

April 15, 1997

To: Royce Huber, Project Leader, FTN-VLT NWR Complex

From: Len McDaniel, Wildlife Biologist, Valentine NWR

Subject: CMP - Recreational Fishing & Grazing Issues



The following is a summarization of biological trend information for, and information applicable to, Valentine NWR. Specifically, the information addresses recreational fishing and grassland management activities and their relationship to the purposes for which the refuge was established. The following information is generally contrary to the comments that were received from the local Chamber of Commerce, recreational fishery, and ranching interests that were well represented at the CMP Scoping Meeting held in Valentine on March 20.

A. Recreational Fishery Issue:

"Fisheries USA - The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service" was released in 1991 and the "Guidelines for Enhancing Recreational Fisheries on National Wildlife Refuges" was released in 1993. However, there are two significant items of this action that seem to be overlooked:

- (1) Page 3: *Fishery management activities on refuges should focus on development and maintenance of those fish communities that are expected to occur in natural ecosystems typical of the area.*

Robert Hrabik (in An Atlas of the Sand Hills, 1990) indicated that the current origin of fish species in the Nebraska Sandhills resulted from introductions to "satisfy the growing demand for a Sand Hills sport fishery." Mike Jennings reported (in A Biological Survey of Fort Niobrara and Valentine National Wildlife Refuges, 1993) that fish "information for Sandhills lakes is scant and often anecdotal, making determinations of historical fish distributions difficult." However, black bullhead, grass pickerel, Brook stickleback, fathead minnow and green sunfish were probably the primary fish species that historically could have been present in the Sandhill Lakes. Fish species that have been introduced to lakes on Valentine NWR include: northern pike, crappie, bluegill, Sacramento perch, yellow perch, largemouth bass, muskellunge, channel catfish, flathead catfish, trout sp., walleye, saugeye, carp and freshwater drum. Other fish species known to exist are grass pickerel, Brook stickleback, black bullhead, fathead minnow and green sunfish. Walleye, channel catfish, trout sp., crappie and Sacramento perch are currently not known to exist in refuge lakes.

(2) Page 8: *Refuges and Waterfowl Production Areas are established for specific purposes and actions taken to increase recreational fishing opportunities on these areas must be compatible with the legislated purposes (50 CFR, Part 33.1) and have adequate funding and staff. Before a refuge is opened to recreational fishing, the program must be consistent with principles of sound fishery management, supported by a Fishery Management Plan, determined to have "no negative effect" by an internal Section 7 evaluation, and in compliance with the National Environmental Policy Act.*

The first part of second sentence may not be applicable to Valentine NWR since fishing is already an approved recreational opportunity. However, the spirit and intent of "no negative effect" seem clear, but, the biological reality is that there is no such thing as "no negative effect" when simultaneous management of sport fisheries and waterfowl production are attempted.

Attached is correspondence originating from Dr. Ward Sharp (the first Manager of Valentine NWR), Burnie Maurek (Regional Director, USDA-Bureau of Biological Survey) and J. M. Merritt (Superintendent Hatcheries, Nebraska Game & Parks Commission), regarding the development of a sport fishery in the Marsh Lakes. Dr. Sharp's of June 13, 1938 to the Regional Director, had several germane points that are just as applicable today as they were in 1938.

- (1) Residual cover is important for upland nesting ducks.
- (2) Fish compete for the same food base as ducks.
- (3) Disturbance factors caused by fishermen.
- (4) The Marsh Lakes is a quality waterfowl production area and that a fishery "should never be" developed.
- (5) Recreational fisheries should be confined to the Dewey-Hackberry Lakes area to reduce costs associated with expanded public use (fishery) programs.

The basic thrust of the Nebraska Game and Parks Commission (NG&PC) fishery personnel has not changed since 1938. NG&PC recently completed a strategic planning exercise. To date, this plan has not been released to the public due to the lack of action on behalf of the Commission. However, the Stewardship Doctrine established the following Goal: *Maintain, enhance, and restore the natural ecosystems of Nebraska.* The Goal of the Sandhills Lakes (sport fishery portion of the document) was to *maximize fishing opportunity while preserving the Sandhills lake ecosystem.* The objectives and strategies included in the Sandhills Lakes section were generally narrow in scope and contradictory to the stated goals. Examples are: *Objective 3, Strategy 3. Pursue changes to current policies or laws that limit recreational fishing on public lands;* and *Objective 4. Develop and maintain fishable populations in any Sandhills lake with the potential to produce fish.*

The adverse effects that carp infestations exert on sport fisheries and waterfowl production have long been recognized. Furthermore, the Service has expended a tremendous effort to minimize the adverse effects of carp infestations on Valentine NWR. During the 1950's, Hackberry and Dewey Lakes were treated with toxaphene to eliminate carp. In the 1960's, these lakes were retreated with rotenone and antimycin was applied to Whitewater Lake to minimize the effects of carp. By 1970, carp had again repopulated the lakes. The latest lake renovation effort was initiated in 1975 and continued through 1982. The elevations of seven lakes were lowered via drainage and pumping prior to chemical treatment with rotenone. To date, only West Long and Watts Lakes may remain carp-free and the carp populations in the remaining lakes have not yet dominated the lakes as was the case before initiation of the most recent lake renovation program. Six of these lakes are managed as recreational fisheries in which the following fish species have been stocked to meet various fish management strategies: largemouth bass, bluegill, yellow perch and northern pike. Additionally, muskellunge and saugeye were stocked in Watts Lake; saugeye and freshwater drum in Duck Lake; crappie in Clear Lake; and flathead catfish in Dewey Lake.

Refuge fish populations are monitored by Service personnel using a sampling protocol that provides information on the general physical condition (i.e., relative weights) of the various size classes of fish. This is the same procedure employed by NG&PC fishery personnel. It is significant to note that fish biologists concur that as fish populations exploit available food resources, relative weights of fish decline.

The conflict between management for duck production and fish is much more subtle than the general public's common criticism that large predator fish (northern pike and largemouth bass) eat ducklings. Invertebrates are the basic food resource and the magnitude of competition for that basic resource changes the population dynamics of both fish and wildlife. Wildlife, and particularly breeding ducks, do not compete well with fish. Wildlife simply attempt to relocate (at various levels of success) and fish survive, in place, through population restructuring (species, size and physical condition) or die.

Studies conducted by research scientists (G. A. Swanson, G. L. Krapu, J. L. Eldridge, J. C. Barkonek and H. W. Murdy) from the Northern Prairie Wildlife Research Center and others (D. C. Ankeny) have documented the importance of food resources, primarily invertebrates, for breeding waterfowl. Waterfowl are attracted to an unlimited food base that is necessary to meet the physical demands of production, brood rearing and plumage molt. Specific research documented that average clutch sizes are greater, reneating effort increased, egg formation and duckling survival are enhanced when an unlimited food base is available. Also, birds in good physical condition are able to survive the additional energy demands associated with plumage molt and the rigors of migration better than birds in poor physical condition.

P. S. Corn, M. L. Jennings and R. B. Bury (in *A Biological Survey of Fort Niobrara and Valentine National Wildlife Refuges*, 1992) stated:

Fisheries management at VNWR has probably reduced populations of northern leopard frogs and tiger salamanders, because these species are most abundant in

shallow ponds and lakes without fish. Elsewhere, populations of tiger salamanders and several species of western ranid frogs have been extirpated or declined after introductions of predatory fish.

Western and eared grebes colonized Dewey Lake in 1983 - the year following renovation. This is the only record of colony nesting grebes that is available for Dewey Lake since the refuge was established in 1935. The grebes were attracted to the food base (fathead minnows) that had not yet been exploited by the sport fish that were stocked immediately after renovation. In 1984, the grebe colonies were greatly reduced in size and by 1985 grebes had abandoned Dewey Lake. Also by 1985, the sport fishery was established and sports fishing activity was initiated.

Black terns were also common nesters on the renovated lakes for 1-3 years following renovation; however, black tern nesting is currently absent from all the lakes that are managed as sport fisheries. Presently, the status of the black tern is being reviewed under the provisions of the Endangered Species Act.

Blanding's and yellow mud-turtles are listed as Category 2 species under the provisions of the Endangered Species Act. P. S. Corn, M. L. Jennings and R. B. Bury (in A Biological Survey of Fort Niobrara and Valentine National Wildlife Refuges, 1992) reported that Blanding's turtles may favor smaller, shallower waters since four times as many turtles were collected in ponds than in lakes on Valentine NWR. Additionally, most of the juveniles and particularly the small sized young were collected from ponds. However, the abundance of juvenile turtles in the ponds was most likely a result of an abundance of available food resources and reduced mortality. Similar observations have been made for yellow mud turtles on Valentine NWR. Observations also indicate that adult yellow mud turtles sustain greater mortality by motor vehicles than Blanding's turtles. Most of the motor vehicle mortality occurs in May - shortly after yellow mud turtles emerge from winter hibernacula. This is a period of substantial visitation by recreational anglers and many yellow mud turtles are killed on the public use trails. Turtles are long-lived animals that generally have low recruitment rates; therefore, even low mortality levels, may be disastrous to local populations.

Breeding ducks responded favorably to the lake renovation program for several years after treatment (Figures 1 - 6). However, breeding duck pair use decreased as the positive effects of renovation (draw down) deteriorated and the sport fishery became established. What is most interesting is the degree to which the attractiveness of the renovated lakes deteriorated after several years - duck breeding pairs decreased to levels prior to renovation when the lakes' fish populations were dominated by carp. Therefore indicating, that if an abundant food resource is not available to attract breeding ducks, the significance of fish species that dominate a wetland area is inconsequential. To date, no significant effort has been made to compare duck breeding pair use to the status of recreational fisheries (species composition, physical condition or fishing activity) on Valentine NWR. Anecdotal evidence exists that may provide additional insight into the duck production - sport fisheries issue.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

Valentine Lakes Refuge,
Valentine, Nebraska.

Valentine Lakes Refuge,
Regional Office Correspondence.

June 13,

Regional Director,
Bureau of Biological Survey,
P. O. Box 1269,
Omaha, Nebraska.

Dear Sir:

Mr. J. M. Merritt, Superintendent of the Fish Propagation and Distribution Division of the Nebraska Game and Fish Commission called today at this office concerning fish propagation in the meandering lakes on the refuge. He is very anxious to stock the Marsh Lakes with Bass this June. His reasons for stocking these lakes are as follows: --

- (1) -- He stated that sportsmen of the State were very anxious to have fish in these lakes.
- (2) -- That the Marsh Lakes are excellent Bass Lakes.
- (3) -- That meandering lakes (Marsh Lakes for example) are public domain.
- (4) -- He is very insistent that these lakes be stocked. He feels our other lakes are not yet in good enough condition to be stocked.

My objections to stocking these lakes are as follows:

- (1) -- Our best nesting areas. This year, the following nests have been found.

Puddlers.....96

Divers.....33

Probably 100 Redhead nests are on the lake since we estimated that only one-third of the ground had been covered. The other is too boggy. One-third of our puddle ducks are raised on these lakes. Three-fourths of our diving ducks are raised on these lakes

- (2) -- The Marsh Valley is all grown up for nesting cover. A fire started by fishermen would wipe out the entire area since 50% of the water is dead material.

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(3) -- To open the Marsh Lakes to fishing means an extra patrolman during that season on this area. Administrative problems would be doubled as we now want the public confined to the area around Dads, Dewey or even Hackberry Lakes.

(4) -- Other lakes such as Dads, Dewey, or Hackberry should be stocked prior to Marsh Lakes provided sufficient pressure is brought to bear. The Marsh Lakes should never be stocked.

(5) -- Fish compete for the same food as do young ducklings. To permit fishing in the Marsh Lakes would mean disaster to our duck management program.

(6) -- Disturbance of duck broods by fishermen will be a factor.

What is the legal interpretation of meandering lakes.

Very truly yours,

WARD. M. SHARP,
Assistant Refuge Manager.

WMS:MT
cc: Washington office

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

ADDRESS REPLY TO
REGIONAL DIRECTOR
AND REFER TO

Valentine Lakes
Fish

OFFICE OF REGIONAL DIRECTOR
406 POST OFFICE BUILDING
OMAHA, NEBRASKA

June 15, 1938

REGION NO. 9
N. E. MONTANA
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS

Dr. Ward M. Sharp
Valentine Lakes Refuge
Valentine, Nebraska

Dear Dr. Sharp:

Acknowledgment is made of your letter dated June 13 in which you advise us that Mr. J. M. Merritt, Superintendent of the Fish Propagation and Distribution Division of the Nebraska Game and Fish Commission is very anxious to stock Marsh Lakes with bass this June.

It is noted that among other reasons, Mr. Merritt indicates that the Marsh Lake areas are meander lakes and are public domain and is insistent that these lakes be stocked. Your objections to stocking these lakes have been noted, and it is believed that your points are well taken. As you pointed out, administrative problems would be greatly increased and much harm would be likely to result to nesting waterfowl and their off-spring if these areas were stocked and later utilized as fishing areas that would be heavily patronized.

You ask for a definition or legal interpretation of meander lakes. It is believed that in that question another point should be brought out and that is the point that Mr. Merritt raises regarding public domain. As you are aware, the establishment of the Migratory Waterfowl Refuge areas was for the purpose of providing nesting and resting areas for our waterfowl. The primary function of these areas is for the purpose of providing sanctuaries for our migrant waterfowl, and other activities are more or less secondary in nature. Many of the refuge areas will have certain sections of them that will naturally be thrown open for fishing or other recreational uses, but extreme care has been and always will be taken to guard against the destruction of those areas that are of primary importance in the waterfowl propagation program.


From your letter, it would seem that Mr. Merritt has presented his side of the picture to you with the feeling that it is one worthy of further negotiations inasmuch as he has seen fit to present legal points for argument. For the purpose of fortifying ourselves, the legal interpretation of meander lakes and also the point relative to the public domain question will be presented to Washington for interpretation. It is of course realized that under our federal laws in the establishment of our refuges, situations such as this were anticipated and in practically all cases adequately provided for by law.

On the other hand there seems to be very little reason why strained relationships between Mr. Merritt and the Biological Survey should result over his insistence to stock lakes that are of greater value to us as duck nesting areas rather than fishing areas. It is suggested that Mr. Merritt be advised that fish stocking activities on our areas must be approved by the Regional Office and the Washington office before such programs can be undertaken, and that until hearing further you cannot give him any definite reaction to his proposal and insistence to stock the Marsh Lake area with bass.

Very truly yours,

Burnie Maurek, Regional Director

By


Sr. Administrative Assistant

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

Valentine Lakes Refuge,
Valentine, Nebraska.

Valentine Lakes Refuge,
State of Nebr., Game & Fish.

June 18, 1938.

Mr. J. M. Merritt,
Superintendent of Fish Propagation & Distribution Division,
Nebraska Game and Fish Commission,
Lincoln, Nebraska.

Dear Mr. Merritt:

Reference is made to your recent visit to this refuge concerning Bass or other fish propagation in the lakes controlled by the Valentine Migratory Waterfowl Refuge.

I have been informed that before any fish can be placed in the lakes of the refuge, it is necessary that written approval be given by the regional and Washington offices. A permit in writing will no doubt be issued by the Secretary of Agriculture authorizing this procedure.

Very truly yours,

WARD M. SHARP,
Refuge Manager.

WMS:MT
cc; regional office

7-11

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VICE-CHAIRMAN

FRANK O'CONNELL
SECRETARY

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SPALDING

State of Nebraska

GAME, FORESTATION AND PARKS COMMISSION

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Gretna, Nebraska.
June, 22nd, 1938.

Dr. Ward M. Sharp.
Refuge Manager,
Valentine Lakes Refuge,
Valentine, Nebraska.

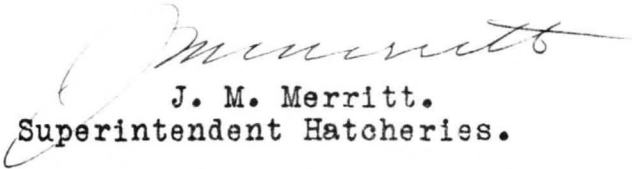
Dear Mr. Sharp;

Thank you for your prompt letter relative to planting fish in the meandered lakes within the boundary of the Valentine Migratory Waterfowl Refuge.

For the reason that the privilege of fishing is vital to any plan to provide recreation for Nebraska sportsmen, it was my hope that we would be able to restock the once famous Marsh Lakes to bass again.

At present I have no instructions from our Commission in reference to the meandered lakes and am referring the matter to them for decision.

Yours very truly,


J. M. Merritt.
Superintendent Hatcheries.

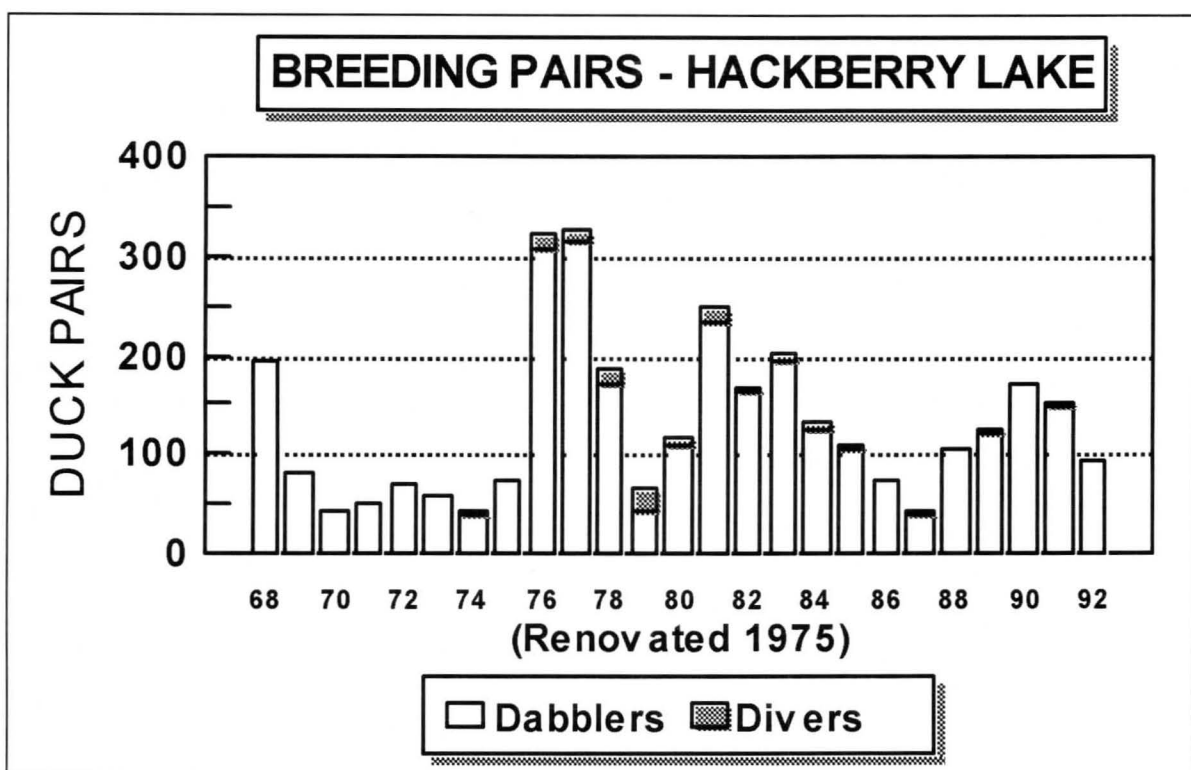


Figure 1

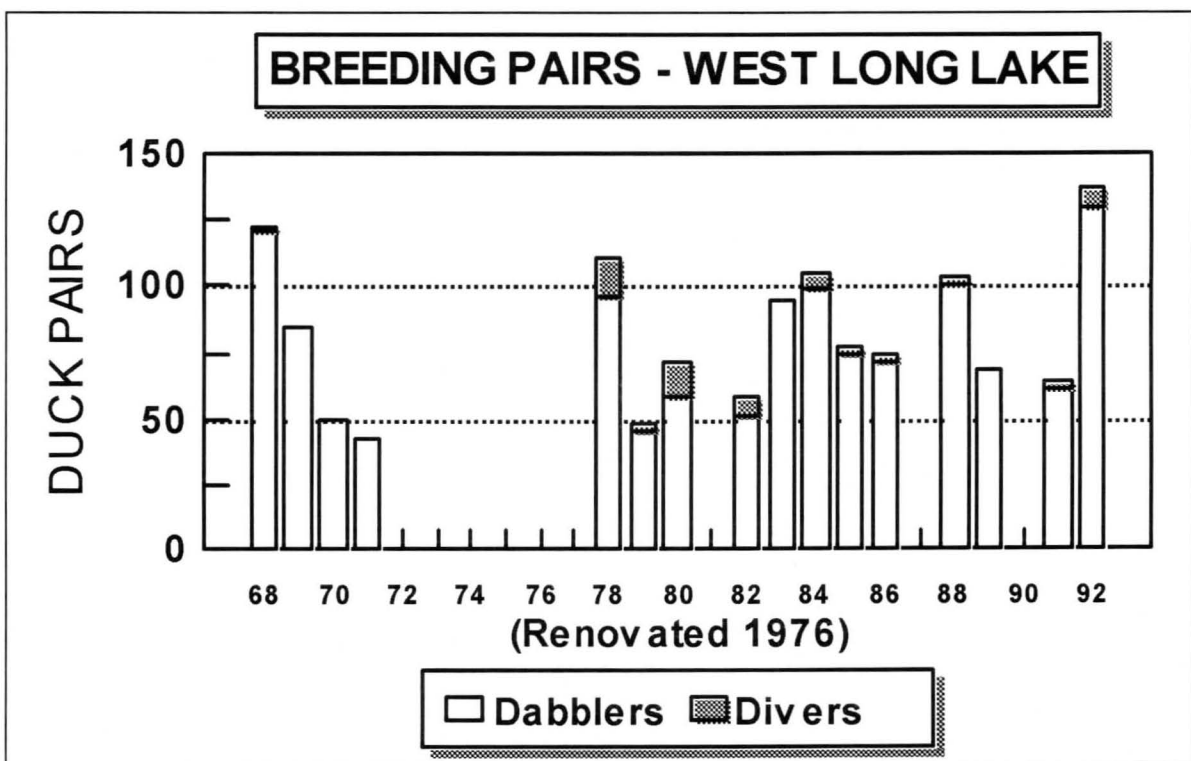


Figure 2

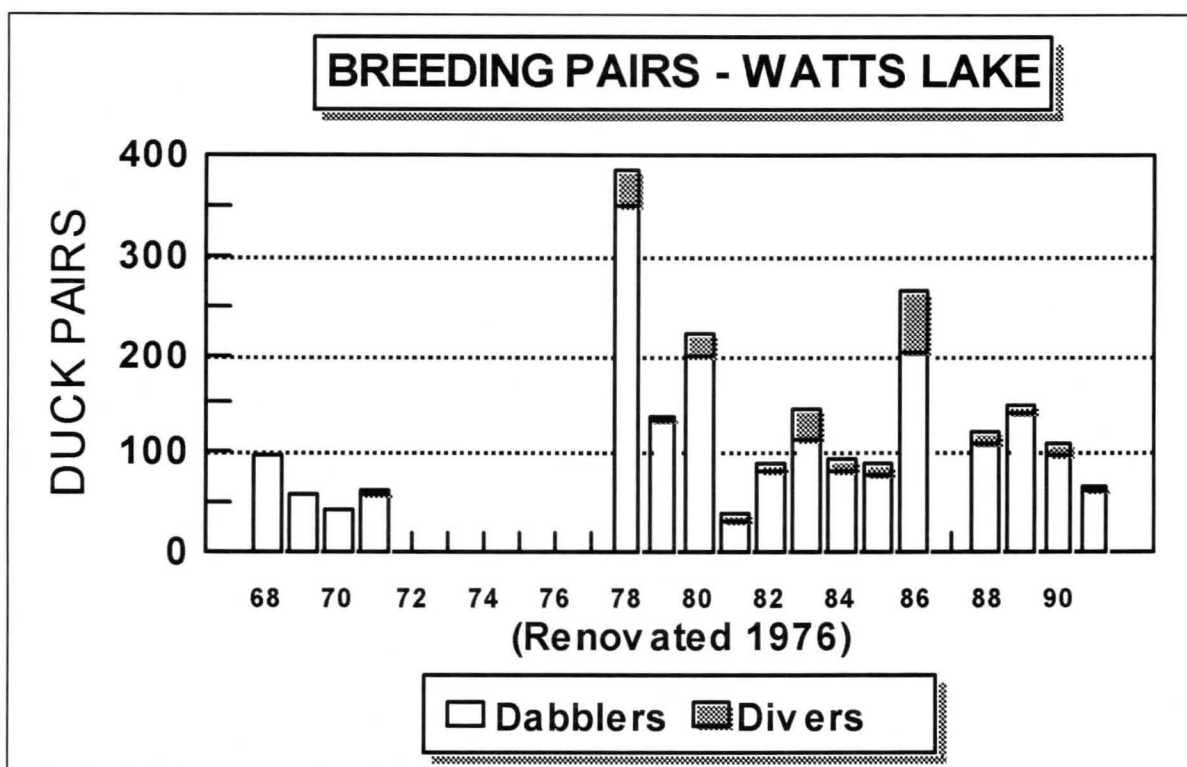


Figure 3

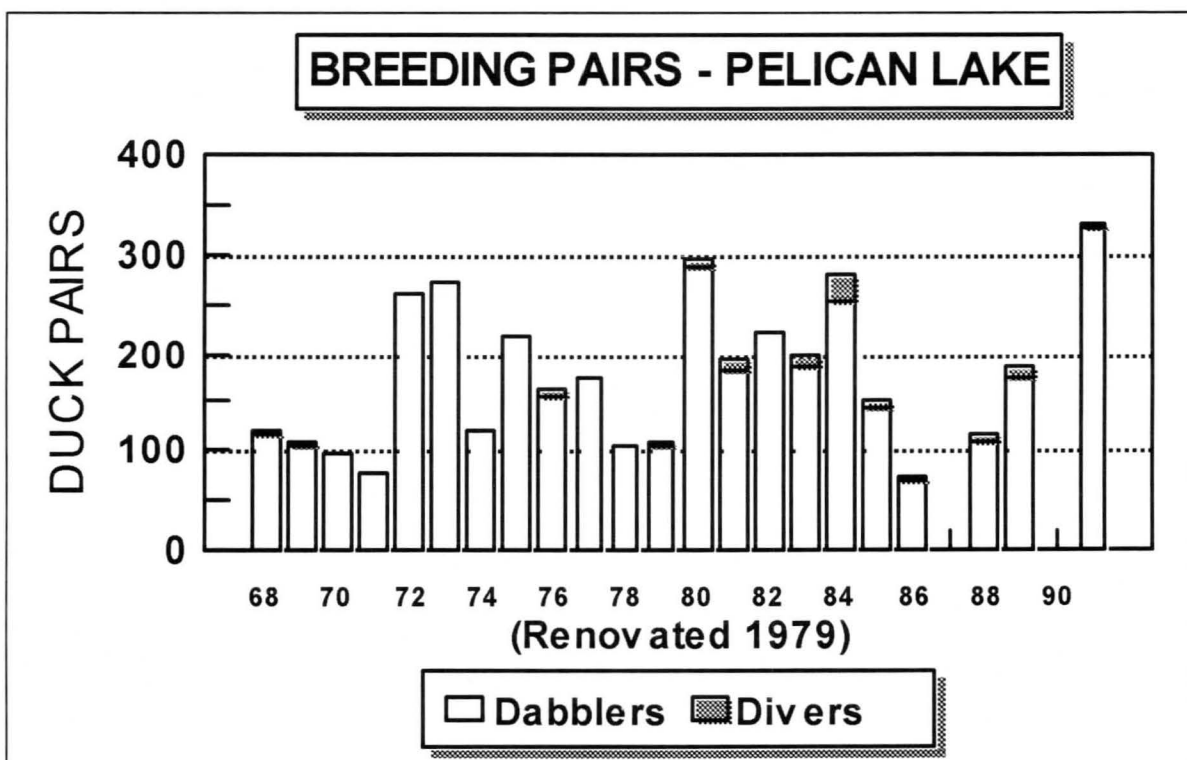


Figure 4

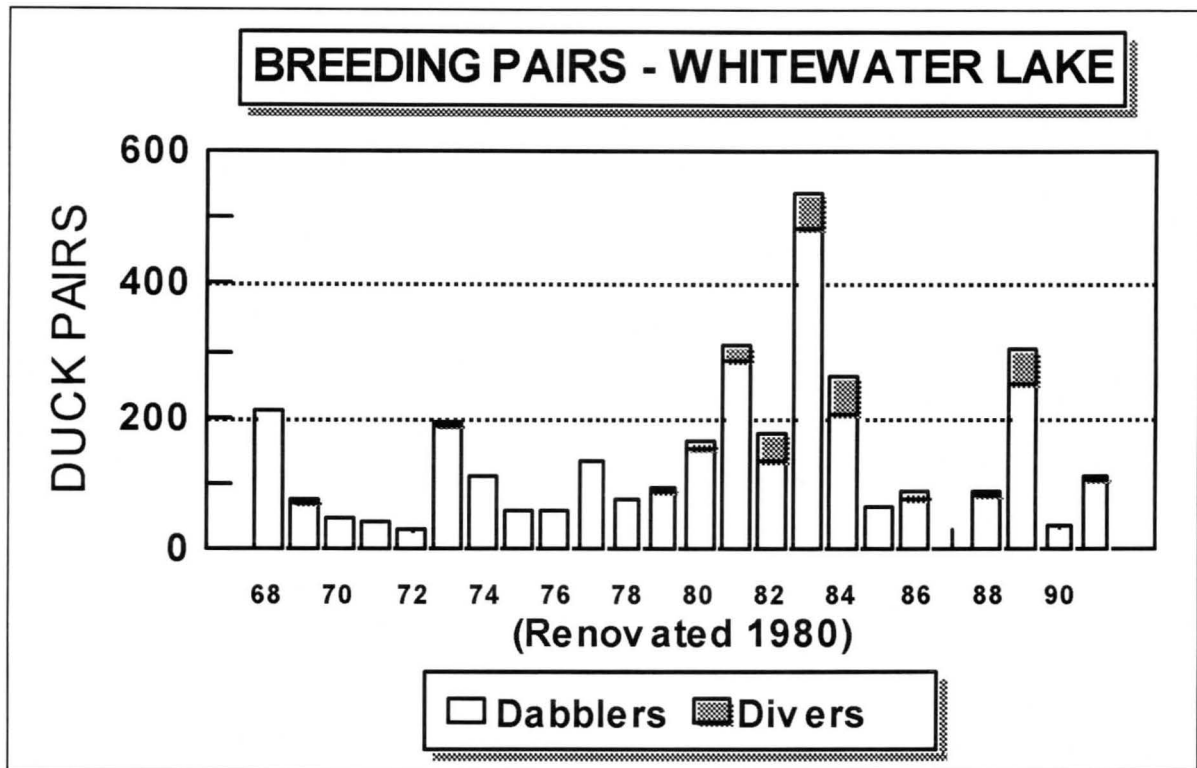


Figure 5

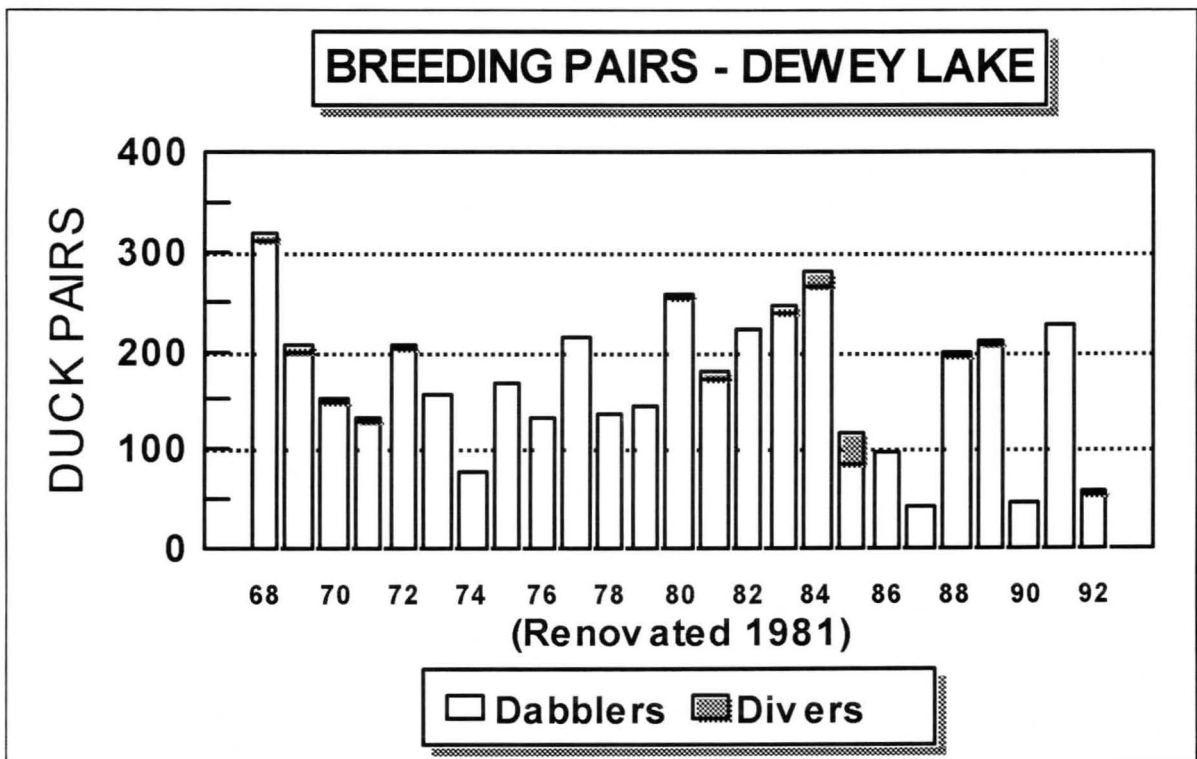


Figure 6

B. Upland Nesting Bird Habitat and Grazing Issue:

Grazing interests advocate that upland nesting birds preferred to nest in disturbed (grazed and/or mowed) cover rather than undisturbed cover; nest predation is greater in undisturbed cover; and that there was more wildlife on Valentine NWR 20-30 years ago. However, this is a situation that is not limited to Valentine NWR, but, to Public Land grazing interests in general. Biological documentation, on refuge and elsewhere, does not support the disturbed cover hypotheses. Furthermore, it is difficult to refute the positive effects that various governmental land set aside programs (Soil Bank, CAP and CRP) have had on upland nesting bird populations - particularly, where these programs have involved large acreages.

I. Upland Nesting Ducks

Refuge nest data (1987-93) documented that visual obstruction readings (VORs) of vegetation at blue-winged teal nest sites averaged 6.2 inches (n=862) while mallard nest sites averaged 9.1 inches (n=334). Average VORs, by species, were similar for fate (successful and unsuccessful nests) as well as between cover treatment (disturbed, 1 yr. rest and 2 yrs.+ rest). Therefore, nesting hens were obviously selecting nest sites where vegetation was within their respective average VOR regardless of cover treatment. Furthermore, in the habitat units with disturbed cover treatment, nest site VORs were considerably greater than the average vegetation VORs of the specific habitat unit. Overall, the greatest productivity (i.e., nest density and successful nest density) occurred in cover that had received rest treatment for two or more years (Figures 7 & 8).

Documentation included in the Office of Migratory Bird Management Administrative Report - June 21, 1996 (Trends in Duck Breeding Populations, 1955-96) indicated that continental duck breeding populations were relatively high during 1968-79 time period. However, during 1982-91, the estimated duck breeding population trends were declining or at very low levels. Conversely, the Valentine NWR duck breeding pair trend was just the opposite and increased over the same time period (Figure 9). The mallard breeding pair trend increased considerably during 1968-91 (Figure 10). This increasing trend occurred simultaneously with a reduction in the annual AUM utilization and decreased acreage of disturbed cover on Valentine NWR. For example, the mallard breeding pair density (pairs / sq. mi.) on the Marsh Lakes increased as the acreage of two or more years of rest treatment increased (Figure 11) and the acreage of disturbed cover decreased (Figure 12). The increasing trend of breeding mallards is indicative of improved hen success or the breeding population would not have increased.

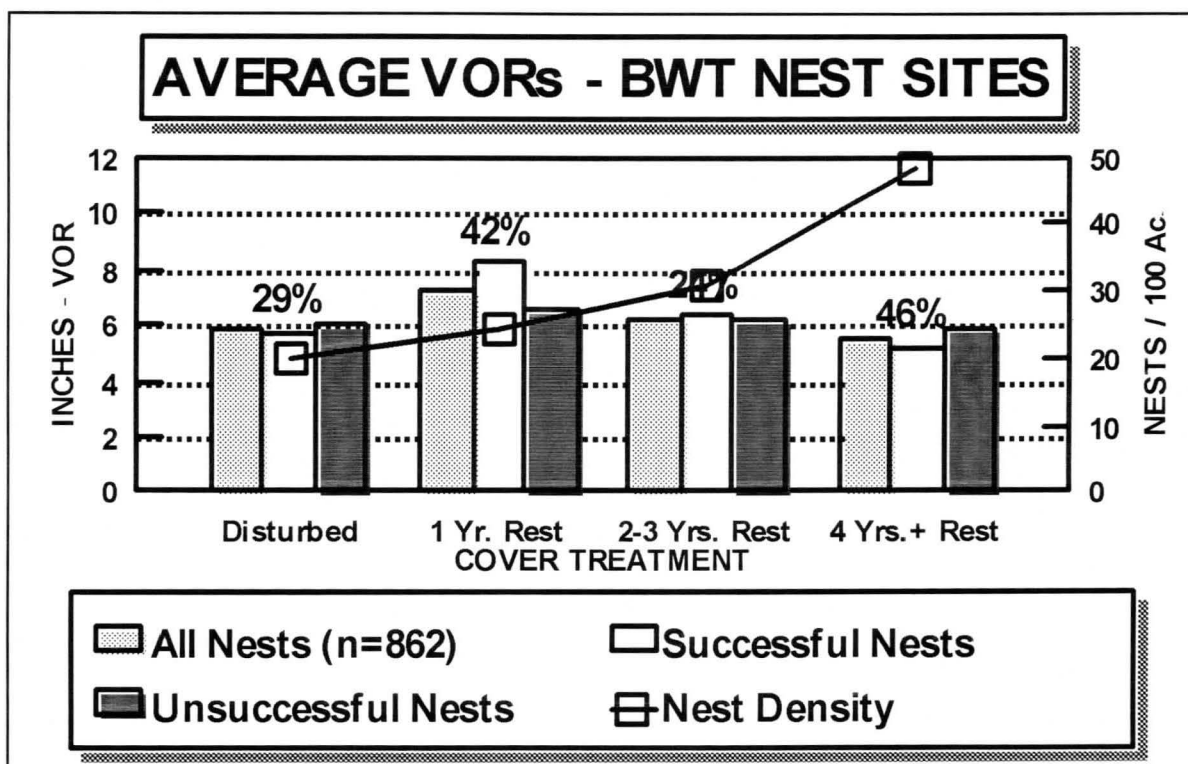


Figure 7

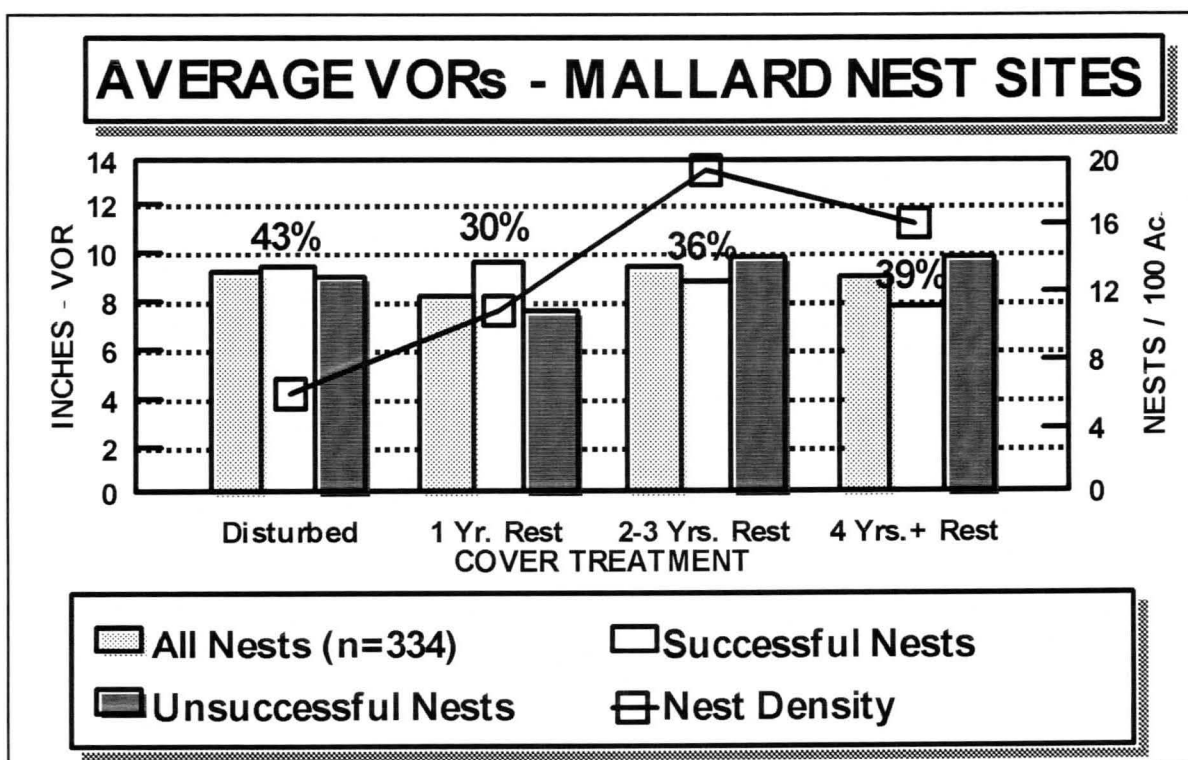


Figure 8

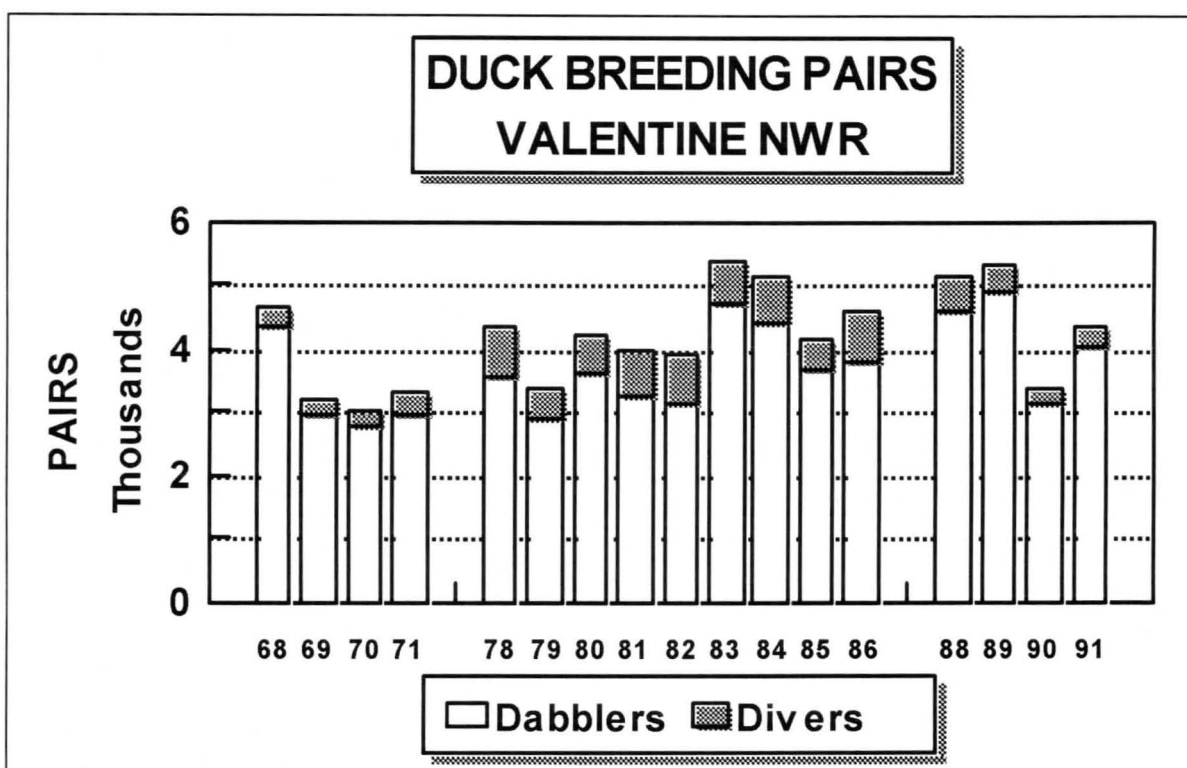


Figure 9

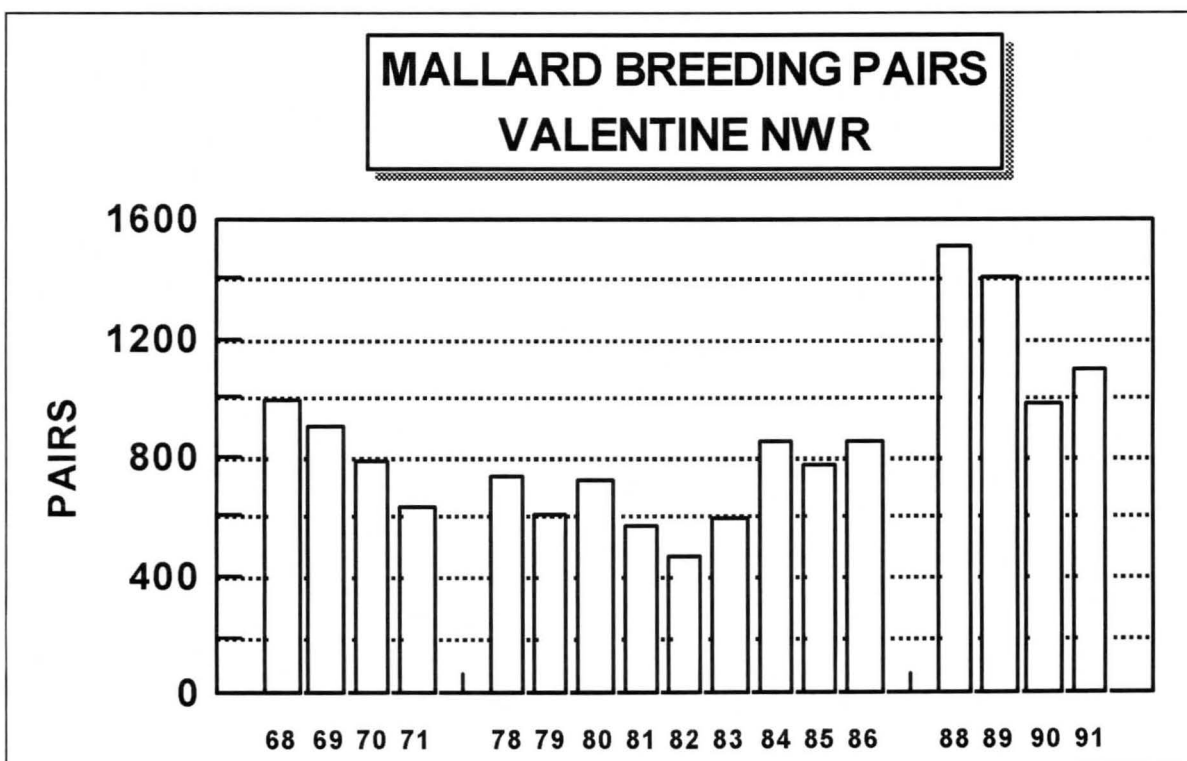


Figure 10

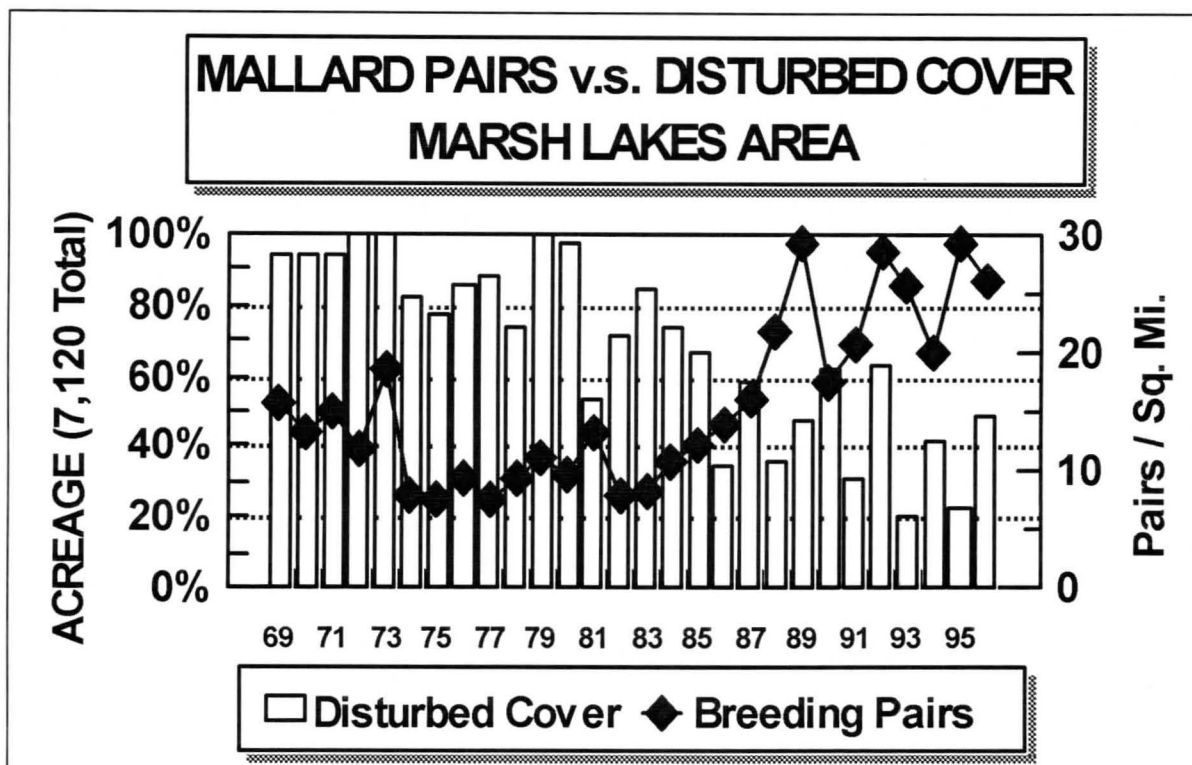


Figure 11

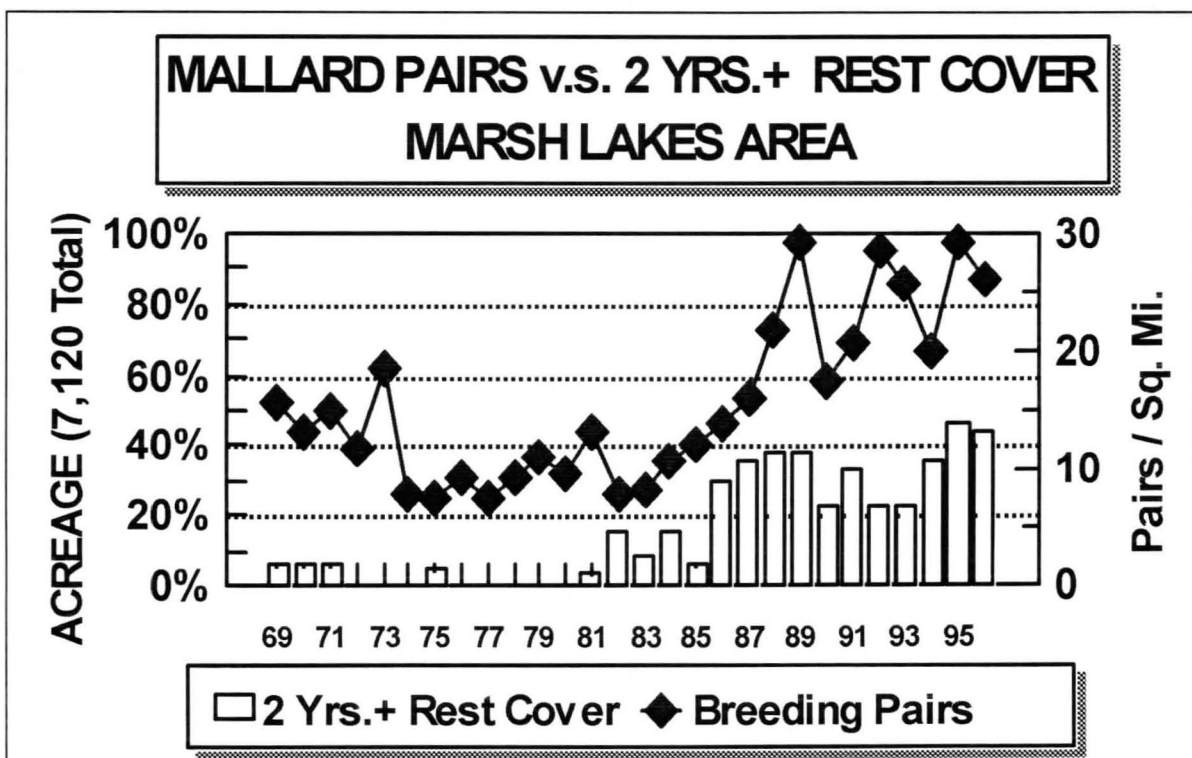


Figure 12

II. Prairie Grouse

Prairie grouse (sharp-tailed grouse and prairie chickens) are excellent key indicator species to evaluate grassland management and the extent to which basic habitat is available throughout the year. Prairie grouse population trends are monitored by breeding ground (lek) counts and hunter harvest surveys in cooperation with NG&PC. The harvest survey information is also collaborated with the USDA-Nebraska National Forest which also includes the Ft. Pierre National Grassland (FPNG) in South Dakota.

Prairie grouse lek counts were initiated on Valentine NWR in 1956 and are the longest systematic data set available for Valentine NWR. Complete counts are possible for prairie chickens because they are so vocal and can be heard over two miles away. However, sharptails are much more difficult to locate because their vocalizations are over shadowed by prairie chickens and numerous other bird vocalizations. Therefore, the sharptail trend is not as accurate nor as complete as the prairie chicken data.

Refuge prairie chicken data indicate that there is a significant negative correlation between breeding males and annual AUM utilization. The upward trend did not occur until a "threshold" of minimum habitat suitable for prairie chickens was exceeded in the early 1980's (Figure 13). Total prairie grouse leking grounds on Valentine NWR have increased due to the increased number of prairie chickens. Sharptail data indicate a more stable breeding population trend since 1980 than during the period 1969-79 (Figure 14). The sharptail breeding population is greater than the data indicate and this is reflected in the hunter harvest (Tables 3 & 5).

There are four major public land areas in Nebraska (Halsey and McKelvie National Forests and Crescent Lake and Valentine NWRs) that are within the current and historic range of prairie grouse. Of these areas, Valentine NWR has generally achieved better prairie grouse productivity (i.e., juvenile:adult harvest ratios, total birds and hunter success have been consistently greater than the other public land areas) since wing collection data was initiated via the Cooperative Prairie Grouse Hunter Harvest Survey (Tables 1-6).

Of particular interest, is the degree to which the prairie grouse harvest increased on the FPNG during 1992-96. This was a result of a court settlement by the local Audubon Chapter v.s. the Forest Service. The Forest Service was obliged to place approximately 15% of the FPNG acreage in rest treatment for a five year period - annual AUM utilization was reduced accordingly. During this time the Forest Service was also to document the effects of the action - some of which is included in Tables 1-6. At the end of the five-year period, a meeting was held in Pierre in which the permittees requested that their AUMs be reinstated. The permittees continued to contend that prairie grouse productivity is greater in disturbed cover in spite of the results obtained. Presently, it does not seem likely the AUMs will be reinstated, but, time will tell.

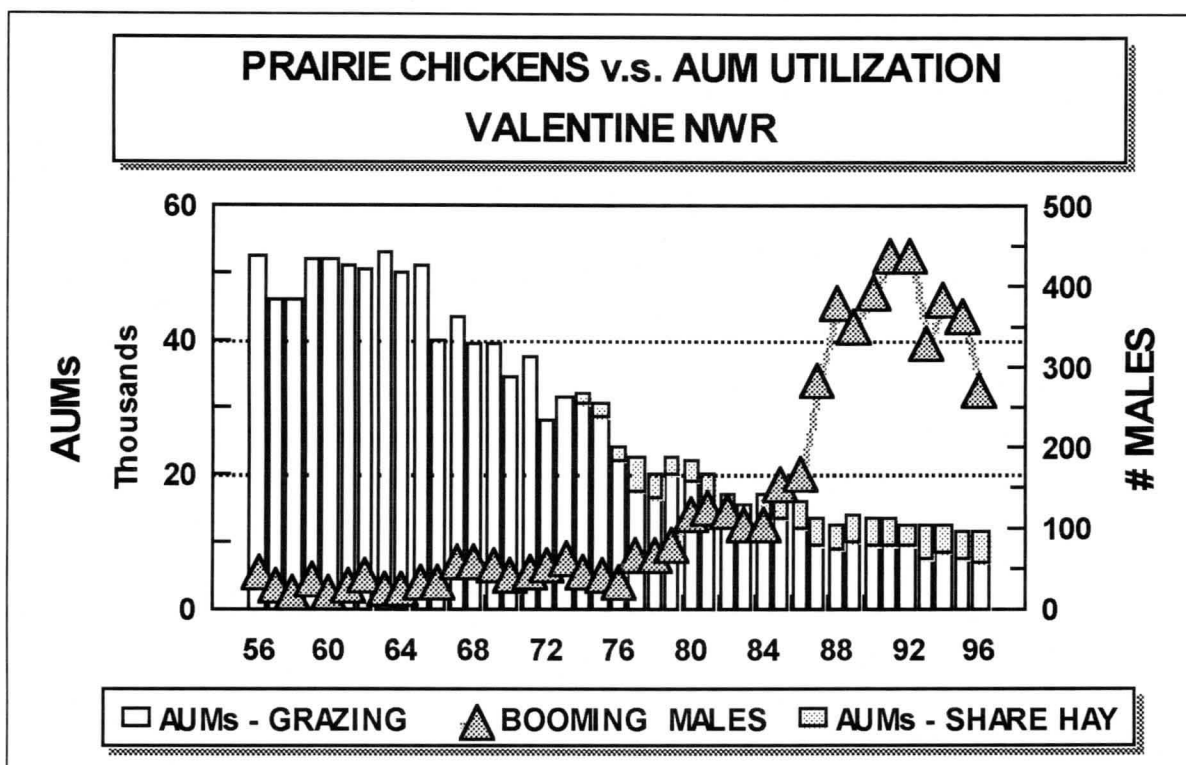


Figure 13

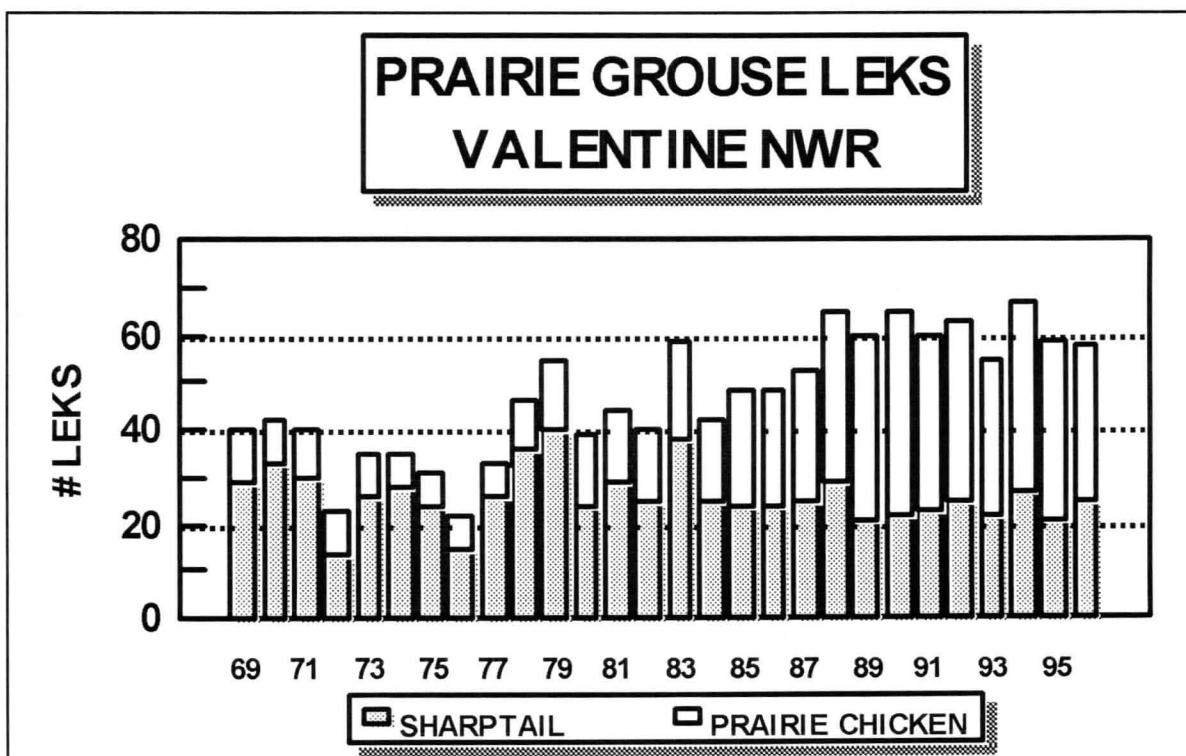


Figure 14

TABLE 1. HUNTER DAYS

	SRM	HAL	CLNWR	VNWR	FPNG
1979	171				
1980	142	178	203	311	
1981	157	97	328	409	
1982				266	
1983	72	141	359	410	
1984	139	151	270	472	
1985	56	103	206	351	
1986	97	175	334	584	
1987	223	506	345	730	
1988	112	147	293	642	
1989	82	282	96	459	
1990	139	248	106	275	
1991	138	364	115	434	
1992	254	204	110	442	259
1993	72	191	59	276	445
1994	291	426		580	770
1995	173	133	66	458	980
1996	187	212	69	208	637

TABLE 2. PRAIRIE GROUSE HARVEST

	SRM	HAL	CLNWR	VNWR	FPNG
1979	171				
1980	142	178	188	262	
1981	157	83	327	402	
1982				260	
1983	71	111	358	396	
1984	129	115	253	449	
1985	56	91	167	323	
1986	96	175	334	524	
1987	189	392	329	593	
1988	98	94	276	419	
1989	80	216	93	336	
1990	101	174	103	202	
1991	130	284	112	291	
1992	244	167	110	346	118
1993	70	161	57	230	174
1994	281	304		485	380
1995	152	98	62	355	299
1996	167	161	66	167	248

TABLE 3. SHARPTAIL HARVEST

	SRM	HAL	CLNWR	VNWR	FPNG
1979	171				
1980	142	178	188	262	
1981	157	83	327	402	
1982				260	
1983	71	111	358	396	
1984	129	115	253	449	
1985	56	91	167	323	
1986	96	175	334	524	
1987	189	392	329	593	
1988	98	94	276	419	
1989	80	216	93	336	
1990	101	174	103	202	
1991	130	284	112	291	
1992	244	167	110	346	118
1993	70	161	57	230	174
1994	281	304		485	380
1995	152	98	62	355	299
1996	167	161	66	167	248

TABLE 4. SHARPTAIL JUVENILE:ADULT HARVEST RATIO

	SRM	HAL	CLNWR	VNWR	FPNG
1979	1.67				
1980	2.02	0.96	2.36	2.28	
1981	3.13	2.62	2.57	2.47	
1982				3.19	
1983	4.46	2.41	2.14	2.48	
1984	1.63	2.59	1.99	2.73	
1985	1.12	1.28	1.66	2.05	
1986	2.43	1.69	3.12	3.26	
1987	2.03	2.10	2.20	4.22	
1988	0.96	1.68	1.47	2.05	
1989	0.97	1.59	0.37	1.96	
1990	1.22	1.64	1.78	2.17	
1991	2.02	2.07	1.89	3.68	
1992	0.81	0.95	1.19	1.56	2.47
1993	1.92	2.20	1.71	3.65	3.05
1994	2.41	2.25		3.19	2.52
1995	1.85	2.16	2.10	2.40	2.69
1996	1.61	2.22	2.00	2.26	

TABLE 5. PRAIRIE CHICKEN HARVEST

	SRM	HAL	CLNWR	VNWR	FPNG
1979	0				
1980	0	0	0	8	
1981	0	11	0	7	
1982				6	
1983	0	21	0	14	
1984	1	20	0	22	
1985	0	12	2	28	
1986	1	0	0	60	
1987	2	97	1	137	
1988	1	53	1	159	
1989	2	62	0	98	
1990	1	66	0	57	
1991	0	74	0	136	
1992	2	29	0	86	141
1993	0	27	0	42	271
1994	10	80		84	390
1995	2	31	0	75	681
1996	6	44	0	35	389

TABLE 6. PRAIRIE CHICKEN JUVENILE:ADULT HARVEST RATIO

	SRM	HAL	CLNWR	VNWR	FPNG
1984		1.86		1.75	
1985		0.50		2.50	
1986				4.00	
1987		3.65		4.12	
1988		1.48		2.47	
1989		1.38		2.23	
1990		1.54		0.87	
1991		2.13		3.21	
1992	1.00	0.93		0.81	2.44
1993		1.70		1.80	2.76
1994		5.08		1.93	2.61
1995	1.00	1.14		1.27	2.57
1996	0.50	1.75		1.06	2.54