' with dubious quality food. I think that we each ate a bowl of something there and staggered back to the hotel at 3:00 am. At least we had a room and beds. We arose late the next morning, luckily with not too much indigestion. Fred found us a nice 'B & B' down on the shore of Great Slave Lake in 'old town'. We spent a couple of night's recuperating and met up with Bob Bromley (formally CWS) for supper. The next day Fred departed for points south via commercial air and I departed for Juneau via N754. Nice trip for me, flying across the grain of remote, scenic country and always a treat flying back into Juneau in good weather.

Ah, the untold stories/challenges of flying surveys in remote places where, as Art Brazda used to say, one has to be a bit creative to 'keep the show on the road' and also depend upon the goodwill of local people. N754, being an uncertificated airplane, made unscheduled maintenance a lot easier, especially in Canada, since it is a modified version of their favorite national airplane.

One of the joys of conducting aerial surveys across North America and beyond is the interesting people we get to meet and learn to know. One good example for Bruce was meeting Jim (Hutch) Hutchenson, widely recognized as a pioneer aviation mechanic, as stated in The Flying North (Potter 1947), "No pilot has contributed more to Alaskan aviation than mechanic Jim Hutchenson." I first met Hutch when his niece (I believe) worked for the Fairbanks FWS office. Jim King introduced me to him then as Jim remembered him from Hutch working on FWS airplanes in Jim King's early years flying for FWS.

Hutch was in the U.S. Army and stationed at Fort Chilkoot near Haines, Alaska during WWI. When the war ended, he was discharged there and needed something to do. He found a summer job with the baseball team in Fairbanks. When winter came, he found another job at a hardware store there. This was the time when aviation came to Alaska. Inevitably, accidents happened with the new mechanical device called an airplane. When that happened, pilots naturally turned to the hardware store for help in fixing them. That is how Hutch got into the game of fixing up airplanes, which he was still active in doing when I met him in the 1980's.

His reputation was well known as a pioneer aviation mechanic and someone tried to make a voice tape recording of his memories. Apparently, it did not work well when someone sat down in front of him with the mike. He still lived in the same log house along the Chena River in Fairbanks that he bought in the 1920's. One evening, while Debbie Groves and I were in Fairbanks on the annual duck survey and knowing that he liked to drink beer, I bought a couple of six packs and we stopped by his house, knocked on the door and he invited us in. What a wonderful evening we had with him! He told us how he bought his house for $75 and a stove for it for the same price. He sat in his easy chair, drank beer and told us many stories of his adventures fixing up wrecked airplane out in the bush. When they would go out and camp, often for months, with the airplane and fix it up to fly back to home bases. My big regret is that I did not have a tape recorder to capture it all. I hope that someone eventually did.

The last time I saw Hutch was when Steve Cain and I were flying a Trumpeter Swan survey and staying in Glennallen, Alaska. At breakfast, I recognized Hutch who was out with his motorhome touring Alaska. I asked him whether he would like to see N754, our one-of-a-kind airplane that we had parked at the Gulkana airport. He did and we met him at the airport. On the spur of the moment, I offered to give him a ride in it. Eighty five year old Hutch climbed into the copilot seat. When N754 was light in weight, one could make impressive takeoffs with high rates of climb. Just after we broke ground, and climbing out, I looked over at Hutch and he looked at me with a great mouth wide smile. Priceless!!!

When Jim King and I were flying a Trumpeter Swan survey out of Anchorage, Jim invited a professional photographer, who was a close friend of someone in the FWS Regional office, to come along. About halfway through the day, as we usually did, we landed in a lake for lunch. N754 has a long pointed nacelle surrounding the engine. Jim coaxed her to climb out on the nose where she took one of my favorite photos of Jim as we sat eating our lunch on top of the wing.

Jim King and Bruce Conant having lunch during a survey for Trumpeter Swans in the Susitna River Valley.

Bruce retired from FWS in 2008 and lives with his wife Sue in Juneau, Alaska. Jack Hodges retired from FWS in 2008 and lives with his wife Molly in Juneau. Debbie has continued as Wildlife Biologist and the last remnant of the Juneau Waterfowl Project, but now part of the Anchorage Project since 2008 as well as the inclusion of Fairbanks Project in 2013.

Anchorage Waterfowl Project - William I. (Bill) Butler Years - 1982-1994.

William (Bill) I. Butler first came to Alaska in June 1982 to work as a biologist/pilot on the USFWS Yukon Delta National Wildlife Refuge. Bill had just gotten his floatplane rating at the Salton Sea Air Service in California and arrived in Anchorage with 7 hours on floats in a J3 Cub. The next two weeks were spent receiving instruction in N740, the Refuge's Cessna 185 on floats, from Tom Belleau, the OAS standardization pilot and a legend in Alaska aviation. On his final evaluation flight Tom asked Bill to land and take off in a lake he had not flown into before. Bill told Tom he was not comfortable doing it. Tom took over the controls and turned for home without a word. Bill was sure he had failed the evaluation. But in the review of the flight, Tom said you are not an accomplished Alaska aviator yet, but you are safe. I am going to approve you going to fly for the Refuge. I want you to fly nonoperational flights in the Refuge's Super Cub and Cessna 185 and I will be back in the fall to check you out in both aircraft.

Bill spent the summer of 1982 flying nonoperational flights in the Refuge's Super Cub and Cessna 185, becoming familiar with refuge and aircraft operations. He manned the office field

camp radio, assisted with camp supply, banded geese, participated in field camp data collection, and assisted in a survey of sea bird colonies located on the south side of Nunivak Island. The snow had started to fall when Tom Belleau arrived at the Refuge that fall. He checked Bill out in both aircraft on wheels and ski's. With the successful completion of his operational checks, Bill felt he had succeeded in getting the job he had always wanted since reading the book *Flyways* in high school.

Over the next 2 years on the Refuge, Bill continued to develop his skills as a biologist/pilot. He participated in the development of data collection protocols and coordinated logistics for nine refuge field camps, collecting nest production data from Cackling Canada Goose and Emperor Goose survey plots broadly spaced throughout the Refuge's coastal zone. He flew one of the support aircraft and supervised the use of a helicopter for camp setup.

Bill after landing on the tundra at a field camp.

Tom Belleau – Alaska OAS check pilot.

Bill provided logistics and a data collection protocol for a Taverner's Canada Goose camp and supervised two biologists collecting information on nest production, habitat types, and avian populations in the area. He flew support aircraft and assisted with the Refuge's Cackling Canada and Emperor Goose banding and collaring projects.

He flew fall surveys for Wrangell Island Snow Geese, where oblique photos from aircraft were taken of Snow Goose flocks migrating across the Refuge, on their way to California. Young of year were counted on the photos and used to determine annual production. He flew surveys over Hazen Bay and adjacent sloughs to map locations of brood flocks for Cackling Canada, Emperor, and White-fronted Geese and flew low level surveys over Brant colonies along the coast. He flew high level (5000ft) photographic transects, using a 9x9 aviation camera, to evaluate Brant nesting study areas.

In 1984, Bill was selected for a new position as Project Leader of the new Anchorage Waterfowl Project in the USFWS, Region 7, Division of Migratory Bird Management under Bob Leedy. The

project's primary purpose was to develop aerial surveys to monitor nesting and migrating populations of declining arctic nesting geese throughout Alaska.

Bill Butler with the Anchorage Waterfowl Project aircraft, an amphibious Cessna 206.

His major accomplishments on the Project, 1985-1994, are described below:

He developed an aerial survey of Cackling Canada, Emperor, and White-fronted Geese nesting on the coastal zone of the Yukon Delta Refuge (Butler 1986, Butler and Maleki 1986, Butler et. al. 1987, Butler et. al. 1998). Front seat observers counted all geese. Rear seat observers counted Tundra Swans, Sandhill Cranes and Spectacled Eiders. Front seat observers were Bill Butler (1985-1994), Rich Malecki 1985, Cal Lensink 1986, and Bill Eldridge (1987 through 1994). Rear seat observers were Karen Bollinger 1986-1987 and Bob Platte 1988-1994 (Apps. XXXV).

He used Loran and later GPS navigation to accurately fly transect lines. Data was initially collected on continuously running voice tapes and analyzed for positions along transect lines using a computer program developed by Jack Hodges (Butler et. al. 1995). Accurate locations of aerial observations allowed for the production of goose nesting distribution maps (Plate and Butler 1993., Butler, el. al. 1995a.). These maps were used for refining survey design and evaluation of nesting habitat on Alaska Native and Refuge lands. Bill worked with the USFWS Division of Research to develop a GIS system to display goose nesting distribution maps,

derived from the aerial surveys, and to improve the management utility of the data (Butler et. al. 1995a.).

The final survey design was completed in 1988 and the management survey was subsequently flown by Bill and Bill Eldridge until 1994 (Butler et. al. 1988, Fischer et. al. 2018.). The survey was incorporated into the annual management of Arctic nesting geese in the Pacific Flyway and has been flown each year since 1994 by Jack Hodges and Bill Eldridge until each retired. At over 30 years, it is one of the longest running, most consistent, aerial management survey of nesting geese ever conducted.

Bill developed an aerial survey for Dusky Canada Geese nesting on the Copper River Delta. The same techniques that were used on the Yukon Delta, were used that allowed for the production of accurate distribution maps for management and survey design. The survey was conducted by Bill and observer Bill Eldridge from 1986-1990 (Butler and Eldridge 1998a, Eldridge et. al. 1999). (Note: An aerial survey for Dusky Geese there was first designed by Dan Timm, Waterfowl Biologist with the Alaska Department of Fish & Game). Bruce Conant flew that survey before Bill redesigned and expanded the survey to include off-shore islands, which yielded more complete results.

Bill flew spring migration surveys for geese in Cook Inlet with observer Bill Eldridge. The objectives were to determine the timing of migration through the inlet and the use of the major tidal flats there by Cackling Canada Geese. Four surveys were flown each spring from 1986-1990.

Bill assisted in collaring and banding operations for Cackling Canada and Emperor Geese on the Yukon Delta, 1984-94. At least two and sometimes three aircraft were operated out of the Refuge's Kanagiak cabin site. Bill flew one aircraft ferrying gear and crew to banding sites and helped drive, collar, band, and record data. This project was headed by Rod King of the Fairbanks Waterfowl Project.

Bill also assisted Rod King in collaring and banding Emperor Geese in coastal areas near Buckland, Sishmaref and Deering, Alaska and also assisted with collaring and banding of White-fronted Geese near McGrath and west of Deadhorse, Alaska on the North Slope. These were exploratory efforts and each area was done in only one year.

Bill flew fall surveys to determine the annual production for Emperor Geese from 1986-1993. Oblique photographs were taken from an aircraft of migrating flocks of Emperor Geese in estuaries along the north side of the Alaska Peninsula. Margaret Peterson of the Research Division was Bill's photographer. The proportion of young of the year, in flocks, was determined by photo analysis (Butler et. al. 1998b).

Bill coordinated and flew early spring waterfowl surveys of the Prince William Sound coastline and the outer ocean coastline from the Sound to Katchemak Bay (1989-93). The survey was flown to assess the impacts of the 1989 Exxon Valdez oil spill on waterfowl. Sea otters and bald

eagles were also counted. The survey encompassed more than 4,000 miles of shoreline and required four aircraft to complete.

Bill and Bill Larned flew surveys to enumerate populations of Steller's and King eiders in the estuaries and bays on the north side of Bristol Bay, along the coast from King Salmon, Alaska to the Kuskokwim River mouth, along the coast of the Yukon/Kuskokwim Delta, and on the south side of Nunivak Island (Platte and Butler 1995). Bill also assisted Bruce Conant by flying a survey area for the summer quinquennial Alaska Trumpeter Swan Survey in 1990. He also participated in Bruce Conant's multi-aircraft project, in 1984, to determine the number of Black Brant staging on Izembek NWR. Multiple surveys were flown with different pilots and observers. The results were statistically analyzed by Jack Hodges.

Bill flew an Emperor Goose nesting habitat survey of all the river deltas and estuaries from Kotlik to Kivilina, Alaska with Jim King as his observer and mentor. While there is Emperor Goose nesting habitat in these areas, the tidal flats are much smaller than on the Yukon Delta. Nearly all of these areas are located near villages and the small sizes makes nesting Emperors there vulnerable to human activity.

Bill flew a raptor nesting survey of potential nesting sites for golden eagle and gyrfalcons on the Yukon Kuskokwim Delta in 1986.

Bill transferred to the Region 1 Office of USFWS in Arlington, Virginia as the Service's National Aviation Manager in 1994. Russ Oates followed as Project Leader until 2005 when Julian Fischer took over the helm to date. After Bill left the Anchorage Project, biologist/pilots who followed include Chris Dau, Tim Tiplady, Paul Anderson, Rob McDonald, Heather Wilson, Anna Anderson, and Bradley Shults. Anchorage based waterfowl biologists over the years include Bob Platte, Bob Stehn, Greg Baloug, Karen Bollinger, Bill Eldridge, Tim Bowman and Dennis Marks.

In addition to Bill's Butler's new managerial duties, he was responsible for flying 2 WPBHS areas within the Province of Ontario. This enabled him to stay in touch with the needs of Service pilots. He also was the first National Aviation Manger to successfully get a Congressional appropriation in the USFWS budget for replacement of Service aircraft. He retired in 2005 and now lives with his wife Dee in Sandia Park, New Mexico.

Fairbanks Waterfowl Project – The Rod King Years – 1978-1999.

Rod first moved to Alaska in 1976 where he worked as a wildlife biologist for the US Forest Service in Cordova, Alaska. In 1978, he joined the Waterfowl Management program (US Fish & Wildlife Service - USFWS) as a Wildlife Biologist/Pilot in Anchorage. Rod moved to Fairbanks in January 1981 and opened the first Migratory Bird /Waterfowl Management Field Station in Fairbanks, sharing office space in the original USFWS Alaska statewide office building located at 1412 Airport Way.

In the 1950's, Hank Hansen and Jim King flew an exploratory aerial bird survey on the North Slope of Alaska to look at the low densities of nesting waterfowl there and also document the important goose molting area near Teshekpuk Lake (King 1970). Rod was hired by FWS to work on the North Slope bird resources in response to the development of the expansive oil reserves there. He developed an Arctic Coastal Plain survey to measure bird resources there which he flew for many years (King and Mallek 1998). He also flew surveys to document and monitor the populations of the molting geese near the Teshekpuk Lake.

Rod's many significant contributions to the conservation and management of North American waterfowl and other wildlife will certainly be lasting. His data sets, numerous reports, and published accounts that focused on aerial surveys and inventories, band returns and neck collar observations, aerial relocations of radio-marked birds, and wetland habitat monitoring form important components of management plans for Pacific Flyway waterfowl, specifically for arctic nesting geese where these data sets were instrumental in the development of coordinated management plans for Emperor geese, Pacific (black) Brant, and Cackling Canada Geese nesting on the Yukon-Kuskokwim Delta and for management plans coordinated among Alaska Native people, the USFWS, and the Pacific Flyway Study Committee and Council. His efforts definitely contributed to making waterfowl hunting an enduring prospect for generations of Alaska Natives and sport hunters throughout the Pacific and Central flyways and also helped serve as foundations for wildlife management on National Wildlife Refuges, National Parks and Bureau of Land Management lands across Alaska. Rod advanced the techniques for drive trapping flightless geese, especially for White-fronted geese. Perhaps Rod's greatest legacy to the wildlife field, is the successful multi-state and province Trumpeter Swan restoration program that he orchestrated and spearheaded. Through his collection of swan eggs, Rod helped make it possible for legions of birders and conservationists to observe Trumpeter Swans for the first time in states and a Canadian province where their populations had been reduced or extirpated long ago and sightings that will thrill ever more people in the decades to follow (King 1987).

Rod was dedicated to and passionate about his job and never let the clock or the day of the week dictate his actions. Rod regularly flew 400-500 annual flight hours during the short summer field season in Alaska. Rod logged the majority of his flight hours in N1055F, a Cessna 185 (flown mostly on amphibs), but he also flew Beavers, Cessna 206's (mostly on amphibs), and other U.S. government aircraft, as well as his own personal Piper Super Cub. Not only was he dedicated to completing assigned aerial surveys and waterfowl banding projects, but Rod also was very generous and committed in offering aircraft flight assistance to personnel in the USFWS, National Park Service, Bureau of Land Management, Alaska Department of Fish and Game, Pacific Flyway member states, several other state agencies, and non-governmental resource organizations as well as the Canadian Wildlife Service. In addition to flying personnel, Rod routinely dropped off supplies at numerous field camps, staged gear for numerous projects, and also rescued two private citizens from a rising tide situation near the mouth of the Copper River that would have otherwise proven to be fatal. Here is Jack's account of that incident.

Rod was piloting 55F and I was in the right seat. We had just left Cordova and were flying low over the Copper River Delta to begin a day of swan surveys. It was low tide and the river was branched into multiple channels. In the distance, I noticed two people standing on a sand bar. One was waving a white piece of cloth up and down rapidly. A fishing boat was anchored in the channel next to the sand bar. Rod altered course and flew over them. They were actually on a sand island. They didn't have a skiff or other means to get back to their boat. Rod didn't hesitate to scope out the channel and land. He taxied over to them. It was a man and his wife. She frantically told us that their skipper had been at the

other end of the sand island. They were digging clams. The tide was coming in. When they took a break, to look over where he had been, they saw that the tide had carried off the skiff and their skipper was already in the water swimming out to the fishing boat. They yelled, but he kept on swimming out. When he got to the boat, he apparently had no strength to climb on board. They heard his screams for quite a while and then he disappeared.

The tide was coming in and they were facing the same fate. Her husband had put a plastic bag over a bucket and was going to try to swim to the boat with the bucket as buoyancy. Rod told them to stand on the float while he taxied them out to the boat. We all climbed onto the boat. Rod called the Coast Guard on the marine VHF radio and reported the situation. They promised that they would send out a craft to handle the fishing boat and take care of the couple. Rod knew they were okay and we took off to start our day anew.

Rod mastered the art of flying, primarily as a means for accomplishing much of his work with waterfowl and other wildlife. His exemplary skill level at flying was such that few other pilots in the wildlife field (or even in general bush flying as well) could match. Rod recognized and understood the capability and limitations of both his skill level and that of the aircraft he was flying. This skill level, on the edge of the envelope, transferred into a completely comfortable, competent, and confident atmosphere in the cockpit during many average, non-eventful flights. Many biologists and others not only welcomed the opportunity to fly with Rod in accomplishing their missions and also sought him out to fly with, one of the highest compliments that a natural resource pilot can receive. Rod's mastery of flying was not only the result of his flying skill, but also his understanding and knowledge of the aircraft and its systems as well. Never satisfied with the current configuration, he was continually researching aircraft systems and components for ways to improve performance, decrease weight, and increase flight time. Rod was innovative and continually striving to improve the performance of the aircraft he flew.

Rod also had the ability to quickly assess and comprehend situations and then formulate and communicate his perspective and perception. He unequivocally stated things as he saw them, often in a somewhat brash manner and without consideration as to their political correctness. Rod was never bashful about letting folks know his opinions. I never wondered about Rod's thoughts on a range of topics. Here is one that I remember well.

Jim King expressed an idea, shortly after he retired, that FWS pilots should be recognized for a history of safe flying. Sometime after that, a Safe Flying Award was developed back in DC. It showed up, to some of us, at our offices in a plain manila envelope.

Shortly after we received it in the mail, we had an all Alaska Interior pilot's safety meeting in Anchorage. In the meeting, Rod stood up and said something to the effect that "you would think that 'Management' would have a more thankful opinion of a history of safe flying by their pilots than to just send out awards in the regular mail". (I agreed with Rod thinking that, don't they teach that to managers in People Management 101? i.e. You should recognize good performance by employees in public and conversely criticize them in private). I think that it had an effect because shortly after that, Safe Pilot Awards were awarded in public, at annual pilot meetings. I am glad that I was able to convince folks that Jim King deserved a Safe Flying Award, in retirement, which he received at one of our pilot meetings.

The other half of the story is that Rod made a case that he thought a more representative photo of a working FWS airplane should be in the middle of that award. Unbeknownst to me, before the award arrived to me in the mail, in the middle of the award, there was a copy of a photo of N754 that we took over Berner's Bay north of Juneau (along with a bunch more) for Jerry Lawhorn's pending retirement. In my defense, I made a statement, in the meeting that I did not know that the photo was going to be used in the award. Earlier I had received a request from our FWS Chief Pilot (forgot his name) for a good photo of N754, not saying why he wanted one. I believe that Kenai FWS pilot Bob Ritchie said something like he thought that the photo was appropriate, since it was an airplane developed by Alaska FWS.

The next spring, when we stopped by Rod's office in Fairbanks, on our annual spring survey, there was Rod's Safe Flying Award on top of his bookcase with a nice photo of N1055F over the photo of N754.

Rod and I were good friends over the years. I enjoyed working with him and attending his storied annual spring pig roasts in Fairbanks. I very much enjoyed stopping and seeing him in California (on my flights to/from Mexico) after he moved down there to finish his distinguished FWS career, and later in Goldendale, WA where he and Charlie retired. We had enjoyable survey flights together in Mexico (a low point, in a bar, in Loreto where we watched Rod's beloved Oakland Raiders lose the Super Bowl). I always enjoyed and appreciated Rod's straight forward approach to flying and life

Even though Rod was very dedicated to his work, he also knew when to leave it behind and how to have a good time, - approaching down time with the same enthusiasm that he put into his job. His outgoing personality often resulted in him naturally becoming the center of attention in social settings. The annual spring 'Pig Roast' at Rod and Charlotte's residence on Solitude Way in Fairbanks became infamous and was highly anticipated as the social event/party of the year. He very much enjoyed the atmosphere and camaraderie of 'happy hours' at local bars and parties – sharing pitchers of beer, stories, and jokes with co-workers, friends and others. Even when relaxing solo at a bar, Rod could easily strike up a conversation with a total stranger sitting next to him on the adjacent bar stool; and as a result of his talent at telling stories and jokes, make a new friend (at least for a short time).

In 1999, Rod transferred to the Waterfowl Population Surveys (WPSUSFWS) program in the lower 48 as a Flyway Biologist and was stationed at Mare Island, California, sharing office space with the US Geological Survey, Western Region Ecological Center.

Rod retired from FWS in 2007 and lived with his wife Charlotte (Charlie) Van Zant-King in Goldendale, Washington where he sadly passed away in 2018.

Rod King banding a Tundra Swan on Yukon Delta.

Rod King with his favorite Fairbanks Project aircraft, an amphibious Cessna 185.

Fairbanks Waterfowl Project - The Ed Mallek Years 1999 - 2013

Edward (Ed) Mallek joined the Fairbanks project in 1998 and succeeded Rod as Project Leader in 2000. Ed arrived in Alaska in June 1991 as a volunteer for Innoko NWR where he met Rod King in July 1991. He became a permanent FWS employee in January 1993. He was hired by Rod as a biologist/pilot trainee in 1998. After Rod transferred to Region 9, Ed served as project Leader until 2013. Ed hired Larry Lysne and Karen Bollinger to work as biologist/pilots before he transferred back to refuges to work as a biologist/pilot for the Koykuk NWR. The Fairbanks Project was closed when Ed transferred and its functions were consolidated into the Anchorage Project.

Karen Bollinger is the only employee to work in all three Alaska field Waterfowl Projects, plus as a Flyway Biologist down south. She started with the Juneau Project in 1982, then Anchorage/Fairbanks, then FWS Research in Anchorage, then FWS Region 9 and then back to Fairbanks as a biologist/pilot until retirement in 2013. She flew many surveys and conducted other waterfowl projects.

Ed carried on many of the aerial surveys that Rod was doing, before transferring, and started a few new ones. His major accomplishments include: The annual Arctic Coastal Plain Breeding Population Survey; Spring/Fall Emperor Goose surveys; Izembek Lagoon Fall/Winter Pacific Brant Surveys; Teshekpuk Area molting goose surveys; Scoter breeding population timing surveys; Arctic Coastal Plain Nearshore Survey; Mexico Winter Pacific Brant surveys (that Bruce use to fly); the Alaska portion of the annual WBPHS; Canadian Arctic Surveys with fixed wing aircraft (that Bruce initiated); Trumpeter Swan surveys in Minto/Cordova and parts of the Alaska Trumpeter censuses (2000/05/10/15); White-fronted Goose banding; yellow billed loon surveys; sea duck surveys.

His many professional talents are now being used well in the Alaska refuge system.

Ed Mallek in the left front seat of N754.

The William (Bill) Larned Addition 1992 – 2012.

William (Bill) Larned transferred to Kenai NWR from Jacksonville, Florida where he had worked as a Flyway Biologist in Region 9. His duties at Kenai included: survey/logistic pilot; law enforcement; upland wildlife management biologist and SW Alaska Fire Management Officer.

An interesting sidebar story that happened when Bill was returning from conducting helicopter comparison surveys for the Juneau Project as mentioned above. After borrowing Bill, we took him to the airport in Fairbanks for his trip back to Kenai. At the terminal, there were lots of firefighters there waiting to get on the plane to Kenai. It turned out that a prescribed burn on the Kenai Refuge had gotten out of control. That burn was a project that Bill was responsible for in his duty as Fire Management officer.

Bill transferred to the Anchorage Project of Migratory Birds in the winter of 1992, as biologist/pilot, where he flew many of the fixed wing surveys initiated in the Anchorage and Fairbanks Projects, but was based and still remains in Soldotna. Here is an example of a satisfying and highly entertaining work assignment as detailed by Bill:

"Roughly a century ago, provisions of the Migratory Bird Treaty act made it clear that federal and state governments needed to develop methods of counting or estimating populations of waterfowl and other migratory game birds to inform regulations to protect against overharvest by hunters. After WWII the availability of military surplus small aircraft provided an affordable way for technicians to begin counting birds far more efficiently and comfortably than from mosquito and tick infested ground blinds. Many species lent themselves to systematic aerial transect sampling and extrapolation when birds were scattered in pairs during the breeding season, but for others, and for other habitat-specific management objectives, they were limited to estimating aggregations during the off-breeding seasons. Unlike ground-based observations, aerial observers could often see the extent of large aggregations of ducks and geese and keep track of flock movements to prevent double or under counting. During ensuing years, procedures were developed to improve and standardize ocular estimation, and results were generally accepted as adequate for harvest regulation decisions, as long as a generous cushion was added in favor of the resource. However, many management circumstances demanded greater accuracy, confidence, and permanent records for audit. In some cases, it was possible to meet these needs using aerial photography. For instance, large white snow geese and swans were highly visible in dark open (snow-free) winter habitats. Other examples are light-colored ducks like scaup, redheads and canvasbacks, which contrast well against open water and often winter in dense stable single-species flocks. I used that technique successfully with redheads wintering in Apalachee Bay in Florida.

Another of my career assignments that utilized aerial photography involved a project featuring a little known but strikingly charismatic sea duck which spends its entire life cycle in arctic and subarctic coastal tundra and marine habitats in Alaska and Russia. Spectacled eiders suddenly glowed more brightly on the human "radar screen" in 1993, when they were listed as threatened under the Endangered Species Act due to their alarming downward trends in Alaskan breeding population survey data.

A recovery team was selected, and tasks, including designation of critical habitat, were developed and prioritized. But there was a big life history gap relevant to the critical habitat task: no one knew where they spent the winter. They seemed to just disappear from arctic staging areas in the fall, reappearing on Alaskan and Russian breeding grounds in May and June.

To address this critical data gap, in early summer of 1993 the USGS instrumented 14 spectacled eiders with satellite transmitters. It was also hoped that resulting tracking data might help identify locations and opportunities where we could estimate the wintering population. Late summer satellite data showed several instrumented spectacled eiders apparently molting along the south coast of St. Lawrence Island, but by mid-October all but one transmitter had failed, and that one was located about 40km south of that island. Using that scant evidence, in early November fellow biologist Greg Balogh and I conducted a reconnaissance survey along the entire coast of St. Lawrence Island in a chartered twin engine Aero Commander Shrike piloted by its owner Doug Burts., and verified the presence of about 33,000 spectacled eiders along the south shore. In late winter we planned another survey in the same general area, but in February there was a single hit from a long-silent eider transmitter located halfway between St. Lawrence and St. Matthew Islands. In a March "weather window" we launched another survey in the same plane, planning to include the area surrounding that recent location. The timing happened to coincide with an extended cold snap, which left the northern Bering sea almost completely covered by heavy sea ice. That was fortuitous as we found that open leads, the only usable habitat available there for eiders, were few and easily spotted miles away, which enabled us to maximize the grid spacing by spotting a distant open lead, leaving the transect to check for eiders, and returning to the transect. Using that technique, we covered a much larger area than originally planned. Near the end of the first 7-hour survey flight we observed and photographed a flock of several thousand spectacled eiders swimming in an open lead. The next day we flew a more focused grid around the same area and observed and photographed 22 flocks in several open leads. When we returned to Anchorage there was great excitement, and we immediately had contributions from various FWS offices to fund a second expanded survey, which we completed in mid-April, estimating about 140,000 birds. 20 more birds were instrumented in each of 1995 and 1996, providing numerous winter locations clustered in the same general area. In March of 1996 and 1997 we flew contiguous search strips covering a generous area around the recorded locations, photographed all flocks obliquely through an open window with a 35mm camera, and later tediously counted images using a "Photoshop" counting and marking extension. Because many of the darker females were not discernable against the dark water background, we counted males in all images and used sex ratios determined from a subset of images where all females could be seen, to adjust the males-only counts to estimate total birds. In 1997, Ideal survey conditions and techniques refined through experience yielded the best and highest estimate of 363,000 plus or minus 10,000 birds; about 5 times the earlier, and generally accepted, global "guesstimate" of 70,000 birds! The precision accomplished in this project was extremely satisfying and vastly more useful for management than the usual alternative of ocular estimates of flocks ranging up to tens of thousands of birds and subject to many potential biases and unevaluated assumptions."

Bill retired the end of 2012 but continues to work as an occasional observer in aerial bird surveys in the Anchorage Project. He lives with his wife Susan in Soldotna, Alaska.

Break time away from the mosquitoes during a White-fronted Goose banding operation in Innoko National Wildlife Refuge. Bill Larned on the right atop N61599, a Cessna 206.

Summary.

In the perhaps not all too distant future, biologists and others will look back at this era of aerial bird surveys with nostalgia. As flying in general became safer and more acceptable, pioneer bird biologists took advantage of getting up in the air with birds and looking down on their habitat with a new perspective. Beyond gathering bird population data on a broad scale, among the results was a greater understanding of how the parts fit together at the continental scale. An additional benefit was the interaction/cooperation that developed between field level bird biologists between the different entities responsible for the continental management of migratory bird resources, especially between different countries. In Alaska, bird survey projects have had a long and dependent relationship with the various Alaska NWR personnel working with migratory birds.

Many wildlife biologists depend on strictly professional aircraft pilots for providing the flying. The combination of professional aircraft piloting with professional migratory bird biology, in the same person is unique. Some excelled more in one aspect than the other, but all succeeded as the safety record shows. Especially in Alaska, there is a long history of aerial migratory bird biologists producing many high quality reports as well as formal publications. Hank Hansen established the model for those of us who followed in aerial biology. We tried to aspire to his vision. Some succeeded better, such as Jim King and Jack Hodges, but most of us succeeded to different degrees. The continental WBPHS concentrated on counting ducks. In Alaska, other species were enumerated and reported on as well; Swans, Sandhill cranes (Conant et.al. 1985a), and loons (Groves et. al. 1996).

The relatively small cadre of flying biologists were a very dedicated and adaptable lot. Most spent their whole careers doing this work. Typically, most were men in the early years, but this is changing as society evolves. As Art Brazda told a reporter on the floats of his aircraft in Fort McMurray, Alberta, Canada, "this is not your average 8-5 job". Also, as journalist Kokie Roberts wrote about the wives of early American Presidents, similarly biologists' wives were very supportive and were a key aspect to the success of the endeavor (App. XXII.). In especially the northern parts of the spring surveys, it was a joyous time of the annual year cycle. Local people were generally in good moods and perhaps that is how birds feel as they return to their nesting grounds. As in society as a whole, as time goes by, more women are joining the ranks of those dedicated to this kind of work, which is a good advancement.

The whole continental aerial bird survey program has an enviable longevity and safety record. Most of those who joined the challenge and adventure stayed with it until retirement. The Juneau Waterfowl Project had just three Project Leaders in sixty four years (App. XXI.). Early on, many observers were involved which contributed an unknown variability to the results. When Bruce, Jack and Debbie joined the Juneau Project, some stability in aerial observations was established. The core survey, during the history of continental surveys, is the annual WBPHS. The Alaska portion settled down to an unchanged design in 1964 and continues to be repeated with minimal changes in pilots, observers and aircraft. The 50th anniversary of this survey occurred in 2006 (Conant and Mallek 2006). Technology has evolved which increased the utility of the results. A remarkable safety record, of low level flying, has been established and maintained for this survey as well as other surveys and associated projects in weather and logistically challenging parts of North America and Russia. All who made this possible, including the support parts, should be proud of all the efforts to make this achievement possible.

A tragic event occurred in the Juneau Project in 1987 when Jack's wife Lisa was killed in a commercial aircraft accident just north of Juneau. Jack described the accident and its aftermath in detail in his book *Above and Beyond* (Hodges 2017). Jack later put together a running team for the Klondike Trail of '98 Relay to honor Lisa. Our Juneau Project personnel participated, Bruce running along with other close professional friends and Jim and Marylou King driving a support vehicle. It was a difficult time for the Juneau Project and, of course, especially for Jack and his two young daughters. We all eventually worked through it.

Many advancements in techniques have occurred over the years as technology advanced in aircraft, navigation and the advent of the computer age. The integration of GPS into capturing bird observation locations was a major step forward. Military surplus aircraft were replaced by commercial airplanes with good capabilities. Jim King, Bruce Conant, Jack Hodges and Ed Mallek were fortunate (thanks to Jerry Lawhorn and Theron Smith) to have had, for a lot of years, the opportunity to fly N754, a highly modified aircraft for aerial wildlife work. If aircraft were musical string instruments, beavers could be considered the violins of the deHavilland section and, for those who flew it, N754 would compare to a Stradivarius.

Many leaders, in government and elsewhere, contributed to developing the continental migratory bird management system we have in North America today. In Alaska, we were very fortunate to have Clarence Rhode at the helm in the formative years, who had a forward looking vision to take advantage of what Sam White initiated with wildlife flying. Many dedicated intermediate administrators helped it along the way. Migratory Bird Coordinators in Alaska include, Jim Bartonek, Mimi Hogan, Jim Baker Dick Pospahala, Dirk Derksen, Skip Ladd, Jim Baker, Bob Leedy, Russ Oates and Julian Fischer.

In Alaska, for many years, an associated FWS Aircraft Division under the leadership of Theron Smith and Jerry Lawhorn, with many dedicated professional aircraft mechanics, were critical to the longevity and success of the aerial bird survey program. Without the aircraft logistical support, throughout North America as well as in nearby Russia, wide ranging aerial bird surveys would not be possible.

In the early years, Waterfowl Projects had a lot of secretarial as well as administrative support without which they could not have functioned. Over the years, many people, primarily within FWS, but also elsewhere, participated in many aerial bird surveys and other projects. Their help and contributions are much appreciated.

A remarkable team effort, across North America and beyond, made the success and longevity of aerial bird surveys possible. I've tried to compile some of the major achievements and advancements in aerial bird surveys in this document as well as give a little 'flavor' of what flying wide ranging aerial surveys is like. Others have and more could provide more details and add some of the many rich personal stories experienced over the years and across the continent. I have many pleasant memories of the whole collective effort and feel so lucky to have found and been a part of it all.

Acknowledgements.

In compiling this overview, I have relied on help from many of those named here, especially from Debbie Groves for Alaska FWS sources, Bill Butler, Bill Larned, Ed Mallek and Dirk Derksen for words contributed to Rod King's obituary. Oral histories, of many of the major players in the aerial survey game, are accessible from the USFWS National Conservation Training Center archives website and are another source of information. The two books, *Waterfowl Tomorrow* (U.S. Government Printing Office – 1964) and *Flyways* (U.S. Government Printing Office – 1984), are excellent sources of historical information on the whole continental waterfowl management program, including aerial waterfowl surveys, by the U.S. Fish and Wildlife Service. The publication, *Current Status and Future Directions of Waterfowl Harvest Management* by the U.S. Fish and Wildlife, edited by Robert J. Blohm, and published by Wildlife Management Institute in 2008, is another source of information on the waterfowl harvest aspect of continental waterfowl management. Doug Benning compiled and displayed all the information contained in the Excel Spreadsheets (Apps. XLIV., XLV. And XLVI.).

Bruce Conant

2021

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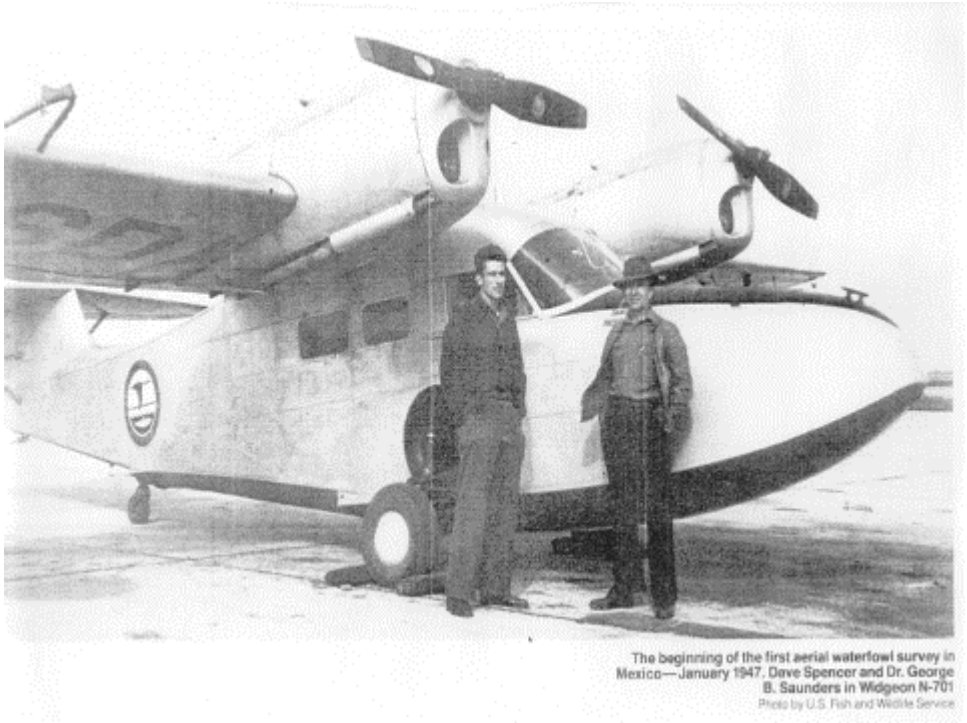
Appendixes - People, Equipment, Maps, Forms and Documents.

I. Prairie 'Duck People' in 1947 - Dave Spencer far right.

II. First Mexico Aerial Waterfowl Survey - Dave Spencer/Pilot - George Saunders/Observer.



The beginning of the first aerial waterfowl survey in Mexico—January 1947. Dave Spencer and Dr. George B. Saunders in Widgeon N-701
Photo by U.S. Fish and Wildlife Service

III. Alaska Survey Aircraft - Piper Pacer/1957-58.

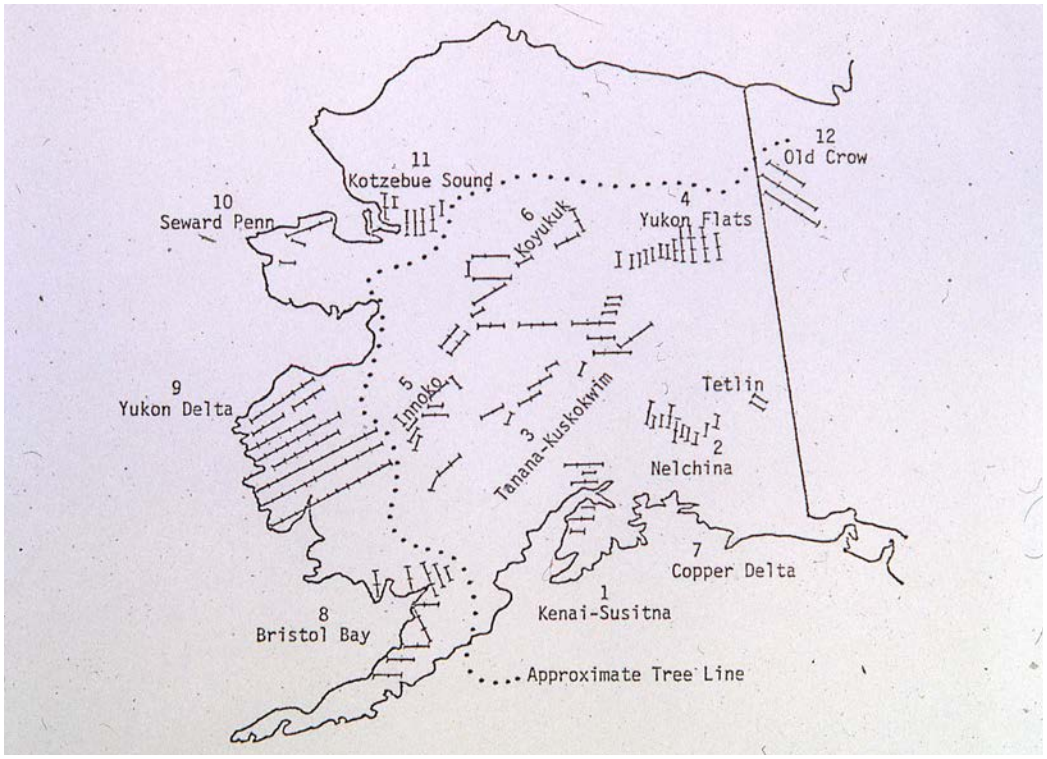
IV. Alaska Survey Aircraft - Cessna 180 with Jim King/1959-66.

V. Alaska Survey Aircraft - deHavilland Piston Beaver with Jim King/1967-74.

VI. Alaska Survey Aircraft - deHavilland Turbine Beaver on Yukon Delta Mud/1977-2011.

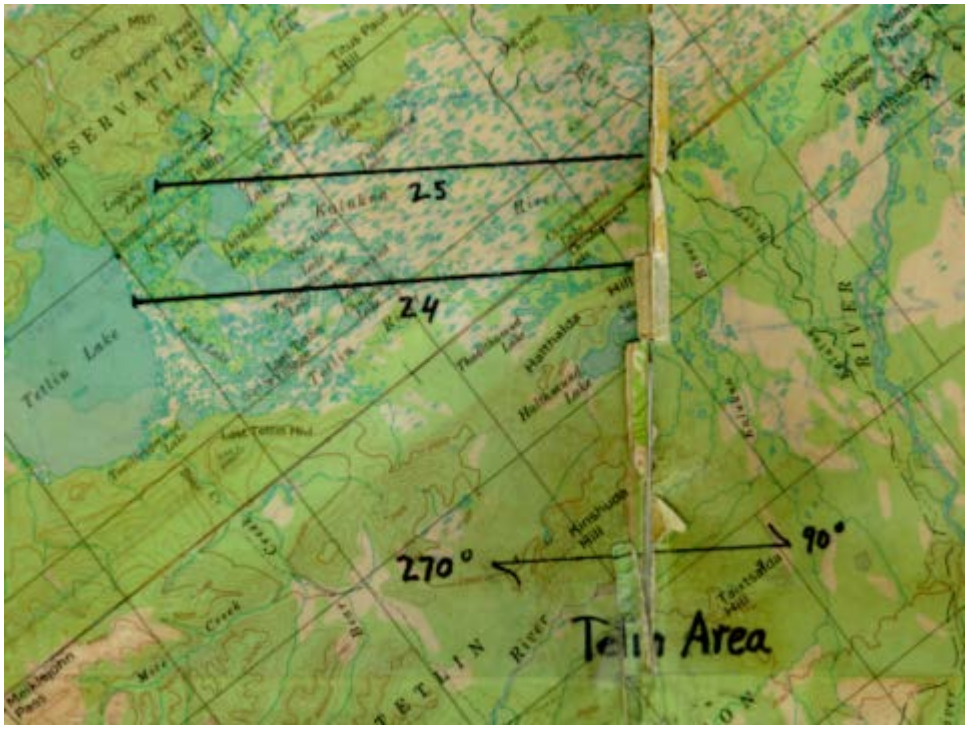
VII. Continental WBPHS Map.

VIII. Alaska Portion Design of WBPHS.



VIX. Early Design of a Survey Area in Alaska - WAC Map Showing Boundaries and Survey Transects.

X. Survey Flight Map - 1:250,000 Scale USGS Map.



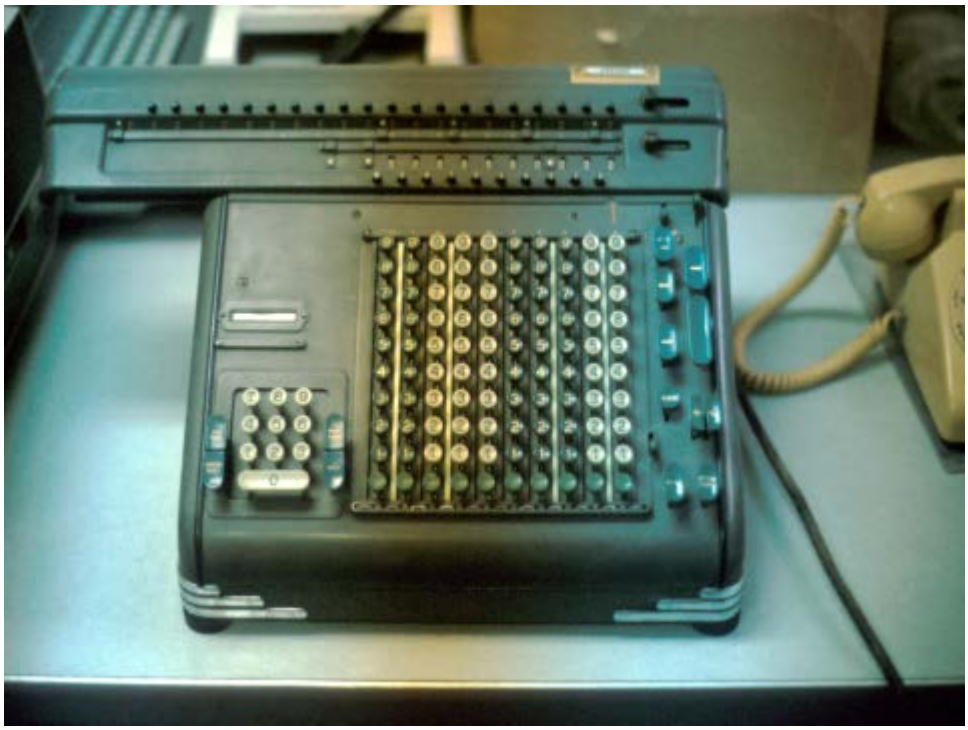
XI. Old Flying Method Using Survey Map for Navigation Compared to Using Computer Map.

XII. On Survey in N754 - Jim King/Pilot - Bruce Conant/Observer.

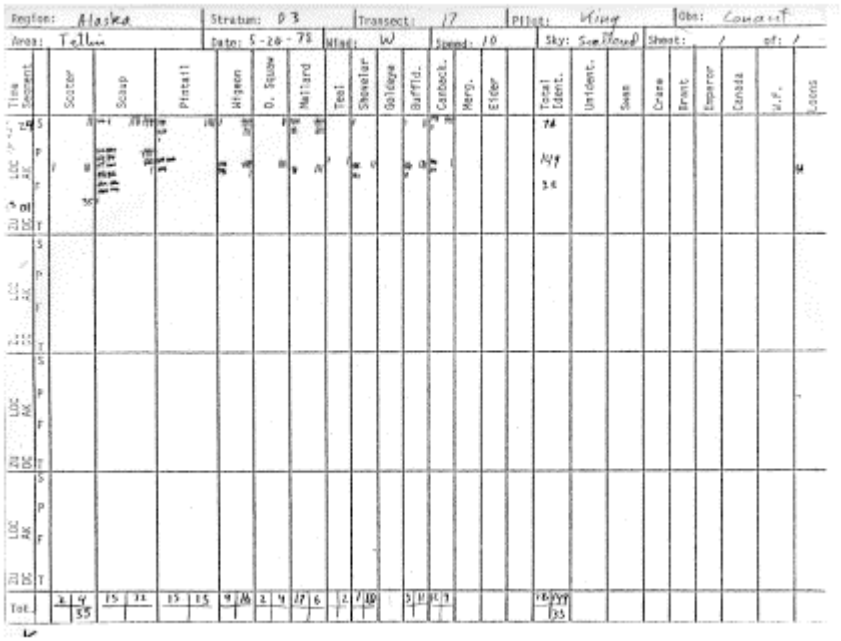
XIII. Superb Forward Visibility in N754.

XIV. Transcribing from IBM Dictabelt Voice Recorder onto New Combined Field Form.

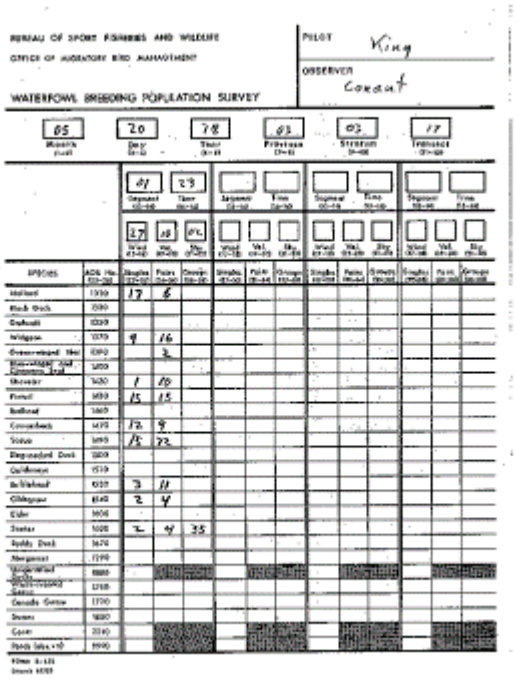
XV. Friden Manual Calculating Machine.



XVI. Old Field Transcription Form.



XVII. Computer Punch Form - 3-158.



BUREAU OF SPORT FISHERIES AND WILDLIFE
OFFICE OF MIGRATORY BIRD MANAGEMENT

PILOT King
OBSERVER Consult

WATERFOWL BREEDING POPULATION SURVEY

Month	Day	Year	Previous	Station	Transect
05	20	78	02	03	17

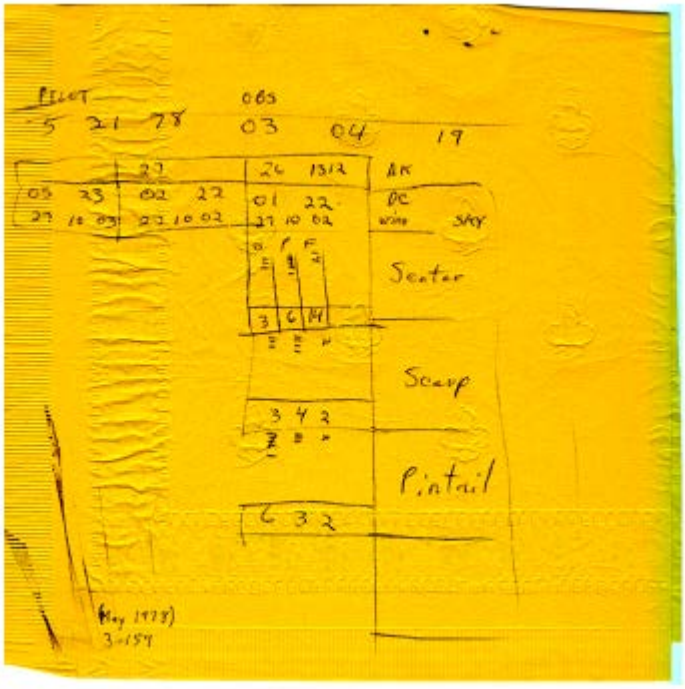
Segment	Time	Segment	Time	Segment	Time	Segment	Time
01	23						

Wind	Vel.	Sky
27	18	OC

SPECIES	ADS No.	Singles	Pairs	Groups	Singles	Pairs	Groups	Singles	Pairs	Groups	Singles	Pairs	Groups
Mallard	1310	17	6										
Black Duck	1280												
Gadwall	1320												
Wigeon	1370	9	16										
Green-winged Teal	1390		2										
Blue-winged and Cinnamon Teal	1400												
Shoveler	1420	1	10										
Pintail	1430	15	15										
Redhead	1460												
Canvasback	1490	12	9										
Scaup	1510	15	22										
Ring-necked Duck	1520												
Goldeneye	1570												
Bufflehead	1590	3	11										
Oldsquaw	1640	2	4										
Eider	1650												
Scoter	1670	2	4	35									
Ruddy Duck	1670												
Merganser	1790												
Unidentified Ducks	1880												
Rails-Coots-Gallinules	2160												
Canada Goose	1730												
Swans	1830												
Geese	2240												
Ducks (also +10)	9990												

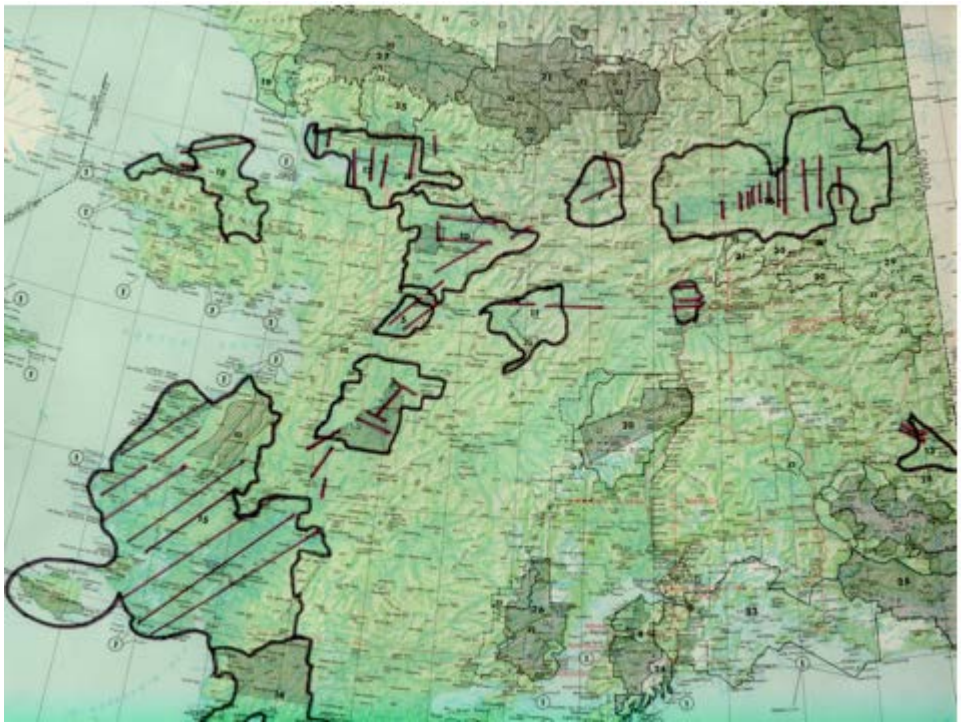
Form 3-158
Stock 6-00

XVIII. Original 'Napkin' New Transcription Form Design.



XIX. Transcribing from Newer Dictaphone Voice Cassette Recorder directly into Field Computer.

XX. Alaska Survey Transects Overlay on New Alaska Waterfowl National Wildlife Refuges.



XXI. Three Project Leaders of the Juneau Waterfowl Project - Bruce/Jim/Hank - 1954-2008.

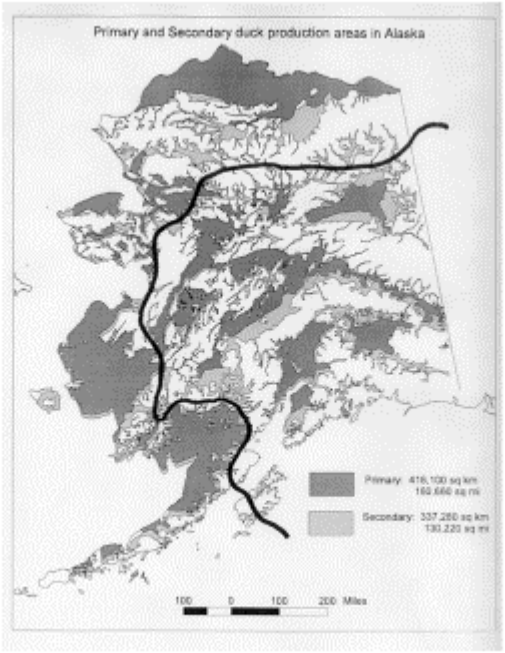
XXII. Three Juneau Project Leaders Wives - Sue/Marylou/Doris.

XXIII. Juneau Waterfowl Project Personnel - Jim/Bruce/Steve/Jack - 1984.

XXIV. Juneau Waterfowl Project Personnel - Jack/Bruce/Debbie - 2000.

XXV. Helicopter/Fixed Wing Comparison Aircraft in Fort Yukon, Alaska - 1986.

XXVI. Depiction of Recalculation of Alaska WHPHS Survey Boundaries.



XXVII. Tundra Habitat in Alaska.

XXVIII. Boreal Forest Habitat in Alaska where Duck Brood Surveys were conducted.

XXIX. Canoe used for Duck Brood Surveys - Mike (Jake) Jacobson.

XXX. Aircraft ‘Driving’ Molting White-fronted Geese towards Trap.

XXXI. Trap Built to Catch White-fronted Geese for Banding.

XXXII. Flightless White-fronted Geese in Trap with Wilbur (Skip) Ladd.

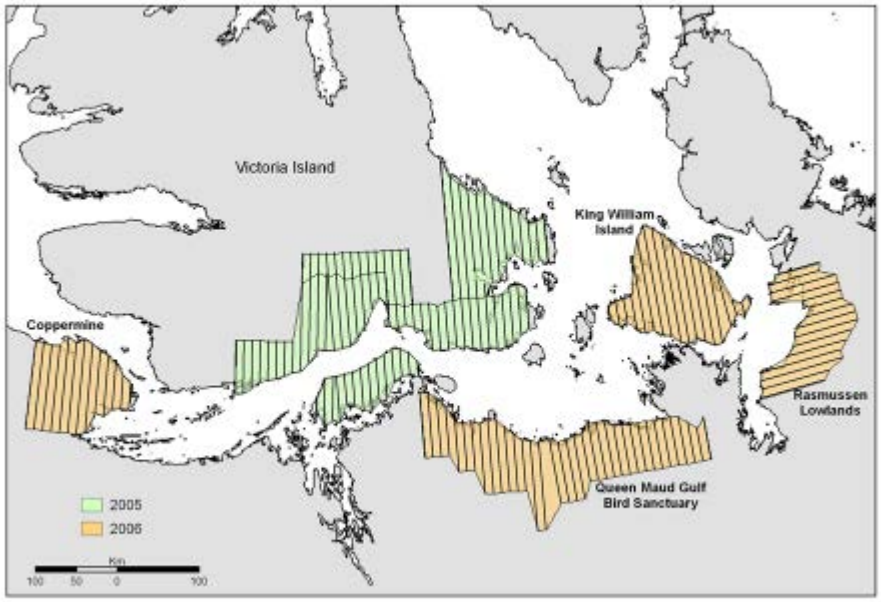
XXXIII. Catching Flightless Trumpeter Swans off Float of Aircraft.

XXXIV. Rod Drewien with Flightless Trumpeter Swan Caught in the Yukon, Canada.

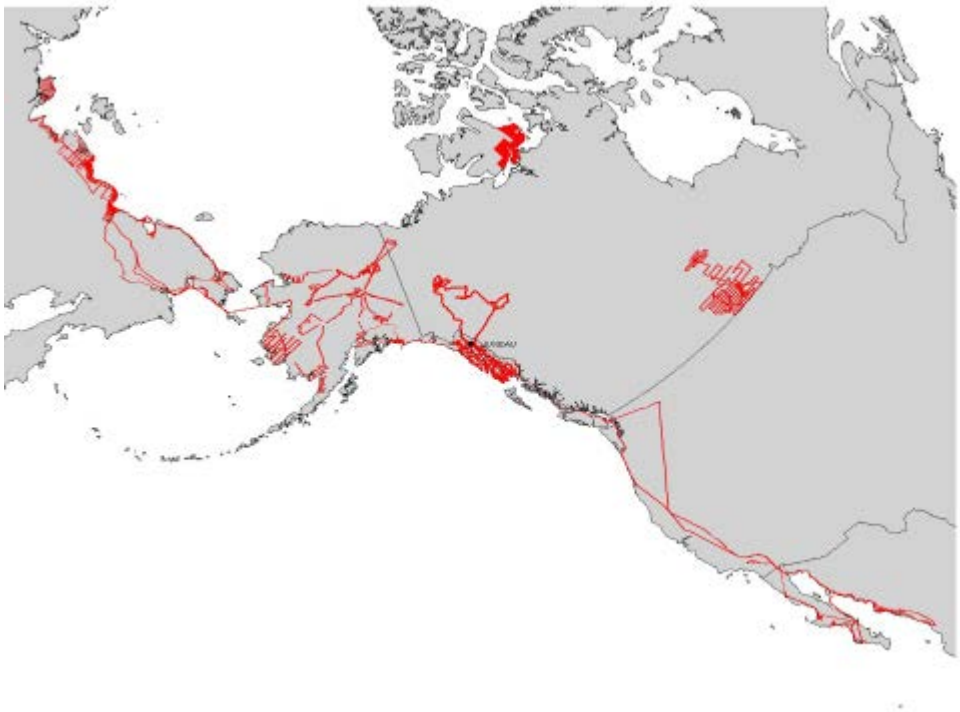
XXXV. Karen Bollinger/Bill Butler/Bill Eldridge on Survey on Yukon Delta.

XXXVI. Tundra Habitat in Nunavut, Canada.

XXXVII. Survey Lines Flown by Juneau Waterfowl Project in Nunavut, Canada.



XXXVIII. GPS Tracks of Aircraft on Survey in Alaska, Russia, Canada and Mexico.



XXXIX. Alaska Portion of WBPHS Sample History.

Waterfowl Survey Segment Numbers

Alaska

1966			1964-65		1974		1956-63	
Stratum	Transect	Segment	Stratum	Segment	Transect	Segment	Area	Segment
37	01	01	1	1	0801	01		14
		02		2		02		15
	02	01		3	0802	01		12
		02		4		02		13
	03	01		5	0803	01		10
		02		6		02		11
	04	01		9	0804	01		
		02		8		02		
		03		7		03		
	05	01		10	0805	01	Bristol Bay	8
		02		11		02		9
	06	01		12	0806	01		
	07	01		13	0807	01		
		02		14		02		
	08	01		15	0808	01		3
		02		16		02		2
		03		17		03		1
	09	01		19	0809	01		
		02		18		02		
	10	01		21	0810	01		5
		02		20		02		4
	11	01		23	0811	01		7
		02		22		02		6
	12	01		24	0912	01		54
		02		25		02		45
		03		26		03		46
		04		27		04		47
		05		28		05	Yukon Delta	48
		06		29		06		49
		07		30		07		50
		08		31		08		55
		09		32		09		56
		10		33		10		57
		11		34		11		58
	13	01		35	0913	01		44
		02		36		02		43
		03		37		03		42
		04		38		04		41
		05		39		05		40
		06		40		06		39
		07		41		07		38
		08		42		08		3
		09		43		09		2
		10		44		10		1
		11		45	11			65

XXXIX – continued.

Waterfowl Survey Segment Numbers
Alaska (con't.)

1966			1964-65		1974			1956-63	
Stratum	Transect	Segment	Stratum	Segment	Transect	Segment	Area		Segment
37	14	01	1	46	0914	01			64
		02		47		02			63
		03		48		03			62
		04		49		04			61
		05		50		05			37
		06		51		06			36
		07		52		07			4
		08		53		08			60
		09		54		09			59
		10		55		10			5
		11		56		11			6
	15	01		57	0915	01			32
		02		58		02			33
		03		59		03			34
		04		60		04			35
		05		61		05			8
		06		62		06			7
	16	01		63	0916	01			31
		02		64		02			30
		03		65		03			29
		04		66		04	Yukon Delta		28
		05		67		05			27
		06		68		06			26
		07		69		07			9
		08		70		08			10
	17	01		71	0917	01			23
		02		72		02			24
		03		73		03			25
		04		74		04			13
		05		75		05			12
		06		76		06			11
	18	01		77	0918	01			19
		02		78		02			18
		03		79		03			17
		04		80		04			16
		05		81		05			15
		06		82		06			14
	19	01		83	0919	01			53
		02		84		02			52
		03		85		03			51
		04		86		04			22
		05		87		05			21
		06		88		06			20

XXXIX. - continued.

Alaska (con't.)

1966			1954-65		1974			1956-63
Stratum	Transect	Segment	Stratum	Segment	Transect	Segment	Area	Segment
37	20	01	1	89	1020	01	Norton Bay Area	2
	21	01		90	1021	01		5
	22	01		91	1022	01		5
	23	01		92	1023	01		6
		02		93		02	Seward Peninsula	7
		03		94		03		8
		04		95		04		9
	24	01		96	1024	01		11
		02		97		02		12
	25	01		98	1125	01		10
	26	01		99	1126	01		8
		02		100		02		9
	27	01		101	1127	01	Kotzebue Sound	7
		02		102		02		6
	28	01		103	1128	01		4
		02		104		02		5
	29	01		105	1129	01		2
		02		106		02		3
	30	01		107	1130	01		1

Note: 8 segments were added in Bristol Bay in 1964
Norton Sound 3 segments dropped 1964
Seward Peninsula 6 segments dropped 1964

XXXIX. - continued.

Waterfowl Survey Segment Numbers

Alaska (con't.)

1966			1964-65		1974			1956-63	
Stratum	Transect	Segment	Stratum	Segment	Transect	Segment	Area		Segment
38	01	01	2	1	0101	01			1
	02	01		2	0102	01			2
		02		3		02			3
	03	01		4	0103	01			4
	04	01		5	0104	01	Kenai-Susitna Area		5
		02		6		02			6
	05	01		7	0105	01			7
	06	01		8	0106	01			8
		02		9		02			9
		03		10		03			10
	07	01		11	0207	01			2
		02		12		02			1
	08	01		13	0208	01			3
	09	01		14	0209	01			4
	10	01		15	0210	01			5
		02		16		02			6
	11	01		18	0211	01	Nelchina		7
		02		17		02			9
	12	01		19	0212	01			8
	13	01		20	0213	01			10
	14	01		21	0214	01			11
	15	01		22	0215	01			12
	16	01		23	0216	01			13
	17	01		24	0317	01			5
	18	01		25	0318	01	Tetlin		3
	19	01		26	0419	01			1
	20	01		27	0420	01			5
	21	01		28	0421	01			7
	22	01		29	0422	01			8
	23	01		30	0423	01			9
	24	01		31	0424	01			10
	25	01		32	0425	01			11
	26	01		34	0426	01			13
		02		33		02	Ft. Yukon Flats		12
	27	01		37	0427	01			14
		02		36		02			15
		03		35		03			16
	28	01		40	0428	01			
		02		39		02			
		03		38		03			
	29	01		43	0429	01			19
		02		42		02			18
		03		41		03			17
	30	01		44	0430	01			20
		02		45		02			

XXXIX. - continued.

Waterfowl Survey Segment Numbers
Alaska (con't.)

1966			1964-65		1974			1956-63	
Stratum	Transect	Segment	Stratum	Segment	Transect	Segment	Area		Segment
38	31	01	2	49	0331	01			
		02		50		02			
		03		51		03			
	32	01		46	0332	01			6
	33	01		47	0333	01	Minto		3
	34	01		48	0334	01			4
	35	01		57	0335	01			
		02		58		02			
		03		59		03			
	36	01		55	0336	01			
		02		56		02			
	37	01		52	0337	01			14
		02		53		02			1
		03		54		03			2
	38	01		60	0338	01			
	39	01		61	0339	01			11
	40	01		62	0340	01			8
		02		63		02	Tanana-Kuskokwim		
	41	01		64	0341	01			18
		02		65		02			19
	42	01		66	0342	01			
	43	01		67	0343	01			9
		02		68		02			10
	44	01		69	0344	01			15
		02		70		02			16
		03		71		03			17
	45	01		72	0545	01			1
	46	01		73	0546	01			
		02		74		02			
	47	01		75	0547	01			v2
	48	01		76	0548	01			4
		02		77		02			3
	49	01		78	0549	01	-Innoko River		5
		02		79		02			7
	50	01		80	0550	01			6
		02		81		02			8
	51	01		82	0551	01			
	52	01		83	0652	01			4
		02		84		02			3
	53	01		85	0653	01	Bettles		2
		02		86		02			1
	54	01		87	0654	01			

XXXIX. - continued.

Waterfowl Survey Segment Numbers

Alaska (con't.)

1966			1964-65		1974			1956-63	
Stratum	Transect	Segment	Stratum	Segment	Transect	Segment	Area		Segment
38	55	01	2	90	0655	01			8
		02		89		02			9
		03		88		03			10
	56	01		91	0656	01			
	57	01		92	0657	01			5
		02		93		02			6
		03		94		03	Koyokuk River		7
	58	01		97	0658	01			
		02		96		02			
		03		95		03			
	59	01		98	0659	01			
	60	01		100	0660	01			
		02		99		02			
	61	01		102	0661	01			
		02		101		02			
	62	01		103	0362	01			7
		02		104		02			6
	63	01		105	0363	01	Tanana		5
		02		106		02			4
		03		107		03			3

Note: Ft. Yukon - 3 segments dropped and 4 added in 1964
Koyokuk River - 4 segments dropped and 9 added in 1964
Minto - 3 segments dropped in 1964
Tanana-Kuskokwim - 9 segments added in 1964
Innoko River - 3 segments added in 1964
Nelchina - 2 segments dropped in 1964
Tetlin - 5 segments dropped in 1964
Copper Delta - 7 segments dropped in 1964

XXXIX. - contnued.

Waterfowl Survey Segment Numbers
Old Crow - Yukon Territory

	1966			Pre, 1966						
Stratum	Transect	Segment	Map No.	Transect	Segment	Map No.	Transect	Segment	Map No.	
05	01	01	8	10	A2	8	1201	01	8	
		02	7		A1	7		02	7	
	02	01	4	10	B3	4	1202	01	4	
		02	5		B2	5		02	5	
		03	6		B1	6		03	6	
	03	01	3	10	C3	3	1203	01	3	
		02	2		C2	2		02	2	
		03	1		C1	1		03	1	

XL. Survey Crews, Alaska-Yukon Waterfowl Breeding Population Survey.

Year	Crew		Aircraft
1957	Henry A. Hansen	Walt Crissey	Piper Pacer - floats
1957	Henry A. Hansen	Rudolph W. Switzer	Piper Pacer - floats
1957	Henry A. Hansen	John Buckley	Piper Pacer - floats
1957	David Spencer	Virgil Crosby	Piper Pacer - floats
1958	Henry A. Hansen	Jude Henzler	Piper Pacer - floats
1958	Henry A. Hansen	_____ Johnson	Piper Pacer - floats
1958	David Spencer	John Buckley	Piper Supercub
1959	Henry A. Hansen	James G. King	Cessna 180-floats
1959	David Spencer	Henry A. Hansen	Cessna 180-floats
1960	Henry A. Hansen	Raymond H. Tremblay	Cessna 180-floats
1960	Henry A. Hansen	James G. King	Cessna 180-floats
1961	Henry A. Hansen	Milstead Zahn	Cessna 180-floats
1961	Averil Thayer	Carl(?) Divinyi	Cessna 180-floats
1962	Henry A. Hansen	John D. Wendler	Cessna 180-floats
1963	Henry A. Hansen	John D. Wendler	Cessna 180-floats
1964	James G. King	Henry A. Hansen	Cessna 1980-amphib floats
1965	James G. King	Clinton Lostetter	Cessna 1980-amphib floats
1966	James G. King	Peter E.K. Shepherd	Cessna 1980-amphib floats
1967	James G. King	Ben Hilliker	Standard Beaver - amphib floats
1967	James G. King	Harold Hanson	Standard Beaver - amphib floats
1967	James G. King	Peter E.K. Shepherd	Standard Beaver - amphib floats
1968	James G. King	Wesley K. Moholt	Standard Beaver - amphib floats
1969	James G. King	Wesley K. Moholt	Standard Beaver - amphib floats
1970	James G. King	Wesley K. Moholt	Standard Beaver - amphib floats
1971	James G. King	Larry Haddock	Standard Beaver - amphib floats
1972	James G. King	Dan Timm	Standard Beaver - amphib floats
1973	James G. King	Palmer Sekora	Standard Beaver - amphib floats
1974	James G. King	Dan Timm	Standard Beaver - amphib floats
1975	James G. King	Don Fortenberry	Cessna 185 - amphib floats
1976	James G. King	John E. Sarvis	Cessna 185 - amphib floats
1977	James G. King	James C. Bartonek	Modified Turbine Beaver (N754) - amphib floats
1978	James G. King	Bruce P. Conant	Modified Turbine Beaver (N754) - amphib floats
1979	James G. King	Bruce P. Conant	Modified Turbine Beaver (N754) - amphib floats
1980	James G. King	Bruce P. Conant	Modified Turbine Beaver (N754) - amphib floats
1981	Bruce P. Conant	Rodney J. King	Modified Turbine Beaver (N754) - amphib floats
1982	James G. King	Bruce P. Conant	Modified Turbine Beaver (N754) - amphib floats
1983	James G. King	Bruce P. Conant	Modified Turbine Beaver (N754) - amphib floats

1984	Bruce P. Conant	John I. Hodges	Modified Turbine Beaver (N754) - amphib floats
1985	James G. King	Bruce P. Conant	Modified Turbine Beaver (N754) - amphib floats
1985	Bruce P. Conant	John I. Hodges	Modified Turbine Beaver (N754) - amphib floats
1986	Bruce P. Conant	John I. Hodges	Modified Turbine Beaver (N754) - amphib floats
1987	Bruce P. Conant	Fred H. Roetker	Modified Turbine Beaver (N754) - amphib floats
1988	Bruce P. Conant	John I. Hodges	Modified Turbine Beaver (N754) - amphib floats
1989	Bruce P. Conant	Christian P. Dau	Modified Turbine Beaver (N754) - amphib floats
1990	Bruce P. Conant	Christian P. Dau	Modified Turbine Beaver (N754) - amphib floats
1991	Bruce P. Conant	Christian P. Dau	Modified Turbine Beaver (N754) - amphib floats
1992	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1993	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1994	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1995	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1996	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1997	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1998	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
1999	John I. Hodges	Deborah J. Groves	Cessna 206 - amphib floats
1999	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2000	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2000	John I. Hodges	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2001	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2002	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2003	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2004	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2005	Bruce P. Conant	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2006	Bruce P. Conant	Edward J. Mallek	Modified Turbine Beaver (N754) - amphib floats
2007	Edward J. Mallek	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2008	Edward J. Mallek	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2009	Edward J. Mallek	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2010	Edward J. Mallek	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2011	Edward J. Mallek	Deborah J. Groves	Modified Turbine Beaver (N754) - amphib floats
2012	Edward J. Mallek	Deborah J. Groves	Quest Kodiak - amphib floats
2013	Edward J. Mallek	Deborah J. Groves	Cessna 206 - amphib floats
2013	Fred H. Roetker	Mark D. Koneff	Quest Kodiak - amphib floats
2014	Bradley S. Shults	Deborah J. Groves	Cessna 206 - amphib floats
2014	Heather M. Wilson	Deborah J. Groves	Cessna 206 - amphib floats
2014	Heather M. Wilson	William W. Larned	Cessna 206 - amphib floats
2014	Fred H. Roetker	Steven M. Olson	Quest Kodiak - amphib floats
2015	Bradley S. Shults	Deborah J. Groves	Cessna 206 - amphib floats
2015	James P. Bredy	Deborah J. Groves	Partenavia Observer - wheels (twin engine)
2015	Heather M. Wilson	Deborah J. Groves	Cessna 206 - amphib floats
2016	Bradley S. Shults	Deborah J. Groves	Cessna 206 - amphib floats
2017	Bradley S. Shults	Deborah J. Groves	Cessna 206 - amphib floats

XLI. Justification Memo for Concentrated Goose Surveys.

Assistant Regional Director, Refuges and Wildlife
Migratory Bird Specialist and Chief, Wildlife Assistance

Waterfowl Investigations, Juneau July 10, 1984

Proposal for establishing annual population status for 4 species of Yukon-Kuskokwim Delta nesting geese on their breeding grounds

Introduction: There currently is a great deal of interest in the welfare of 4 species of Yukon-Kuskokwim Delta nesting geese (cacklers, black brant, whitefronts, and emperors). The apparent decline of these species/populations has been documented (King and Conant 1983, Petersen and Gill 1982, O'Neill 1979, Timm and Dau 1979). Presently there is only coarse population status data for these species/ populations from fall staging and wintering area surveys and only superficial breeding ground population trend data for these species/populations is available.

Therefore, the USFWS finds itself in a position of managing a shrinking resource over a broad geographical area experiencing increasing competition by culturally separated users with only a general picture of their population status. Better population status data specific to the Yukon Delta could enhance our credibility in dealing with this sensitive issue. Responsiveness of specific populations to different management prescriptions could be measured with the use of more sensitive techniques. There is an opportunity to significantly expand and improve survey methods and products on the breeding grounds. We propose the following strategy to increase our data base.

Methods: An intensive 3 year program to refine and develop standard aerial techniques specifically for these geese is envisioned. All coastal goose nesting habitat on the Yukon-Kuskokwim Delta will be intensively sampled with a closely spaced grid system of standard transects. Observers will concentrate efforts on identification and enumeration of the 4 species of geese. All observations will be spatially separated by location, tallied, and stratified by micro-computer. Ground truthing of subsamples by Refuge, Research, or Wildlife Assistance personnel will result in air survey correction factors to be applied to air survey data.

In conjunction with the occular transect technique, aerial photographic methods will be explored to determine their feasability for these species for the Yukon-Kuskokwim Delta. Various aerial camera systems (35 mm, 70 mm, 9x9 large format) will be employed to evaluate various combinations of altitude, exposure setting (shutter speed and f-stops), focal length, and film type.

XLI. - continued.

Chronologically:

FY 85
1. Determine preliminary habitat and population stratification.
2. Implement preliminary aerial occular transects.
3. Explore preliminary aerial photo methods.

FY 86
1. Establish experimental aerial occular transects.
2. Establish experimental aerial photo design.

FY 87
1. Establish annual operational occular transects.
2. Refine aerial photo techniques.

After this developmental period, operational surveys (occular transect, aerial photo, or both) will be continued annually to monitor population status and establish long-term trends on the Yukon-Kuskokwim Delta. Population data from occular duck survey transects will be evaluated for monitoring Pacific whitefronts outside of coastal habitat.

Expected Results:

FY 85
1. Good stratification of breeding populations of these species/populations of geese on the Yukon Delta.
2. Preliminary population estimates by species with confidence limits from aerial occular transects.
3. Preliminary photo techniques evaluation.
4. Annual progress report.

FY 86
1. Better population estimates by species, with confidence limits, from aerial occular transects.
2. Experimental photo technique for measuring population status.
3. Annual progress report.

FY 87
1. Good population estimate by species, with confidence limits, from aerial occular transects plus good trend data for the Yukon Delta.
2. Visibility correction factors to apply to aerial occular transect data.
3. Population estimates with photo technique to compare with occular transect data.
4. A computer generated, three-dimensional, numeric relief map depicting goose population distribution for the Yukon Delta by species/populations.
5. Annual progress report.

Budget:

Initially:

Airplane:			
1st choice	Turbo-Beaver/amphib	(convert standard Beaver)	300 k
2nd choice	C-185 or 206 turbo/amphib	(convert a C-185 or 206)	200 k
3rd choice	C-185 standard/amphib	(new)	150 k
Aerial Camera:	State-of-the-Art System		100 k

XLI. - continued.

Annually (FY 85-87):

Pilot/Biologist (salary)	50 k/yr	150 k
Operations	100 k/yr	300 k
Total Cost FY 85-87		700-850 k

References:

King, J.G., and B. Conant. 1983. Alaska-Yukon waterfowl breeding pair survey, May 16 to June 11, 1983. U.S. Fish and Wildl. Serv. Rept., Juneau, AK. 6 p.

O'Neill. 1979. Fourteen years of goose populations and trends at Klamath Basin refuges. Pages 316-321 in R.L. Jarvis and J.C. Bartonek, eds. Management and biology of Pacific Flyway geese. OSU Book Stores, Inc., Corvallis, OR.

Petersen, M., and R. Gill. 1982. Population and status of emperor geese along the Alaska Peninsula. Wildfowl 33:31-38

Timm, D.E., and C.P. Dau. 1979. Productivity, mortality, distribution and population status of Pacific Flyway white-fronted geese. Pages 280-298 in R.L. Jarvis and J.C. Bartonek, eds. Management and biology of Pacific Flyway geese. OSU Book stores, Inc., Corvallis, OR.

Submitted By:

Bruce Conant

John I. Hodges

XLII. Distinguished Mom Award.

DISTINGUISHED MOM AWARD

In recognition of special service as a Fish and Wildlife Service mom.

For all your patience when it takes an extra week to get back home after I've been gone a month.

For sounding cheerful on the phone when you have been shoveling snow for a week and I called home from sunny Mexico.

For bringing Tamara Lynn into this world safe and sound while I was gone catching trumpeter swans at Cordova; and therefore you and Tamara have always had to settle for a phone call from Cordova as my contribution to the celebration of that special day each year.

For helping me pack for all those trips long and short;close by and far away.

For putting up with an unfinished house, with sawdust and shavings everywhere, with a gas stove that doesn't work just right, with no room in the house quite finished, with a laundry sink drain that freezes up when it gets real cold.

For reading Colleen Marie stories day after day and answering all those endless questions while I'm gone flying surveys.

For remembering to wind the clock on Sunday nights and keeping the home fire burning day after day.

For house training(mostly) Snowball(the bunny) and keeping her fed and watered and keeping the girls from holding her too tight.

For taking Tamara to the hospital when she bonked her head and worrying about her for both of us.

For putting up with "Country Parsons" every Sunday night till we fall asleep.

For considering the annual deer hunt a worthy tradition, allowing us to cut up deer on the kitchen table, and fixing it for supper steadfastly.

For all your hours working at, organizing, telephoning, or thinking about pre-school.

For always coming up with something good to eat for all the potlucks, parties, picnics, and suppers.

For loving and taking such good care of Thing #1 and Thing #2 (Tamara and Colleen).

For being the special person that you are.

Therfore be it known that the Secretary of the Interior,if he knew all these things,would take great pleasure in presenting this award to you. Without you it would be impossible for me to do the job I do for him. With you I'm able to complete those long trips with minimal worry knowing you have things mostly under control at home.

The Secretary and I just wanted to let you know how much we appreciate it.

XLIII. Hank Hansen Obituary.

IN MEMORY OF HENRY "HANK" HANSEN

Henry A. 'Hank' Hansen, 86, died at home on March 3, 2005 surrounded by his family.

Hank Hansen was born on the homestead of Otto and Mary Hansen near Winner, South Dakota on April 9, 1918. The family moved to Des Moines, Iowa, and after high school Hank graduated from York College in Nebraska. He met Doris Landon there and they were married in 1942.

During World War II Hank flew fighter reconnaissance in P-51 Mustangs over France and Germany. He completed 75 combat missions and was awarded the Distinguished Flying Cross and the Bronze Star.

After the war, he earned an MS from Iowa State University and briefly taught at Washington State. In 1948, Hank was hired as a biologist for the Washington State Dept. of Game and Fish.

The family moved to Alaska in 1955 where Hank became the first waterfowl biologist for the U.S Fish & Wildlife Service in Alaska. Hank developed a program for monitoring waterfowl populations by aerial survey in Alaska, the same system still used today. He did pioneering work on several species of geese, swans and ducks, authored dozens of technical and popular articles, and received a meritorious service and numerous other awards. Hank is still remembered by his peers as an expert on Alaskan waterfowl and no finer person to have shared a camp with.

Hank went to Washington, D.C. in 1966 as a Deputy and then Branch Chief, and later returned to Alaska as Deputy Regional Director. His last assignment was in Hawaii as Area Director for the Pacific Trust Territories and Hawaii. He retired to Whidbey Island in 1979 after 34 years of distinguished state, military and federal service.

Hank loved the outdoors and nature. Among his many other interests, he was an avid hunter and fisherman, a sports fan and he read widely, golfed, played a keen game of bridge, and loved to garden. He was a member of the Whidbey Presbyterian Church. Cause of death was complications from diabetes.

Hank, July 1961, Juneau, Alaska

Hank is survived by Doris, his wife of 62 years: son Eric and wife Jeanne of Juneau and Port Ludlow; daughters Linda Atwood and husband Gary of Woodinville; Karen Timm and husband Dan of North Platte, Nebraska; granddaughter Heidi Hansen in Washington, D.C.; brothers Walt, Otto and Bill; and sister Louisa. His parents, a brother and a sister preceded him in death.

In lieu of flowers, the family requests donations be made to The Nature Conservancy, the American Diabetes Association or a charity of choice.

Doris Hansen
651 SE Bayshore Dr.
Oak Harbor, WA 98277-5755

XLIV. Excel Spreadsheet Codes for History Locations.

Canada

(use standard 2/3 character upper case for provinces or districts and lower case for geographic regions)

ABn = Northern Alberta
ABs = Southern Alberta
ARc = Central Arctic (NUca)
ARe = Eastern Arctic (NUbi)
ARw = Western Arctic (NWTwa)
BCne = Northeast British Columbia
BCvi = Victoria Island, British Columbia
CAbl = (Barrenlands), Canada (includes portions of Nunavut north of MBn & east of NWT)
CAc = Central Canada
CAe = Eastern Canada
CAw = Western Canada
HB = Hudson Bay
JB = James Bay
Lab = Labrador
Labun = Ungava Labrador
MBn = Northern Manitoba
MBs = Southern Manitoba
NB = New Brunswick
NF = Newfoundland
NS = Nova Scotia
NUbi = Baffin Island, Nunavut (ARe)
NUca = (Central Arctic), Nunavat (ARc)
NUei = Ellesmere Island, Nunavat
NUke = Keewatin District, Nunavat
NUvi = Victoria Island, Nunavat
NWTbi = Banks Island, NWT
NWTmc = Mackenzie District, NWT
NWTvi = Victoria Island, NWT
NWTwa = (Western Arctic), NWT (ARw)
ONe = Eastern Ontario
ONs = Southern Ontario
ONw = Western Ontario
PEI = Prince Edward Island
QUc = Central Quebec
QUn = Northern Quebec
QUns = North Shore Quebec
QUs = Southern Quebec
QUun = Ungava, Quebec
SKn = Northern Saskatchewan
SKs = Southern Saskatchewan

SKse = Southeast Saskatchewan
YK = Yukon Territory

US

(use standard 2 character upper case for states or flyway and lower case for geographic regions within)
A/F = Atlantic Flyway
C/F = Central Flyway
M/F = Mississippi Flyway
MTc&e/NDw/SDw = Central & Eastern Montana/Western North Dakota/Western South Dakota
NDc&e/SDc&e = Central & Eastern North Dakota/Central & Eastern South Dakota
P/F = Pacific Flyway

Mexico

GC = Gulf Coast
GCn = Northern Gulf Coast (Laguna Madre)
IH = Interior Highlands
PC = Pacific Coast

Other

BA = Bahamas
Ca = Caribbean (Bahamas, West Indies, Leeward & Windward Islands – all areas east of the Gulf and north of S/A)
C/A = Central America
CU = Cuba
DR = Dominican Republic
HA = Haiti
RU = Russia
S/A = South America
W/I = West Indies (Cuba, Jamaica, Haiti, Dominican Republic, Puerto Rico)

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XLV. Excel Spreadsheet Activity Codes.

MBMO-DMBM Programs

Pioneering/Exploratory

A - Canada
B – US
C – Mexico
D – Caribbean (areas east of the Gulf & north of S/A)
E – West Indies (Bahamas, Cuba, Jamaica, Dominican Republic & Puerto Rico within the Caribbean)
F – Central America
G – South America

Surveys – Waterfowl (annual unless otherwise noted)

1 – Waterfowl Breeding Population Survey (WBPS) a-(central arctic), b-(Barrenlands)
2 – Waterfowl Production Survey (WPS)
3 – Winter Waterfowl (and Bald Eagle) Survey-US (WWS-US)
4 – WWS a-(Mexico [WWS-MX]),b-(D),c-(E),d-(F),e-(G)
5 – Redhead (winter)
6 – Sea Duck (winter)
7 – Sea Duck (spring)
8 – Goose (fall/winter) a-(all sp.),b-(Canadian),c-(brant),d-(whitefront),e-(snow),f-(Ross'),g-(snow/Ross') h-(Nov & Dec)
9 – Goose (spring) a-(all sp.),b-(Canadian),c-(brant),d-(whitefront),e-(snow),f-(Ross'),g-(snow/Ross')
10 – Productivity Goose (fall) a-(brant),b-(whitefront),c-(snow),d-(snow/Ross')
11 – Productivity Swan (fall) a-(Tundra),b-(Trumpeter)

Survey – Non-Waterfowl (annual unless otherwise noted)

12 – Sandhill Crane (spring) a-(Mid-Continent population - MC),b-(Rocky Mountain population - RMP)
13 – Sandhill Crane (fall) RMP
14 – Whooping Crane a-(summer),b-(winter)
15 – Bald Eagle (non-WWS) a-(Natl. BE Survey-5-yr intervals),b-(productivity),c-(other)
16 – Golden Eagle a(winter),b(summer)

Surveys – Special/Experimental

17 – Waterfowl a-(canvasback),b-(Russia),c-(late duck brood),d-(Yellowknife Study Area),e-(other)
18 – Black Duck (winter)
19 – Goose a-(all sp.),b-(Canadian),c-(brant),d-(whitefront),e-(snow),f-(Ross'),g-(snow/Ross')
20 – Sea Bird a-(winter),b-(summer)
21 – Shore Bird
22 – Other a-(osprey),b-(white-winged dove),c-(black-crowned night heron),d-(phalarope),e-(other)
23 – Waterfowl diseases
24 – Environmental Hazards a-(oil spills),b-(hurricanes),c-(other pollutants)

Banding

25 – Duck pre-season a-(western Canada),b-(eastern Canada),c-(C/F),d-(Alaska),e-(exploratory),f-(other)
26 – Other a-(goose),b-(swan),c-(common eider),d-(other),e-(utilizing aircraft)

Telemetry

27 – a-(MD captive release mallards),b-(black duck),c-(canvasback – includes color marked),d-(whitefront),e-(whooping crane-spring),f-(whooping crane-fall),g-(Bald Eagle),h-(black-crowned night heron),i-(other),j-(design aircraft antennas)

Aerial Photography

28 – Air-Ground transects (WBPS) analog, vertical a-(prairies),b-(bush)

29 – Other analog a-(snow geese),b-(sea lettuce),c-(habitat),d-(sandhill crane),e-(eiders),f-(vertical),g-(oblique)

30 – Digital a-(canvasback),b-(sea duck),c-(Canada geese),d-(brant),e-(snow geese),f-(swans),g-(sandhill cranes),h-(brown pelican),i-(black-crowned night heron),j-(shore birds),k-(other)

Other

31 – Waterfowl Harvest Surveys "Wing Bees"

32 – "Show-Me" tours a-(Canada, June),b-("Public Outreach" – Oshkosh Air Show)

33 – Chief Pilot FWS

34 – Regional Pilot FWS

35 – Law Enforcement Operations

36 – Develop a-("Wildlife Counts" computer program), b-("Moving Map" computer program), c-("Advanced Data Entry Program" for WBPS),d-(specific MB Program survey design),e-(inventories for potential waterfowl Refuges),f-(establish use of aircraft for MB surveys), g-(designed and built "Bear River" airboat),h-(designed banding carousel to organize bands for banding operations),i-(designed collapsible duck bait trap),j(designed and certified directional YAGI telemetry antenna aircraft mount),k-(designed and certified non-directional telemetry antenna aircraft mount), l-(train new FBs-#)

37 – Wetlands a-(Wetland Habitat Preservation Program),b(Acquisition Program),c-(lead poisoning)

Notes;
C/F = Central Flyway
WBPS = Waterfowl Breeding Population Survey
FWS = Fish and Wildlife Service
MB = Migratory Bird
N/A = North American

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XLVI. Excel Spreadsheet of Alaskan Wildlife Pilots/Aircraft Flown/Projects - by Year.

Wildlife Pilot	Sources	Primary Aircraft	Migratory Bird Program Activities
R. F. Scott, MBM ('48-'52), non-FB		L5 Stinson (N7??),Piper Super Cub (N7??)	Administrator, Chief-MB,AK, B/1(AK-'48-'52)
J. G. King, MBM ('64-'84), Wildlife Pilot-AK	*SSRs* ,personal communication	Piper Cub (N714),(N722),(N724),(N751),(N757),(N791),	1****(AK-'55-'60,'64-'80,'82-'84),(YK-'66-'80,'82-'84),(BCne,NWTmc,ARw ,ABn-'85),2(AK-'61-'81),3(AK-'69),7(AK-86**-'06**),7/20b(AK-'61-'65,'68,'71),8c(AK-'62,'64,'66,'67,'77,'79),9b,h(AK-'90s*),
		Piper Pacer (N702),(N704),(N715),(N716),(N745),(N792),	11a(AK-'86**-'06**),11b(AK-'61,'68,'75,'78,'80,'82,'85**,'05**),15c(AK-'66,'67,'77,'78,'79,'82),(BC-'80),25d(AK-'55-'57,'60-'66),26a/e(AK-'70,'76,'77-'79),35(AK-'54-'60),36d/11b(AK-'68,'75),
		C180 (N740),(N744),(N748),(N750),(N7884),(N785),	36d/15c(AK-'67),36d/20b(AK-'61-'65,'68,'71)
		C185 Am (N70162),(N727),C206 Am (N736),	
		Beaver Am (N715),(N728),(N765),(N768),	
		Beaver Turbine Am (N754)	
C. D. Evans, BGM ('53-'61)	*SSRs Flyways, Muskeg to Mangrove*	Piper Super Cub (N7??), Widgeon Am (N744),	A/1(MBs-'49),A/1(ON,QU,Lab-'56,'57),,A/2(MBs-'49),1(MBs&SKse-'54)(SKs-'53,'54,'55),2(MBs&SKse-'54,'60,'61),(SKs-'53,'54,'55),3(VA,MD?-'53-'61),,8b(OAe-'56,'57),8b(A/F-'56?-'60),
			10c(A/F-'50s),25a(MBs-'53?-'60),26a(A/F-'57)
H. A. Hansen, DM&E - Chief , WPS ('67-'70), non-FB	*SSRs, Flyways, Muskeg to Mangrov*	C180 (N7??),Piper Super Cub (N7??)	Administrator,Asst. Chief,Branch of Surveys & Banding,Div. of Management & Enforcement('64),Chief, Br. Of Mgmt.('65-'67),Chief , Waterfow l Population Surveys ('67),Chief , Waterfow l
			Investigations-AK('72-'7?),1****(AK-'55-'63,'64),(MTc&e/NDw /SDw -'65,'66),2(AK-'55,'56),(MTc&e/NDw /SDw -'65,'66),4(IH-'53'),11b(AK-'58-'64),14(ABn,NWTmc-'68),17e(YK,BC-'61-'63),25d(AK-'50s,'60s),
			26(AK-'50s,'60s),25d(AK-'50s,'60s),26(AK-'50s,'60s)
D. N. Frickie, DM&E ('68-'71)	*SSRs* ,personal communication	**C185 AM (N725)**,C180 (N783)	1(NDc&e,SDc&e--'68*,'69*),(MBs&SKse-'70*,'71),2(NDc&e,SDc&e--'68*,'69*),(MBs&SKse-'70*),3(MD,VA-'68*,'69),(GA,??-'70),4(PC-'68),(GC-'69),15b(MD,VA-'69,'70),25a(ABn-'68),(NWTmc-'69-'70),
			31(A/F-'69,'70)
B. P. Conant, MBMO ('76-'77), MBM ('78-'07),	*SSRs* ,personal communication	Beaver Am (N728),(N765),**Beaver Turbine Am (N754)**,	1****(SKn,MBn-'76*,'77*),****(AK,YK-'78-'06),(NUvi,NUca-'05,'06),2(SKn,MBn-'76*,'77*),(AK-'81-'84,'86-'92),3(A/F&MF-'76,'77),****(AK-'73,'74,'79-'84,'96),4****(GC-'77*),****(PC-'78*,'79*,'82-'06),5(QOn-'77*),
Wildlife Pilot-AK		C180 floats (N709),C185 Am (N727),(N757),	8a(MF,C/F-'76,'77),8c(AK-'78,'82-'84),(AK-'86-'90,'92,'94),8d,g,h(MF-'76-'77),10b(MF-'76,'77),10c((AK-'86-'90,'92-'94),11a(AK-'91),11b(AK-'75,'80-'83,'85-'92,'94-'05),15b(AK-'78,'81-'83, '84,'86,'87,'92,
		C206 Am (N702),(N712),(N61599)	'95),(YK-'81),15c(AK-'80-'84,'86,'87,'91,'93,'96),21(PC-'94),25a(SKn-'76,'77),26a&e(AK-'78,'79,'93),(YK-'94),26b(YK,BC-'05),27g(AK,BC-'79-'82),31(A/F-'76),(MF-'77),36d/3(AK-'73,'74,'79-'81,'96),
			36d/11b(AK-'91),36d/19c(PC-'94,'95)
W. W. Larned, MBMO ('76-'83), MBM ('84-'13),	*SSRs* ,personal communication	C172RG (N4917V,C180 (N709),(N783),C182 (N763),K100 Am	1****(SKs-'77*),(MBs/SKse-'78*,'79-'83),(YK'91),2(SKs-'77*),(MBs/SKse-'78*,'79-'83),3(FL,**??**-'78-'82),4(GC-'80*,'82*,'83?),(IH-'84*),5(FL,AL,MS,LA,TX-'77-'83),6(AK-'96,'03),7(AK-**'??-??**),
Wildlife Pilot-AK		(N745),C185 (N729),Am (N725),(N757),(N727),(N783),	8c(CA,OR,WA,BC-'??),(AK-'??,'??),9?(CF-**'??**),(AK-**'??,'??**), 10b(AK-**'??**) ,11b(AK-**'??-'??**),12a(AK-**'??**),15b(AK-**'??**),17b(RU-'92*-'95*),17e(AK-**'??-'??**),22a(A/F-'77,**'??**),22c(GC,IH,PC-'83),
		(N321KC),(N1055F),C206 (N702),(N61599),C206 Am (N71	25a(MBn/SKn-'76-'77,'78-'83),26a(AK-'??,'??),26a(AK-**'?-'?**),27e(C/F-'82?),27h(PC-**'??**),(IH-'84),(GC-**'??**),29e(AK-**'??,??**),31(A/F-'77-'**??**),(MF-'?),(,PF-'77?-'83?)
		(N736),(NH1599),(N234JB),(N61599),FI (N9178G),	
		PA 18 FL (N784),(N743),(N13833),Beaver Am (N765),	
		Beaver Turbine Am (N754),Aero Commander	
F. H. Roetker, MBMO/DMBM ('84'-'16)	*ARs* , (no personal input), **UNVERIFIE**	C185 Am (N783),(N727),(N757),C206 Am (N723),	1****(AK,YK-'84*-'87*),(MBs,SKse-'85,'86,'88-'92),(ON-'86,'88-'94),(SKn,MBn-'95-'08),(BC,NWTmc,ABn-'09-'11,'13,'14),(MBn,NUca,NWTw a["Barrenlands"]-'14*-'16),2(MBs,SKse-'85,'86,'88-'92),
		Kodiak Turbine Am (N708),(N710),(N736)	(SKn,MBn-'95-'08),3(MD,VA-'85-,'86),(LA,AR?-'87-'16),3a(AR-'87-'88),4(GC-'88,91,'94,'00,03,06),5(LA,TX,GCn-'87-'04?),6(A/F-'11,'13,'14+D143),8a?(MD,VA-'84-'85),(LA,TX-'86-'14),
			10b,c(LA,TX-'86-'??),15a?(??-'09,'14),18?(A/F-'86,'99),21(GC-'94),25a(SKn,ABn-'84),(SKn-'85-'??),(ON-'?-'?),27c?(MD,VA-'**??**)
J. J. Hodges, MBM ('84-'05), Wildlife Pilot-AK	*ARs* ,personal communication	**Beaver Turbine Am (N754)**,C180 (N709),C182 (N702),	1****(AK,YK-'84*-'86*,'88-'91,'99,'00),(MBs-'87,'96,'98)(ON-'87),(BC-'05),3(AK-'84*,'85-'88,'91,'92,'94,'97-'02),6(AK-'96-'03),(BC-'05),9a(YK-'92,'03-'05),11a(AK-'91),11b(AK-'84-'87,'90,'92,'93,'95,'00,'05),
		C185 Am (N1055F),(N725),(N727),C206 (N52PX),C206 Am	15b(AK-'86,'89-'92,'95,'97,'00,'02,'05,'06),17b(RU-'92-'95),36a(AK-'89-'12),36b(AK-'92),36c(AK-'97-'17),36d/17b(RU-'92),36d/15c(AK-'86),36d/3(AK-'??)
		(N729),(N736),(N9798Z),(N61599),(N234JB),	
W.Butler, MBM ('96-'04), Wildlife Pilot-AK ('82-'94)	*ARs* ,personal communication	(Oops, forgot to get this info from Bill Butler)	1(ON-'96-'04),(AK-'89-'16),('86-'90),8c(AK-'77),9b(AK-'86-'90),11b(AK-'??-'??),16b(AK-'86),22f(AK-'??),24a(AK-'89-'93),26a(AK-'85-'94),26f,g(AK-'??-'??),29g,j(AK-'86-'93),36/4/1c,d(AK-'85-'88),
			33(DC-'94-'04)
R. J. King, MBM, ('??-'97), Wildlife Pilot-AK, MBM	*ARs* , (no personal input), **UNVERIFIE**	**C206 Am (N728)**,(N753)	1(ON-'98),(MBs&SKse-'99-'06),3(CA?-'98-'06),10?(CA-**'??-'??**),17a(AK-'??),25a(**??-'??-'??**),26a(AK-**'??**)<31(PF-**'??-'??**)
('98-'07)			
K. S. Bollinger, MBMO/DMBM, ('99-'11), DMB ('12-	*ARs* , (no personal input), **UNVERIFIE**	**C206 Am (N729)**,C206 Am (N728)	1(MTc&e/NDw /SDw -'99*,'00*),(SKs-'01*),(MBs&SKse-'02*,'08,'11),(ON-'03*,'04-'06,'10),(QU-'10),3(MD?,VA?-'99?-**'??**),25a(NWTmc-'99?)
MBM ('12-13), Wildlife Pilot - AK			
E. J. Mallek, MBM ('06-'17), Wildlife Pilot-AK	*ARs* , (no personal input), **UNVERIFIE**	Beaver Turbine Am (N754),Kodiak Turbine Am (N7??)	1(AK,YT-'06*,'07-'13),9a(ARc-**'07-'07**),17a(AK-'??)
J.Rayfield, OLE, ('09,'11)	*ARs* , (no personal input), **UNVERIFIE**	?????	1(ON,QU-'09,'11),
K.Fox, MBM ('12,'15), Wildlife Pilot-AK	*ARs* , (no personal input), **UNVERIFIED**		1(SKn,MBn-'12),(MBs&SKse-'15)
B.S.Shults, MBM ('14-'17), Wildlife Pilot-AK	*ARs* ,personal communication	C206 Am (N7554),(N9623R),(N375F)	1(AK,YK-'14,'17),11b(AK-'15),26a(AK-'14-'17),30k(AK-'14-'16,'17),31(PF-'15-'17)
H.Wilson, MBM ('14,'15), Wildlife Pilot-AK ('04-'17)	*ARs* ,personal communication	PA-18 (N784),(N788),(N7875D),(N743),(N788), Husky (N637)	1(AK-'14,'15),('08-'17),7(AK-'12),3(AK-'15),8b(AK-'13-'15),8c(AK-'13-'17),9a(AK-'11-'14(,9b(AK-'14-'16),(AK-'14-'17),10e(AK-'13),11(AK-'10,'15),30c(AK-07*-'17),30k(AK-'12-'14,'17)
		(N724),(N21HY),(N40HU),(N739), C206 (N32PX),(N740),	
		(N9178G),C206 Am (N9623R),(N77554),(N375F),(N9798Z),	
		Kodiak Turbine Am (N745),(N700FW),	
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