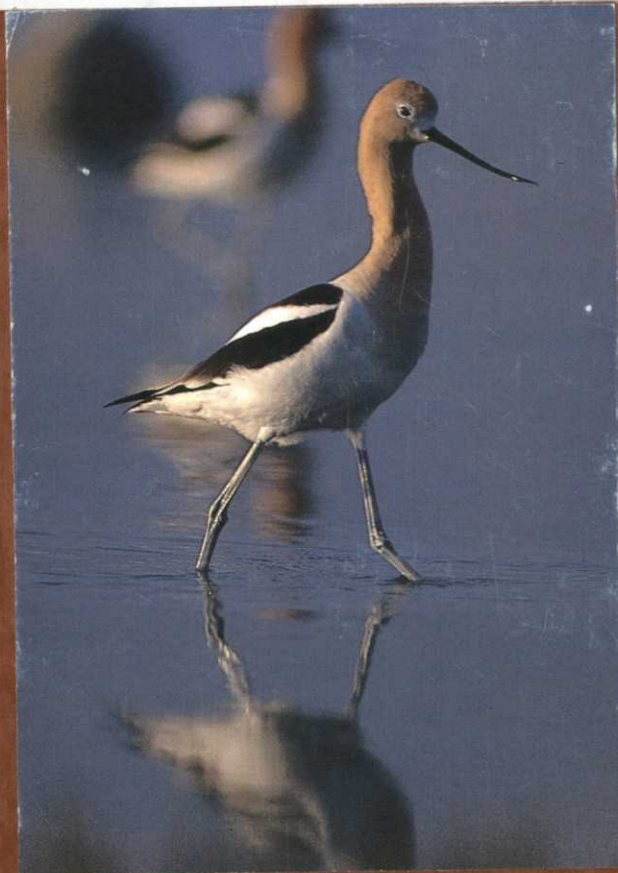


Bear River Migratory Bird Refuge
Brigham City, Utah

ANNUAL NARRATIVE REPORT
1992

U. S. Department of the Interior
Fish and Wildlife Service
Region 6



BEAR RIVER MIGRATORY BIRD REFUGE

Brigham City, Utah

ANNUAL NARRATIVE REPORT

Calendar Year 1992

REVIEW AND APPROVALS

<u>Alan H. Hunt</u>	<u>4/23/93</u>
REFUGE MANAGER	DATE
<u>R. Nagel</u>	<u>5-6-93</u>
SUPERVISOR REVIEW	DATE
<u>John Ladd</u>	<u>5/8/93</u>
REGIONAL OFFICE APPROVAL	DATE

Printed on recycled paper

INTRODUCTION

The Bear River Migratory Bird Refuge is located in Box Elder County, 15 miles west of Brigham City, in northwestern Utah. It was established by a special act of Congress on April 23, 1928. At the time, many individuals and organizations were concerned about the loss of marsh habitat and waterfowl mortality.

In 1843, explorer John C. Fremont described the multitudes of waterfowl at the Bear River delta. As settlement of the Salt Lake valley progressed, market hunting of waterfowl flourished. From 1877 to the turn of the century, 200,000 ducks were harvested each year and sold to eastern hotels and restaurants. During the same period, residents were concerned with the devastating losses to avian botulism. In the 1900's, 50 to 70 percent of the waterfowl stopping to rest and feed died of the disease. Millions of dead birds lied scattered in the marshes - a gruesome spectacle. About the same time, large quantities of river water were diverted for farming, and the delta marshes began to dry. By 1920, about 2 to 3 thousand acres of marsh remained of the original 45,000.

The Bear River Refuge comprises 65,000 acres of marsh, open water, and mud flats, which are managed for use by migratory birds. Five, 5,000 acre shallow water impoundments, with an extensive system of dikes and water control structures, were developed to keep the precious supply of water from the Bear River from flowing into the Great Salt Lake.

During most of the Refuge's existence, scientific investigations were conducted on botulism. Important discoveries were made in controlling the disease, but the riddle has not been completely solved.

The Refuge hosted over 200 species of birds and many millions of individual birds as they stopped to rest and feed on their seasonal pilgrimages.

Sixty species of birds nested and raised their young at the Refuge. About 10,000 young were produced each year by gadwall, cinnamon teal, and redheads, the principal nesting species. The Refuge was part of a major redhead nesting area along the shores of the Great Salt Lake; considered to be one of the finest redhead production areas in the nation.

In addition to the ducklings produced, approximately 2,000 Canada geese were fledged annually, and countless thousands of various species of shorebirds, marshbirds and songbirds.

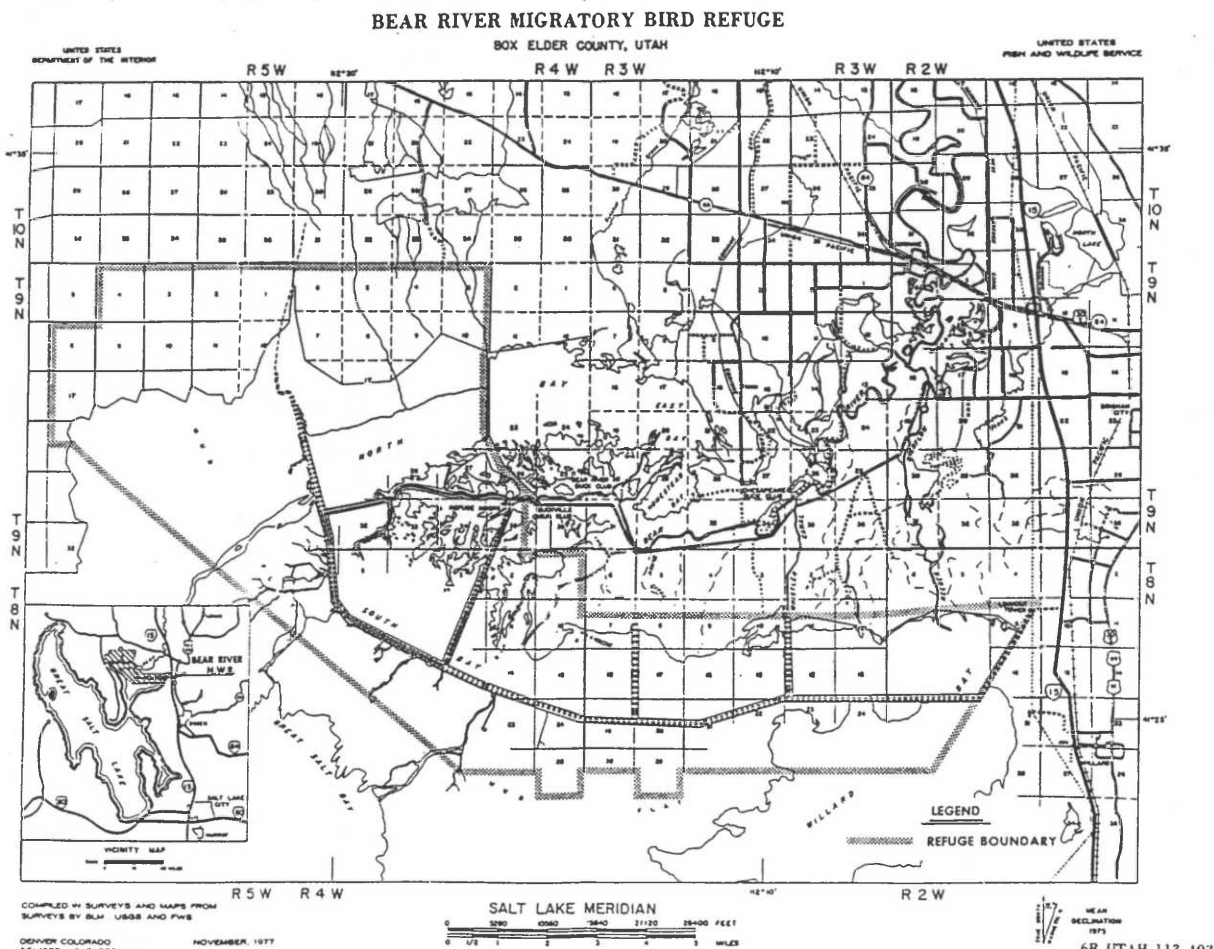
During the fall migration up to 500,000 ducks and geese concentrated on the Refuge impoundments. Large rafts of Wilson's phalaropes, American avocets, black-necked stilts, and other shorebirds were observed as birds staged for the flight south.

The Refuge was a popular tourist attraction and educational center. The visitor center and tour route recorded 30, 000 visitors yearly.

Unfortunately, in 1983, the Refuge was reduced to ruins by flooding of the Great Salt Lake. One hundred year storm events occurred in 2 consecutive years, with higher elevations receiving as much as 70 feet of snow. Runoff inundated the Refuge marshes with salt water, destroying existing vegetation and all facilities. Fortunately, the waters receded much more quickly than anticipated. By early 1989, the lake elevation had returned to 4206.45 and the decision was made to re-staff the Refuge.

A manager was brought on board in August of 1989 to begin the planning process for restoration and possible expansion of the "New and Improved" Bear River Migratory Bird Refuge. Through the generous efforts of dedicated volunteers the old auto tour route and some water control structures were partially restored, allowing public access to the Refuge and enabling the flushing of the impoundments with fresh river water. As of 1991, the Refuge staff had grown to seven full-time employees, who together with volunteers, are undertaking the momentous task of rebuilding the Refuge.

Mother nature will play the leading role. Alkali bulrush began to sprout in the delta during the spring of 1990 and has continued to flourish. Insect populations have returned with vigor and many thousands of waterfowl and shorebirds have returned to use the Refuge for feeding and staging during spring and fall migrations. Breeding and nesting habitat is still limited for most species, but in time is expected to increase.



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A. HIGHLIGHTS

1. Drought conditions continued in 1992. Flows in the Bear River reached record lows. (section B)
2. The first option to sell on new expansion lands was signed in October. (section C.3)
3. Plans for Refuge redesign were completed by the Bureau of Reclamation. (section D.6)
4. The Bureau of Reclamation issued a contract to construct a 4 mile north-south dike/drain in Unit 3. (section D.6)
5. Units 1,3, and 5, and all habitat outside of the D-line were dry by late May. (section F.2)
6. Record numbers of ducks concentrated on the Refuge during the fall migration. (section G.3)
7. No botulism or other disease outbreaks occurred in 1992. (section G.17)
8. Refuge staff cooperate with other agencies to implement the first Nature High Summer Youth Camp designed to encourage minority interests in natural resource careers. (section H.7)
9. Construction of public use facilities were completed at the old headquarters sight. (section I.1)
10. Construction of a dike on the north part of Unit 1 was funded and initiated by private individuals and organizations, with matching funds from the National Fish and Wildlife Foundation. (section I.1)
11. New guardrails and catwalks were installed on bridges and water control structures. (section I.2)
12. The Unit 3 east-west cross dike and a dike dividing Units 3C and 3D were completed. (section I.2)
13. The bridge decking and radial gates were replaced at the Headquarters control structure. (section I.2)
14. Multiple pieces of heavy equipment were purchased for Refuge restoration. (section I.4)

B. CLIMATIC CONDITIONS

1992 Weather Data
Brigham City, Utah

<u>Month</u>	<u>Ave.</u> <u>Prec.</u>	<u>1992</u> <u>Prec.</u>	<u>Snowfall</u> <u>Inches</u>	<u>High</u> <u>Temp</u>	<u>Low</u> <u>Temp</u>
Jan.	1.99	.74	15	6	-3
Feb.	1.59	1.82		63	9
Mar.	1.93	.83	8	68	26
Apr.	2.34	.15		84	28
May	1.95	.59		86	33
June	1.90	.70		96	40
July	.34	1.01		95	43
Aug.	.71	.07		100	34
Sept.	1.14	.92		89	31
Oct.	1.49	2.58		87	25
Nov.	2.03	<u>1.31</u>	<u>22</u>	47	-8
TOTAL:	19.36	12.69	52		

The Great Basin along with much of the west suffered through its fifth year of drought. The moisture for the last three months of the year gave us hope that perhaps things would change next year. Area reservoirs and ground moisture will require a couple of years of well above normal moisture to replenish them.

Past records indicate that moisture received at the old Refuge headquarters site is 37 % less than that received at Brigham City. While no figures are available, this year appeared to follow that trend with the western portion of the Refuge receiving less moisture than the eastern.

Precipitation was 66% of normal for the year, but for the first nine months was only 49 % of normal. Snowfall was almost non-existent during the early part of the year. There were only two days with snow in January, no days in February (although there was a fair amount of rain) and only one day in March. All snow was melted by February 7th and March snow lasted only a couple of days. We did not receive our first fall snowfall until November 20th, then received some snow about every three days through the end of the year. The mountains got much heavier snow than the valleys. Conditions were extremely dry through the growing season and by late summer most communities were on limited water use schedules, many for the first time in history.

As evidenced by the late winter snowfall, this period was much warmer than normal. February had 10 days of 60 ° or higher, and March had only 9 days below freezing . Temperatures for August, September and November were near normal, while October was warmer than normal and December ended the year with below normal temperatures. Our last freeze of the year was April 24th and the first freeze of the fall was September 26th, giving us 155 frost free days, which is near the norm.

January had many days of heavy fog with extremely limited visibility. There were also a few days in December with thick fog.

Winds were nearly normal during the year. February had several days with strong winds and was windier than normal. April, normally our windiest month, was perhaps slightly windier than normal and September had four days with strong southerly winds.

C. LAND ACQUISITION

3. Other

Land acquisition activities consumed a large amount of time during the year and progress is being made toward the fee purchase of the lands identified in the EA for Refuge expansion. Lack of funding continues to be the major problem.

In January, Harvey Wittmier from the R.O. and Manager Trout met with Congressman James Hansen and his staff at Hansen's Ogden office. The purpose of the meeting was to update the congressman on progress toward land acquisition and ask for his continued assistance in trying to obtain funding for land acquisition.

Biologist Hansen met with the Box Elder Farm Bureau Board of Directors to update them on the status of the land acquisition program and to answer any questions they had regarding Refuge expansion. Some members of the Farm Bureau still have concerns regarding government purchase of private lands, but with the open dialogue that we have had, the Farm Bureau has not opposed the expansion plans.

Max Jamison of the Bear River Club and Alice Lindhal of the Bridgerland Audubon Society met with Refuge personnel and were briefed on Refuge and Service plans to obtain funding for land acquisition. They then traveled to Washington in February to testify before the Congressional committees in favor of fund allocation for land acquisition at Bear River MBR. Efforts, however, were unsuccessful and no funding for FY93 was forthcoming.

In April, Harvey Wittmier and Manager Trout met with the Box Elder County Commissioners to update them on Refuge activities and solicit their political support for land acquisition funding.

Also in April, Dave Soker of R.O. Reality, began making contacts with landowners regarding sale of their property to the government, and also began working up land appraisals for priority one lands.

The Bureau of Reclamation completed an 18 minute video on the need for Refuge restoration and expansion. This video was sent out to over 40 groups and individuals who could be helpful in obtaining both political and financial assistance for Refuge expansion. The Refuge also received the completed Concept Plan brochure from Merrick Engineers and Architects. These two documents do a great job of explaining and presenting visually what the Refuge will accomplish with the expansion proposal.

In May, Kathy Clarke from Congressman Hansen's office and the Box Elder County Economic Development Board were given tours of the Refuge and expansion area.

In August, Manager Trout met with Utah Governor, Norman Bangerter to ask for a letter of support for Refuge expansion and to brief him on Refuge plans. The Refuge did receive this letter of support.

Karla Norris, R. O. Reality and Dave Soker spent several weeks in the Brigham City area meeting with willing seller landowners and our first option to sell was signed by Wynn Nichols on 1,146 acres in October. There are several other owners who are also close to signing options - it would be nice to have funds to complete these transactions.

Again in October, manager Trout met with County Commissioners to appraise them of Refuge expansion progress, i.e. signing of option to sell by Wynn Nichols and contacts with other land owners.

Since efforts to obtain funding for Refuge expansion under the Migratory Bird Commission Funding for FY93 did not materialize, a meeting was held in late October with representatives from the State Audubon Society, State Wildlife Federation, R. O. Reality and Refuge personnel to formulate strategies for attempting to obtaining Land and Water Conservation Funds for Refuge expansion.

While no actual land was purchased, we have good public and governmental support for our land acquisition policy. It is also apparent that there are willing sellers who would like to see their land included in the Refuge. We are hopeful that funding will be forthcoming from governmental sources, but we are also exploring private funding options.

D. PLANNING

1. Master Plan

A rough draft of the Master Plan, less the last two sections on development costs, was submitted to the Regional Office for review.

5. Research and Investigation

Dr. John Kadlec of Utah State University (USU) was a frequent visitor at the Refuge, gathering data on marsh restoration. Refuge personnel ran some of the transects which were established to track marsh revegetation.



Dr. John Kadlec and Biologist Roy take conductivity readings as part of a botulism study.

Dr. Kadlec also initiated a study to investigate a potential correlation between redox potential in sediment, presence of organic matter, and botulism outbreaks. Preliminary data was intriguing, indicating a sharp rise in redox coincident with botulism outbreak.

Sarah Barnum, a graduate student at USU continued to analyze data collected on the effects of scale on nest site selection of redheads and American coots.

Suzanne Fellows, a graduate student at USU, continued her weekly shorebird counts on the Refuge. Suzanne is hired by the State Department of Natural Resources to complete a study on shorebird use and distribution in the Great Salt Lake ecosystem.

The Refuge worked with Dr. Chris Neal from USU, who is developing a remote videography system using several super VHS cameras each sensing a specific wavelength of light. We were hoping to be able to determine contour elevations as the units filled with water after spring flushing. Due to several problems, we did not get all the information we had hoped for, but the system did seem to work on the flights that were accomplished. The system has the potential of giving elevations in inches rather than feet.

Dr. Robert Hill, from USU installed a continuously reading weather station near the old headquarters sight. The station records air, water, and soil temperatures, solar radiation, precipitation, and wind speed.

6. Other

Biologist Hansen was assigned to write an EA for the Duchesne River NWR located near Myton, Utah. The Bureau of Reclamation purchased 1,090 acres under mitigation for a canal relining project and turned this over to the Service to manage. This land is on the north side of the Duchesne River and contains some good riparian habitat. To make a manageable unit and control the complete riparian area, the EA recommended the Service purchase private



Utah State University installed a weather station that continuously records coded data to a tape recorder.

lands or lease from the Ute Tribe an additional 1,990 acres. Several trips to the Uintah Basin were made to gather information, meet with the Ute Tribe and the two County Commissions, as well as discuss the project with Ouray NWR personnel who will manage the Refuge. The EA was completed in late summer and submitted to the Regional Office for review and editing prior to final printing.

Numerous meetings were held with Lee Baxter and other personnel from the Bureau of Reclamation regarding the engineering design of the enhanced and expanded Refuge. The Bureau also obtained drought relief funds for the Refuge totalling \$500,000.00. As part of the drought relief work, the Bureau issued a contract to construct approximately four miles of drain/dike through the center of Unit 3 in a north/south direction. This will become the main drain for Unit 3. Funds were only available to do the west side and work will commence early in the new year. Lee also was working with Fish Springs NWR on drought relief projects and the two Refuges combined and presented him with a special achievement award in recognition of his efforts.

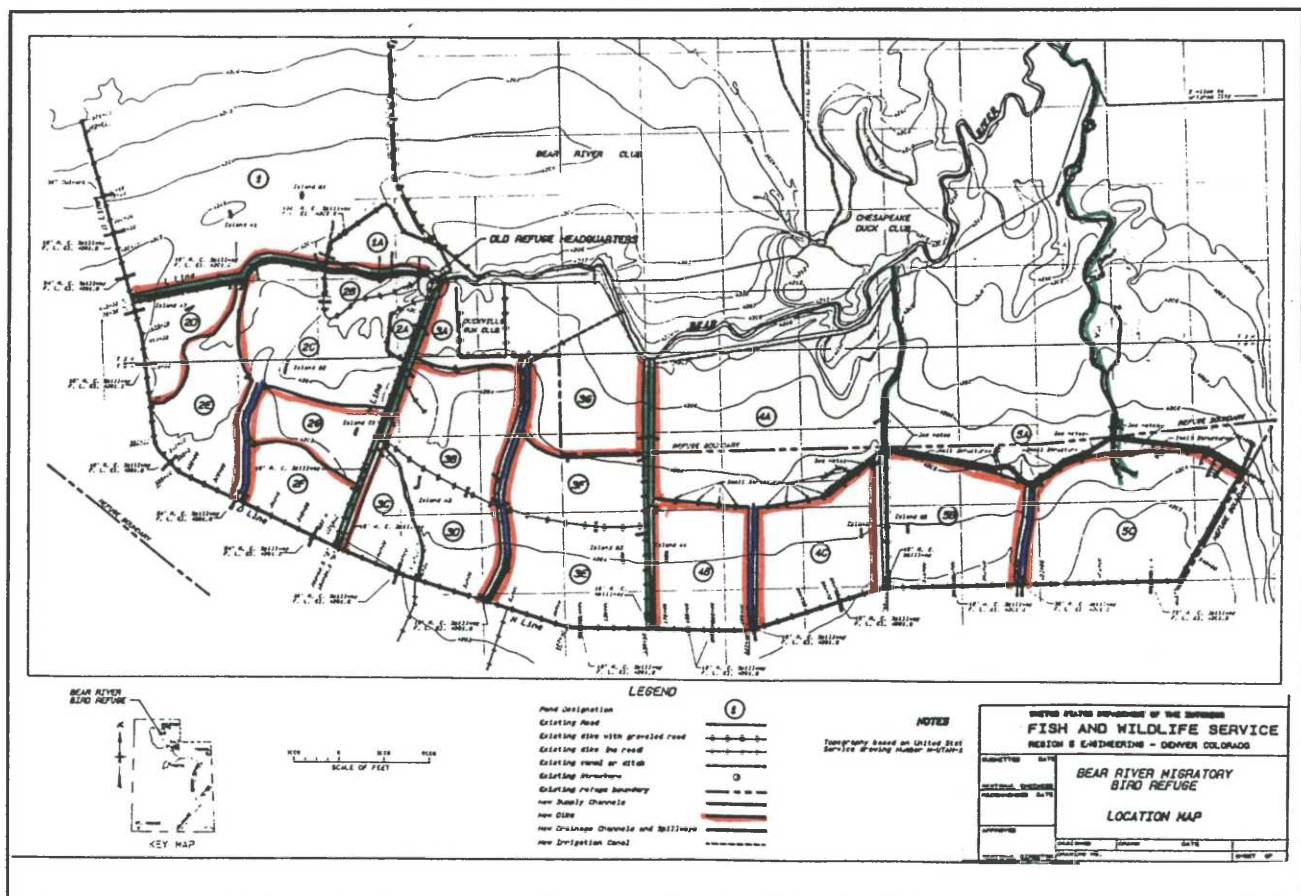


Lee Baxter, Bureau of Reclamation, receives a special achievement award from Manager Trout

We are extremely pleased with the work of the Bureau, their efforts in getting the Refuge back into operation, and the funds they expended for design, equipment purchase and technical assistance in water rights, engineering feasibility and innovative thinking.



Manager Trout and Bureau of Reclamation engineers discuss Refuge and enhancement ideas.



Map of the Refuge redesign showing locations of new cross dikes, drains, and inlet canals.

E. ADMINISTRATION

1. Personnel

Two changes occurred in the full-time permanent staff. One was the filling of the Administrative Assistant position with Ann Bull. Ann came on board April 1. She transferred over from the National Park Service's Golden Spike National Historic Site and has done an excellent job. The position had been vacant since December 13, 1991. In July, Ann had surgery and was on leave for six weeks.

The other change was the conversion of Wildlife Biologist Keith Hansen from full time to part time at the beginning of the fiscal year. Keith will work 24 hours per week during the next year. This reduction was necessary due to lack of funding and also a reduction in workload. Keith will be serving primarily as an on site inspector for contracts on rehabilitation and enhancement of the Refuge.



Biologist Hansen keeps tabs on contractors.

Four temporary Heavy Equipment Operators worked during the year. Tim Woodward and Curtis Pittman were hired with drought relief money from the Bureau of Reclamation as temporary not to exceed one year on June 1. Curtis worked about two months and then found permanent employment. John Hansen was then hired to fill the remaining portion of Curtis' appointment. Kevin Archer was hired on a 30 day appointment beginning August 24th

and was extended another 30 days, ending his service on October 22nd. All did and are continuing to do an excellent job on beginning the rehabilitation of the Refuge flood damage.

Refuge Personnel

Alan K. Trout, GS-12, PFT (EOD 8/27/89)	Refuge Manager
Claire Caldes, GS-11, PFT (EOD 8/12/90)	Refuge Spec.
Ann Bull, GS-5, PFT, (EOD 4/1/92)	Refuge Asst.
Keith S. Hansen, GS-12, PPT (EOD 1/16/90)	Biologist
Vickie Roy, GS-7, PFT (EOD 6/20/91)	Biologist
Mark K. Lanier, GS-7, PFT (EOD 12/1/91)	Bio. Tech.
Rich Iwanski, WG-10, PFT (EOD 7/1/91).	H. E. Oper.
Tim Woodward, WG-8, TFT (EOD 6/6/92).	H.E. Oper.
Curtis Pitman, WG-8, TFT (EOD 6/6/92-Term. 9/20/92	H.E. Oper.
John Hansen, WG-8, TFT (EOD 7/6/92)	H.E. Oper.
Kevin Archer, WG-8, TPT (EOD 8/24/92-Term. 10-22-92)	H.E. Oper.



1992 Staff : Top row- R. Iwanski, T. Woodward, A. Trout; Bottom Row- K. Hansen, J. Hansen, C. Caldes, A. Bull, M. Lanier, V. Roy.

The five year staffing pattern is shown in the table below:

REFUGEE PERSONNEL

<u>Year</u>	<u>FTE</u>	<u>Green Thumb</u>	<u>Bur. of Rec. Hire</u>	<u>Volunteers</u>
1992	6.75		1.35	11
1991	5.80	1		10
1990	4.33			36
1989	1.00			2
1988	00			

Several members of the Refuge staff received achievement awards for their work this past year. Those receiving awards were Claire, Vickie, Mark, Rich, and AL.

Refuge employees attended the following training sessions or workshops during the year:

February

Trout, Caldes and Iwanski attended Credit Card Training in Denver.

Caldes and Lanier were in Denver for a Budget Tracking Session.

Hansen and Lanier completed Basic Aviation Training in Salt Lake City.

Caldes went to Denver for a Volunteer Training session.

March

Roy attended Farm Bill training at Brookings, South Dakota from the 4th through the 6th.

Roy attended a 40 hour Migratory Bird Workshop at Kearney, Nebraska.

May

Lanier spent the better part of the month of May in the Dakotas working on the Waterfowl Breeding Population and Habitat Survey.

June

Roy participated in a SCS Wetland Restoration Workshop in Sacramento, California from the 8th through the 12th.

Bull was in the Regional Office in Denver for a week receiving Administrative Orientation.

July

Lanier attended a Handicapped Accessible and Interpretive Trails workshop at the Colorado State University Forestry Camp , Fort Collins, Colorado from the 13th through the 17th.

August

Roy spent the month in Canada on a waterfowl banding assignment.

September

Roy participated in the Neotropical Migratory Bird Workshop at Estes Park, Colorado from the 21st through the 25th.

October

Caldes and Roy attended an 8 hour Holistic Resource Management session in Vernal, Utah.

Other Personnel Activities

Refuge personnel are working closely with Brigham City and the State Highway Department regarding an additional highway interchange for Brigham City at Forest Street off Interstate 15. Several planning meeting were attended during the year and this project is scheduled to get under way next summer.

Lanier and Roy are working on a State wide task force looking into purple loosestrife in the State. While this pest plant does not yet appear to be wide spread, not much is known about its distribution in the State. Information will be gathered, and recommendations made on legislation needed to control the weed's spread. State, County, Private and USU Extension Service horticulturists are working to identify the problem.

Supervisory personnel attended the Zone I project leaders meeting in Salt Lake City in February and the one at Great Falls, Montana in September.

Numerous trips were made to the Denver Regional Office for such things as Duchesne River NWR environmental assessment, flood rehabilitation funding and planning, Bureau of Reclamation redesign of the Refuge, and FY93 budget training. Trout also represented Zone I at an Administrative Project review.

Mark and Tina Lanier became the proud parents of a second son when Dustin was welcomed into the world on November 7th.

4. Volunteer Program

Volunteers continue to provide valuable assistance to the Refuge in many areas. Major on the ground work projects have decreased as Refuge staff and contracts have taken over some things the volunteers did right after the flood water receded. Bob Ebeling again provided the guidance and scheduling of the volunteer corps in close coordination with Refuge Operations Specialist Caldes. Eleven volunteers, contributed 2,680 hours of work on the Refuge.

Some of the items which the volunteers assisted with or completed are:

1. Clean-up of the headquarters area.
2. Work at State Fair booth.
3. Put up signs on auto tour route.
4. Constructed floating nest structures, installed same and removed following the nesting season.
5. Salt cedar removal.
6. Engineering for Dike Rehab of D-Line and Unit 1 Dike.
7. Installed benches in pavilion.
8. Installed water gauges on water control structures.
9. Posted Refuge area prior to waterfowl hunting season.
10. Trips to move equipment and pick up equipment parts.
11. Assisted with equipment repairs.
12. Water management - installing and removing stop logs.
13. Pulled sheepsfoot to pack Unit 3 cross dike.
14. Supervised construction of dike and water structures in Unit I.
15. Trouble shot problems with "Clevus" composting comfort station.
16. Compiled monthly vehicle books and scheduled vehicles for routine maintenance work.
17. Continued to provide a positive image of the Refuge in the local area.

Volunteers Jess Roberts and Norm Layton participated in a radio interview by KUSU radio to discuss Refuge achievements and the role the volunteers have played in getting the Refuge back on line.



Refuge Volunteers with floating nest structures

5. Funding

We were in pretty good shape fund wise this past year in part to a variety of fund sources, most importantly Service construction funds to rehab the flood damage and money from the Bureau of Reclamation for "drought relief". These sources allowed us to hire equipment operators and keep the machines running.

A summary of Refuge funding for the past five years is listed below:

Refuge Funding

<u>Funds</u>	<u>FY92</u>	<u>FY91</u>	<u>FY90</u>	<u>FY91</u>	<u>FY88</u>
1261	350,400	381,000	166,000	55,000	10,000
1262	110,000	62,000			
1230		9,000			
912	1,619	4,700	18,000		
2821	24,754	45,000			
5100			7,000		
1664			75,000		
2696*	<u>44,210</u>				
	530,993	501,700	375,000		

*Bureau of Reclamation "Drought Relief"

6. Safety

We again made it through the year with no lost time to accidents. One accident occurred in late December when John Hansen slipped while getting off heavy equipment and bruised his shoulder. The shoulder was tender for a couple of days. Caldes serves as the station safety officer. Several safety meetings were held during the year covering a variety of subjects. "Tailgate" sessions were held prior to most projects and with the volunteers when they began something new.

All Refuge employees and most volunteers completed First Aid and CPR training at the local hospital. Two employees completed Basic Aviation training in Salt Lake City. All employees were base tested for Lyme Disease.

A new station safety plan was written and submitted for approval to the Regional Office in January.

7. Technical Assistance

Trout, Hansen, Roy and Lanier were all involved in Private Lands/ Farm Bill activities during the year. Numerous meetings with land owners, and SCS were attended to conduct Minimal Effects Determinations and inspect potential Partners for Wildlife projects. Lanier and Roy attended a state-wide Private Lands Coordination meeting in Salt Lake City in October. Coordination of the Private Lands program in Utah was transferred from Ouray NWR to Bear River late in the year.

8. Other

Finally, after better than a year of waiting we received the approval from GSA to erect a chain-link fence at the shop area to create secure storage. This 18,000 square foot outdoor storage area will provide security for our large equipment. Approval was received in July and the fence was constructed under contract by the property owners soon thereafter.

F. HABITAT MANAGEMENT

1. General

Habitat management options were limited during the year by lack of water in the Bear River. None of the water control structures on the river were repaired to a functional state during the year. Ample water was available for management purposes for only two months of the year. In areas where we were able to hold some water for an extended period of time, the submergent and emergent vegetation responded well.



Units 1,3 and 5 were dry in 1992

2. Wetlands

The Great Salt Lake was not a factor in our management because over a five year period it has receded to near normal level. The closest portion of the lake is 1.5 miles south of the Refuge boundary.

As anticipated last year, this was a poor water year and we struggled through our fifth year of drought in the west. Snowpack in the Bear River drainage was only about 85 % of normal. Flows in the Bear River reflected this. We had good flows in late February through mid-April, then river flows dropped dramatically and we went through the summer with flows of around 25 cfs. Past records indicate these are the lowest river flows ever recorded. Relief finally came in early November when Utah Power and Light released 1,500 cfs from Cutler Reservoir for five days and then cut releases to 500 cfs for another ten days. These releases

were intended to lower Cutler and allow Utah Power to complete some bank stabilization on the reservoir. River flows remained good through the remainder of the year.

With low river flows water management was limited. In early March all boards were pulled in the D-Line spillways and the units were drained. These units were refilled by the 20th. Unit 3 was again kept dry to allow for construction work. By late May, Unit 5 was dry and Unit 1 nearly so. All river flows were directed into Units 2 and 4, but by fall these units were only about half full. The increased river flows in November allowed us to fill Unit 1, 2 and 4. Unit 5 was kept dry in anticipation of construction work in late 1993, although some water did filter along the east side and through the D-Line into Willard Spur.

Units were iced over solid until mid-February and were completely ice free by March 1. Fall freeze up began just before Thanksgiving and was completed by month's end.

While water levels were low in the units most of the year, water quality remained good, and we experienced no algae blooms or botulism for the first time in three years.

Alkali and hardstem bulrush growth, was excellent in the areas where water was present. Although abundant growth commenced in all the wet units, vegetation in Units 1 and 5 died when the water receded. Sago pondweed was prolific in Units 2 and 4.



Bulrush thrived in Unit 2 when water was available

Little water was spilled through the D-Line this year. We spilled water for 50 days in early spring and then again in early November through the end of the year. Areas were dry below the D-Line all through the growing season and no growth occurred there except for some kochia.. For the first time in a great many years the Willard Spur area was completely dry and at the beginning of the hunting season airboaters could not use any of the areas below the D-Line because of lack of water.

10. Pest Control

Salt Cedar invasion on the bare mud flats continues to be a problem. Any place where soils are wet for a period of time and then dry, salt cedar pops up. This will continue to be a major problem for the Refuge. Bigger trees along the river and dikes were dug out with the backhoe while small shoots in Unit 2A were hand pulled by staff, volunteers and youth from the Youth Diversion Program who worked on the Refuge for a few hours each week through the summer.

11. Water Rights

Several meeting on Refuge water rights were held during the year. A meeting to lay out the Refuge position on water rights to State Water personnel, was held in Salt Lake City in February. Cheryl Willis, Bob Greene and Meg Johnson from the Denver Regional Office were present along with Refuge staff and State Division of Water Resources personnel.

In July a tour of the Refuge and Refuge expansion area was given to Regional Office Water Rights personnel, and personnel from the Solicitors Office, to brief them on water needs. The State of Utah is in the process of adjudicating the Bear River and the purpose of the tour was to provide information on Refuge needs for those who will be involved in this legal issue.

The Bear River Compact between the States of Wyoming, Idaho, and Utah calls for irrigation water to be out of the canals by September 30th. The Bear River Canal Company still had water in the canals in late October while the river flows were still too small to benefit the Refuge. Upon complaint to the State Division of Water Resources the water was shut out of the canals on October 29th. This complaint was followed up with a meeting between Manager Trout, Bear River Canal Company and State Water Resource personnel. The result was that the canal company agreed in the future to abide by the Compact.

It appears that the Service has more power over "the powers that be" than we had previously been led to believe when it comes to water rights on the River. Time will tell, but water problems will continue to be a major headache for the Refuge staff and we need to remain actively involved, using our power in a judicious manner so as not to alienate other water users who we may need to work with for other Refuge objectives.

G. WILDLIFE

Ninety species of birds were observed on the Refuge in 1992. Twelve rare and 18 occasional species were recorded (Table 1). Noteworthy sightings included 2 oldsquaw, 2 common loons, a great egret, an Eurasian wigeon, Bonaparte's gulls, 2 great horned owls, a merlin, and a whimbrel. Of 76 historically common species, 11 were observed rarely and 8 were not seen at all. Neotropical migrants (NTMB) and small sandpipers continue to top the list of historically abundant species now absent or rarely seen on the Refuge.

BIRD SPECIES OBSERVED IN 1992							
SWANS	GEESE	DUCKS	WATERBIRDS	GULLS/TERNES	PASSERINES	RAPTORS	SHOREBIRDS
Tun. Swan (c)	Can. Goose (c)	Mallard (c)	W. Pelican (c)	Forst. Tern (c)	C. Raven (c)	Per. falcon (r)	Snowy Plover (r)
	Snow Geese (c)	Gadwall (c)	Am. Coot (c)	Casp. Tern (o)	Black-bill. Magpie (c)	Bald Eagle (c)	Killdeer (c)
		Pintail (c)	C. Merganser(c)	Black Tern (c)	Horned Lark (c)	North. Harrier (c)	Long-bill. Curlew (c)
		G.W. Teal (c)	Eared Grebe(c)	Ring-billed Gull (c)	Starlings (c)	Amer. Kestrel (o)	Willet (c)
		B.W. Teal (c)	West.Clarks Grebe (c)	Cal. Gull (c)	YH Black Bird (c)	Rough-leg Hawk (c)	Yellowlegs spp. (c)
		Cin. Teal (c)	D. C. Cormorant (c)	Frank. Gull (c)	Bank Swallow (c)	Great Horned Owl (r)	Baird's Sandpiper (c)
		Am. Wigeon (c)	G. B. Heron (c)	Bonapartes Gull (o)	Cliff Swallow (c)	Red-Tailed Hawk (r)	Dowitcher spp. (c)
		N. Shoveler (c)	B. C. N. Heron (c)	Comm. Tern (r)	Barn Swallow (c)	Turkey Vulture (r)	Marb. Godwit (c)
		Redhead (c)	Snowy Egret (c)		Tree Swallow (c)	Short-Eared Owl (o)	Am. Avocet (c)
		Canvasback (c)	W. F. Ibis (c)		Amer. Robin (o)	Burrowing Owl (o)	B. N. Stilt (c)
		Scaup spp. (c)	Pied-bill. Grebe (c)		Western Kingbird (c)	Prairie Falcon (o)	Wil. Phalarope (c)
		C. Goldeneye (c)	Sandhill Crane (o)		Lark Bunting (o)	Merlin (r)	West. Sandpiper (c)
		Bufflehead (c)	Common Loon (r)		BH Cowbird (c)	Gold. Eagle (c)	Common Snipe (o)
		Ruddy Duck (c)	Red-Breasted Merg. (c)		Mourning Dove (o)		Whimbrel (r)
		Old Squaw (r)	Great Egret (r)		Meadow Lark (c)		L. Golden Plover (o)
		Eurasian Wigeon (r)			Amer. Pipit (c)		Least Sandpiper (c)
					Amer. Goldfinch (c)		Spotted Sandpiper (c)
					Loggerhead Shrike (o)		Black-bellied Plover (o)
					Black-cap. Chickadee (r)		Red-necked Phalaropes (o)

19



A merlin was a rare, but welcome visitor during the winter months.

Simpson's diversity index (D) takes into account the number and abundance of species in a given area. The diversity of bird species observed in 1992 ($D=4.3$) was less than 1991 ($D=5.1$). Although more species were recorded in 1992 than in 1991 ($n=90$ vs $n=75$), the abundances of the species (E) were less evenly distributed in 1992 ($E=0.05$ vs $E=0.07$). This probably can be accounted for by the large concentrations of waterfowl on the Refuge in October, likely a result of drought conditions.

The National Audubon Society Christmas Bird Count was conducted on December 19. Five observers sighted 33 species and 4123 individuals during 11.5 party-hours of observation. Weather conditions greatly effect this survey and variation can be extreme (Fig. 1).

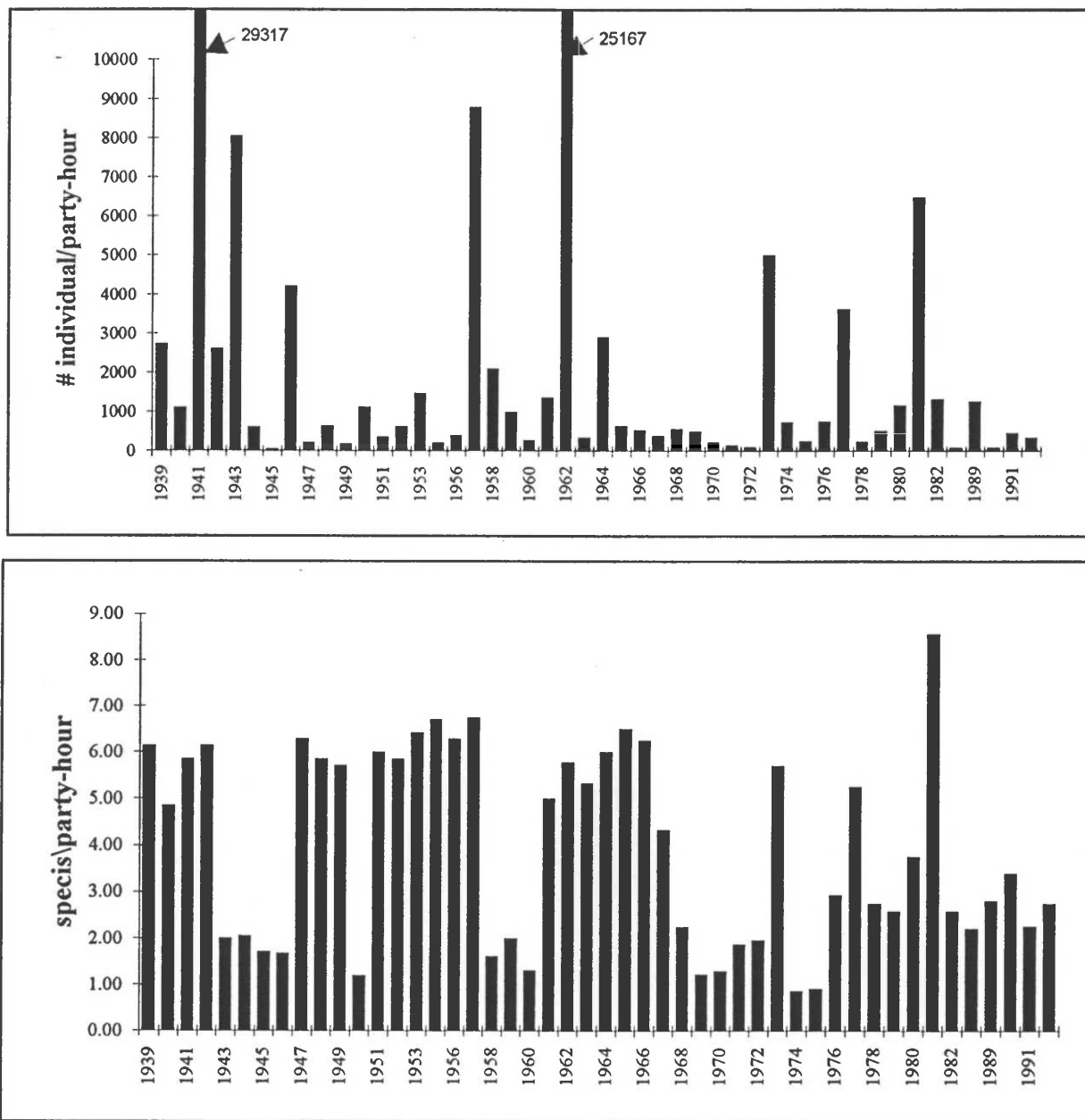


Fig. 1: National Audubon Christmas Bird Count Data from Bear River MBR, 1932-1992. Variation in this survey is greatly effected by weather.

2. Endangered, Threatened, Sensitive Species

Ice on the units broke up on February 14, providing open water for foraging bald eagles. A peak number of 208 bald eagles was recorded on March 3 (Fig. 2). Eagles foraged on carp and waterfowl during most of March and April. Fewer eagles used the Refuge during the fall migration. A peak number of 8 birds was recorded on November 4.

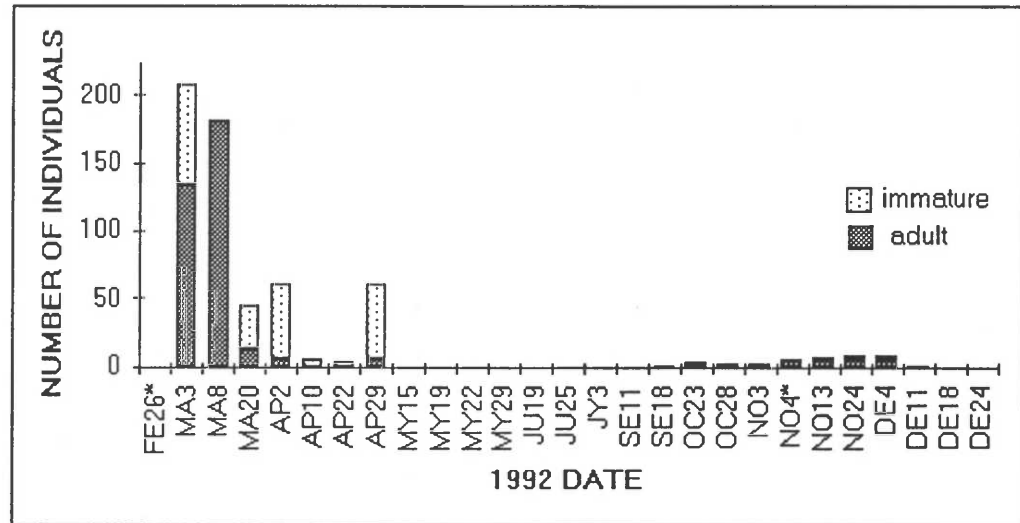


Fig. 2: Bald eagles observed in 1992 at Bear river MBR.

A pair of peregrine falcons was observed in May, but only one bird was infrequently observed the rest of the year. It is not known whether any young were fledged from the hack tower on the Bear River Club.

Snowy plovers were often observed near stagnant pools of water left at the water control structures as the units dried up. Twelve individuals were observed on July 19. Surveys for nesting snowy plovers revealed birds nesting on the dry interior of Unit 3. Nests were associated with slightly raised ridges, sparse salicornia, and bones from an old gull colony. Four nests were located. The success of the nests appeared doubtful because of the long distance the adults had to travel to collect water to cool the eggs. Two broods were observed near puddles at the water control structures.

Five long-billed curlews were recorded on July 3. A pair was frequently seen in salicornia near the north end of Unit 3. Long-billed curlews were regularly observed in the grasslands between the Premium Club and the Canada Goose Club. No nests or young were noted.

White-faced ibis numbers during the spring and summer were down from 1991 (Fig. 3). Spring populations peaked at 941 far below the 4220 recorded for 1991. Although the reasons for the decline are not apparent, these birds are highly mobile and gregarious. Variation in their distribution of use is not uncommon. No nesting colonies were located on the Refuge in 1992. Numbers declined in May and June as birds moved off the Refuge to nest (Fig. 4). Ibis began to stage in early July. Unfortunately data was not collected in August and the peak fall population was not recorded. All ibis had departed by mid-September.

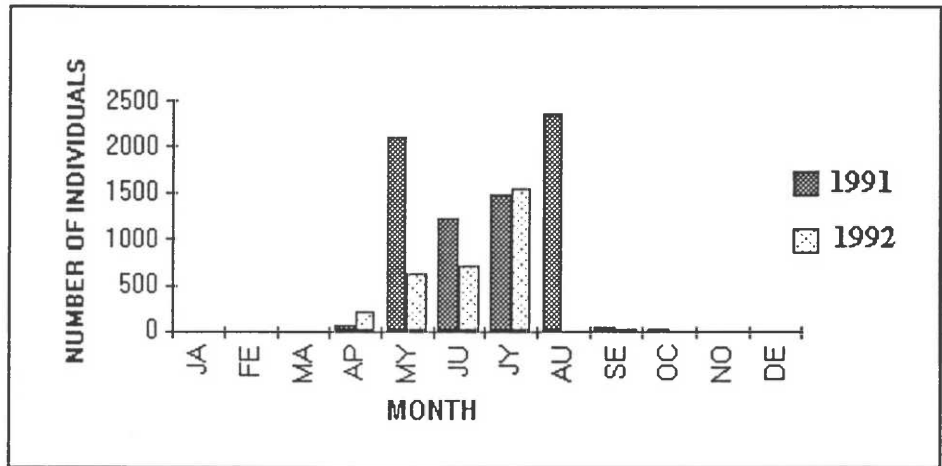


Fig. 3: Average number of white-faced ibis observed per month at Bear River MBR, 1992.

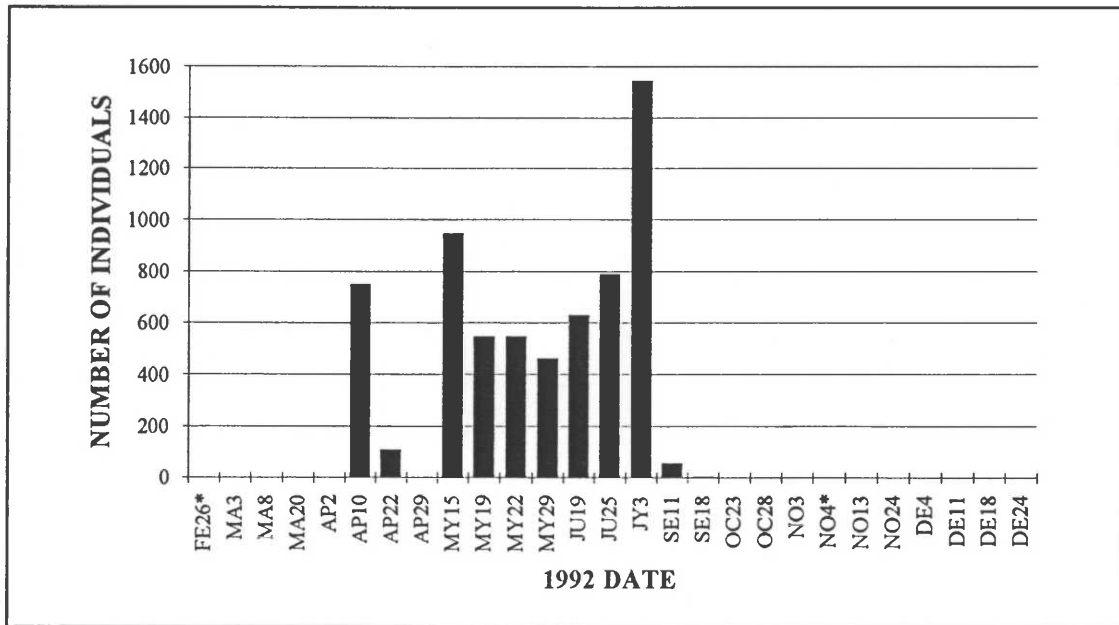


Fig. 4: Temporal distribution of white-faced ibis at Bear River MBR, 1992.

3. Waterfowl

Drought conditions continued in 1992. Units 1, 3, 5 and all areas south of the D-line were dry most of the summer and early fall. Bird use was concentrated on Units 2 and 4, the only remaining wet pools. Fortunately, early spring drawdowns and shallower water resulted in abundant growth of submergent vegetation, especially sago pondweed. Unusually large numbers of fall migrants made use of the food resources during October and November.

A. Ducks

Duck use was phenomenal during 1992 (Fig. 5). Use days for the year were nearly double the 10 year pre-flood average. Peak numbers occurred in late November and were approximately 3 times the 10 year pre-flood average (Fig. 6). Dry conditions concentrated birds from surrounding areas on Units 2 and 4. Also, abundant sago pondweed was undoubtedly attractive to feeding migrants.

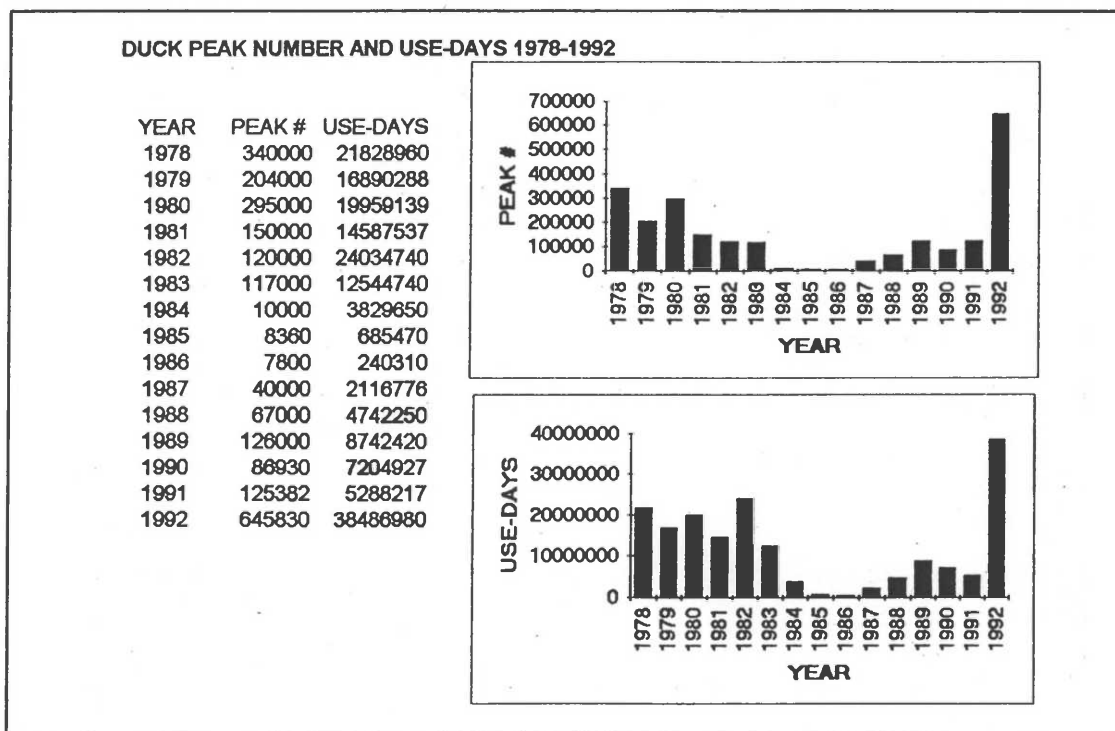


Fig.5: Duck peak number and use-days at Bear River MBR, 1992. Duck numbers were up substantially from previous years, probably a result of drought conditions.

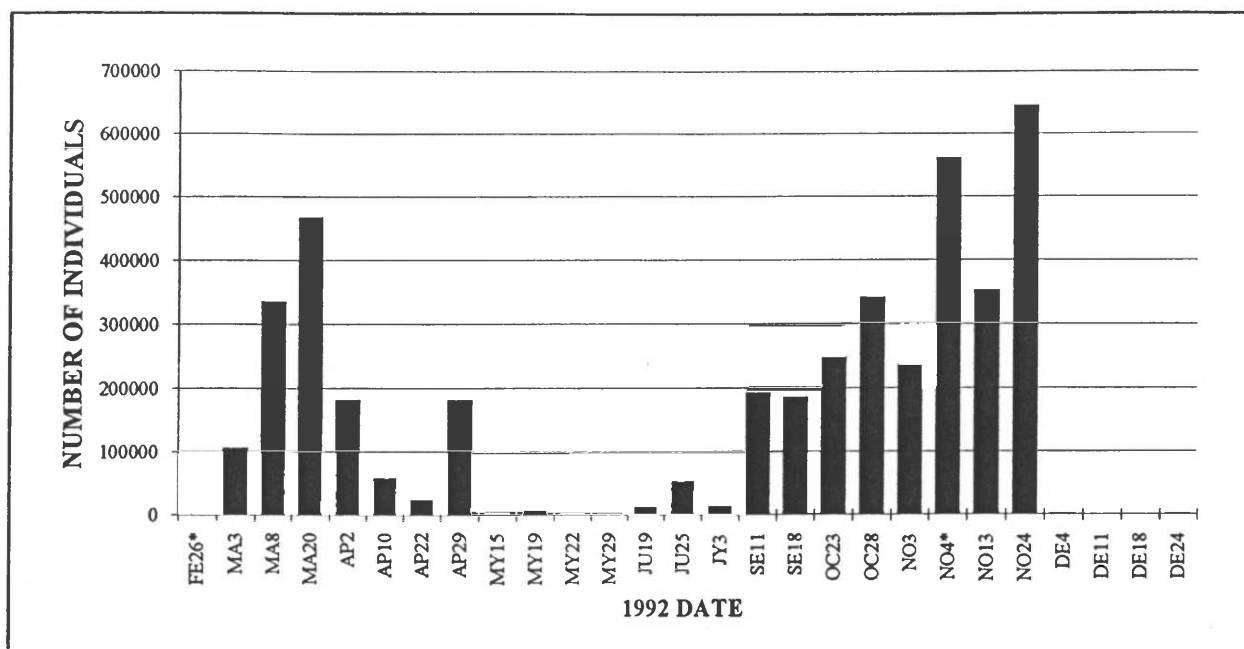


Fig. 6: Temporal distribution of ducks at Bear River MBR, 1992.

Numbers were up considerably for most species, except redheads, buffleheads, and ruddy ducks (Table 2). Especially noteworthy were the high numbers of canvasbacks and American wigeon. Dabblers were more abundant in 1992, but diver numbers were about the same (Fig. 7).

DUCK SPECIES PEAK NUMBER AND USE - 1992

SPECIES	PEAK #	DATE	USE-DAYS
Mallard	157371	4-Nov	2918099
Pintail	161223	4-Nov	9461566
Shoveler	87000	28-Oct	4134150
Gadwall	41550	18-Sep	1033361
Wigeon	33750	18-Sep	857152
GW Teal	410800	24-Nov	15641838
Cinn/BW Teal	6142	10-Apr	122902
Total Dabblers	639752	24-Nov	34169068
Redhead	5086	25-Jun	50717
Canvasback	5052	4-Nov	91339
Scaup spp.	3011	10-Apr	43991
Goldeneye	6000	28-Oct	61049
Bufflehead	3020	24-Nov	121226
Ruddy duck	13507	4-Nov	164155
C. Merganser	625	26-Feb	4422
Total Divers	25312	4-Nov	536899
TOTAL DUCKS	645830	24-Nov	34705967

Table 2: Duck species peak numbers and use-days at Bear River MBR, 1992.

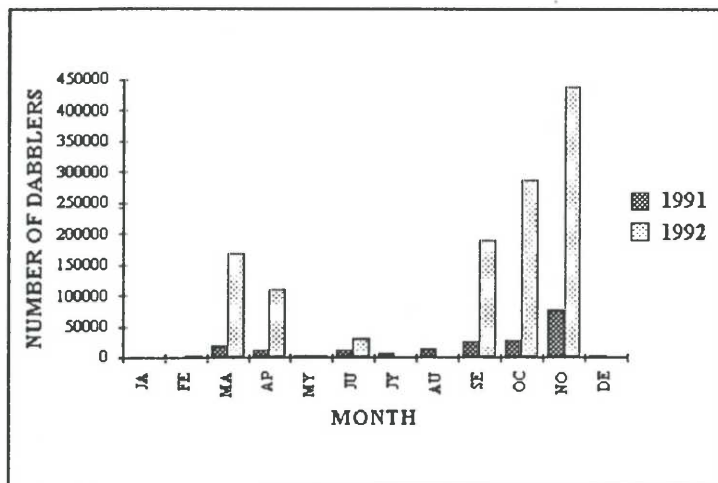
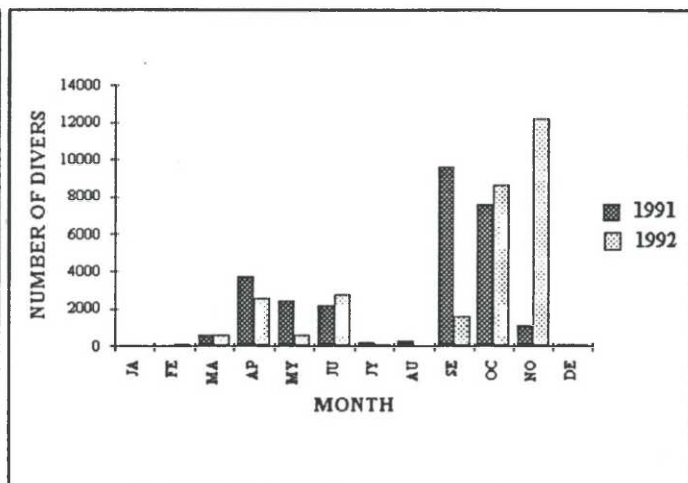


Fig. 7: a. Total number of dabbling ducks, 1991 verses 1992.



b. Total number of diving ducks, 1991 verses 1992.

Spring migration was equally impressive. The Refuge was ice free by mid-February and by mid-March duck numbers peaked at 467,000. Pintail, green-winged teal, and shovelers were the predominant species in the spring migration. As in 1991, the absence of ducks during the nesting season was apparent.

Approximately 15 miles of dike around Units 4 and 5 were searched for nests using a boom drag.



Boom drag used to search for duck nests along dikes

Dense stands of kochia, sweetclover, and various forbs provided seemingly adequate nesting cover. Although several birds flushed, only 1 nest was located. Two other nests were found on foot. All 3 nests (gadwall, mallard, redhead) were later depredated, one by an avian predator and 2 by unknown species. Seven broods (3 cinnamon teal, 2 mallards, 1 gadwall, and 1 pintail) were observed for a total of 40 ducklings.

In addition, 15 floating nest structures, each containing 2 nest boxes were put out early in April. The structures were constructed by volunteers out of PVC pipe, milk crates, and tumbleweeds. Each structure was anchored in Unit 2, greater than 50m from shore and near good brood cover. Unfortunately, by early May many of the sites dried up as the river flows dropped. Two of the structures were moved to deeper water. Of the 15 structures, only 6 were consistently surrounded by water throughout the nesting season. Six nests were used. Two structures had nests on both sides. Four nests were successful, 1 abandoned, and 1 parasitized by a redhead and abandoned. In addition 2 nests were used, but depredated when the water levels dropped leaving the structure on dry land. Species using the structures included gadwall, pintail, mallard, and cinnamon teal. Although the structures were constructed to provide room for a goose nest on top, they were put out too late in the season to be effective. The overall occupancy rate for the first year was 27% and the apparent success 50%. The nest structure project will be continued in 1993, but the structures will be placed strictly in deep water channels that are unlikely to go dry.



Muskrat hut or nesting structure?

B. Geese

Geese were one of the first migrants to return once the Refuge was ice free. Approximately 400 snow geese were in the area during the first week of March. An early group of 300 Canada geese passed through in late February, but spring numbers remained low until late May (Fig. 8). Pairs began initiating in early March and the first nest was discovered on March 31. Production of Canadas was more than double 1991 estimates, but still only 33% of the 10 year pre-flood average (Fig. 9). Few nests were located on Refuge dikes. Birds seemed to prefer more isolated areas where bulrush and saltgrass have re-established.

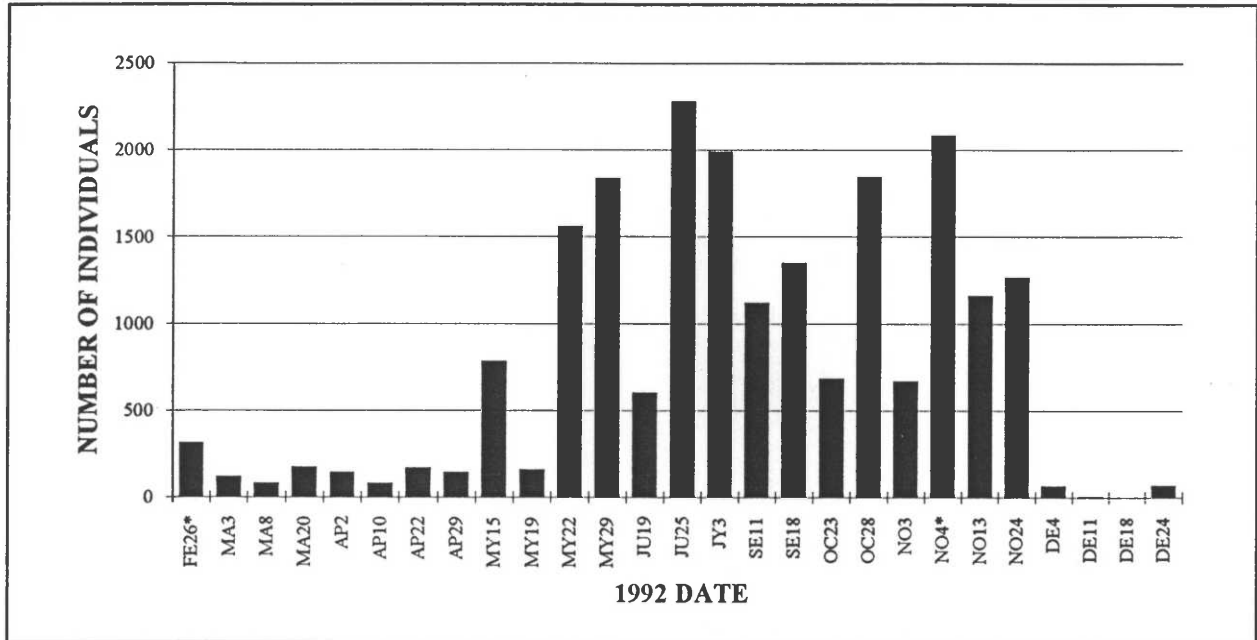


Fig. 8: Temporal distribution of Canada geese at Bear River MBR, 1992.

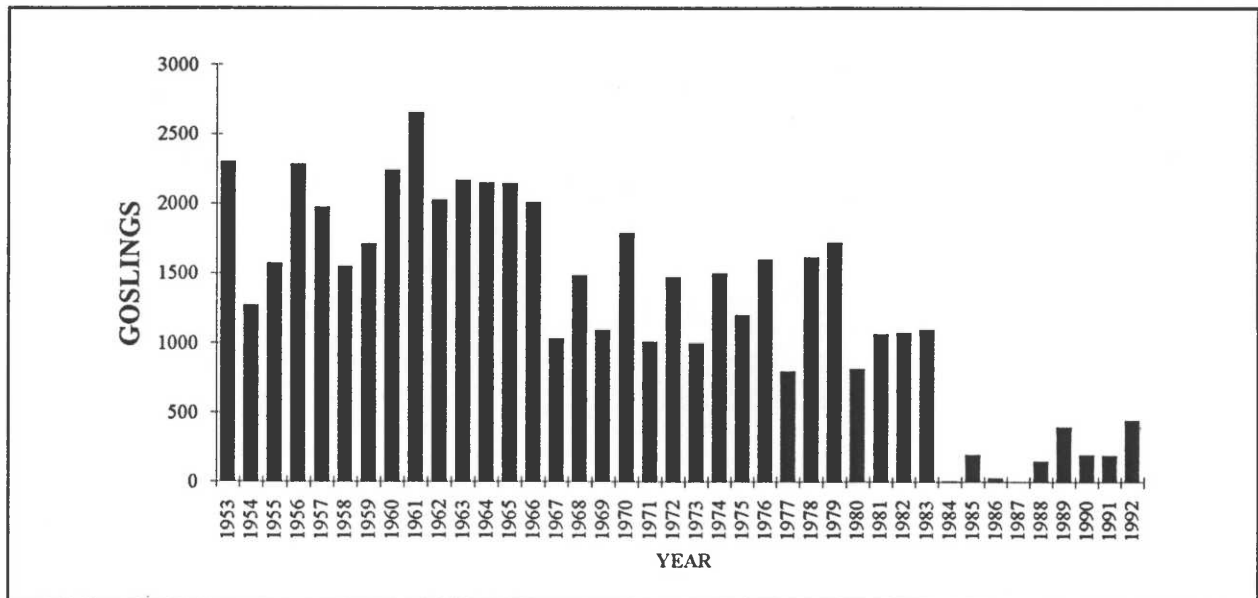


Fig.9: Historic Canada goose production at Bear River MBR, 1932-1992

A peak number of 2282 Canada geese was observed on July 25, up 28% from 1991 (Fig. 10). The distribution of use was similar in 1991 and 1992 (Fig. 11). Total use-days were down slightly compared to 1991, but the difference was likely effected by lack of August data .

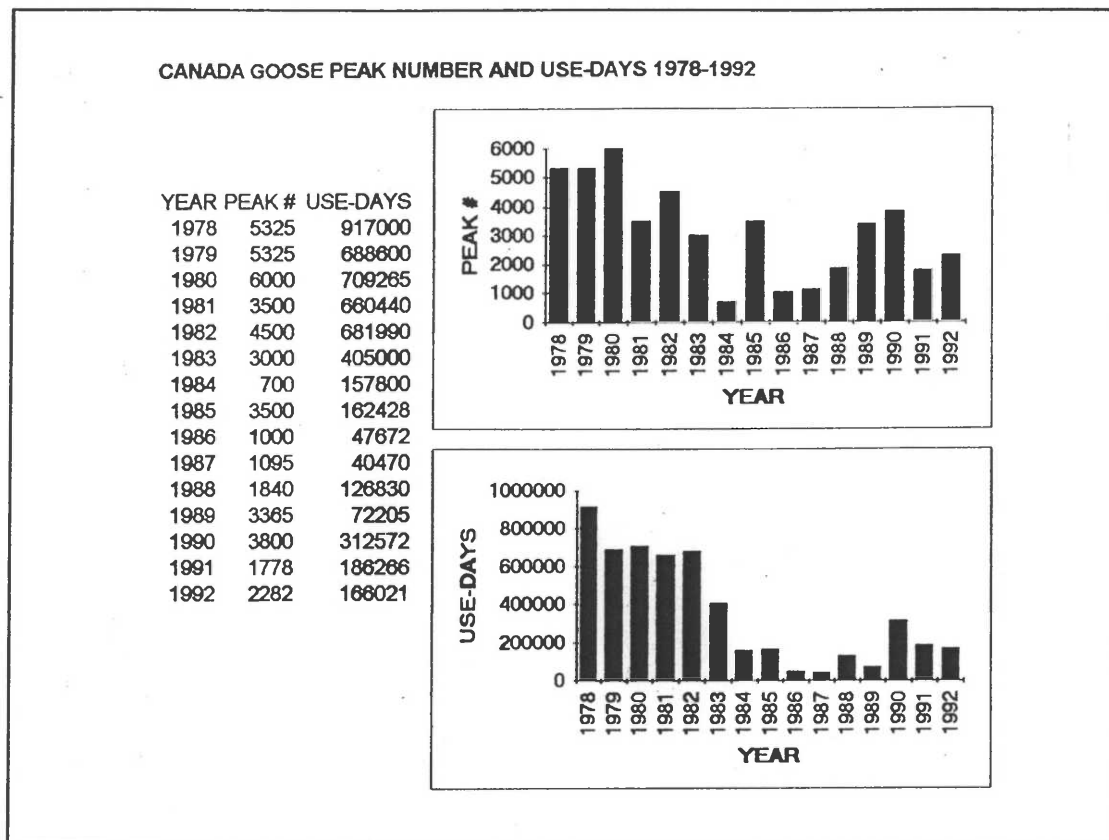


Fig. 10: Canada goose peak number and use-days at Bear River MBR.

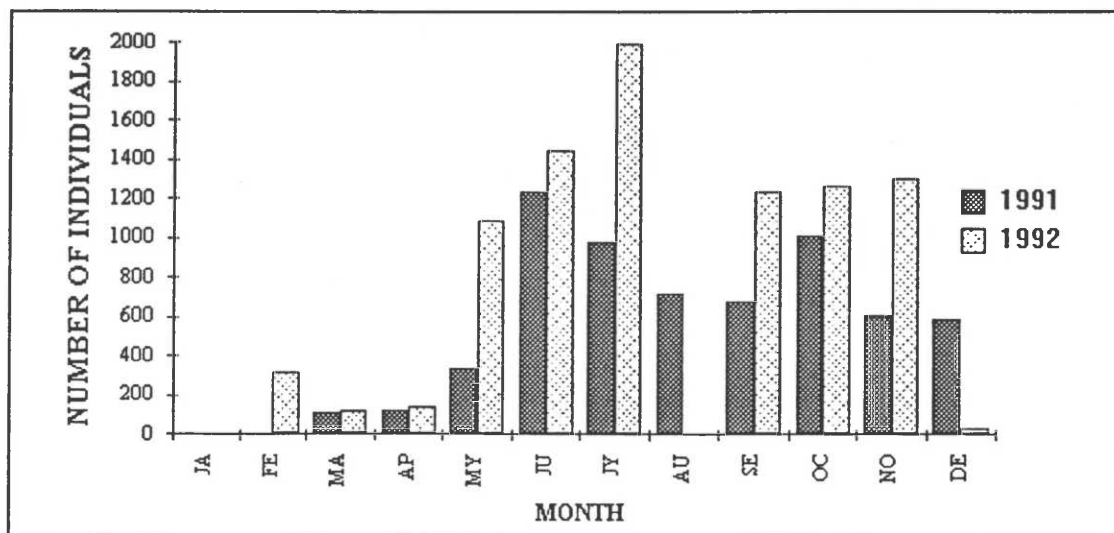


Fig. 11: Canada goose numbers at Bear River MBR, 1991 verses 1992.

C. Swans

TUNDRA SWAN PEAK NUMBER AND USE-DAYS 1978-1991

Tundra swan peak number and use-days were up slightly from 1991 (Fig. 12). Most of the resting habitat favored by the swans on the north end of Unit 1 was dry until early November. Swans were observed frequently in Units 2 and 4, and many stayed until late December (Fig. 13).

Utah Division of Wildlife Resources flew weekly swan surveys during the fall. One marked trumpeter was observed north of the Refuge on Bear River Club marsh. In addition, a wounded trumpeter was recovered from Ogden Bay State Waterfowl Management Area. The bird later died at the rehabilitation center and was sent to the National Health Lab for necropsy. Gunshot wound was confirmed as the cause of death. This bird's death was significant because it was the first cygnet born at Red Rock Lakes to migrate.

YEAR	PEAK #	USE-DAYS
1978	13000	483860
1979	25000	519182
1980	35000	1053805
1981	25000	877282
1982	62000	1200780
1983	50350	1086300
1984	100	100
1985	850	850
1986	2000	2000
1987	720	720
1988	1040	1040
1989	1780	1780
1990	3000	3000
1991	2471	51891
1992	3127	60435

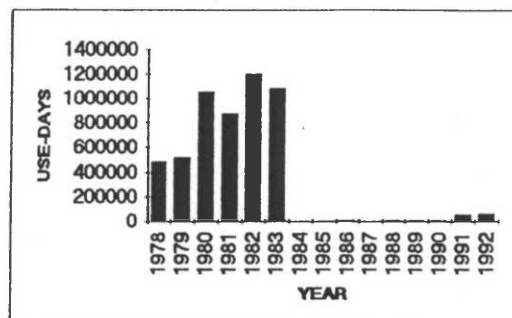
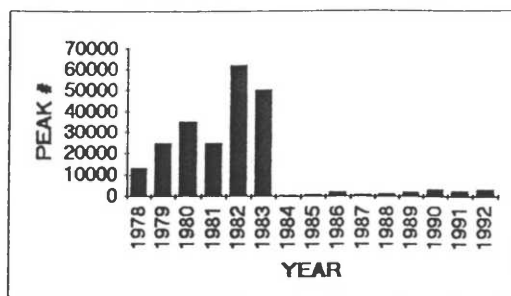


Fig. 12: Tundra swan peak number and use-days at Bear River MBR.

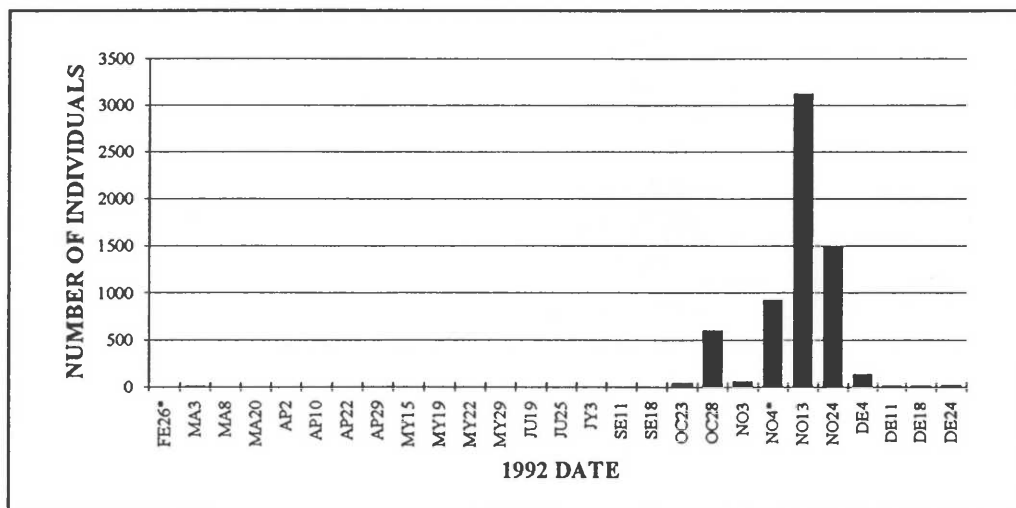


Fig. 13: Temporal distribution of tundra swans at Bear River MBR, 1992.

D. Coots

Coot numbers and use-days were up significantly from 1991 (Fig. 13). Nesting habitat remained inadequate and no production was noted. Numbers peaked in early September and most birds departed by the end of October (Fig. 14).

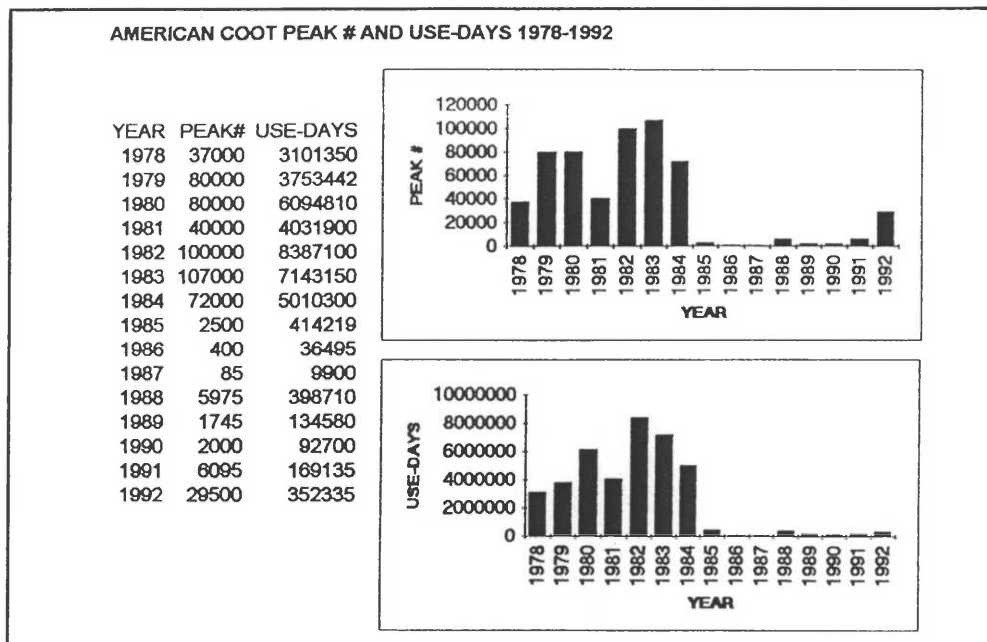


Fig. 14: American coot peak number and use-days at Bear River MBR.

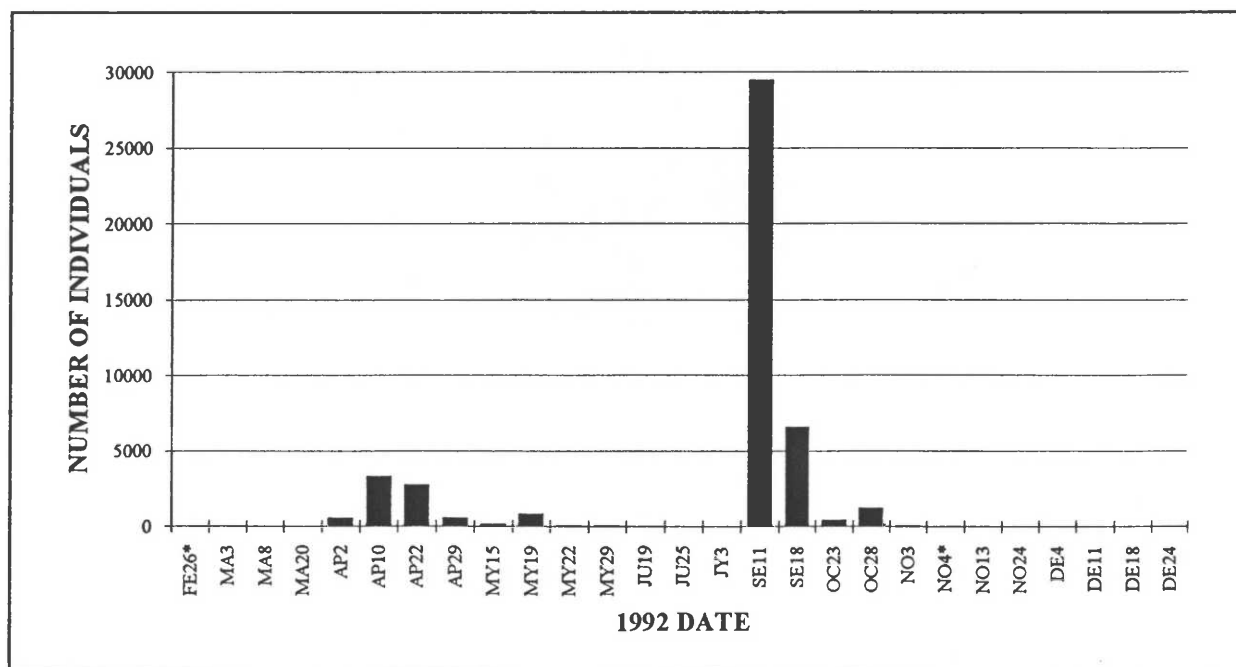


Fig. 15: Temporal distribution of American coots at Bear River MBR, 1992.

4. Marsh and Waterbirds

Eight species of waterbirds were regularly surveyed in 1992 (Table 3). Unfortunately data was not collected in August and the fall migration was not recorded for these species. Total numbers cannot be compared with previous years. Numbers were probably down in 1992 versus 1991 for American white pelicans, western/Clark's grebes, great blue herons, white-faced ibis, ; and up for black-crowned night herons, double-crested cormorants, and snowy egrets.

MARSH AND WATERBIRD PEAK NUMBER AND USE			
SPECIES	PEAK #	DATE	USE-DAYS
Amer. White Pelican	969	3-Jul	45864
Black-crowned Night Heron	37	19-Jun	878
Double-crested Cormorant	546	22-May	27715
Eared Grebe	50	28-Oct	2522
Great Blue Heron	32	25-Jun	2356
Snowy Egret	181	3-Jul	6427
Western Grebe	172	22-Apr	4945
White-faced Ibis	1545	3-Jul	60234
Total use-days for 8 species =			150941

Table 3: Peak number and use-days for 8 species of marsh and waterbirds at Bear River MBR, 1992.



White-faced ibis are abundant during the spring and summer months.

Cormorants nested on islands in Unit 4. Two hundred, ninety-one nests and 1047 young were observed. Production has gradually increased on the Refuge since the early 70's. The number of nests in 1992 rivals the all-time high recorded in 1984 (Fig. 16).

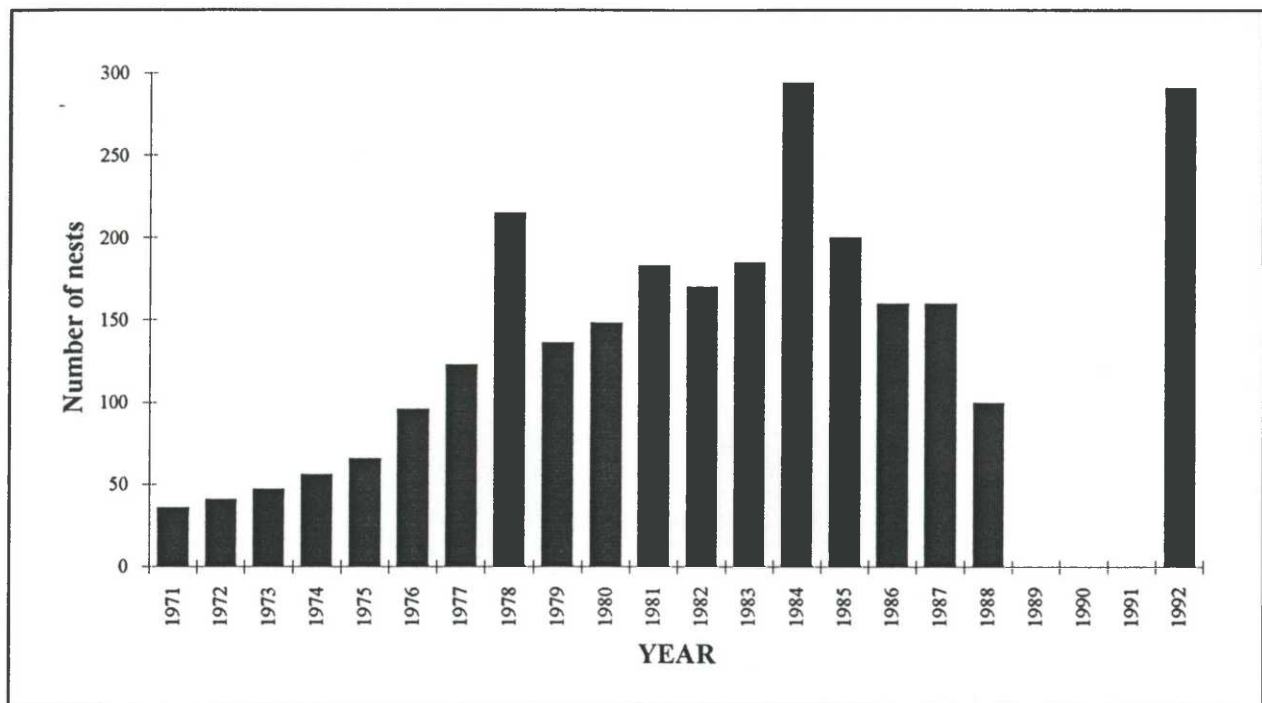


Fig. 16: Historic production of double-crested cormorants at Bear River MBR, 1971-1992.



A face only a mother could love!

5. Shorebirds, Gulls, Terns, and Allied Species

Sixteen species in this group were regularly monitored (Table 4). The data is biased downward because of omission of August surveys. Peak fall numbers for many of these species were not recorded. Monthly distribution data indicates that numbers of most species were probably up, except for killdeer and Wilson's phalaropes.

Few shorebirds nested on the dikes in 1992. Thick kochia and sweetclover covered most dikes making them unattractive for nesting. Snowy plovers nested in the interior of Unit 3, but the distance to water made the success of these nests appear questionable.

SHOREBIRD, GULL, TERN, AND ASSOCIATED SPECIES USE-DAYS 1992

SPECIES	PEAK #	DATE	USE-DAYS
American Avocet	22723	10-Apr	579305
Black-necked Stilt	1367	3-Jul	57008
Black Tern	543	15-May	8727
Caspian Tern	43	15-May	688
Dowitcher spp.	16	19-May	150
Forster's tern	185	15-May	4350
Killdeer	235	23-Oct	10205
Marbled Godwit	7820	18-Sep	138670
Snowy Plover	12	19-Jul	461
Western Sandpiper	7	11-Sep	63
Baird's Sandpiper	58	22-Apr	63
Yellowlegs spp.	17	19-May	240
Willet	50	25-Jun	1387
Wilson's Phalarope	1867	25-Jun	21845
California Gull	40362	20-May	1009737
Franklin's Gull	2244	22-May	73059
Total use-days for 11 species =			1905958

Table 4: Peak number and use-days for 16 species of shorebirds, gulls, terns and associated species at Bear River MBR, 1992.



American avocets, marbled godwits, and dowitchers snack on midge larvae.

The California gull colony on the Unit 1A dike was again prosperous. Two thousand, fifty-seven nests and 4887 young were counted along 0.25 miles of dike. An additional 386 nests and 932 young were counted on islands in Unit 4. It is unclear at this time whether these colonies are expanding. The number of colonies has remained stable since the flood, even though ample nesting habitat is present.

A colony of Caspian Terns was discovered on an island in Unit 4. Records indicate an historic colony existed at this site. Forty-four nests were counted. California gulls also nested on this island and tern nests were highly susceptible to gull depredation when disturbed. In the future this island will be off limits until the terns finish nesting.



Caspian terns returned to their historic nesting colony in unit 4.

6. Raptors

As previously noted, bald eagles and peregrine falcons were frequently observed. Raptors were more abundant during the fall than last year. Rough-legged hawks and northern harriers were numerous late into December. Noteworthy sightings included a merlin, prairie falcon, red-tailed hawk, burrowing owl, short-eared owl, 2 great horned owls, and several golden eagles.



Great horned owls were welcome winter visitors.

7. Neotropical Migratory Birds

Of 169 species of neotropical migratory birds (NTMB) occurring in Utah, 53% (89 spp.) frequent the Refuge (Fig. 17). Of these, 67% are dependent on wetlands or grasslands during some portion of their lifecycle. In 1992, twenty-nine of the potential 89 species were observed. Habitat for many of these grassland species has not recovered from the flood and sightings of many species may continue to be low until vegetation returns.

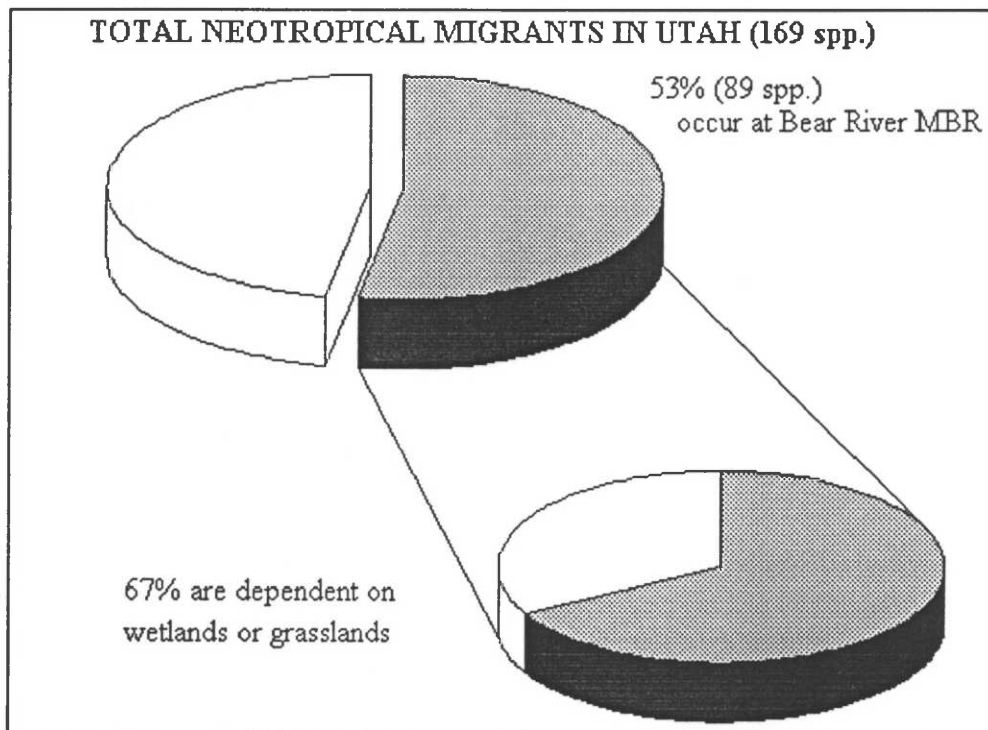


Fig. 17: Bear River MBR provides critical habitat for a large proportion of the neotropical migrants that occur in Utah.

8. Mammals

Muskrats continued to recolonize the Refuge in 1992. Huts were visible in Units 1A and 2 where bulrush was available. Many tunnels and den sites were apparent along dikes on the northern boundary with Bear River Club.

Red fox were a common sight during the winter and summer. Incidental observations were recorded throughout the year. Fox were observed 22 of 44 trips around D-line. Most sightings occurred in January, when juveniles were dispersing, and June-August when adults were

feeding pups at their dens (Fig. 21). Five active dens were located and pups were observed on 5 different occasions.

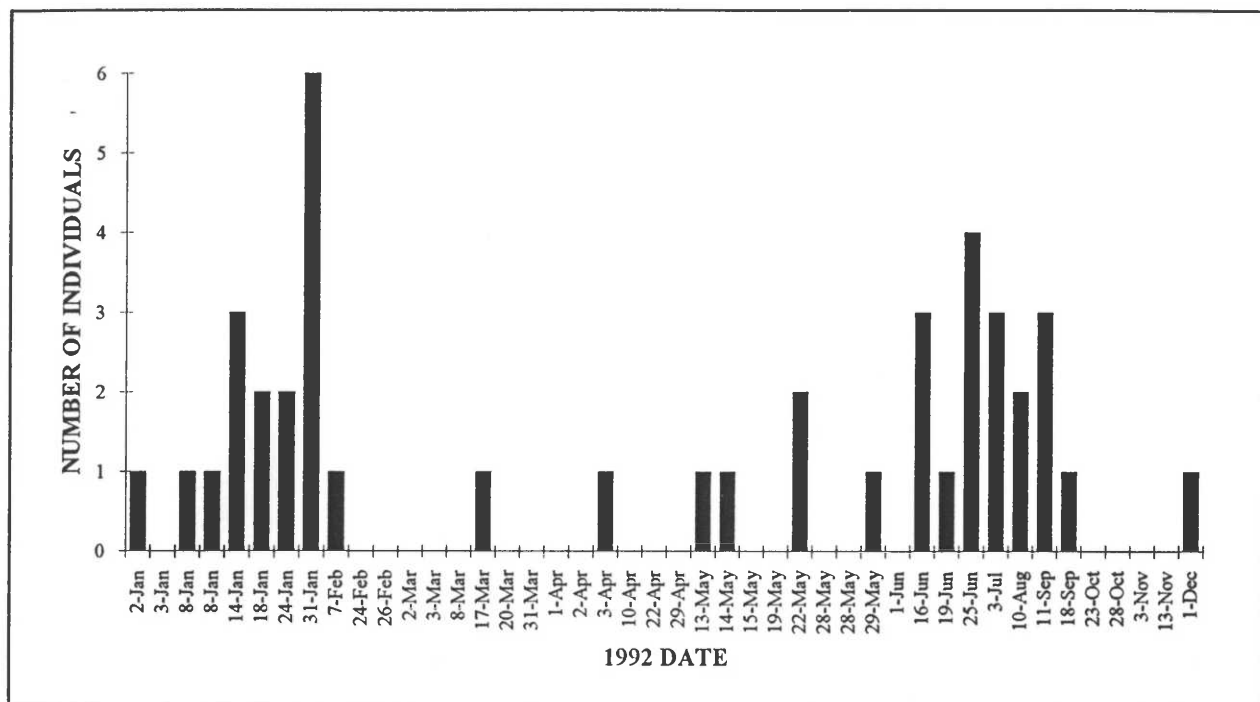


Fig. 18: Fox observations were regularly recorded by staff in 1992. Fox were observed on 50% of the visits to the the Refuge.

Fox typically move to and from the Refuge from State wildlife areas and private hunting clubs to the north. These areas are aggressively trapped during the winter and spring. The Bear River Club reported removing 70 animals in 1992. Fox have easy access to the Refuge across frozen wetlands in the winter. The Refuge may be functioning as a source population for recolonization in the spring.

Remains of a variety of bird species were found at fox dens during the summer. These included green-winged teal, mallards, california gulls, and frequently white-faced ibis. A dummy nest study was conducted to try to asses the impact of fox predation on ground nesting birds. Three trials of 25 dummy nests were randomly place in suitable cover along dikes. Each nest consisted of 3 brown chicken eggs, placed in a depression in the vegetation and sparingly covered with duff. Nests were flagged along the opposite side of the road and travel between nests was by vehicle. Mayfield nest success for the dummy nests was $64 \pm 2.5\%$ (95% CI) . Using the conversion equation ($y = -0.093 + 0.790x$) devised by Ball and Kurnat (in prep), a dummy nest success of 64% equates to a natural nest success of 41% (90% prediction interval equal to approximately 10-80%). These results are difficult to interpret. Because few birds were nesting on the Refuge in 1992, fox may not have been keying in to nests. In addition, few scent cues may have been available to help fox locate the

nests. Conversely, mice and voles were abundant and may have helped offset predation on nests. The study will be continued in 1993.



Red Fox looking for a bite to eat.

Striped skunk sightings increased in 1992. Three skunks including one juvenile were observed. In addition, 1 long-tailed weasel and 2 house cats were noted. Both cats were seen hunting along the tour route and may have been dropped off by the public.

8. Other Resident Wildlife

Invertebrates are the food base for most bird species using the Refuge. Large emergences of chironomid midges provided abundant nourishment for migrating birds and a continuous source of irritation for Refuge employees and visitors. Spiders seemed to emerge earlier in the season in 1992 becoming a nuisance by early June. Their sticky webs soon entombed the vegetation and any vehicles or persons passing by. Damselflies and moths emerged in abundance in July.

11. Fisheries Resources

Fishing for channel catfish along the River and at headquarters was popular during the summer. Carp flourished in all wet units. While some fish eating species fed on the smaller carp, the adults continued to plague the Refuge with poor water quality and low productivity.

12. Marking and Banding

Refuge personnel assisted the Utah Division of Wildlife Resources in banding 150 Canada geese in June. Birds were herded into funnel traps using airboats. The majority of these birds were local juveniles.

Duck banding was postponed until 1993 due to lack of personnel and production of ducks. If banding is to be successful in future years, traps will have to be located to the north, on hunting club marshes where ducklings are being produced.

17. Disease Prevention and Control

No outbreaks of disease occurred on the Refuge in 1992. Although dry conditions and large concentrations of birds appeared poised for an epidemic of botulism, no sick or dead birds were observed. Other management areas around the lake were similarly

blessed, except for Ogden Bay where a few birds (200) were picked up. Dr. John Kadlec, from USU, began some preliminary research on the correlation of redox potential in the sediment and botulism outbreaks. Early results are encouraging, indicating a sharp rise in redox accompanying the onset of the disease. Research will continue in 1993.



Who is the cage for - the biologist or the geese?

H. PUBLIC USE

1. General

With the recovery of the Refuge comes an increase in public use activities. Refuge visitation increased from 7,000 last year to nearly 8,000 in 1992. Recent articles in Ducks Unlimited and Wild Bird magazines, as well as local newspapers have spread the word that Bear River is again open to the public. Requests for tours from school, and scout groups have increased, and written requests for information on the post-flood recovery have also gone up.



The new pavillion was a great asset to the public use program.

Due to the design of the facilities at the old headquarters site and traffic flow patterns in this area, the tour route was changed from a clockwise traffic flow to a counter-clockwise flow.

The volunteers reinstalled eleven interpretative signs around the auto tour route. These signs were on the Unit 2 auto



New signs were installed by Refuge volunteers.

tour route prior to the flood and had been in storage. The signs were installed, and turnouts provided where needed, to conform with the new counter clockwise direction on the route.

6. Interpretive Exhibits/demonstrations

Refuge personnel assisted in setting up and staffing booths at three events during the year. In February we helped staff the Service booth at the Rocky Mountain Elk Exposition held at the Salt Palace in Salt Lake City. This booth consisted of an educational panel, elk antlers which the National Elk Refuge were kind enough to loan us and Service information. The event was well attended and many people stopped by to chat or pick up information.

In April we were back at the Salt Lake City Fair Grounds with a booth for the Utah Wildlife Federation Fair. This exhibit consisted of an informational panel and a desk with Service pamphlets. Again, a good crowd was present and many received information on the Service's programs and wildlife Refuges in Utah.

In terms of people, the booth at the Utah State Fair in September drew the greatest visitation. This ten day event broke all attendance records for the State Fair and our booth area in the Grand Building had a steady stream of visitors from opening to closing each day. Once again we had an informational panel and Service and Refuge literature. We also gave out bags and posters. Staff from the other Refuges in Utah as well as from the Ecological Services office in Salt Lake City assisted during the ten days. Refuge volunteers were active in working tours of duty at the fair grounds.



Refuge and Service information was handed out at fair booths in 1992.

7. Other Interpretive Programs

Refuge Operations Specialist Caldes gave talks to the Utah Museum of Natural History on May 3rd and 17 regarding plans for Refuge restoration and expansion.

Bio-Tech Lanier made the journey to Fish Springs NWR in September to assist them with their Refuge open house. He assisted by taking guided tours through the marsh using the Refuge van.

Lanier, Caldes and Roy were actively involved in the planning, organization and implementation of the first Nature High Natural Resources Youth Camp. The camp was a joint effort between the Federal and State land management agencies in Utah, and Utah State University. The purpose of the camp was to introduce high school students, especially women and minorities, to natural resources management and hopefully interest them in pursuing degrees and careers in the field. Planning meetings began in January and were held monthly until the camp was finally completed in August. The Region had no funds to commit, so the Refuge pledged \$1,000 from station funds to help support the camp. Applications were sent to high schools in the State with a high percentage of minority students. Ninety-five applications for the camp were received, 37 students were selected to attend and 32 participated in the camp. The camp was held August 17-22 at USU Forestry Camp in Logan Canyon. Lanier and Caldes served as instructors for the wildlife sessions and Lanier served as a FWS representative at the Career Fair and other functions throughout the week. While this took a lot of time in planning and hard work to bring off, staff and students all agreed it was a needed, worthwhile endeavor and a great success.



Bio-tech Lanier investigating skulls with participants of the Nature High Summer Camp.

In March, Refuge Operations Specialist Caldes provided the Bridgerland Audubon members with a tour of the Refuge and discussed Refuge rehabilitation and expansion. Again in April this same tour was given to the Utah Chapters of the Audubon Society who were meeting in the area.

In April, Bio Tech Lanier and Biologist Roy provided a guided tour and explanation of Refuge management to 75 third grade students from the Bonneville Elementary School from Brigham City.

During the year numerous tours and discussions of Refuge operations, and wildlife identification were given at the Refuge to Cub Scout groups. Roy gave a Bird identification and flyway talk in May to the Webelos Woods scout group out of Honeyville and Lanier gave a similar presentation in June to the scouts in Tremonton. A total of 140 youth were involved, many of these as cub, pack, or den activities.

Other guided tours of the Refuge were given for the Box Elder Wildlife Federation, eleven British birdwatchers, and six students and three instructors from the Ogden Alternative Classroom School for student with behavioral problems.

A Refuge guided tour was given to Assistant Secretary of Interior, Mike Hayden, members of the press and local elected officials. Secretary Hayden was impressed by the work completed by the volunteers and pledged support for the Refuge expansion.

8. Hunting

The waterfowl season opened at noon on October 3rd. Once again this year the State was divided into zones for waterfowl hunting, the Refuge being in Zone I. The duck season ran from October 3rd through November 30 with a limit of four ducks, no more than three of which could be mallards, but only one hen, two redheads or two canvasbacks or one of each, and one pintail. The possession limit was twice the daily bag limit. Goose season ran from October 3rd through January 3, 1993 with a daily limit of five geese, but only two dark species. Possession limit was six geese, but no more than four dark geese.

Refuge habitat within the area open to hunting was in the best shape ever since the flood and bird numbers were excellent. However, low water conditions made hunting on the Refuge extremely difficult during the first portion of the waterfowl season. Marsh access improved in November as River flows raised the Unit 2 water levels. Hunter numbers of 600 were slightly above last years 450. Success was generally good for ducks, but less so for geese and swans. Waterfowl hunting is the only type of hunting allowed on the Refuge.

The area open to hunting remained the same as it has been for the last two years. Units 1-A, Unit 2 and the area below the D-Line dike were open. Airboats were permitted outside the D-Line only (this was dry almost all year). Other boats were allowed in Units 1-A and 2, but low water levels made getting around extremely difficult.

Caldes met once again with representatives from the Utah Department of Sovereign Lands to resolve restrictions of public access to State land located behind the Perry City sewer lagoon. No progress was made in solving the problem and public access through Perry City lands is still blocked.

Caldes attended the spring meeting of the Utah Air Boaters in Bountiful and provided them with an update on Refuge activities. Hansen attended the fall meeting in Bountiful and gave them an update on hunting prospects on the Refuge.

9. Fishing

Refuge use by fishermen dropped for the second year in a row to an estimated 500 fisherman, down from 550 visits last year and the 2,500 visits recorded in 1990. Many of the favored fishing holes have silted in and fishing has not been the same since the flood. Low water probably discouraged anglers and contributed to poor fishing success.

11. Wildlife Observation

It is estimated from our traffic counter readings that 7,600 visitors drove the tour route around Unit 2 to observe wildlife. The road was generally in good shape and was open throughout the year. There was a period of about a month when the bridge was being repaired at headquarters and visitors had to backtrack as they couldn't cross the river. Wildlife numbers were generally good along the route.

17. Law Enforcement

Trout, Caldes and Lanier have law enforcement authority. These staff members completed the refresher training at Marana, Arizona in January and February and qualified with their new automatic sidearms in August. In conjunction with the August qualification, a meeting was held between Utah Refuge personnel, State Division of Wildlife Resources LE personnel and special agents to discuss the upcoming seasons, receive law enforcement updates and exchange ideas.

Spot checks of hunters during the season indicated good compliance by our visiting hunters. Three citations were written during the season for hunting in a closed area. Two citations were issued earlier in the year for ATV trespass.

Trout and Lanier participated in the law enforcement roadblock on Interstate 70 near Wendover, Utah on October 19-23. This roadblock resulted in fewer violations detected than previous operations of this type but still collected over \$17,000 in fines.

In November, Trout assisted special agents and State DWR personnel in Operation Wasatch, an intensive compliance check of waterfowl hunters along the eastern marshes of the Great Salt Lake.

I. EQUIPMENT AND FACILITIES

1. New Construction

Funds from a "Directors Grant" allowed us to do additional work at the old Refuge headquarters area. Whitaker Construction of Brigham City received the contract to install 2 paved handicap parking stalls, a paved walkway between the pavilion and comfort station, and a boardwalk around the observation pond, level and gravel the parking area, extend two concrete culverts under the road and remove the concrete picnic table slabs outside the gate. Price was \$66,440. Work under this contract commenced in mid-July and was completed in about three weeks. This work makes the old headquarters site a fairly nice site for the Refuge visitor. Whitaker did a good job for us on this contract.



The old headquarters site was refurbished with new walkways, pavillion, parking, and restroom facilities.

To add to this complex the Refuge had a covered fishing shelter and railing constructed on the south boat dock to provide a site for physically challenged persons to fish the River safely. The Refuge also purchased some aluminum benches which the volunteers installed under the pavilion. This will provide an interpretive site on the Refuge for group use.



A universally accessible fishing pier was constructed at the old headquarters site.

Funding was obtained from private individuals and organizations and matching Fish and Wildlife Foundation funds to construct a 1.5 mile dike complete with drive-through spillway and three other water control structures in the northeast corner of Unit 1. This dike attaches to the Bear River Club dike and swings in a southwesterly direction to tie into some islands just south of the Public Shooting Grounds. This dike will impound shallow water over about 640 acres and should create some excellent habitat. This area had channelized and prevented water from sheeting across the land keeping the vegetation healthy. The dike design and supervision of work was done under the direction of the volunteers. About two-thirds of the dike was completed, along with the water control structures, before the project was halted due to the beginning of the waterfowl season. Then wet weather prohibited entry to the area. This dike will be finished in the early spring.

2. Rehabilitation

The Refuge staff spent about three days utilizing new laser surveying equipment to survey the main dikes. The elevations were needed by engineering in the Regional Office to calculate

the fill needed to raise these dikes back to their original elevation. The dikes averaged about one foot low. Readings were taken every 0.01 mile and random cross sections were taken every 4-5 miles. From this information a contract was written and let to move 274,000 cubic yards of material from the existing barrow areas to raise the dikes. Whitaker Construction was the successful bidder at \$186,000 and was awarded the contract in October. Due to various reasons, including an error in the bid price, the actual go ahead was never given and Whitaker's backed out in December without accomplishing any work. The contract will be rebid in the spring with work to start in late summer of 1993. We had hoped to be able to get alot of the work done this fall while much of the barrow area was dry because of the low water levels. Funds are available for this project through our Refuge restoration appropriation.

Refuge personnel replaced a 30 inch steel culvert through the access road, on the Southern Pacific lease, to the Perry entrance. The old culvert had rusted out and caved in on the road shoulders creating a safety hazard.

The Refuge "boneyard" was cleaned up with funds received from an MMS project. There was years of accumulation of various material which the flood moved about or rusted away. Much of the material was buried or burned and some was hauled off as scrap metal. Those items saved, including several thousand cedar posts, were restacked and the area was graded smooth to allow it to revegetate.

In April a contract in the amount of \$56,321 was let to Flare Construction of Coalville, Utah to furnish labor, materials and equipment to install single beam guardrails on the 24 water control structures on the existing dike system. They also removed the wooded catwalks which the volunteers had installed a couple of years ago and put in new steel, slip proof grating on these same structures. The contract was completed in two weeks and we now have a safe area to pull stop logs.



New catwalks and guardrails were installed on the spillways to improve safety.

Refuge personnel finally completed the headquarters cleanup and did some leveling of the area prior to Whitaker's contract work for graveling. The old "hospital" pond was cleaned out, an island constructed in the center and a pumping system set up to fill the pond. Salt grass was planted around the sides and clumps of hardstem bulrush planted in the pond bottom. The boardwalk constructed by Whitaker's encircles this pond.



A boardwalk was constructed around the demonstration pond.

Through the efforts of the heavy equipment operators hired with Bureau of Reclamation drought relief funds, dirtwork on the east-west cross dike in Unit 3 was completed. This project was restoration of a dike originally built in 1983. The dike will be seeded to a grass-forb mixture next year and some water control structures will be put in place before high water in the spring of 1993. This dike is 3.5 miles in length and has been under construction for the last two years. Also rebuilt was the 1.4 mile dike which angles across the south-west corner of Unit 3. Both of these dikes are part of the redesign of the Refuge.

A contract was let to: (1) replace the bridge decking at the headquarters site with new, wider, pre-formed concrete decking; (2) replace the 12 radial gates at headquarters with new electrical operated gates; (3) replace two manually operated gates at Whistler Canal; (4) construct new approaches at the headquarters bridges; (5) install single beam guard rails on both sides of the bridge; (6) move two of the old pre-formed bridge decking to the D-Line to use as a boat ramp for access outside for hunting purposes. Wadsworth Construction from Salt Lake City was the successful bidder in the amount of \$371,346. Work commenced on the project in mid-July with the removal of the existing gates, and was completed in late November. However, the motors installed would not operate the gates, because they either

were not large enough motors or were geared wrong. At year's end the contractor and sub-contractor were still trying to figure out who was to blame and what could be done. Overall, everything looks fine and the contractor did a pretty good job; if only the gates worked. Funds for this project came from Flood Damage money.

In anticipation of the need for electricity for the gate motors, Utah Power and Light Company installed an underground electrical line from the Bear River Club to the old headquarters site, and set up a meter post.

Refuge dike/roads were graded numerous times during the year to fill the holes and keep the vegetation out of the center of the dikes. Late in the year the grader was used to clean vegetation from the dike and move the gravel to the inside allowing a spot for the anticipated placing of fill material to raise the dikes.



Equipment operator Iwanski adapted the laser level for use on the ATVs. Refuge dikes were then surveyed.

The water delivery canal along the east side of Unit 3 was cleaned out to meet Bureau of Reclamation specifications for the new Refuge design. The two and a quarter miles of dirt work on the canal from the River to the Unit 3 cross-dike were completed. Approximately 70,500 cubic yards of material was removed and stacked on the east side. A small amount of material still needs to be removed from the west side and put up on the H-Line dike to raise it back to its original height. This work was completed through the use of our two Refuge excavators plus a rental machine which was used for two months.

The dike formed by the ditch running east from the Reeder Overflow at the upper end of Unit 5 was patched and rebuilt as needed to keep water out of the unit. We are attempting to keep the center of Unit 5 dry so that construction work can begin there in late summer of 1993.

4. Equipment Utilization and Replacement

The maintenance staff thought they had died and gone to heaven as we received eight pieces of new heavy or major equipment.

Through the use of Drought Relief Funds from the Bureau of Reclamation we received a John Deere 2355 agricultural tractor and seven foot John Deere rotary mower; a Case "Tool Carrier" with bucket, tines snowplow and crane arm; and an International Truck-tractor and TWAMCO 48' low boy equipment trailer. The Bureau also purchased a laser alignment system consisting of laser and receiver, for surveying and attachment to the dozer blade.

Out of our flood damage funds we were able to purchase a Cat EL200B excavator; a Cat D-4H dozer; a Cat 12G motor grader and a Ford 8- ton dump truck.

The third time proved to be the charm, as finally after being offered for sale twice before, GSA was able to rid us of our 1981 Jeep.



John Deere 2355 tractor.



Case Tool Carrier



International Truck-tractor and TWAMCO low boy trailer.



Cat EL200B Excavator



Cat D-4H Dozer



Cat 12G Motor Grader.



Ford 8-ton Dump Truck.

4. Credits

Sections B, C, D, E, F, I, and J were written by Hansen. Sections A and G were written by Roy, section H by Lanier, and section K by Trout. Trout and Caldes edited the draft and Bull and Roy assembled the finished report. Photos were taken by Refuge volunteers and personnel.