Delta Waterfowl & Predator Management - 2007

A FINAL CLOSEOUT REPORT FROM THE DELTA WATERFOWL FOUNDATION PREPARED FOR THE LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

CFMS # 594829

Submitted by:

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2007 Predator Management Site Selection/Location:

In total, the State of Louisiana allocated $102,383 in support of Delta Waterfowl's 2007 Predator Management efforts. As a direct result of these funds, four 36 square mile blocks (92,160 acres in total) of land (Whitman - Walsh County; McVille - Nelson County; Bowdon - Wells County: and Harlow - Benson County) were trapped by professionals from the approximate period of 15 March through 15 July (Figure 1). Additionally, four non-trapped control areas (Calio - Cavalier and Benson County; Leeds – Benson County; Crary – Ramsey County; and Courtenay – Stutsman County) were monitored with financial support from the LDWF (Figure 1).

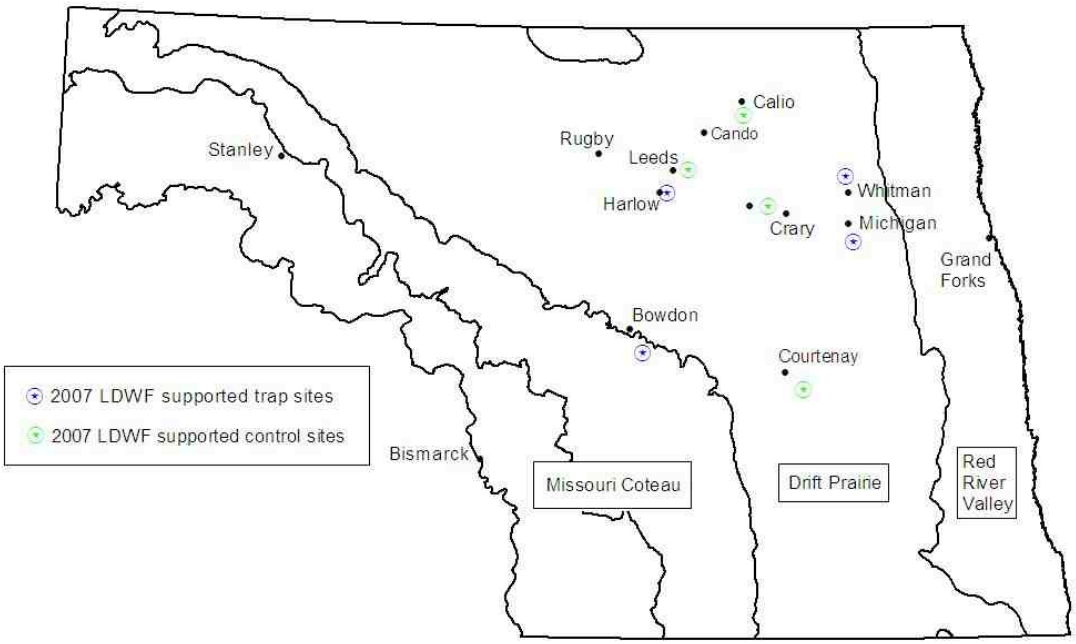

Figure 1. Approximate location of each LDWF supported trap (n=4) and control (n=4) site – 2007.

Maps and tables documenting 1995 land use for each trap and control site are presented in Attachments 1 – 8. Air photos were taken of each trap and control site during the spring of 2007. Any changes in land use occurring from 1995 – 2007 can be detected upon inspection of these photos.

Timetable of 2007 Trapping and Nest Searching Activities:

Trapping:

Prior to placing traps in the field, we obtained permission to trap on at least 80% of each block. For every parcel of land that is trapped, the professional trapper is required to contact the landowner and receive written permission to trap their land.

Trapping typically begins in mid-March and runs through mid-July; however, trappers are permitted to voluntarily trap prior to their contract start date. The date of first animal caught ranged from 17 March (McVille) to 27 March (Bowdon).

Trappers were required to trap daily until contract termination. The dates of last animal caught were 12 July (McVille) and 16 July (Harlow).

Nest Success Evaluation:

In 2007, nest success data were collected by research assistants involved in a 3-year graduate level research project (effect of multiple years of trapping on breeding pair and nest density).

Nest dragging was conducted from the period of 5 May through 1 July. All nests were followed until a known fate (hatched, depredated or abandoned) was determined (approximate date of 30 July).

Plot Selection and Description:

Varying acreages and numbers of plots were nest-searched in 2007 on each study block. Research focus this year was aimed at searching the maximum number of grassland acres in order to locate as many mallard nests as possible for radio-marking and acquiring age ratio estimates. However, nests of all species were marked, monitored, and used in estimating nest success. This led to a slightly altered plot selection protocol than in previous years.

Plots were randomly selected from all quarter sections with at least 80 acres of contiguous perennial cover (CRP, WPA, hay-land, or pasture). In some cases, lack of landowner permission or plot accessibility caused selections to be removed from the pool of available search plots. In 2007, we searched as many of the randomly selected 80-acre plots from the previous two years as possible. If permission allowed, we searched the remainder of each quarter section as well. We also searched additional randomly selected quarter sections as time allowed. Legal descriptions for each search area are detailed in Attachment 9.

Search Effort and Waterfowl Species Composition:

The order in which plots were searched was determined using a random number generator; the same order was followed for each round of nest searching. In an effort to estimate nesting densities in later conducted analyses, plots that were carried over from 2005 and 2006 were searched three times (during early-, mid-, and late-nesting time periods).

When time allowed, additional plots were searched from one to three times; nests from these additional plots were used in Mayfield estimates, but not used for nest density estimates. Table 1 details the number of nests detected, the total number of hours searched, and search acreage totals by search frequency categories on each LDWF supported trap and control block.

Table 1. Number of nests detected, the total number of hours searched, and search acreage totals by search frequency category on each LDWF supported trap block - 2007.

Site	Acres *3 searches*	Acres *2 searches*	Acres *1 search*	Hours Searched	# Nests
Whitman Trap	720.0	-	-	63.9	452
McVille Trap	800.0	-	80.0	73.5	375
Harlow Trap	320.0	640.0	-	68.4	285
Bowdon Trap	240.0	720.0	-	65.3	241
Crary Control	720.0	-	-	63.9	262
Calio Control	400.0	480.0	160.0	70.5	432
Leeds Control	1,000.0	-	-	88.75	367
Courtenay Control	640.0	160.0	160.0	71.8	304

Species Composition of Predators Removed:

Except for the trap site located near Bowdon, skunk and raccoon were the top two predators captured (Table 2). When combined, skunk and raccoon comprised from 35.5% (Bowdon) to 93.5% (Harlow) of the total catch on each site. In total, the number of predators removed per site was highly variable and ranged from 181 (McVille) to 471 (Bowdon) animals (Table 2). Franklin's ground squirrels were a dominant component of the total catch on the Bowdon trap block.

Table 2. Number of predators removed by species per trap site and cumulative total removed by species - 2007.

Site	Skunk	Raccoon	Red Fox	Coyote	Mink	Franklin's Ground Squirrel	Badger	Weasel	Total
Bowdon	84	83	0	2	7	288	7	0	471
McVille	79	60	0	7	9	17	8	1	181
Harlow	77	109	6	2	0	0	5	0	199
Whitman	104	104	17	11	32	0	14	0	282
Total	344	356	23	22	48	305	34	1	1133
% Total	30.4	31.4	2.0	1.9	4.2	26.9	3.0	0.1	100.0

Mayfield Nest Success Estimates:

In 2007, nest success was approximately 29.1% higher (57.0% vs. 27.9%) on LDWF supported trap blocks (n=4) in comparison to the non-trapped control areas (n=4)(Figure 2). Confidence intervals (95 percent) for all ducks, mallard, gadwall and blue-winged teal are detailed in Attachment 10. The number of nests detected by site (Table 1) may differ from the number of nests used in Mayfield calculations (Attachment 10) because only successful,

abandoned or destroyed by predator, and abandoned for unknown reasons were used in Mayfield calculations.

The perceived cause of failure for each nest by site is included in Attachment 11 – *Nest Fate Summary Table – 2007*.

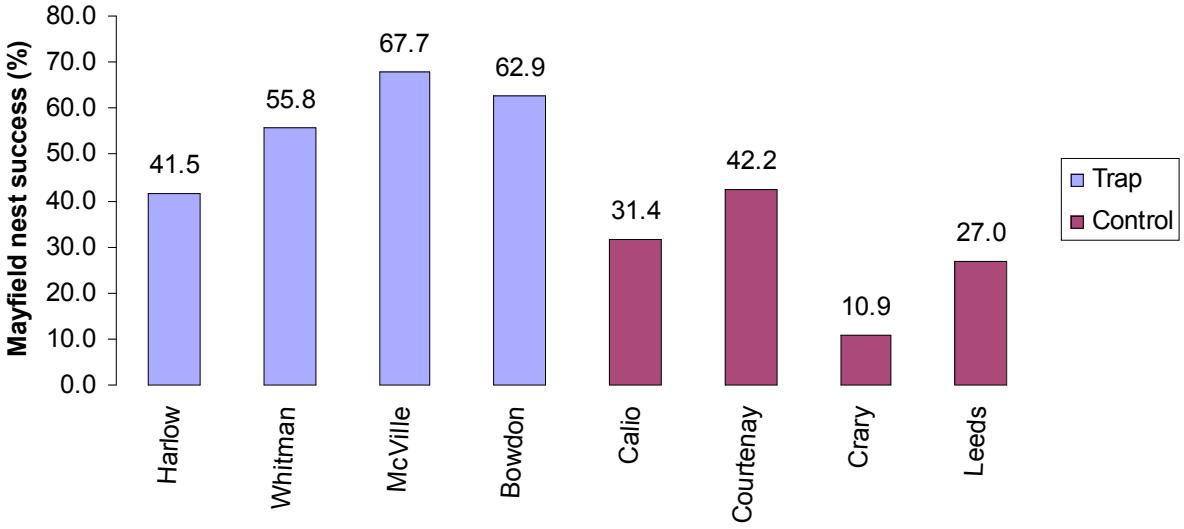

Figure 2. Mayfield nest success estimates for each trap and control site – 2007.

Waterfowl Species Composition:

The number of duck nests detected by species for each LDWF supported trap and control site are presented in Attachment 12. Mallard (32.3%), blue-winged teal (22.9%) and gadwall (26.5%) represented the top three duck species present. Mallards, gadwall and blue-winged teal also represent three of the top six duck species harvested by Louisiana duck hunters during the 2006 – 2007 waterfowl hunting season (Figure 3).

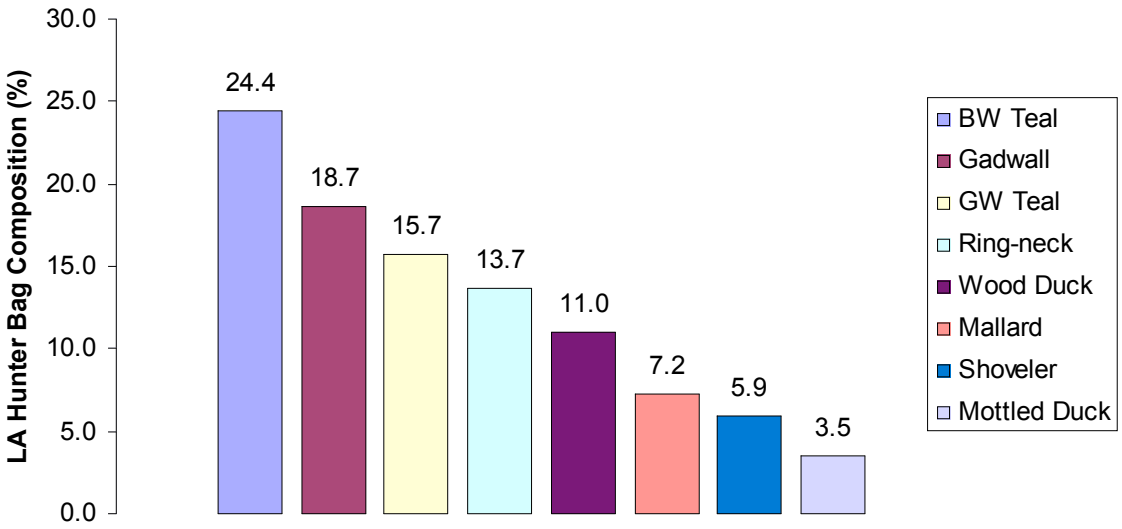

Figure 3. Percent bag composition by species for the 2006 - 2007 LA waterfowl hunting season – top eight species.

OTHER AREAS

In total, 12 sites were trapped by Delta Waterfowl in support of its partners in 2007 (8 in North Dakota - Figure 4; 2 in Saskatchewan – Figure 7; 2 in South Dakota – Figure 10). The oversight and management of an additional site (36-square mile site located near Rock Lake, ND – Figure 4) funded by the Max McGraw Wildlife Foundation was turned over to Delta Waterfowl in 2006 and was again trapped in 2007.

A. North Dakota

All nest success data were collected by research assistants involved in a 3-year graduate level research project (effect of multiple years trapping on breeding pair and nest density). Delta students collected data on seven of eight Delta Waterfowl predator management blocks (the Stanley trap block was not evaluated in 2007). In addition, four non-trapped control sites were evaluated in the northern Drift Prairie region of North Dakota (Figure 4).

Mayfield nest success results were 28.0% higher on trapped blocks (n=7) than control blocks (n=4)(55.9% vs. 27.9%; Figure 5). Of the four control blocks monitored in 2007, two were also monitored in 2006 and the remaining two were also monitored in both 2005 and 2006. The control blocks were not paired with a respective trap block.

In 2007, a total of 207,360 acres (9 sites) were trapped, producing an estimated 47,529 incremental or "extra" ducks at a total cost of approximately $297,000 (Figure 6). Applying the long-term average nest success data, this equates to an estimated $6.25 per incremental duck. These calculations take into account the improvement in nest success due to the renesting of females whose nests were destroyed by predators and use brood survival estimates from Delta's trapped sites in Saskatchewan (2000 – 2001 research results). We expect to refine the brood survival estimates with our recently initiated North Dakota predator management research project (2006 – 2008).

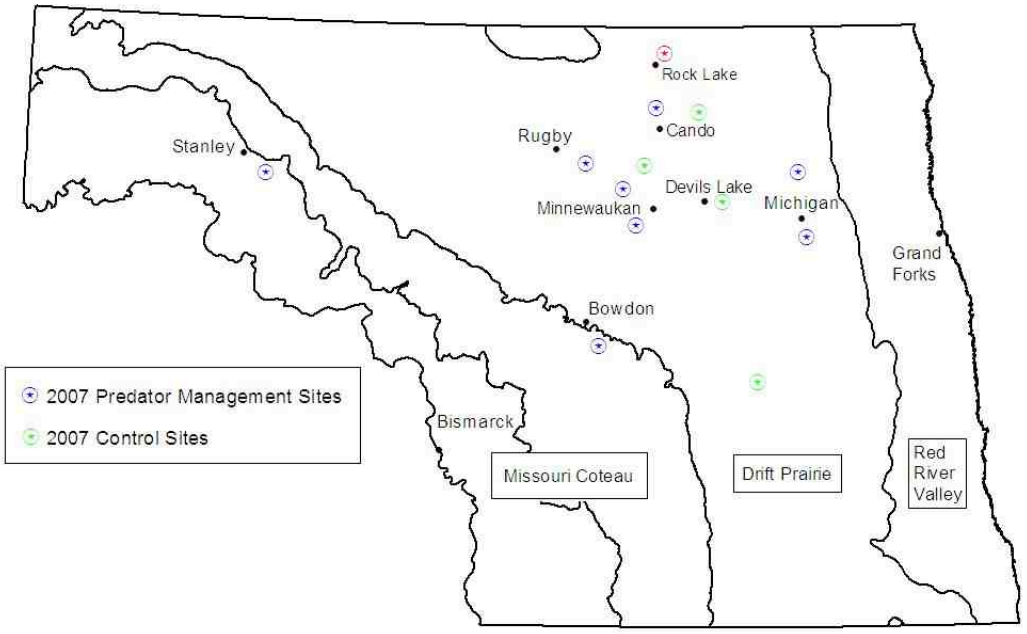

Figure 4. Location of each Delta Waterfowl trap (n=8) site and control site (n=4) - 2007. Location of Max McGraw funded trap site (n=1) is presented in red.

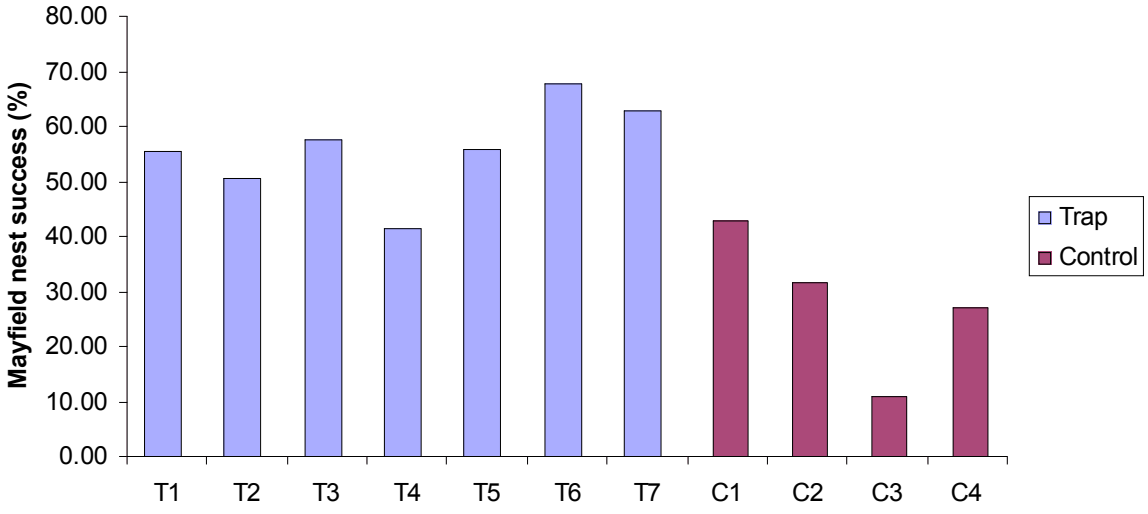

Figure 5. Mayfield nest success estimates for 2007 North Dakota evaluated trap and control sites.

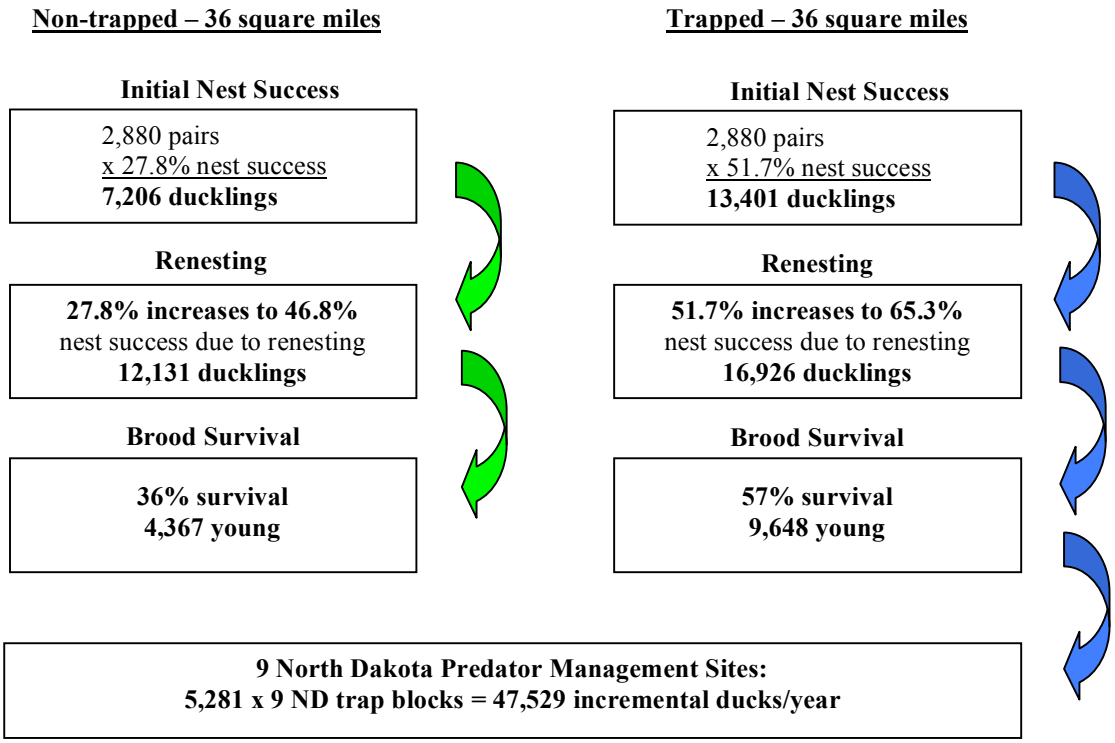

Figure 6. Flow chart for the calculation of incremental duck production from 9 North Dakota predator management sites in 2007, using long-term averages of Mayfield nest success. Calculations assume that females lay 9 eggs.

Variation in Mayfield Nest Success:

Over eleven trapping seasons on 36-square mile blocks (1997-2007) in the Drift Prairie, average Mayfield nest success for trapped and control blocks is 51.7% (n=35) and 27.8% (n=19), respectively. In 2007, the average Mayfield nest success for trap and control blocks was 55.9% (n=7) and 27.9% (n=4), respectively. Nest success on our trapped sites in 2007 exceeded the long-term average and control nest success was fractionally higher than the long-term average (27.9% vs 27.8%).

While it remains clear that spring predator management significantly increases waterfowl nest success, we have detected unexpectedly high levels of nest success on some of the non-trapped study areas on the Drift Prairie. Previous research has documented a long-term decline in waterfowl nest success to levels that are often at or below the rate believed necessary to maintain duck populations, generally estimated to be 15-20%[1].

[1] Beauchamp, W. D., R. R. Koford, T. D. Nudds, R. G. Clark, and D. H. Johnson. 1996a. Long-term declines in nest success of prairie ducks. J. Wildl. Manage. 60(2):247-257.

By design, areas selected for predator management are typically characterized by 25-40% grassland nesting cover on a 36-mi^2 block. In areas such as these, nest success is expected to be at or below maintenance levels[2].

Nest success is highly variable

Nest success on our trapped sites is consistently higher than non-trapped sites, but what are some possible contributing factors to the higher levels of nest success measured on the non-trapped blocks?

Variation in nest success is poorly understood, but most likely relates to the dynamic predator populations reacting to disease and the availability of buffer prey, such as rodents, which can relieve predation pressure on nesting ducks. In years of reduced predator populations and high numbers of buffer prey, areas where nest success is usually below 20% based on available cover can produce better results such as we experienced this year in north-central North Dakota.

Conversely, areas with high grass cover that should experience high nest success, such as the Missouri Coteau region of North and South Dakota, sometimes produce surprisingly low nest success. For the third year in a row, research conducted by Ducks Unlimited in 2007 in the cover-rich Missouri Coteau region of North Dakota highlights the variable nature of duck nest success. Of 22 monitored sites in the Coteau during 2007, only 11 of 22 sites achieved Mayfield nest success estimates that met or exceeded maintenance level reproduction[3] (15% Mayfield). This region is one wherein managers would generally feel that predator management is unnecessary as a result of the high percentage of permanent cover and the expected high nest success.

Predator populations are highly dynamic

As an example of the possible effects of disease, since the mid-1990s, the number of red fox has generally declined across the state of North Dakota[4]. This decline coincides with the onset of a sarcoptic mange epidemic that still persists across most of North Dakota. Mange first entered the state in the mid-1980s and became a very serious problem for red fox and coyote populations in the mid-1990s, particularly in the northern reaches of the state[4].

Red fox are noted as a primary predator of ground-nesting waterfowl. Red fox not only depredate eggs in duck nests, but they also kill females on the nest[5]. Researchers at USFWS

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[2] Reynolds, R. E., T. L. Shaffer, R. W. Renner, W. E. Newton, and B. D. J. Batt. 2001. Impact of the conservation reserve program on duck recruitment in the U.S. prairie pothole region. *Journal of Wildlife Management* 65:765-780.

[3] http://www.ducks.org/Conservation/GrasslandsforTomorrow/2213/ResearchNestingSuccess.html October 16, 2007)

[4] Steve Allen, retired Furbearer Biologist, North Dakota Game and Fish Dept.

[5] Sargeant, A. B., R. J. Greenwood, M. A. Sovada and T. L. Shaffer. 1993. Distribution and abundance of predators that affect duck production in the prairie pothole region. U.S. Fish Wildlife Service Resource Publication 194.

Northern Prairie Wildlife Research Center estimated that red fox took more than 900,000 adult ducks, mostly female dabblers, annually from the Prairie Pothole Region during spring and early summer from 1969-73[5].

As a possible result from this sarcoptic mange epidemic, control block nest success has been notably higher over the past five years (31.7%, 2003 – 2007; no control blocks evaluated in 2002) in comparison to the first five years (15.4%, 1994 – 1998) of conducting predator management in North Dakota. In addition, the average number of red fox removed per square mile on each large block predator management site (>16 square miles) has generally declined over this same time period (3.4 per square mile, 1994 – 1998; 0.18 per square mile, 2002 – 2007). While not solely responsible, these data may indicate a possible result of the reduced red fox population in North Dakota.

These outbreaks of mange and the accompanying decreases in population are normal. Most furbearer biologists believe that fox populations will rebound from the mange outbreak as they have done in the past[4].

Why Continue Trapping in Areas Wherein Nest Success Levels Are Periodically Above Maintenance?

From the perspective of managers using predator management as a management tool, the question is "why trap in those areas wherein nest success levels are periodically above maintenance?"

The answer is that the objective of trapping is to *improve* nest success over background levels. Without exception, every Delta study has demonstrated that trapping increases nest success, even in areas where nest success rises above maintenance levels. Nest success is also not the only variable determining duck production. It is likely that predator management has a positive effect on hen and brood survival, which has a significant effect on overall production.

From Delta's perspective, the take-home message regarding variation in nest success is that we need to keep our eye on the long-term data and probabilities and manage accordingly. *Over the long term*, the heavily farmed areas will likely have lower nest success and require predator management to ensure duck production. Accordingly, areas such as the Missouri Coteau will probably be more productive because of the high concentration of grass cover and habitat protection will likely be the priority.

Additionally, the variable nature of duck nest success also highlights the need to focus on the incremental increase in nest success that directly results from seasonal predator removal, rather than absolute levels of nest success. Independent of non-trapped nest success, hunters expect that conservation will add more ducks in the fall flight and in a cost effective manner.

Predator management in North Dakota continues to provide a large number of cost effective, incremental ducks—a long sought after objective of waterfowl managers and a legitimate measuring stick of conservation actions.

B. Saskatchewan

John Dassow, MS Candidate, Southern Illinois University. ***Can Predator Population Reduction Increase Waterfowl Nest Success in Parkland Habitats in Saskatchewan? 2006 – 2008.***

Delta's previous work has shown that removing predators on large sites is an effective method to increase duck nest success in prairie habitats. The geography of the Canadian Prairies is such that the North Dakota research results are not directly applicable to the Canadian portion of the Prairie Pothole Region. While some of the southern portions of the Canadian Prairie region are similar to the true prairie of North Dakota, much of the Canadian Prairies is comprised of the Aspen parkland biome.

This is the area of the pothole region that lies immediately above the more arid Prairie biome, and is characterized by more permanent wetlands, clumps of forested cover and a different predator community. Given the ecological differences from the prairie areas where Delta's trapping work has taken place to date, it is essential that we test the technique in this Aspen Parkland region.

For the second year in a row, two 36 square mile sites were trapped in the prairie parkland portion of Saskatchewan. While not conducted in 2006, nest success evaluation took place in 2007 on two trapped and two non-trapped sites (Figure 7). Past studies have indicated that the prairie parklands are typically characterized by low nest success rates and 2007 proved to

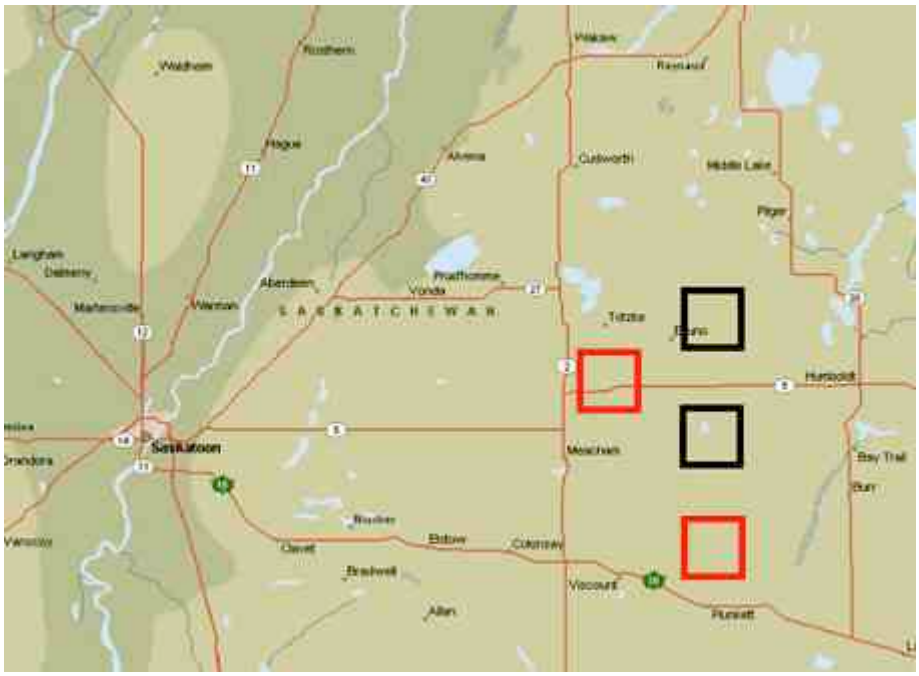


Figure 7. Approximate location of each 2007 Saskatchewan predator management trap site (black) and control site (red).

be no exception. Mean Mayfield nest success on trapped sites was 33.6% compared to 5.6% on nontrapped sites (Figure 8). Trapping and nest success evaluation will continue for a final year in 2008.

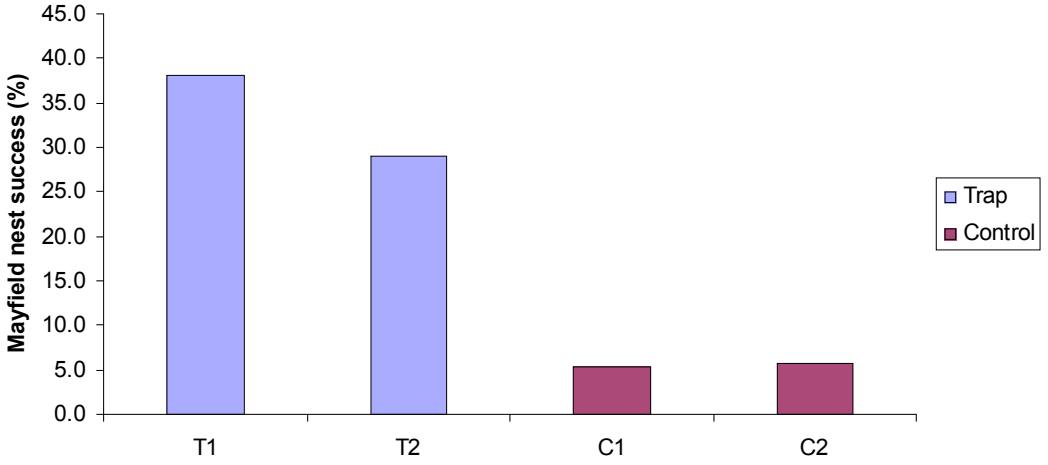


Figure 8. Mayfield nest success estimates for 2007 Saskatchewan trap (n=2) and control sites (n=2).

C. South Dakota

Nick Docken, MS Candidate, South Dakota State University. ***Evaluation of duck and pheasant nest success in large block predator management areas in northeast South Dakota, 2007 - 2008.***

2007 was a ground breaking year for predator management in South Dakota, seeing the launch of a 2-year evaluation on the effectiveness of predator management to increase both duck and ring-necked pheasant nest success. Historically on our sites in North Dakota, pheasants have either been absent or occurred at relatively low densities. In contrast, the South Dakota portion of the PPR is largely inhabited by both ducks and pheasants.

The formal endorsement of the "Two State Plan" (Figure 9) in January of 2006 broadened both the general and financial support of predator management in South Dakota - as evidenced by the addition of the National Audubon Society and the South Dakota Department of Game, Fish and Parks to a long list of partners who provided both staff time and financial support to the effort.

Trapping and nest success evaluation occurred on two 36 square mile blocks in northeast South Dakota (Figure 10). For comparison purposes, nest success evaluation was also conducted on two non-trapped blocks of similar size and habitat composition. For ducks, mean nest success on trapped areas (33.2%) showed a slight increase in comparison to nontrapped (27.4%) areas (Figure 11). Although a large difference in nest success was not detected, the same trappers will be returning in 2008. This is a key point, since all first year trappers face a rather steep learning curve in relation to learning critical factors such as the lay of the land, the foraging behavior of spring vs. fall animals, the traditional travel corridors

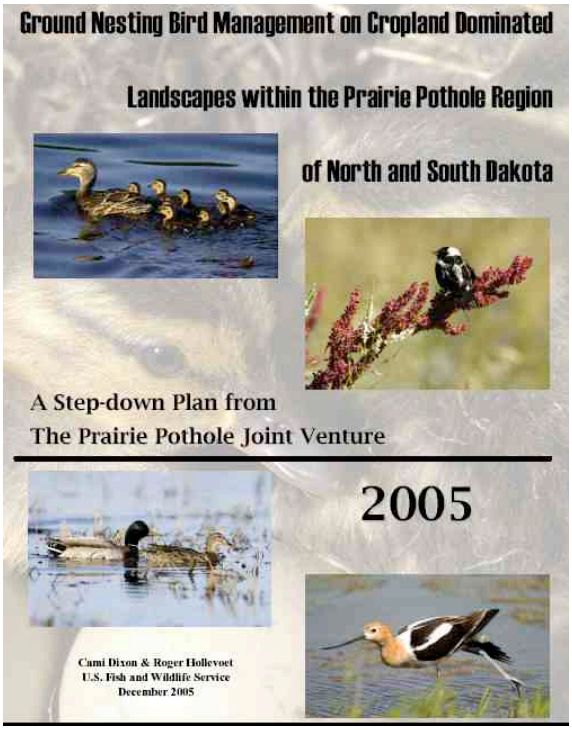


Figure 9. Front cover of the "Two State Plan". This plan provided support critical to the expansion of predator management into South Dakota.

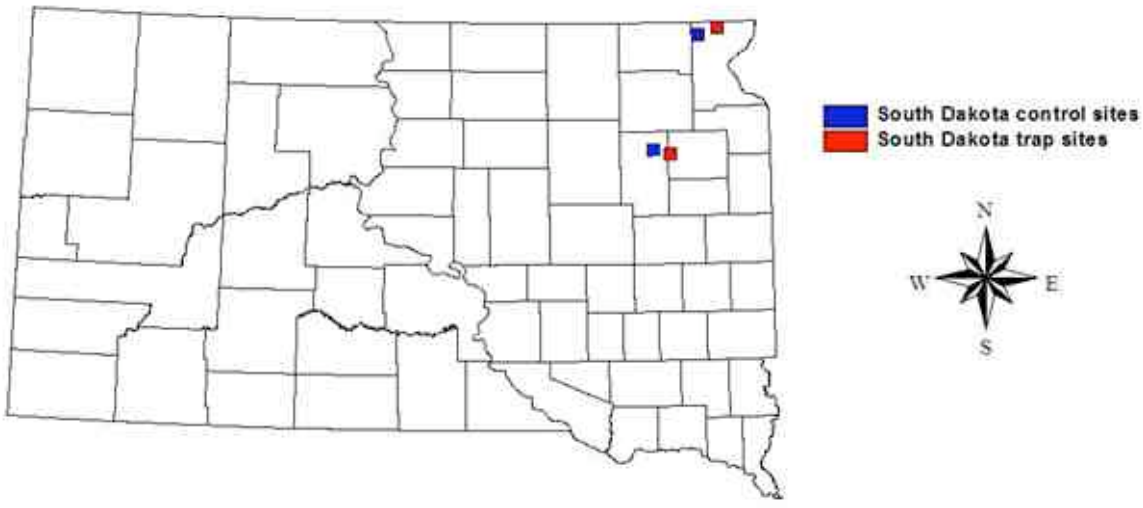


Figure 10. Approximate location of each 2007 South Dakota Predator Management trap (red) and control site (blue).

of predators and the habits of landowners on their block (i.e. timing of planting, livestock grazing, travel of local domestic animals such as dogs, etc)—all factors limiting their first year effectiveness.

Due to complications in locating an adequate sample of nests, results for pheasants in 2007 were inconclusive. Locating pheasant nests proved difficult using standard duck nest searching techniques. In particular, pheasants tended to run from their nest site as researchers approached, making the detection of the actual nest site difficult. Particular attention will be paid to pheasants in 2008. In addition to adding a third trap site located in a duck and pheasant rich area, alternate nest searching and population survey techniques will be used in 2008.

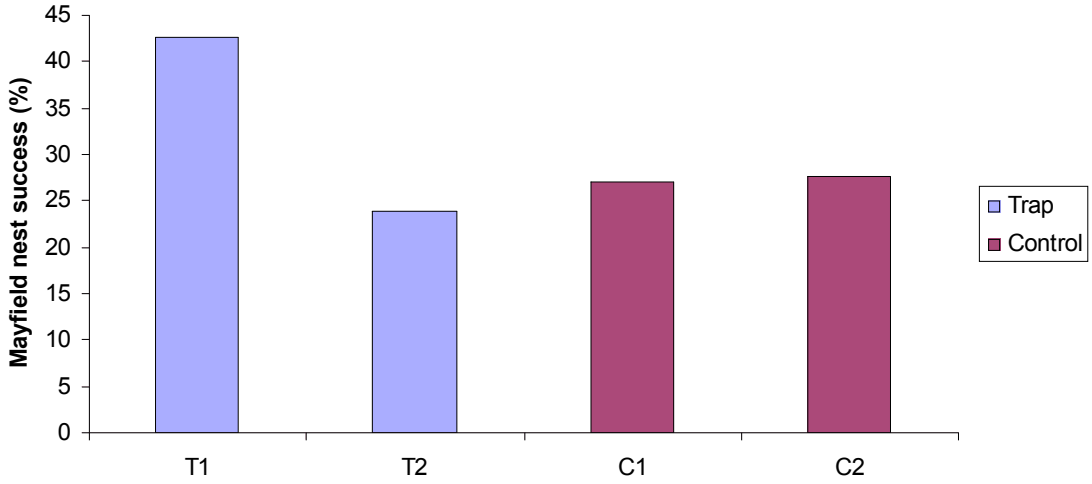


Figure 11. Mayfield nest success estimates for 2007 South Dakota trap (n=2) and control sites (n=2) – upland nesting ducks only.

OUTLINE OF WORK FOR 2008

1) PREDATOR MANAGEMENT RESEARCH: Next Steps

Our 2007 student research program included projects in Saskatchewan, North Dakota and South Dakota that aim to measure factors such as nest success, duckling survival, nest density and juvenile homing rates. Given the philosophical opposition of some to predator management, and the associated need to precisely quantify its effect, it is important that Delta capitalize on the growing number of trapped blocks and collect this information.

In addition to the large volume of research currently underway, three additions are currently being planned for Delta's 2008 research program:

a) Predator Management Research in Southwest Manitoba

Recently conducted research on upland nesting duck nest success in the Minnedosa pothole country of southwest Manitoba calls for the consideration of predator

management in that area. From the period of 2002 – 2004, the average Mayfield nest success estimate for upland nesting mallards on one study site near Minnedosa, Manitoba was 2.2%. In the same study site and over the same time period, mallards nesting in Hen Houses (artificial nesting structures) achieved 47.9% Mayfield nest success.

Moreover, the pothole region north of Minnedosa contained at one time a considerable nesting density of lesser scaup. Due to the long-term declines of continental scaup populations, and the considerable evidence that predation may be the cause, serious discussions are beginning about the possibility of testing predator management as a tool to re-establish local breeding populations of lesser scaup in southwest Manitoba. Additionally, the Minnedosa area possesses one of the largest concentrations of breeding canvasbacks and redheads in North America, species that are highly coveted by diver hunting enthusiasts across the Flyways.

Current plans are for the initiation of a long-term (at least 6 years) predator management study in southwest Manitoba starting in the spring of 2008. Biologists from Delta Waterfowl conducted ground-searches in mid-October of 2007 in southwestern Manitoba to identify potential study blocks. We are currently in the process of obtaining a provincial permit that would allow project trappers to take certain furbearing predators outside of the designated Manitoba trapping season.

b) Increased effort of South Dakota predator management research

From a waterfowl evaluation perspective, the current design of the South Dakota predator management research project functioned as expected and an adequate sample of duck nests was obtained. From a pheasant evaluation perspective, however, the current design will not yield an adequate sample of pheasant nests unless modifications are made.

After one year of evaluation, it became evident that waterfowl breeding densities were high on both blocks as anticipated—but the pheasant population on the northeast block was far less that anticipated. As a result, too small of a sample of pheasant nests was obtained.

In an effort to bolster the pheasant evaluation component, the current plan is to 1) add an additional predator management site in an area known to have a very high pheasant population, and 2) likely extend the length of the project for one additional year (3 field seasons in total).

Spring and summer trapping for ducks is very different than fall trapping for fur. In our 15 years of experience doing predator management research, we have had several experiences with first-time trappers requiring a year of spring trapping to fully understand what it takes to create a treatment effect. We suspect that our first-year trappers on this project needed this first experience to grasp what is required to be successful.

c) Landowner attitudes in the US Prairie Pothole Region towards predator management and other waterfowl management tools

In addition to the biological assessments, some public opinion work is required. If a highly visible, large-scale trapping effort would increase fall flights by hundreds of thousands of birds, it's important to understand the social implications. Having a large

number of trapped sites would require a multitude of cooperating landowners, so research must be conducted to help us better understand the attitudes of those landowners in the PPR.

This work will be taken on by Navena Crawford who is working with Dr. Craig Miller at the University of Georgia. Navena will be surveying private landowners in the US PPR states of North Dakota, South Dakota, Montana and Minnesota. While her survey work will have a heavy emphasis on predator management, she will also be polling attitudes towards many other waterfowl management tools (i.e. land purchase, easements, etc) as well as the private organizations and government agencies that administer them. Delta anticipates expanding this public survey work in the future to include urban audiences.

2) ADVOCACY WORK ON THE CANADIAN PRAIRIES

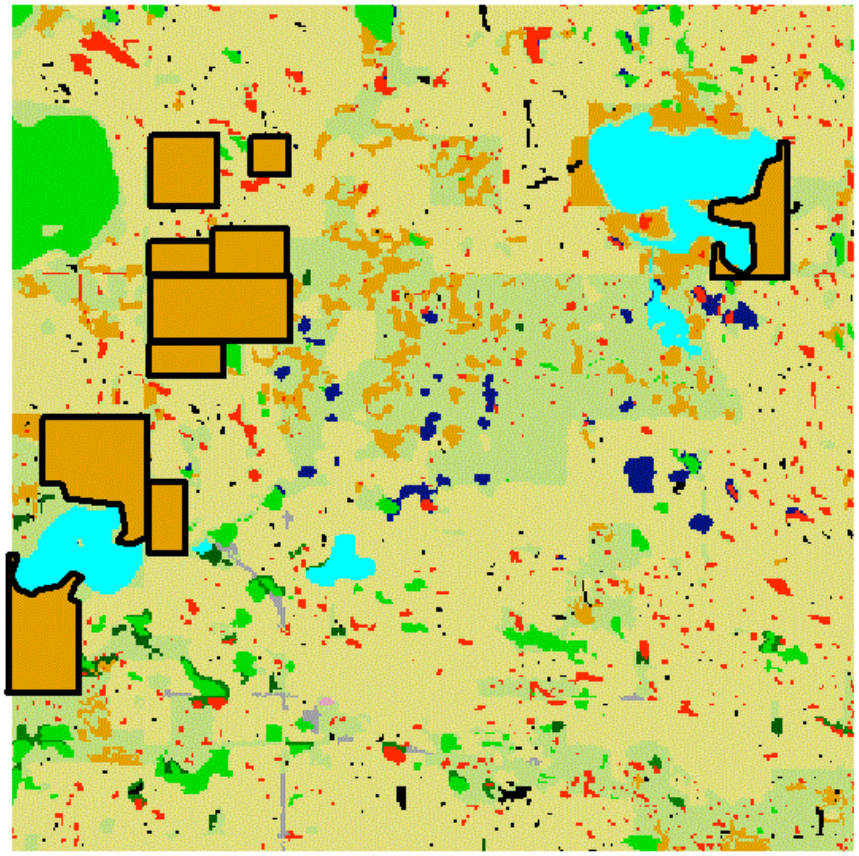
With the advocacy effort well advanced in the U.S. portion of the prairie pothole region, Delta is now in a position to advance its advocacy effort in Canada. As was the case with the original effort in the U.S., the first priority which is currently underway is to lay a solid scientific foundation supporting the integration of this technique into Canadian waterfowl conservation programs.

More details on the advocacy strategy for Canada will arise as this work advances, but it is noteworthy that there is no equivalent agency to the U.S. Fish & Wildlife Service operating in prairie Canada. However, there is an active trapping effort across the Prairies aimed at animal damage control, and Delta will be investigating the possibility of developing partnerships with this program as the results of its evaluation unfold.

Delta staff will be conducting extensive outreach efforts to provincial government wildlife managers in all three Prairie Provinces in 2008 to lay the groundwork for the expansion of predator management work in Canada. Also, our staff will work to secure formal approval for our trapping evaluations from agricultural and trapping advocacy groups. We anticipate strong support from farmers and trappers that will be critical in encouraging government to allow the necessary permitting for our predator management program.

ATTACHMENT 1

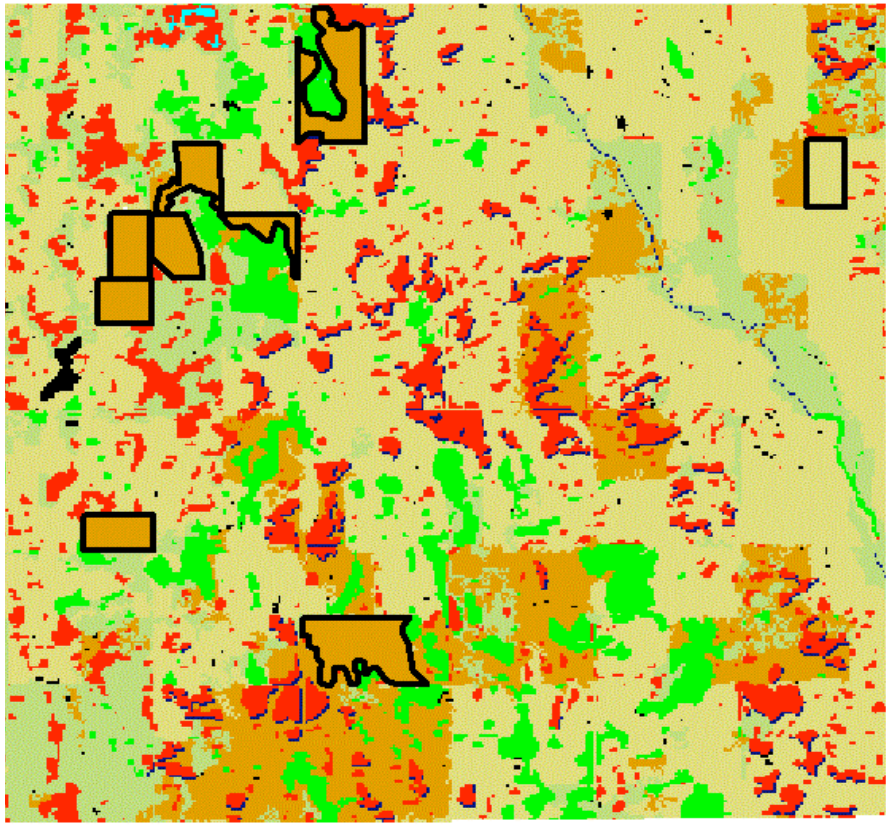
Harlow Trap – 1995 Land Use



Land use	1995 Acres	% total
Other water	216.0	0.9
Native grass	4,707.4	20.4
CRP	1,165.2	11.9
Hayland	3.3	0.0
Cropland	13,930.7	53.6
Forest	77.2	0.3
Urban	67.6	0.3
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	164.1	0.7
Seasonal wetland	691.7	3.0
Semipermanent wetland	1,054.3	4.6
Lake	867.4	3.8
River	0.0	0.0
Riparian	95.1	0.4
Total	23,040.0	100.0

ATTACHMENT 2

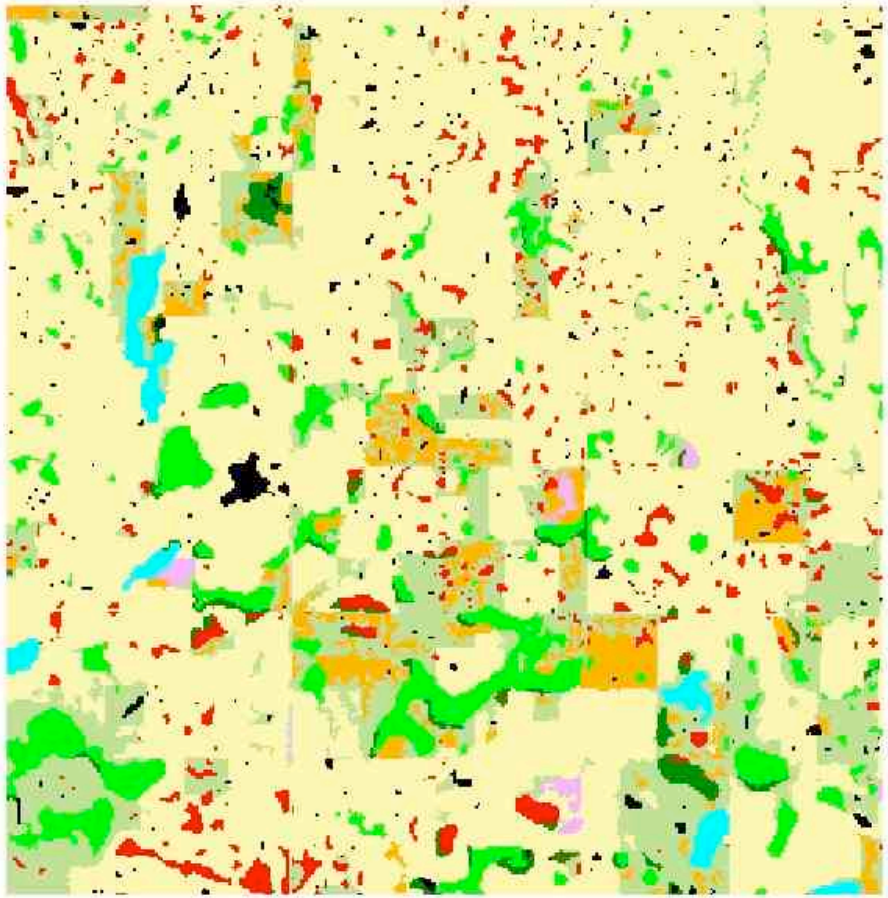
Whitman Trap – 1995 Land Use



Land use	1995 Acres	% total
Other water	0.0	0.0
Native grass	3,392.2	14.7
CRP	2,848.5	12.4
Hayland	0.0	0.0
Cropland	11,818.2	51.3
Forest	0.0	0.0
Urban	0.0	0.0
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	100.4	0.4
Seasonal wetland	2,672.2	11.6
Semipermanent wetland	1,885.0	8.2
Lake	16.5	0.1
River	307.1	1.3
Riparian	0.0	0.0
Total	23,040.0	100.0

ATTACHMENT 3

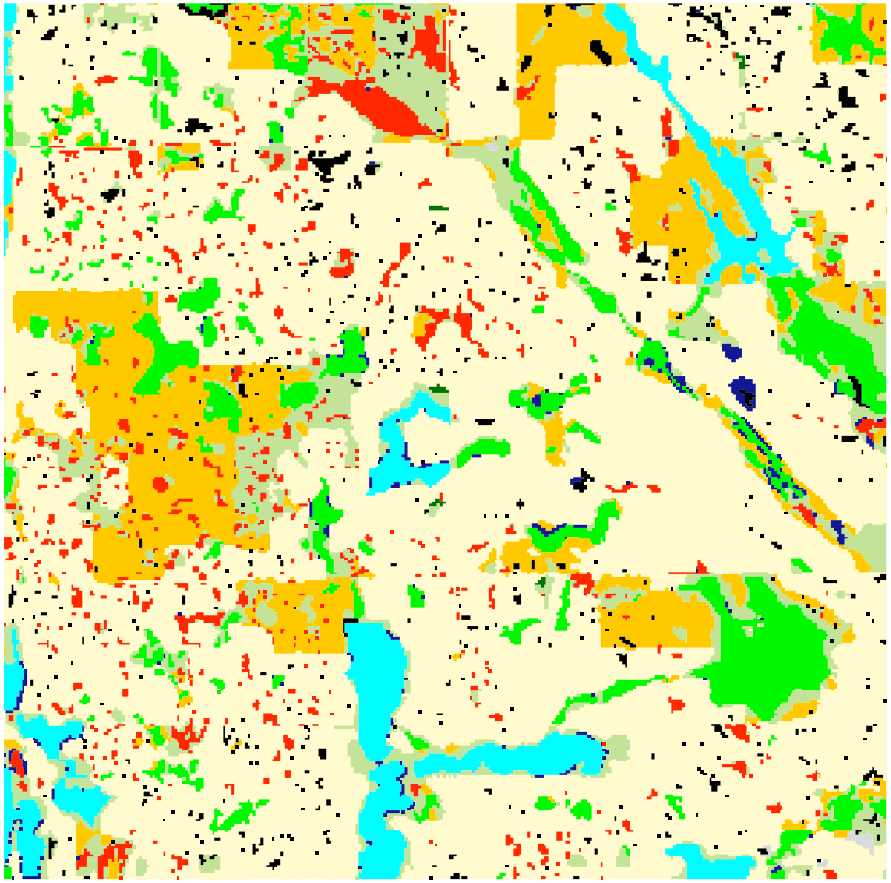
Bowdon Trap – 1995 Land Use



Land Use	1995 acres	% total
Other water	0.0	0.0
Native grass	3227.0	14.0
CRP	942.9	4.1
Hayland	80.1	0.3
Cropland	15640.1	67.9
Forest	34.8	0.2
Urban	15.7	0.1
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	303.9	1.3
Seasonal wetland	772.4	3.4
Semipermanent wetland	1483.2	6.4
Lake	277.5	1.2
River	0.0	0.0
Riparian	262.5	1.1
Total	23,040.0	100.0

ATTACHMENT 4

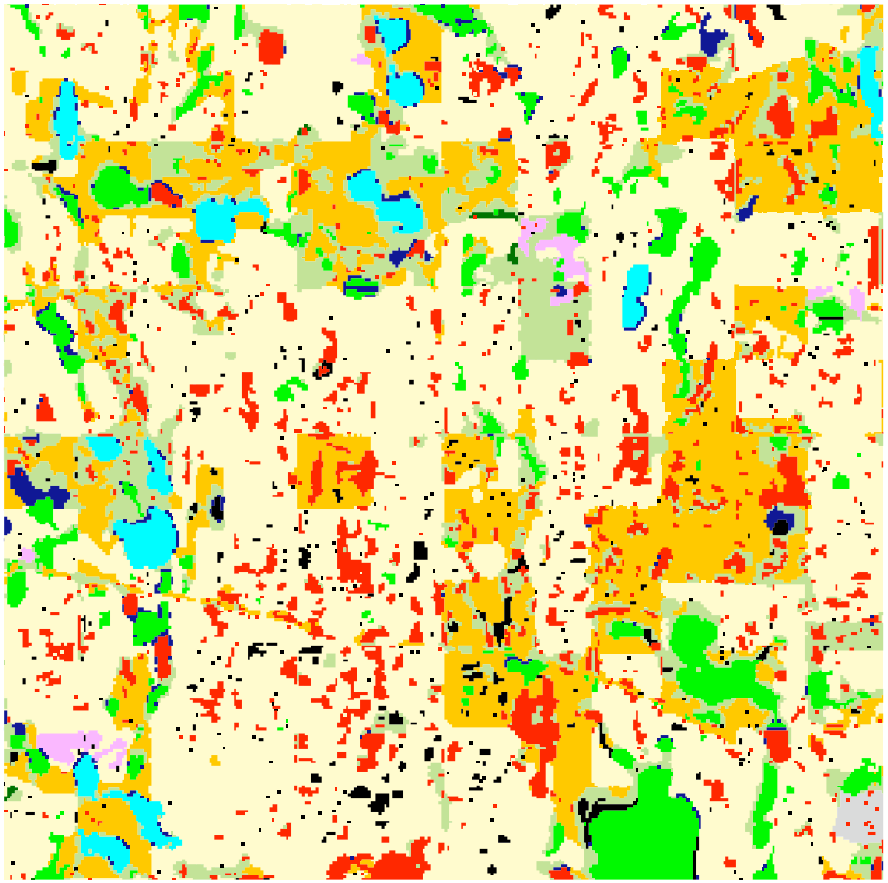
McVille Trap – 1995 Land Use



Land use	1995 Acres	% total
Other water	141.1	0.6
Native grass	1891.9	8.2
CRP	2634.9	11.4
Hayland	0.0	0.0
Cropland	14289.7	62.0
Forest	12.6	0.1
Urban	16.5	0.1
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	418.4	1.8
Seasonal wetland	904.1	3.9
Semipermanent wetland	1673.7	7.3
Lake	1057.1	4.6
River	0.0	0.0
Riparian	0.0	0.0
Total	23,040.0	100.0

ATTACHMENT 5

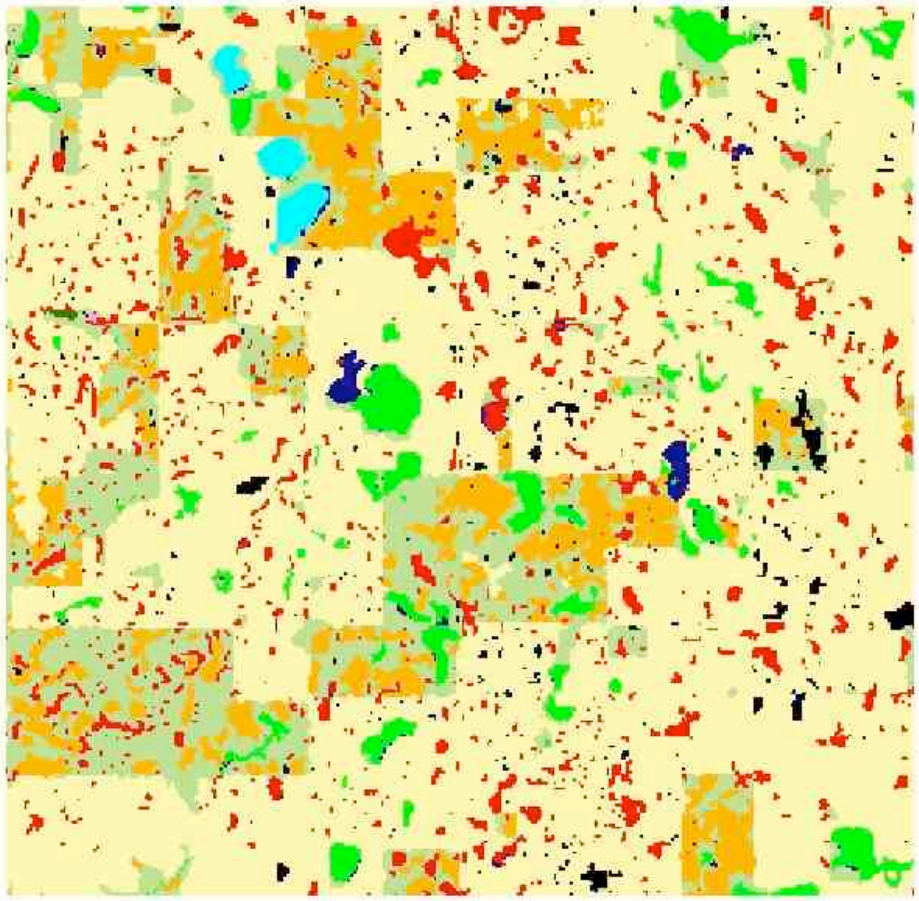
Crary Control – 1995 Land Use



Land use	1995 Acres	% total
Other water	236.3	1.0
Native grass	2201.0	9.6
CRP	3892.1	16.9
Hayland	133.5	0.6
Cropland	12289.8	53.3
Forest	17.4	0.1
Urban	66.0	0.3
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	338.4	1.5
Seasonal wetland	1862.0	8.1
Semipermanent wetland	1488.3	6.5
Lake	515.3	2.2
River	0.0	0.0
Riparian	0.0	0.0
Total	23,040.0	100.0

ATTACHMENT 6

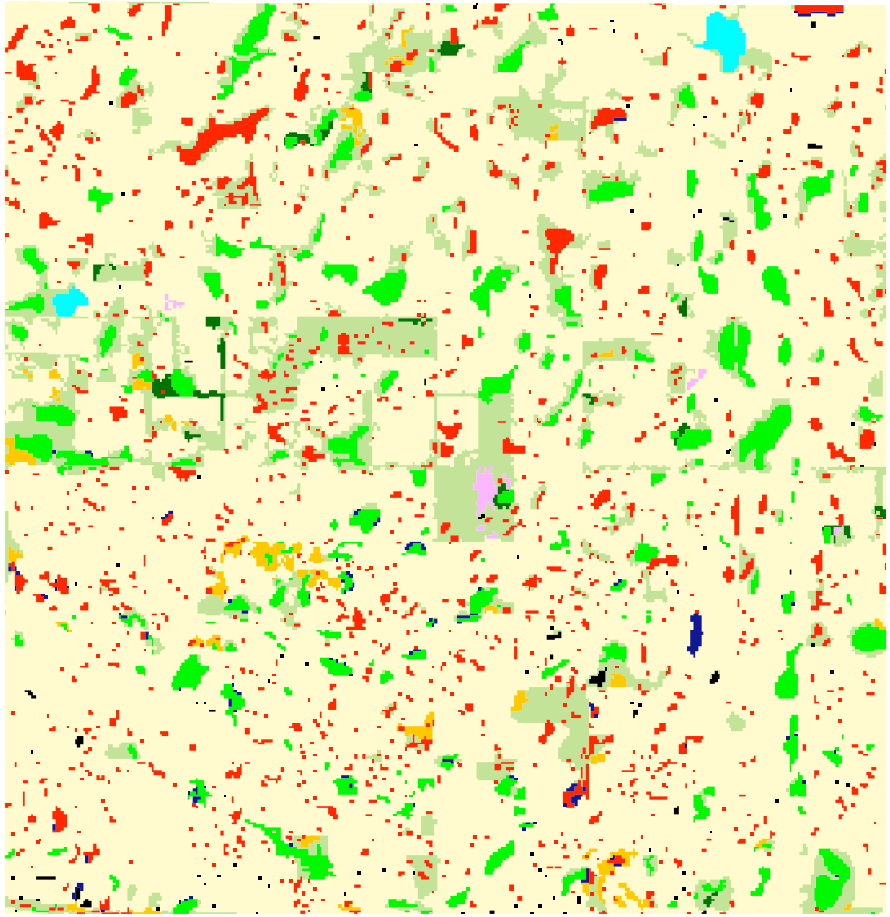
Courtenay Control – 1995 Land Use



Land use	1995 acres	% total
Other water	113.5	0.5
Native grass	3222.3	14.0
CRP	2083.9	9.0
Hayland	2.2	0.0
Cropland	14947.8	64.9
Forest	6.4	0.0
Urban	0.0	0.0
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	290.7	1.3
Seasonal wetland	1367.8	5.9
Semipermanent wetland	874.5	3.8
Lake	130.8	0.6
River	0.0	0.0
Riparian	0.0	0.0
Total	23,040.0	100.0

ATTACHMENT 7

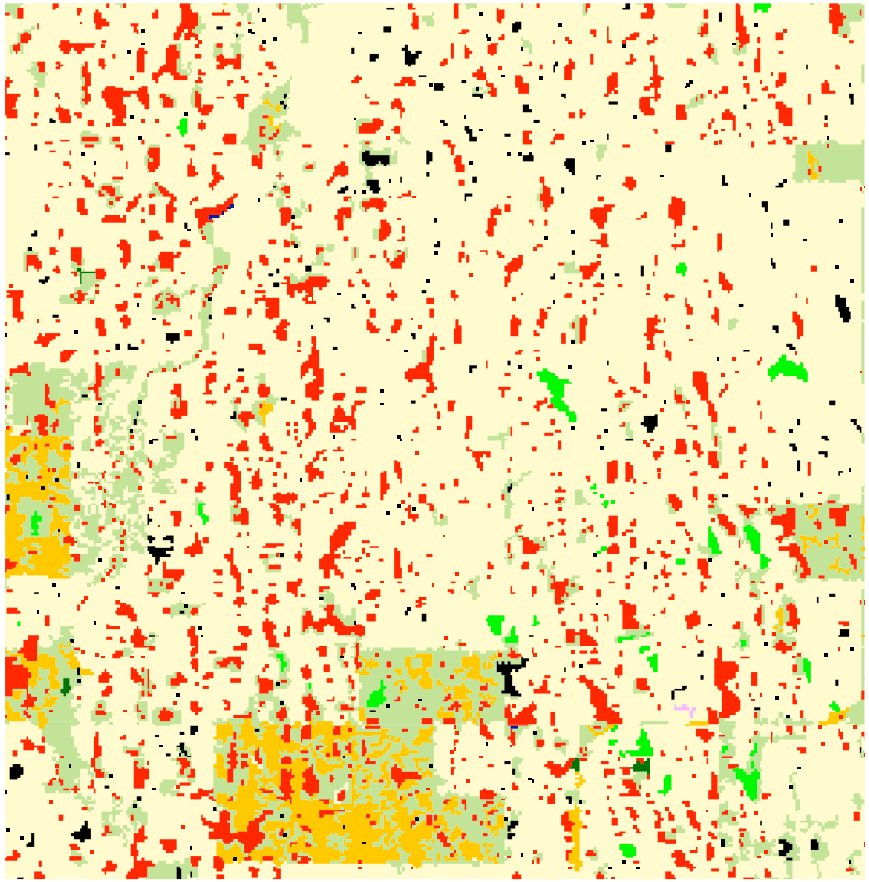
Leeds Control – 1995 Land Use



Land use	1995 Acres	% total
Other water	56.4	0.2
Native grass	2,345.6	10.2
CRP	203.6	0.9
Hayland	34.5	0.1
Cropland	17,921.5	77.8
Forest	81.7	0.4
Urban	0.0	0.0
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	46.5	0.2
Seasonal wetland	1,093.3	4.7
Semipermanent wetland	1,191.1	5.2
Lake	65.9	0.3
River	0.0	0.0
Riparian	0.0	0.0
Total	23,040.0	100.0

ATTACHMENT 8

Calio Control – 1995 Land Use



Land use	1995 Acres	% total
Other water	2.4	0.0
Native grass	2419.5	10.5
CRP	901.6	3.9
Hayland	2.9	0.0
Cropland	17082.4	74.1
Forest	8.0	0.0
Urban	0.0	0.0
Cloud cover	0.0	0.0
Shrub	0.0	0.0
Barren	0.0	0.0
Temporary wetland	234.1	1.0
Seasonal wetland	2215.3	9.6
Semipermanent wetland	166.9	0.7
Lake	0.0	0.0
River	0.0	0.0
Riparian	6.9	0.0
Total	23,040.0	100.0

Attachment 9 – Legal description of each parcel nest searched on LDWF supported trap and control site - 2007.

Benson County Trap (near town of Harlow):

T. 155, R. 69, section 28, E1/2 SE1/4
T. 155, R. 69, section 28, S1/2 SW1/4
T. 155, R. 69, section 33, NE1/4
T. 154, R. 69, section 8, S1/2 NW1/4
T. 154, R. 69, section 8, SW1/4
T. 154, R. 69, section 17, NW1/4
T. 154, R. 69, section 5, NW1/4

Nelson County Trap (near town of McVille):

T. 152, R. 58, section 34, NW1/4
T. 151, R. 59, section 2, N1/2 NW1/4
T. 151, R. 59, section 2, NE1/4 and N1/2 SE1/4
T. 151, R. 59, section 1, S1/2 SE1/4
T. 151, R. 58, section 21, NE1/4
T. 152, R. 59, section 35, E1/2

Wells County Trap (near town of Bowdon):

T. 145, R. 70, section 34, SE1/4
T. 145, R. 70, section 4, SW1/4
T. 145, R. 70, section 22, SE1/4
T. 145, R. 70, section 1, NE1/4 and SW1/4
T. 145, R. 70, section 7, NE1/4

Walsh County Trap (near town of Whitman):

T. 155, R. 58, section 19, NW1/4
T. 155, R. 58, section 30, SE1/4
T. 155, R. 58, section 18, NE1/4
T. 155, R. 58, section 28, NW1/4
T. 155, R. 59, section 13, NW1/4

Cavalier/Ramsey County Control (near town of Calio):

T. 159, R. 64, section 25, SE1/4
T. 159, R. 64, section 33, SW1/4
T. 159, R. 64, section 34, NE1/4
T. 159, R. 64, section 27, S1/2
T. 158, R. 64, section 13, N1/2 NE1/4
T. 158, R. 64, section 2, NE1/4

Stutsman County Control (near town of Courtenay):

T. 142, R. 63, section 14, SE1/4
T. 142, R. 63, section 11, NW1/4
T. 142, R. 63, section 26, NE1/4
T. 142, R. 63, section 33, SE1/4
T. 142, R. 62, section 6, NW1/4
T. 142, R. 63, section 1, SW1/4

Ramsey County Control (near town of Crary)

T. (152-153), R. 63, section 4, NW1/4
T. (152-153), R. 63, section 12, NW1/4
T. (152-153), R. 63, section 9, E1/2 SE1/4
T. 153, R. 62, section 6, NE1/4
T. 153, R. 62, section 7, NE1/4

Benson County Control (near town of Leeds)

T. 156, R. 68, section 2, NE1/4
T. 156, R. 67, section 19, SW1/4 and W1/2 SE1/4
T. 156, R. 67, section 22, NW1/4
T. 156, R. 67, section 32, SE1/4
T. 156, R. 67, section 30, NW1/4
T. 156, R. 68, section 24, W1/2 SW1/4

ATTACHMENT 10

Site - 2007	Mayfield (%)	95% CI
Whitman Trap (n = 434)	**55.80**	**50.18 – 62.04**
- Mallard (n = 86)	58.46	46.47 – 73.44
- Gadwall (n = 141)	59.39	50.13 – 70.30
- Blue-winged teal (n = 117)	44.51	34.31 – 57.63
Bowdon Trap (n = 234)	**62.88**	**55.27 – 71.50**
- Mallard (n = 83)	59.46	46.80 – 75.41
- Gadwall (n = 82)	59.99	47.97 – 74.93
- Blue-winged teal (n = 23)	70.68	49.87 – 99.83
McVille Trap (n = 353)	**67.65**	**61.44 – 74.48**
- Mallard (n = 62)	58.70	43.62 – 78.78
- Gadwall (n = 110)	62.49	51.75 – 75.38
- Blue-winged teal (n = 104)	71.83	61.15 – 84.30
Harlow Trap (n = 264)	**41.49**	**34.96 – 49.20**
- Mallard (n = 164)	41.16	33.00 – 51.27
- Gadwall (n = 57)	38.81	26.31 – 56.99
- Blue-winged teal (n = 21)	49.92	30.43 – 81.31
Calio Control (n = 393)	**31.35**	**26.38 – 37.21**
- Mallard (n = 151)	30.82	23.19 – 40.87
- Gadwall (n = 83)	29.79	20.46 – 43.20
- Blue-winged teal (n = 70)	37.80	26.29 – 54.16
Leeds Control (n = 354)	**27.04**	**22.33 – 32.71**
- Mallard (n = 88)	18.76	11.71 – 29.89
- Gadwall (n = 99)	33.16	24.00 – 45.69
- Blue-winged teal (n = 120)	27.12	19.73 – 37.16
Crary Control (n = 257)	**10.92**	**7.84 – 15.17**
- Mallard (n = 96)	3.57	1.66 – 7.58
- Gadwall (n = 67)	10.29	5.34 – 19.59
- Blue-winged teal (n = 58)	18.84	10.84 – 32.48
Courtenay Control (n = 293)	**42.16**	**35.80 – 49.62**
- Mallard (n = 80)	37.31	26.56 – 52.24
- Gadwall (n = 63)	39.90	27.58 – 57.52
- Blue-winged teal (n = 86)	54.49	42.70 – 69.41

****Confidence limits for nest success are asymmetrical because they are derived exponentially.** (Klett, A.T., H.F. Duebbert, C.A. Faanes, and K.F. Higgins. 1986. Techniques for studying nest success of ducks in upland habitats in the prairie pothole region. 24 p. U.S. Fish and Wildl. Serv. Resour. Publ.; 158.)

ATTACHMENT 11 – Nest Fate Summary Table – 2007

Nest Fate	Abandoned				Destroyed					Total
Cause of Failure	Investigator	Predator	Unknown	Other	Predator	Other	Nonviable	Unknown	Successful	nests
Whitman Trap	13	16	28	-	77	2 – machinery	2	1	313	452
Bowdon Trap	4	2	11	-	39	1 – machinery 1 – investigator	1	-	182	241
McVille Trap	19	10	11	-	45	1 – machinery 2 – investigator	-	-	287	375
Harlow Trap	17	8	8	1 – flooding	90	1 – machinery 1 – investigator	1	-	158	285
Calio Control	21	9	11	5 – flooding	162	4 – machinery 8 – investigator	1	-	211	432
Leeds Control	10	7	18	1 – flooding	163	2 – investigator	-	-	166	367
Crary Control	4	3	5	-	172	1 - machinery	-	-	77	262
Courtenay Control	8	1	2	1 – machinery	109	1 – machinery	-	1	181	304

Categorical Explanation:

Abandoned:

- Investigator: All incidents occurred during egg laying stage. Same number of eggs present (less than full clutch) in nest bowl on subsequent nest checks and no hen present.
- Predator: Occurred either during egg laying or incubation. Some eggs missing from last visit and either no advance in incubation stage or advance in incubation stage less than expected.
- Unknown: Occurred either during egg laying or incubation. No eggs missing from last visit and either no advance in incubation stage or advance in incubation stage less than expected.
- Other: Detailed in table.

ATTACHMENT 11 – Nest Fate Summary Table – 2007 – *continued*

Destroyed:

- Predator: Evidence present linking destruction of nest to either mammalian or avian predation.
- Other: Detailed in table.

Nonviable:

- Hen present and incubating eggs that are not advancing in growth stage.

Unknown:

- Lost: Previously sampled nest unable to be relocated.
- Terminated: Permission to nest search revoked by landowner.

Attachment 12. Number of duck nests detected by species for each 2007 LDWF supported trap and control site.

	Wigeon	BW Teal	Gadwall	GW Teal	Scaup	Mallard	Pintail	Shoveler	Canvasback	Total
Whitman Trap	0	122	143	1	13	91	18	64	0	**452**
McVille Trap	3	106	117	5	18	70	25	30	1	**375**
Bowdon Trap	4	23	83	0	13	89	14	15	0	**241**
Harlow Trap	2	21	59	1	2	180	9	11	0	**285**
Crary Control	0	60	68	0	1	98	18	17	0	**262**
Leeds Control	0	125	100	1	5	93	13	30	0	**367**
Calio Control	1	76	86	1	11	173	34	50	0	**432**
Courtenay Control	4	90	63	0	4	83	30	30	0	**304**
Total	14	623	719	9	67	877	161	247	1	2718
% Total	**0.52**	**22.92**	**26.45**	**0.33**	**2.47**	**32.27**	**5.92**	**9.09**	**0.04**	**100.00**