

1989 CANADA GOOSE PRODUCTION STUDY

FISH SPRINGS NATIONAL WILDLIFE REFUGE

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OBJECTIVES:

1. Determine the reproductive success of the breeding population including average clutch and brood size, total hatched, total fledged.
2. Determine areas/types of nest sites selected and the reproductive success pertaining to these sites.
3. Determine site utilization for feeding, loafing, brood rearing throughout the reproductive season.
4. Determine the feasibility of a continued goose hunting season, in relation to its impact on the breeding population.

PROCEDURES:

Six pair counts were completed between March 31 and May 17. Locations of goose activity were noted and/or mapped during the counts. Supplemental observations were made between counts to verify nesting territories and foraging/loafing areas. Counts were conducted from 4:30 P.M. to sunset (except count #1) to take advantage of increased goose activity during this time period. Only those pairs or lone males which displayed a specific site affiliation were tallied as nesting pairs. Groups of geese that broke into pairs when flushed were treated as flocked birds. Pairs which did not show any strong territoriality were considered to be non-nesting, first or second year subadults. These pairs were not used to calculate nesting data.

As pairs started nesting, intensive observations were made to locate the exact nest site. "Located" nests were checked at least once to determine clutch size. Nests with less than 5 eggs were rechecked to verify the final clutch size. Nest checks were made by foot, canoe, and/or airboat depending on the location of the nest. Nest observations were made by distant vehicle and spotting scope to note nest activity and limit disturbance. When hatching times approached, nests were checked if the female was not visible from the vehicle after two or more sighting attempts (usually within 2 days) or when new broods were sighted in the area. This was dependent on the degree of visibility exhibited during earlier observations. Some females were easily observed while incubating, others were more wary and only the tops of their heads could be observed from time to time. One nest was checked when hatching was a week overdue. All nest sites were frequently monitored until hatching or another conclusion was reached.

Brood counts were started after the first brood was observed on

May 2. Subsequent counts were conducted during the pair counts and first duck brood count. Incidental observations provided the most information on broods and use areas. Brood age, size, and location were used in an attempt to follow specific family activity and monitor brood mortality. This worked well in some cases but mortality, brood mixing and movements to other impoundments made positive family identification difficult in later weeks. Location of use-areas became important in later weeks to determine the overall gosling population. Known use-areas were the focus of subsequent gosling banding efforts. Further reference to specific nests, pairs, or broods will follow nest codes in Appendix 1.

## RESULTS:

Pair counts were conducted on March 31; April 7,14,26; May 5,17. There was an average of 25 pairs counted (high-31, low-21). The average adult goose population up to May 5 was 84 (high-95, low-76). The population rose to 428 by May 17, as "molters" began to arrive.

Eighteen (18) pairs of geese were considered to be breeders. The other observed "pairs" could not be pinned down to a specific area. These were probably paired subadults that did not breed. Fish Springs NWR is fairly open in most areas, particularly the north units where goose nesting primarily occurs. The frequency and intensity of observations was believed sufficient to find virtually all nesting or probable nesting areas. Of the 18 apparent nests, 13 were found. Two of these were on natural islands, the rest on man-made islands or platforms (Appendix 1). The 2 territorial pairs/lone males from the east side of Egret unit (E12,E17) were replaced with 2 broods of 5 goslings each on May 7. Though no nests had been previously found, these 2 pairs were the only ones observed on Egret unit. Therefore these 2 broods were equated with the 2 territorial pairs. Two potential pairs/lone males were observed regularly along the inner dike of Avocet unit (A10) and the inner dike of Curlew unit (C13). Nests could not be located but they were considered as breeders. One lone, visibly and audibly "upset" goose was observed in a slough on Avocet unit while conducting duck pair counts. A search on the following day revealed a freshly lined nest (A18) with a few small buried egg fragments, but no geese in the area. A later check of the site and area produced neither geese nor eggs. The egg fragments found were very few and appeared to be from a former nest. Predation seems unlikely because of the neatness of the down lining. It is believed to be a nest abandoned prior to egg laying due to the fresh, clean appearance or a trial nest built by a subadult. It is not believed to have successfully hatched. Its inclusion as a nesting pair is suspect.

Twelve (12) of the 18 nests hatched (success = 67%). One nest (H7) contained a dead gosling with the other eggs either infertile or in various stages of development. Observations show that the nest was abandoned before or during the storm on May 12,



probably precluded by the death of the gosling. This nest was not included in the "hatched" category. The conventional method of defining a successful nest as one which hatches at least one egg is misleading, particularly in this case where the gosling died before leaving the nest. This may more aptly be termed an abandoned or failed nest. One nest (H1) contained all infertile eggs. Two unlocated nests (A10,C13) were believed to have been either destroyed by predators or failed nests. The absence of adult geese in the area after certain dates and the lack of broods indicate an unsuccessful nest or lost brood. Only one of the "fate determined" nests (I15) was destroyed by predators (coyote) - 7.6% of the known nests. This was a late nesting attempt initiated around May 1.

The average clutch size of known nests was 6.23 (high-8, low-5). Seventy-eight percent (78%) of the total number of eggs hatched (63 of 81), while 98% of the eggs of successful nests hatched (63 of 64). The average brood size hatched from successful nests was 6.3. Artificial structures exhibited an increased nesting success and contained larger clutch sizes than natural islands (Appendix 2). Despite the small sample size, this has been reported in other studies concerning nestling geese and artificial structures.

The first brood was observed on May 2 in Avocet unit and hatched from A9. Five of the 6 hatched young were observed. On May 16, only 1 of the nest sites had not hatched or ceased activity. The last nest (I15) was destroyed in early June, just prior to hatching. Seventy-three goslings in 12 broods left the nest. This included broods from the 10 known successful nests, plus the 2 broods of 5 goslings on Egret Unit.

Nineteen brood counts were conducted May 5 to July 13. Incidental observations were noted on other days, since all broods could not be located on a given day. On May 17, 10 of 12 broods were counted. One additional broody pair was observed on a saltgrass meadow, but no goslings were seen. This was believed to be the family from I11, containing 6-1a goslings. This brood was observed the previous day but not on the 17th. The Mallard unit brood was the only unaccounted brood that day, but was observed 2 days later. Forty-one (41) of the original goslings were tallied. This is a 44% mortality for broods that were 1 to 15 days old. When calculated by age, this shows a 58% mortality for goslings in the 1 to 2 week old range (53% for 10-12 day old, 64% for the 13-15 day old). Brood data collected over several days around June 1 gives a best guess estimate of 33 surviving goslings (55% mortality), with the oldest broods being 4 weeks old.

A brood count on June 24 tallied 8 broods with 22 goslings. Subsequent searching did not reveal any unaccounted broods. All broods were then 39 to 52 days old (5.6 to 7.4 weeks). The average Class II brood size = 2.75. Final calculations show a 30% survival rate for Fish Springs goslings. Assuming that the



other 4 broods were alive but unfound, which is not considered likely given the intensive searching, the average class 2 brood size would suggest 33 fledged goslings or 45% survival. Refuge personnel banded 15 of the 22 goslings from June 27 to July 7. This additional disturbance scattered family groups to other units and increased their wariness. This made further censusing difficult. A final count on July 13 tallied 6 broods with 15 young. There was no further mortality in the 4 broods that could be identified to family. Survival to fledging was set at 22 birds. The low production and the low number of breeding pairs this year prompted the closure of the 1989 goose hunting season.

#### DISCUSSION:

Canada Goose production at Fish Springs has apparently bottomed out in 1989. The estimated 22 fledged goslings and 18 breeding pairs are the lowest figures reported on the refuge since at least 1965. The 1988 census figures show an estimated 50 geese present during the breeding season. Unfortunately, pair counts were not conducted nor was there any effort to monitor the goose population after the 1987 hunting season. Census and brood data would indicate roughly 25-40 breeding pairs in 1988, a 47-67% drop from the 75 pairs estimated in both 1986 and 1987. Allowing for census variation, etc., this still shows a significant drop in breeding pairs after the 1987 hunting season. The 1988 and 1989 breeding populations were the lowest in 24 years and both followed hunting seasons (1987 and 1988).

As noticed in past years, the Fish Springs population exhibits an unusually high rate of gosling mortality when compared with the "average" Rocky Mountain goose population. There was a 70% mortality in 1989 at FSNWR versus a 7% average mortality for the RMP (Krohn, W.B., Wildlife Report #229). The low gosling survival, and thus recruitment into the breeding population, is considered to be a result of habitat conditions, predation and possibly weather. The sudden crash in the breeding population cannot be explained by habitat or predation problems. It may have resulted from a combination of deteriorating breeding habitat, chronic low recruitment and other unknown factors (such as weather). This compounded with the opening of a full-scale hunting season on a breeding goose population that probably has had little to no exposure to goose hunting pressure (season closed on Fish Springs for 27 years).

Pair and production data exists for most years, but the lack of continuity in collection procedures makes yearly comparisons difficult at best. Pair counts were sometimes used to estimate production; while in other years, no pair counts were conducted. Counting paired non-breeding subadults probably skewed some data as well. Intensive brood counts would give the best indication of reproduction. These inconsistencies negate meaningful comparisons between years of data. However, past data should not be overlooked since it still represents trends in the population. From reported data, total production from 1965 to 1988 was 2499



goslings with an average of 104 fledged per year (22 in 1989). The average pair count from 1972 to 1988 was 66 breeding pairs/year (18 in 1989).

#### HABITAT AND PREDATION

The question of habitat lies principally on brood-rearing or foraging habitat not breeding habitat. Family groups showed a strong tendency to forage outside the main dikes of the refuge. This cuts goslings off from the safety of open water and would make them easier targets for coyotes and large raptors, such as eagles and great horned owls. Although Pinlail and Shoveler units were dry throughout the summer, they did contain sufficient water during the breeding season to entice P5 to nest. The lack of breeding sites was not in question owing to much higher nesting densities in past years, and the general lack of pairs present on the refuge.

Low survival rates of the refuge goslings appears to be a function of a high predation rate caused by a lack of safe foraging areas. Coyotes are considered the main predator of goslings on the refuge. Black-crowned night herons and great blue herons probably take some of the Class Ia-b birds, with raptors possibly causing some mortality. Other than 1 night heron predation incident, no specific predation mortalities were observed.

High predation rates can be influenced by several factors. Large numbers of predators would naturally exert more pressure on goslings, since competition for available prey and prime foraging areas would be high. Family groups that consistently use the "non-safe" areas outside of dikes would present a few predators with a large number of easy and predictable opportunities. A low alternate food base, primarily small rodents, would force predators to focus more on hunting birds. Currently, the status of predator and alternate prey species is unknown.

Though we lack qualitative data, Fish Springs geese and goslings have loafing and foraging tendencies which seem to increase gosling exposure to predation. Loafing on elevated roads and dikes by flocks, pairs and family groups is a common practice. This is not considered a problem in wary adult geese but may pose a problem to flightless young. Steep banks and thick vegetation in some areas can allow coyotes to approach closely before detection, thus giving them an additional jump as goslings scramble for the water. Foraging areas however may be the most likely culprit for high mortality.

Observations revealed extensive foraging in areas outside of the elevated roads or dikes (Appendix 3). This increases visual exposure to predators as families cross the roads. It also cuts the goslings off from the safety of the water. These foraging areas contain a mixture of saltgrass, wirecrush and alkali bulrush, usually with a shallow (1-2") covering of water. While



this affords good hiding cover for goslings, a persistent predator would be undaunted when it realizes an easy meal is in the area. The effectiveness of parental protection under these circumstances is unknown, particularly if a pair of predators is involved. Since coyotes also use the elevated roadways, their ability to detect the goslings is increased versus a flat ground approach, plus their position on the road cuts off all escape routes to the water. These outer foraging areas were used by many of the broods this year and are located near most of the goose nesting units. The principle areas this year were outside the dikes of: NE Avocet, E Egret, N Gadwall and NW Harrison units.

On Avocet unit, brood A9 was observed numerous times outside the dikes and lost 4 of 6 goslings. M11 from Mallard moved immediately to Avocet unit but remained well hidden in the interior. It lost 2 of 5, one of these to a night heron. The two Egret broods were observed outside the dikes occasionally and frequently loafed on the dikes. They lost 5 of 10 goslings. Four broods were routinely observed in NW Harrison unit with some observations outside the dike. Two of these broods (H2,H6) did not fair well. P5 hatched when Pintail unit was dry. It lost 3 of 6 young on its long march to the open water of Harrison unit and its exposed swim to the NW corner of the unit. These 3 families frequented the NW Harrison dike and beyond. A 6/3 brood count tallied only 4 goslings in 3 broods. H11, the last nest hatched, was not observed outside the dikes possibly because the area was drying up; it also was observed more frequently around the NE part of the unit, as well as on Gadwall unit. It appeared to have fledged 5 of 6 goslings. Ibis unit broods in general were difficult to locate and appeared to move about between Gadwall and Egret units. They were not observed far from deep water or heavy vegetation and appeared to fair better than other broods. There are no "unsafe" foraging areas adjacent to this unit, when compared with foraging areas at other units.

The habitat problem appears to involve the use of foraging areas which offer greater exposure to predators and a lack of close, open water for safety. Hard data does not exist to prove it, but broods using these outer foraging areas appeared to suffer greater mortality. This dilemma may be partially solved with more rigorous habitat management to increase foraging areas nearer to water.

Presently, much of the refuge consists of thick decadent stands of vegetation. Its affect on populations of alternate prey species, such as rodents, is unknown. Coyotes and raptors appear to rely on waterfowl, most noticably coots, for a substantial portion of their diet. Whether rodent prey is unavailable through low populations or unattainable because of thick vegetation is not known. The question of alternate prey sources needs to be addressed if future efforts are to key on habitat conditions and predation.



## HUNTING

The impact of the 1987 and 1988 goose hunting seasons on the breeding population is unknown. Band recovery data supplied by the Utah Department of Wildlife Resources indicates that 20 FSNWR banded geese were shot on the refuge during the 2 hunting seasons. Only 1 bird was a local. With only 25 local birds banded in 3 years, this low return rate is not surprising. Forty-one FSNWR banded geese were recovered in 1987 and 1988. Since 20 were shot at Fish Springs, this would indicate that the refuge seasons significantly impacted the goose population. Though probably statistically incorrect, this shows an apparent doubling of the mortality rate of FSNWR geese. However, this return data concerns molters and may not be valid for the breeding population.

Refuge banding efforts prior to 1983 and subsequent band returns show that there have been 25 band recoveries of local birds to this date: 8 in California, 5 in Idaho, 3 in Nevada, 7 in Utah with 4 at Fish Springs, 1 each in Colorado and Alberta. This shows a wide migration pattern but also indicates that some birds remain at Fish Springs or in the area throughout the winter. Twelve of the non-Fish Springs recoveries occurred in December and January. This may indicate that the migratory portion of the breeding population exhibits a late movement, thus subjecting them to most of the refuge hunting season. The timing of this movement probably coincides with freeze-up conditions on the refuge. The refuge has not yet received current return data pertaining to those local geese banded before 1983. These birds, if still around, should have comprised a fair part of the current breeding population.

## RECOMMENDATIONS:

The approach recommended to address the historically high mortality rate is two-fold. Increased coyote management is a likely step but probably will not solve the problem. Currently we do not know the true status of our coyote population nor do we know how many is too many. Removal of a few animals may be prudent but an eradication program is not recommended, since coyotes serve many useful functions both biologically as well as aesthetically. Habitat management via burning and water control is of prime importance to goose management, as well as the other wildlife. Much of the refuge is currently engulfed in decadent stands of vegetation, be it saltgrass, wirecrush or the taller emergents. Burning should open these areas to increased grazing by geese. Since burning and water control is standard procedure at Fish Springs, efforts should be made to identify likely goose grazing areas and concentrate management efforts there. Hopefully, this will entice many of the geese to forage inside the dikes, thus lowering the predation factor. Some areas have been identified and are incorporated in the fall 1989 and 1990 burn plans. A system for monitoring these foraging areas should be established.



Many unanswered questions exist concerning the status of the refuge's breeding goose population. If a hunting season is to be re-initiated, these questions need to be addressed. Data concerning banded molting geese should not be considered valid for the breeding population. The UDNR suggests that the refuge is best utilized as a molting and migration area and not a breeding area. While this may be so, the fact that geese have produced relatively well in past years, proves that the refuge can continue to produce geese. The establishment and maintenance of a breeding goose population has been a refuge commitment since the refuge was established. If a future hunting season is to be initiated, it should be done with more data than is currently at hand.

PRIORITIES:

1. Keep Canada goose hunting season closed until at least 1994.
2. Initiate and maintain a prescribed burn plan with emphasis on goose foraging sites.
3. Maintain set water management levels and evaluate their effect on foraging sites.
4. Continue monitoring the breeding goose population in respect to production, survival, site utilization.
5. Continue banding geese with emphasis on locals and breeding adults, including neck banding to monitor family movements, brood interactions, migratory or sedentary patterns.
6. Continue to cooperate with UDWR in banding molters on FSNWR. Coordinate band return data for juveniles and molters.
7. Initiate a small mammal program aimed at determining population levels, habitat influences in relation to prey availability, small mammal response to burn activities.
8. Determine coyote population size and revise predator control plan as needed.
9. Maintain and/or enhance available goose nesting structures.

## 1989 CANADA GOOSE NESTING SITES

Nest	Unit	Site Type	# of eggs	# hatched
A9	Avocet	natural island	6	6
A10	Avocet	natural island	?	0
A18	Avocet	natural island	?	0
M11	Mallard	natural island	5	5
C13	Curlew	natural island	?	0
E12	Egret	natural island	5 *	5
E17	Egret	natural island	5 *	5
P5	Pintail	man-made platform	6	6
G2	Gadwall	man-made platform	7	7
I4	Ibis	man-made island	7	7
I11	Ibis	man-made island	7	7
I15	Ibis	man-made island	5	0
I20	Ibis	man-made island	6	6
H1	Harrison	man-made platform	6	0
H2	Harrison	man-made platform	8	7
H6	Harrison	man-made platform	6	6
H7	Harrison	man-made platform	6	0
H11	Harrison	man-made island	6	6
Total			91	73

\* 2 broods of 5 observed, assumed 5 eggs laid



## 1989 ARTIFICIAL GOOSE NESTING STRUCTURE SURVEY

Harrison Unit	Structure type	Nest	# of eggs/hatch
H1	platform	1	6/0
H2	"	1	8/7
H3	"	0	
H4	"	0	
H5	"	0	
H6	"	1	6/6
H7	"	1	6/0
H8	island	0	
H9	"	0	
H10	"	0	
H11	"	1	6/6

IBIS UNIT

I1	island	0	
I2	"	0	
I3	"	0	
I4	"	1	7/7
I5	"	0	
I6 to I9	"	0	
I10	"	0	
I11	"	1	7/7
I12 to I19	"	0	
I20	"	1	6/6
island by dike		0	
I15	" (outside bales)	1	5/0

PINTAIL UNIT (unit wet at initiation, dry at hatching)

P2	island	0	
P4	platform	0	
P5	"	1	6/6
P8	"	0	
P7	platform down	P21-22 platforms	need repair
P17 to 20	islands in need of repair		

GADWALL UNIT

G1	platform	0	
G2	"	1	7/7

EGRET UNIT

E1	platform	0	
E2	"	0	

## APPENDIX 2 (cont.)

	PLATFORMS	ARTIFICIAL ISLANDS	NATURAL ISLANDS	TOTAL
# of nests	6	5	7	18
% of total	33	28	39	
# successful	4	4	4	12
% successful	67	80	57	
# of eggs	39	31	21	91
# hatched	26	26	21	73
avg. clutch size	6.5	6.2	5.5	



1989 CANADA GOOSE USE AREASAVOCET UNIT

The Avocet foraging area (map:AF1) is located outside the NNE corner of the unit and the SE corner of Curlew unit. The total use area is about 7.8 acres including a .25 acre pond. Saltgrass comprises about 5 acres, of which half is elevated and supports only sparse saltgrass, Salicornia, and greasewood/shadscale. Approximately 1 acre of mixed bulrush (hardstem, Olney's, alkali) are scattered along the pond and a slough along the west side. About 1 acre of dense wirerush and numerous thin stands finish up the vegetative cover type. A half of this area is seasonally wet through seepage and retains a shallow cover of water into the summer.

Flocks of geese have been observed in this area in early spring. Brood A9 was observed regularly in this area throughout the brood-rearing season. It utilized the adjacent NE Avocet impoundment for escape and hiding cover. Brood M11 began frequenting the NE impoundment later in the season but was not observed in AF1. This brood was occasionally observed in the interior areas of Avocet unit during the early season and returned to it during the latter stages for short periods. Both broods were observed loafing on the NE and E dikes. A9 lost 4 of 6 goslings; M11 lost 2 of 5 - one to a black-crowned night heron.

CURLEW UNIT

The Curlew foraging areas (CF1,CF2) are located along the east end of the inner dike. CF1 consists of approximately 40% saltgrass and 60% alkali bulrush; CF2 has about 70% saltgrass and 30% alkali bulrush. Both areas had a shallow covering of water in the spring and early summer. Pair C13 was observed regularly in these areas, up to the apparent failure of this pairs nest. The dike in this area is relatively unobtrusive, though CF1 is over 50 yards from open water. CF2 appears to be a good alternate foraging site depending on the water management regime. With the somewhat recent addition of the inner dike, currently there is no set water level for the area south of this dike.

EGRET UNIT

The Egret foraging area (EF1) is east of structure E7 and primarily includes the immediate area around the outflow channel. Wirerush is the primary cover with some dense saltgrass and alkali bulrush. Shallow water is also a principle component here. Pairs and broods E12 and E17 used this area extensively throughout the nesting and brood-rearing season. Loafing on the

dike was typical. This dike is relatively high compared to the outlying flats and would prove a barrier to goslings having to flee for open water. It also makes a nice viewing area for both geese and predators. The entire east side of this unit is virtually free of tall emergents, thus providing good visibility. These 2 broods lost 5 of 10 young, all between 7 and 10 days after hatching.

#### IBIS UNIT

IF1 is located south and east of the main impoundment. It consists principally of tall, dense wiregrass with some saltgrass to the south. Again, shallow water covers much of this area. Flocks of geese and broody pairs often used this area. The size of the unit and density of cover made brood observations difficult here. It appeared that the 3 Ibis broods and G2 used this area and the NE shoreline (emergent growth) during the first few weeks. Some broods later journeyed to other impoundments and utilized the open north end of the unit. In general, this seems to be a good foraging area and is close to escape water. However, the vegetation is very dense and is slated for burning in 1990. This should improve the quality of the area for both geese and waterfowl.

#### GADWALL UNIT

GF1 encompasses the entire northern end outside of the Gadwall unit dike. The area is principally used by adult geese in early spring and prior to molting, depending on the ground-moisture conditions. Primarily an alkali bulrush/saltgrass mix, with some wiregrass, this area receives spring runoffs and seepages, depending on the water level of the impoundment. This unit was the principle molting area for geese in 1989. Several broods moved into this impoundment later in the rearing season. Observations of goslings along the north dike was common, although there did not appear to be much use north of the dike. Observations of adults suggest that the best foraging areas are over 100 yards north of this dike. Because of dry conditions, summer foraging is probably reduced in this area.

#### HARRISON UNIT

The areas north of this unit (HF1 and HF2) are primarily saltgrass with scattered stands of alkali bulrush. The entire area receives seepage water and spring overflows. Adult geese are observed here mostly in the spring. Family groups used the NW part of the impoundment extensively. Some gosling use outside of the dike was observed as well as loafing on the dike. This area has a long, straight vehicle approach from the east (the



preferred route for censusing) thus giving families sufficient time to gain open water. This probably prevented more reliable observations for this area. HF3 is sandwiched between the main impoundment and west side slough. It contains a conglomeration of plant species and sheet water. It is used by adults but its use by goslings is unknown. It is broken by a line of dunes which would seriously hamper gosling access to the area. There are some favorable areas close to water which are important foraging areas.

With the planned reflooding of Shoveler and Pintail units, nesting and forage patterns are expected to change somewhat in 1990.

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Plant names used in report:

Saltgrass (Distichlis spicata)  
 Wire rush (Juncus balticus)  
 Olney's bulrush (Scirpus americanus)  
 Slender bulrush (Scirpus maritimus)  
 Hardstem bulrush (Scirpus ochloides)  
 Greasewood (Sarcobatus vermiculatus)  
 Sandspike (Atriplex confertifolia)

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