

MIGRATIONAL MOVEMENTS AND HABITAT USAGE OF MIGRANT PASSERINES IN THE
GREAT LAKES REGION: OTTAWA NATIONAL WILDLIFE REFUGE, OHIO

PROGRESS REPORT-2010
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INTRODUCTION

In 2010, Black Swamp Bird Observatory continued a long term passerine migration study on the Ottawa National Wildlife Refuge complex and various other sites in the region. Specific goals of the project are to monitor the population status of Neotropical migrants in the Great Lakes region and to better understand the relationship between en-route habitat and their breeding ecology. Lake Erie represents a barrier to most passerine migrants. Passerines' reluctance to navigate open water results in major concentrations along the southwestern shore of Lake Erie, unparalleled in the Midwest. With continuing habitat loss both along the Lake Erie coast and inland, this study will assist in monitoring the effects of habitat isolation and degradation. There are only four small segments of beach ridge habitat remaining west of Port Clinton along Ohio's Lake Erie shoreline. The intensive bird use of these ridges in contrast to the adjacent condominium complexes and marinas signifies the importance of this habitat component in the Lake Erie marsh system. A wide range of migration corridor and stopover habitat occurs throughout the region, but these sites do not contain concentrations as high as the beach ridges. A wide variety of study sites are necessary to fully examine habitat use, migrational timing, and energetic condition of birds.

The importance of understanding avian migration and stopover habitat needs has greatly increased over the past two decades as tropical deforestation and temperate forest fragmentation have expanded and songbird populations have declined. Little information is known about the "problems" migrants contend with along their migratory routes (Morse 1980), not to mention the transition between spring migration and the breeding period. To offset the energetic costs of migration, birds deposit substantial lipid reserves which may reach 50% body weight among long distance intercontinental migrants (Berthold 1975). As lipid stores are depleted during migration, birds are capable of replenishing reserves in a few days at rates approaching 10% body weight per day (e.g. Barlein 1985; Biebach *et al.* 1986; Moore & Kerlinger 1987). These lipid deposits are obviously critical for a successful migration, and they may also provide a selective advantage to the migrant with energy reserves remaining (see Sinclair 1983; Ojanen 1984; Krapu *et al.* 1985; Krentz & Ankney 1987). Adequate stopover habitat may play an important role in delivering migrating passerines to their breeding grounds with sufficient energy reserves to successfully nest.

STUDY AREAS

Banding sites are centered along the western basin of Lake Erie in Ohio with additional coverage to the Ohio River and central basin of Lake Erie. The Navarre site is located on the largest remaining beach ridge along the western basin of Lake Erie and holds the most complete native beach ridge vegetative complex. Netting was also conducted on an active beach ridge outside the lakefront dike in Navarre during fall migration. This location allows the opportunity to study avian use of a beach ridge from its formation into maturity. The primary Darby NWR site (not operated in 2010) is on one of the three remaining small beach ridges and provides a comparison with the larger more complete ridge of Navarre. The Darby NWR inland site (not operated in 2010) is approximately 0.5 miles from the beach ridge and is comprised of dogwood thickets and provides a comparison with the beach ridge for assessing habitat use. The Ottawa NWR station (not operated in 2010) is located approximately 1 mile from the lake and is composed primarily of a dogwood thicket with a few remnant overstory trees. This site provides a comparison of large patches of scrub-shrub in the vicinity of the lake to the ridges. The Shaker Lake site near Cleveland is several miles from Lake Erie and lies on a major riparian corridor to the lake. Habitats include a brook, marsh, scrub-shrub, and the border of a woods. The Petersburg site in southern Michigan is shrub habitat that is located past the lake effect zone for bird migration. This site provides a comparison of a habitat away from the lake proper and potentially gives some indications to how quickly migrants spread out across the landscape. The Shawnee Lookout site (not operated in 2010) is located between the Ohio River and Great Miami River west of Cincinnati and is the only site of great distance from Lake Erie. All ten nets are placed within the edge of a powerline cut of this hilly region with many deep cool valleys. Shawnee's vegetation is comprised of wild grape, Pawpaw, Hackberry, Black Walnut, elm, and oak species. Pawpaw, Hackberry, and especially wild grape are the dominant species. The Creek Bend site is located approximately 15 miles due south of Lake Erie and provides a comparison to Navarre for lake effect and spring and fall comparisons for different species groups. Habitat is dominated by dogwood, old field, and a riparian corridor. The variety of habitat types and distances from the lake surveyed allows us to document variation in migrational timing, habitat selection, and movement.

METHODS AND MATERIALS

In 2010, migrating and resident passerines were sampled on the Navarre Unit of the Ottawa National Wildlife Refuge and three other sites in the Great Lakes region: Creek Bend, Shaker Lakes, and Petersburg (Figure 1). Sites operated near Cleveland and Lindsey, Ohio, and Monroe, Michigan provide comparisons to the refuge site that is located at a major passerine migration staging area. Banding and point count efforts covered a minimum of 75% of the migration period for the study site. Every attempt was made to equalize any un-sampled parts of the migration period at the beginning and ending time frame. The migration period covers both short distance and long distance (Neotropical) migrants. Spring migration operation in 2010 began mid-April and continued through early-June. Fall migration banding was July 1 to early November.

Mist netting was conducted from one-half hour before sunrise to at least 11:00 AM on each day of operation, weather permitting. Birds were captured utilizing 2.6 x 12 meter mist nets of 30mm mesh

size. All birds were removed from the net, with the band and net recorded if previously banded, and placed in a mesh holding bag until processing. During processing, each bird was banded with a standard U.S. Fish & Wildlife Service leg band, measured by closed wing chord, body mass recorded, and visually inspected for subcutaneous fat deposits using a 6-point ordinal scale (Helms & Drury 1960). Birds were sexed and aged by the use of plumage characteristics (Pyle 1997) and guidelines of the Bird Banding Manual and Woods Manual (Woods 1969). Weather data were compiled from hourly readings of Toledo Edison's Davis Besse Nuclear Power Station.

Point counts were conducted during both spring and fall migration to complement mist-netting operations and document species such as larger birds that are not typically captured by mist-nets. Counts were conducted at points spaced a minimum of 100 meters apart throughout the banding stations. Counts were conducted for five minutes in which all birds seen or heard were recorded. Counts were run after net set up each morning permitted by weather and avian abundance. Point counts were canceled on extremely high wind or high bird activity days.

Each station kept a daily Bird List to document presence/absence for the site. This method complements the banding and point counts by acknowledging all species seen on a given day. This assists in rare species documentation and provides more complete information on arrival and departure dates for all species.

RESULTS AND DISCUSSION

SPRING

Spring migration was monitored, weather permitting, daily in the Navarre Unit and when personnel were available at the Shaker Lakes, Creek Bend, and Petersburg sites in 2010. Early April temperatures were above average but the last half of April was well below average temperature and resulted in a very poor first wave. There was a strong warm front at the end of April and beginning of May that saw increased migration. May temperature was below average early with a major warm front 14-15 May bringing large numbers of birds. June was variable in temperature. Overall, 2010 was marked by extremely poor migration and bird volume from mid April to June.

Through our research, we have found large numbers of Neotropical and short-distance migrants arrive in three "waves". The first wave is dominated by male White-throated Sparrow, Hermit Thrush, male Myrtle Warbler, and male Ruby-crowned Kinglet, and occurs around 24 April. In 2010, this wave was extremely weak peaking 30 April - 01 May. The second wave occurs 07-13 May and is represented by the greatest species diversity of the spring. It is dominated by female White-throated Sparrow, Swainson's Thrush, female Myrtle Warbler, female Ruby-crowned Kinglet, and male Magnolia Warbler. A second pulse of this wave comes five to seven days later, and usually has the largest volume and contains the same dominant species. This second wave was poor and occurred 05-07 May with a stronger second pulse on 14-16 May in 2010. The third wave normally comes around Memorial Day weekend and is dominated by female Magnolia Warbler, American Redstart, Mourning Warbler, vireos, and flycatchers. In 2010, the third wave appeared 22-23 May with a slight

second pulse 31 May.

Navarre Banding Station, Ottawa County, Ohio (413-0830)

In spring 2010, the Navarre banding station was operated on 51 days for 6,987.5 net hours. Including hummingbirds, 5,029 new birds were banded and a total of 6,059 birds handled (Table 1). The capture rate was 86.7 birds/100 net hours. Ninety-nine species were banded in Navarre during spring 2010 (Table 2). The most unusual species and subspecies included Red-bellied Woodpecker, Cerulean Warbler, Pine Warbler, Whip-poor-will, and the second Cooper's Hawk for this site. The ten most abundant species banded were Gray Catbird (429), White-throated Sparrow (426), Magnolia Warbler (396), Yellow Warbler (270), Traill's (Alder/Willow) Flycatcher (217), Common Yellowthroat (209), Swainson's Thrush (194), Myrtle Warbler (182), Nashville Warbler (169), and American Redstart (146).

Point counts were initiated in 1995 as a part of the data collection at the Navarre site. These counts provide the best data for larger birds not sampled by mist nets. Point counts were conducted on 48 days during spring 2010. One hundred and thirty-seven species and 29,239 individuals were recorded (Table 3). Northern Cardinal, Red-winged Blackbird, Common Grackle, Tree Swallow, and Brown-headed Cowbird were observed each count day. The most abundant species recorded was Blue Jay (7,543) followed by Red-winged Blackbird (4,861), Canada Goose (2,040), Tree Swallow (1,410), and Cedar Waxwing (1,339).

Creek Bend Banding Station, Sandusky County, Ohio (412-0832)

This site permits comparison to the Lake Erie coastal sites as a riverine travel lane. 2010 was the 3rd year of data collection at this site. Banding operations were conducted on 20 days with 201 new birds banded in 737 net hours (27.3 birds/100 net hours) (Table 4). Forty-eight species (Table 5) were banded with the ten most abundant species being American Goldfinch (28), White-throated Sparrow (19), Yellow Warbler (14), Gray Catbird (13), Swamp Sparrow (10), Common Yellowthroat (10), House Wren (10), Indigo Bunting (7), Ruby-crowned Kinglet (7), and Song Sparrow (6).

Petersburg Banding Station, Monroe County, Michigan (415-0833)

This site is located west of Lake Erie and north of Toledo and permits comparison to the Lake Erie sites as birds migrate around the lake and disperse through the landscape. 2010 was the 16th year of banding at this site. Banding operations were conducted on four days with 57 new birds banded in 595 net hours (9.6 birds/100 net hours) (Table 6). Nineteen species (Table 7) were banded with the five most abundant species banded being American Robin (17), Northern Cardinal (8), Gray Catbird (7), Common Grackle (4), and Slate-colored Junco (3).

Point counts were conducted on four days during spring 2010. Twenty-eight species with 153 individuals were recorded (Table 8). American Robin, Northern Cardinal, Common Grackle, Field Sparrow, Black-capped Chickadee, and American Crow were observed each count day. The most

abundant species recorded was American Robin (27) followed by Common Grackle (19), Northern Cardinal (16), Field Sparrow (13), and Ring-necked Pheasant (10).

Shaker Lakes Banding Station, Cuyahoga County, Ohio (412-0813)

This site is located east of Cleveland at the Nature Center of Shaker Lakes and 2010 was the ninth year of the banding operation. This site permits comparison to western Lake Erie sites as birds migrate along Lake Erie and disperse through the landscape. Banding operations were conducted Mondays, Wednesdays, and Fridays and were conducted on twenty-one days, with 236 new birds banded in 693.3 net hours (34.0 birds/100 net hours). A total of 357 birds were handled (51.5 birds/100 net hours) during spring migration (Table 9). Fifty-one species (Table 10) were banded with the ten most abundant species banded being Gray Catbird (23), White-throated Sparrow (19), Magnolia Warbler (16), Ruby-crowned Kinglet (14), Nashville Warbler (13), Northern Waterthrush (13), American Goldfinch (11), American Robin (10), Swainson's Thrush (9), Song Sparrow (7), Red-eyed Vireo (7), and Common Yellowthroat (7).

Point counts were conducted on 21 days during spring 2010. Fifty-seven species with 1,071 individuals were recorded (Table 11). The most abundant species recorded was American Goldfinch (112) followed by American Robin (91), Red-winged Blackbird (77), Song Sparrow (68), and Rock Pigeon (62).

FALL

Fall migration starts in July for many species and some breeding Neotropical migrants (e.g., Yellow Warbler) have left the study area by mid-August. Average fall temperatures were normal but there was considerably more fluctuation with highs and lows in September and October. Late October temperatures were well above average. Fall bird migration is dominated by different stimuli than in spring. Weather conditions appear less important and food availability appears to be a key factor.

Navarre Banding Station, Ottawa County, Ohio (413-0830)

The Navarre main station was operated 63 days for 7,942.8 net hours. Four thousand seven hundred and eighty-four birds were banded with a total of 6,058 birds handled including recaptures (Table 12). This was the 18th fall season in which an extensive netting effort had been conducted on a daily basis. The capture rate for 2010 was 76.3 birds/100 net hours (+16% from 2009). A total of 86 species were banded during fall 2010 (Table 13). The ten most abundant species banded were Swainson's Thrush (679), Blackpoll Warbler (656), White-throated Sparrow (348), Golden-crowned Kinglet (293), Gray-cheeked Thrush (264), Gray Catbird (263), Hermit Thrush (240), Myrtle Warbler (197), Magnolia Warbler (165), and Ovenbird (116).

Fall point counts were conducted on 53 days during 2010. A total of 23,191 individuals of 105 species were recorded (Table 14). The Northern Cardinal was observed on all count days. The most

abundant species were Red-winged Blackbird (11,551), Canada Goose (1,928), European Starling (1,628), Common Grackle (1,084), and White-throated Sparrow (789).

For the 18th year, additional nets were run on an active beach ridge just outside the lake front dike near the main study site. This ridge has one band of 50-60 feet tall Cottonwoods about 40 feet wide and 100 yards long. The ridge presents an opportunity to document avian use as the habitat matures. This ridge has seen considerable loss of sand the past four years with a major narrowing of the vegetated portion resulting in reduced habitat with higher levels of Lake Erie. In 2010, five nets were run on 46 days for 1,336.2 net hours (Table 15). The capture rate for fall 2010 was 105.5 birds/100 net hours. One thousand four hundred and fifteen birds of 66 species were banded on the beach ridge (Table 16). The top ten species banded were Blackpoll Warbler (352), Golden-crowned Kinglet (180), Ruby-crowned Kinglet (151), Gray Catbird (68), White-throated Sparrow (66), Swainson's Thrush (65), Tennessee Warbler (41), Common Yellowthroat (40), Magnolia Warbler (35), Nashville Warbler (31), and Hermit Thrush (31).

Creek Bend Banding Station, Sandusky County, Ohio (412-0832)

Banding operations were conducted on 33 days with 2,639 new birds banded in 1,434.5 net hours (184.0 birds/100 net hours) (Table 17). Sixty-two species (Table 18) were banded with the ten most abundant species being American Goldfinch (1,141), Song Sparrow (225), Indigo Bunting (204), White-throated Sparrow (132), Myrtle Warbler (116), Chipping Sparrow (90), Golden-crowned Kinglet (63), Field Sparrow (51), Nashville Warbler (50), and Ruby-crowned Kinglet (49). The large volume of American Goldfinches banded at this site was a direct result of a 5 acre patch of forbs and second year sunflowers next to the banding station. This food plot was part of the County Park District land management plan for the year. Changes to this management rotation will affect species captured and will need to be documented on an annual basis to interpret banding results over time.

Petersburg Banding Station, Monroe County, Michigan (415-0833)

Banding operations were conducted on 2 days with 55 new birds banded in 338.3 net hours (16.3 birds/100 net hours) (Table 19). A total of 67 birds were handled (19.8 birds/100 net hours). Twenty-five species (Table 20) were banded with the three most captured species being Golden-crowned Kinglet (7), Magnolia Warbler (6), and Black-capped Chickadee (5).

Point counts were conducted on 2 days during fall 2010. Twelve species with 341 individuals were recorded (Table 21). Blue Jay, American Crow, and American Robin were observed each count day. The most abundant species recorded was American Robin (148) and Blue Jay (122)

Shaker Lakes banding Station, Cuyahoga County, Ohio (412-0813)

Banding operations were carried out on Mondays, Wednesdays, and Fridays and were conducted on thirty days with 824 new birds banded in 885 net hours (93.1 birds/100 net hours). A total of 968 birds were handled (109.4 birds/100 net hours) during fall migration (Table 22). Sixty-two species

(Table 23) were banded with the ten most abundant species being Swainson's Thrush (89), White-throated Sparrow (82), Myrtle Warbler (64), Golden-crowned Kinglet (60), Magnolia Warbler (58), Ruby-crowned Kinglet (44), Gray Catbird (42), Nashville Warbler (31), Hermit Thrush (28), and American Redstart (24).

Point counts were conducted on 30 days during fall 2010. Fifty-four species and 1,133 individuals were recorded (Table 24). The most abundant species recorded was Chimney Swift (253) followed by American Goldfinch (130), Rock Pigeon (118), American Robin (77), and Song Sparrow (52).

SUMMARY BANDINGS

Total combined bandings for passerine migration 2010 for the Black Swamp Bird Observatory is shown in parentheses in Table 25. Totals before parentheses are for the National Wildlife Refuge complex. The ten most abundant species banded on Ottawa NWR complex were Blackpoll Warbler (1,033), Swainson's Thrush (938), White-throated Sparrow (840), Gray Catbird (760), Magnolia Warbler (596), Golden-crowned Kinglet (505), Yellow Warbler (378), Hermit Thrush (368), Common Yellowthroat (359), and Ruby-crowned Kinglet (354). Inclusive totals of all sites were topped by American Goldfinch (1,231), White-throated Sparrow (1,095), Blackpoll Warbler (1,051), Swainson's Thrush (1,050), Gray Catbird (882), Magnolia Warbler (695), Golden-crowned Kinglet (632), Myrtle Warbler (584), Ruby-crowned Kinglet (470), and Hermit Thrush (423). A combined total of 114 species of 15,240 individuals (72.8 birds/100 net hrs) were banded. Totals for each study site and for each season are shown in Table 26. Species with greater than 50 individuals sampled had age ratios generally higher than 2009 (Table 27).

RETURNS AND RECOVERIES

A long term study of this type has an added benefit to develop return rates and survival rates over time. One assumption that has not been verified is that passerines often return to the same breeding grounds to nest. There is substantial evidence for this but more research is needed to confirm the rate of this phenomenon. There is less evidence available regarding site fidelity to migration stopover sites. During 2010, 273 birds of 20 species were captured as returning birds at the Navarre sites (Table 28). This total includes 53 Yellow Warblers with the oldest being banded in 2004, 77 Gray Catbirds, 26 Common Yellowthroats (oldest from 2004), 27 Red-winged Blackbird (oldest from 2001), 31 Northern Cardinals (oldest from 1999), and 12 Baltimore Orioles. The long term study at Navarre has resulted in state longevity records for the Yellow Warbler, Prothonotary Warbler, Warbling Vireo, Eastern Wood Pewee, Brown Creeper, Northern Waterthrush, Ovenbird, Great-crested Flycatcher, Cedar Waxwing, and Hermit Thrush. The Yellow Warbler record surpasses the species record as reported by the Bird Banding Laboratory. Continued analysis in this area will hopefully shed some light on turnover rate and site fidelity in some species. An additional 62 birds of 17 species were return captures at Shaker Lakes in 2010 (Table 29). A Gray Catbird was captured that were first banded in 2004. A Northern Cardinal banded at Navarre during the fall 2009 was captured at Shaker Lakes spring 2010. Creek Bend has had little earlier field work but had 50 individuals of 15 species return from 2008 and 2009 bandings (Table 30). Petersburg had 6 returns of 5 species (Table

31). One Gray Catbird was captured that was banded in 2004. Several foreign captures were made of study birds and are reported in Table 32. In addition, one foreign banded bird was captured during the 2010 study year. A Philadelphia Vireo (band number 2610-81396) captured 30 September in Navarre was banded near Long Point, Ontario on 18 September 2010.

ENERGETIC CONDITION

The relationship between energetic condition during migration and breeding success is not well known in passerines. There are many factors that could affect the amount of fat a bird may carry at any given time. We are collecting data on several factors that may affect lipid deposition, but it will be several years before those trends may be tied to productivity. For 2010, 35 species (Table 33) had adequate sample sizes in both 2009 and 2010 to look at the changes in average fat deposits during spring migration. There was considerable variability in species when comparing 2009 and 2010. Twenty species indicated higher fat deposits in 2010 and 13 in 2009.

For passerines it is extremely difficult to acquire an adequate sample of breeding pairs to assess annual production on the breeding grounds. Considerable work has been conducted on larger species, especially waterfowl, on the relationship of spring body condition and reproductive success that breeding season. One method of assessing annual production in passerines is to compare fall age ratios (e.g. production) to spring migration body condition where an adequate sample may be acquired. Of 11 species with adequate sample sizes of spring fat and fall age ratios, nine appeared to show a similar trend in fat between 2009 and 2010 and the percent change in age ratios for these species between the two years. This relationship will be monitored for potential usefulness in assessing species productivity.

In 2010, fall fat composition had a tendency to be lower than in 2009 in 16 of 18 species with 11 species significantly lower ($p < .05$) (Table 34).

DISCUSSION

Black Swamp Bird Observatory has conducted bird migration monitoring research in the Lake Erie Marsh Region for more than 20 years. This project paints an interesting picture for the spring of 2010. At our primary songbird banding station in the Navarre Marsh unit of Ottawa National Wildlife Refuge bird numbers were alarmingly low at slightly more than 5,000 banded. The Navarre Marsh banding station has averaged almost 8,000 birds banded each spring since 1989. This result was also observed at the stations near Cleveland and inland in Sandusky County.

Feedback from banding stations from Minnesota eastward across the Great Lakes show similar outcomes; major reductions in captures. Similar reports from the east and gulf coasts indicate near average numbers but nothing that would account for a major longitudinal shift from the largest concentrations in the country.

Comparing species predominant migrational pathways, 2010 numbers show the biggest reduction in species crossing the Gulf or coming from the Caribbean. Species that primarily circumvent the Gulf

by migrating up through Mexico such as Mourning, Nashville, Wilson's, and Canada Warblers and Yellow-bellied Flycatchers were below average as well, but not by the significant margins of those species using the other two passage strategies.

Fall migration showed a complete contrast and represented one of the better migrations recorded since the beginning of the study. Captures were elevated across the species spectrum at all sites. Age ratios did not demonstrate any clear difference compared to the long-term as would be expected based on the poor spring numbers. If actual population numbers were down in northward passage it would be expected that species would increase production to counter the population reduction; however age ratios during fall 2010 did not support this. The excellent fall migration would indicate a good spring migration in 2011 if past history is indicative to movements.

ENVIRONMENTAL EDUCATION

A secondary goal of this study is to educate the general public on avian migration, research, habitat management, and ecosystems. During 2010, project personnel entertained 14 groups at Navarre and the Black Swamp Bird Observatory Nature Center educating 863 individuals on migration and banding. In addition, three presentations were made to 110 people on avian ecology and migration. As a part of International Migratory Bird Day events, banding demonstrations were presented on the Magee Marsh State Wildlife Area for some 13,000 people.

MANAGEMENT RECOMMENDATIONS

Adequate stopover habitat is a necessity if migrating birds are to successfully reach breeding and wintering home ranges each year. While the Lake Erie marsh region may contain extremely important breeding habitats for some species, it is of much greater importance in meeting migration stopover needs. The combination of quality marshland, scrub-shrub upland and swamps, and wooded beach ridges provide food, water, and shelter for migrants. Intensively managed wetlands form the base for this habitat complex in the Lake Erie Marsh Region. The invertebrate populations required by the massive bird movement are born from these wetlands and shelters in the scrub and on beach ridges. This scrub-shrub and beach ridge habitat provides shelter from weather and protection from predators as well as their food source. Gray Dogwood dominates the shrub habitat providing vast surface area for invertebrates as well as fall migrating birds. Any management scheme at this latitude needs to recognize the over-riding importance of the region as stopover habitat for migrants. With the exception of the Gulf coast, no other region of eastern North America can demonstrate concentrations of avian migrants like Lake Erie's coast.

Management of these habitats needs to ensure protection of the remaining beach ridges and to provide both healthy wetlands and adequate shrub habitat. The mature forests of the Great Black Swamp once held many breeding species, but this habitat should not be a management priority. While migrational needs can be addressed in concentrated habitat units, to meet acreage requirements to influence breeding volume is presently beyond management resources. Wetland and moist soil habitats need to be managed to ensure water inundation during critical spring months to provide the substrate required for abundant invertebrate production. A well planned rotation of management units must be incorporated for summer and fall management plans to accommodate the habitat needs of the different migrant species, including deep water marshes, shallow water marshes, and moist soil areas.

Shrub and grassland habitat management should consider migration as well as breeding needs. Management scenarios should also include food and cover during migration as well as protection during breeding season. Dike systems should be designed to incorporate scrub borders to provide travel lanes for migrants to mimic the limited beach ridges and to augment passerine breeding in shrub management units. Research has not been conducted to determine to what extent dike nesting success may influence overall regional avian production. This needs to be assessed to fully examine this habitat use. In theory, dikes should be looked to as additional habitat for breeders spilling over from more productive shrub habitat blocks. Scrub-shrub habitats need to be maintained to provide adequate surface area for invertebrates, cover for migrant and breeders, and to encourage fruit production for fall migration. This will require periodic rejuvenation of units on a rotational basis.

Wise management of wetlands, shrub, grasslands, and riparian woodlands will not only benefit passerines on a year-round basis, but will also enhance other avian groups, mammals, reptiles, amphibians, and native plant associations.

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Table 1. Daily banding totals for Navarre, spring 2010.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
401	80.5	37	45.96	1	0	38	47.21
402	88.17	34	38.56	1	2	37	41.96
412	92	31	33.7	3	0	34	36.96
414	92	21	22.83	3	2	27	29.35
415	141.83	45	31.73	1	3	49	34.55
416	61.41	19	30.94	0	1	20	32.57
417	109	33	30.28	2	0	35	32.11
419	128.11	20	15.61	1	8	31	24.2
420	105.11	21	19.98	1	6	29	27.59
421	109.25	24	21.97	0	4	29	26.55
422	115	19	16.52	4	9	34	29.57
423	132.25	27	20.42	0	8	37	27.98
424	RAIN						
425	126.5	71	56.13	1	11	83	65.61
426	RAIN						
427	138	54	39.13	2	11	68	49.28
428	138	43	31.16	2	13	58	42.03
429	153.41	84	54.76	2	0	86	56.06
430	138	140	101.45	2	0	142	102.9
501	164.68	141	85.62	5	1	147	89.26
502	132.25	43	32.51	8	1	52	39.32
503	138	78	56.52	2	0	80	57.97
504	141.68	74	52.23	2	4	81	57.17
505	157.09	197	125.41	7	2	207	131.77
506	185.92	200	107.57	9	11	220	118.33
507	147.58	139	94.19	10	17	166	112.48
508	80.5	76	94.41	4	17	97	120.5
509	161	107	66.46	16	42	165	102.48
510	153.41	70	45.63	8	48	126	82.13
511	RAIN						
512	184	125	67.94	14	33	174	94.57
513	145.59	103	70.75	6	32	141	96.85
514	187.83	670	356.71	6	17	693	368.95
515	199.41	396	198.59	5	54	456	228.68
516	164.83	149	90.4	11	59	220	133.47
517	134.17	93	69.32	3	68	166	123.72
518	RAIN						
519	184	103	55.98	11	86	201	109.24
520	153.41	156	101.69	9	20	185	120.59
521	115	139	120.87	10	15	164	142.61
522	191.59	453	236.44	5	16	475	247.93
523	161	170	105.59	8	30	208	129.19
524	145.59	94	64.57	0	23	118	81.05
525	147.58	70	47.43	4	17	93	63.02
526	147.58	95	64.37	3	10	108	73.18
527	141.83	44	31.02	5	15	64	45.12
528	122.59	23	18.76	2	10	35	28.55
529	159.08	23	14.46	5	10	39	24.52
530	130.41	19	14.57	4	3	26	19.94
531	130.41	66	50.61	2	4	72	55.21
601	132.25	44	33.27	6	6	56	42.34
602	97.75	45	46.04	3	3	51	52.17
603	138	50	36.23	5	7	62	44.93
604	126.5	24	18.97	1	8	33	26.09
TOTAL	6987.46	5029	71.97	229	777	6059	86.71

* Total birds include Brown-headed Cowbirds and European Starlings released unbanded.

Table 2. Spring banding totals, Navarre, 2010.

Species	Banded	Species	Banded	Species	Banded
American Woodcock	1	Fox Sparrow	11	Blackpoll Warbler	25
Sharp-shinned Hawk	3	Eastern Towhee	5	Blackburnian Warbler	11
Cooper Hawk	1	Northern Cardinal	49	Black-th.-Green Warbler	13
Black-billed Cuckoo	3	Rose-breasted Grosbeak	10	Pine Warbler	1
Downy Woodpecker	4	Indigo Bunting	53	Western Palm Warbler	55
Yellow-bellied Sapsucker	4	Scarlet Tanager	2	Ovenbird	126
Red-bellied Woodpecker	1	Purple Martin	2	Northern Waterthrush	110
Yellow-shafted Flicker	4	Barn Swallow	1	Kentucky Warbler	1
Whip-poor-will	1	Tree Swallow	16	Connecticut Warbler	3
Ruby-th. Hummingbird	35	Cedar Waxwing	4	Mourning Warbler	90
Eastern Kingbird	4	Red-eyed Vireo	59	Common Yellowthroat	209
Great-crested Flycatcher	11	Philadelphia Vireo	1	Yellow-breasted Chat	3
Eastern Phoebe	2	Warbling Vireo	25	Hooded Warbler	8
Eastern Wood Pewee	19	Yellow-throated Vireo	1	Wilson's Warbler	136
Yellow-bellied Flycatcher	92	Blue-headed Vireo	7	Canada Warbler	102
Acadian Flycatcher	14	White-eyed Vireo	6	American Redstart	146
Trail's Flycatcher	217	Black and White Warbler	53	Gray Catbird	429
Least Flycatcher	54	Prothonotary Warbler	9	Brown Thrasher	16
Blue Jay	25	Worm-eating Warbler	2	Carolina Wren	5
Red-winged Blackbird	137	Blue-winged Warbler	6	House Wren	63
Orchard Oriole	2	Golden-wing. Warbler	2	Winter Wren	6
Baltimore Oriole	26	Nashville Warbler	169	Brown Creeper	16
Rusty Blackbird	1	Orange-crowned Warbler	8	Red-breasted Nuthatch	1
Common Grackle	11	Tennessee Warbler	59	Black-capped Chickadee	3
American Goldfinch	22	Northern Parula	6	Golden-crowned Kinglet	32
White-crowned Sparrow	56	Cape May Warbler	4	Ruby-crowned Kinglet	95
White-throated Sparrow	426	Yellow Warbler	270	Blue-gray Gnatcatcher	17
Chipping Sparrow	2	Black-th.-Blue Warbler	21	Wood Thrush	26
Field Sparrow	11	Myrtle Warbler	182	Veery	53
Slate-colored Junco	12	Magnolia Warbler	396	Gray-cheeked Thrush	47
Song Sparrow	17	Cerulean Warbler	1	Swainson's Thrush	194
Lincoln Sparrow	75	Chestnut-sided Warbler	73	Hermit Thrush	97
Swamp Sparrow	49	Bay-breasted Warbler	11	American Robin	24

Table 3. Number of days observed and totals of species seen on point counts, Navarre spring 2010.

Species	# days	#Observed	Species	# days	#Observed	Species	# days	#Observed
Pied-billed Grebe	16	28	Alder Flycatcher	3	3	Golden-winged Warbler	1	1
Herring Gull	35	138	Willow Flycatcher	17	53	Nashville Warbler	17	79
Ring-billed Gull	35	114	Traill's Flycatcher	3	4	Tennessee Warbler	19	120
Bonaparte's Gull	3	8	Least Flycatcher	13	38	Northern Parula	2	4
Caspian Tern	1	1	Blue Jay	43	7543	Cape May Warbler	8	13
Common Tern	1	1	E. Starling	47	492	Yellow Warbler	34	1008
Dou.-cr. Cormorant	24	225	Bobolink	6	9	Black-th.-Blue Warbler	11	16
Hooded Merganser	4	4	Brown-headed Cowbird	48	563	Myrtle Warbler	21	133
Mallard	21	76	Yellow-head. Blackbird	1	1	Magnolia Warbler	17	108
Gadwall	5	20	Red-winged Blackbird	48	4861	Chestnut-sided Warbler	20	49
Blue-winged Teal	1	1	Eastern Meadowlark	1	1	Bay-breasted Warbler	5	6
Northern Shoveler	1	1	Orchard Oriole	5	7	Blackpoll Warbler	19	56
Wood Duck	41	262	Baltimore Oriole	34	487	Blackburnian Warbler	9	14
Lesser Scaup	2	42	Rusty Blackbird	20	249	Black-th.-Green Warbler	13	20
Canada Goose	46	2040	Common Grackle	48	958	Pine Warbler	3	3
Trumpeter Swan	5	16	Purple Finch	6	24	W. Palm Warbler	12	25
Gr.-blue Heron	44	190	Am. Goldfinch	44	560	Prairie Warbler	1	1
Great Egret	18	33	White-cr. sparrow	8	15	Ovenbird	19	71
Black-cr. N. Heron	1	1	White-th. Sparrow	34	635	No. Waterthrush	21	82
Virginia Rail	6	10	Field Sparrow	2	2	Connecticut Warbler	1	1
Sora	4	6	Slate-colored Junco	5	22	Mourning Warbler	11	17
Am. Coot	2	2	Song Sparrow	44	182	Com. Yellowthroat	34	201
Solitary Sandpiper	4	6	Lincoln Sparrow	6	12	Hooded Warbler	2	2
Killdeer	9	10	Swamp Sparrow	22	75	Wilson's Warbler	13	47
Mourning Dove	21	50	Fox Sparrow	5	30	Canada Warbler	11	24
Northern Harrier	1	1	Eastern Towhee	15	24	American Redstart	20	73
Sharp-sh.. Hawk	2	3	No. Cardinal	48	749	Gray Catbird	33	666
Red-tailed Hawk	1	1	Rose-br. Grosbeak	19	52	Brown Thrasher	31	59
Bald Eagle	9	20	Indigo Bunting	27	103	Carolina Wren	24	32
Peregrine Falcon	1	1	Scarlet Tanager	14	22	House Wren	35	199
Yellow-billed Cuckoo	10	18	Summer tanager	1	1	Marsh Wren	9	15
Black-billed Cuckoo	11	20	Purple Martin	29	156	Brown Creeper	2	2
Belted Kingfisher	1	1	Cliff Swallow	4	9	Black-capped Chickadee	4	6
Downy Woodpecker	20	46	Barn Swallow	29	186	Golden-crowned Kinglet	3	31
Yellow-bell. Sapsuck.	3	3	Tree Swallow	48	1410	Ruby-crowned Kinglet	21	121
Red-h. Woodpecker	1	1	Bank Swallow	17	158	Blue-gray Gnatcatcher	21	53
Red-b. Woodpecker	8	12	Rough-winged Swallow	10	20	Wood Thrush	12	31
Yellow-shafted Flicker	28	82	Cedar Waxwing	19	1339	Veery	9	29
Common Nighthawk	1	1	Loggerhead Shrike	1	1	Gray-cheeked Thrush	8	17
Chimney Swift	14	46	Red-eyed Vireo	26	147	Swainson's Thrush	22	77
Ruby-th. Humming.	10	14	Warbling Vireo	29	136	Hermit Thrush	5	9
Eastern Kingbird	15	24	Yellow-th. Vireo	2	2	American Robin	46	250
Olive-sided Flycatcher	1	1	Blue-headed Vireo	8	10	Eastern Bluebird	1	1
Great-cr. Flycatcher	13	21	White-eyed Vireo	7	11	Unk. warbler	22	307
E. Wood Pewee	16	37	Black & White Warbler	23	78	Unk. Flycatcher	1	1
Yellow-bel. Flycatcher	2	2	Prothonotary Warbler	30	72			
Acadian Flycatcher	3	3	Blue-winged Warbler	2	2			

Table 4. Daily banding totals for Creek Bend, spring 2010.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds	Total bird/ 100 net hr
419	38	1	2.63	0	0	1	2.63
420	38	3	7.89	0	0	3	7.89
421	40	4	10	1	0	5	12.5
422	40	3	7.5	3	1	7	17.5
423	40	6	15	0	1	7	17.5
428	25	11	44	0	0	11	44
429	44	9	20.45	1	2	12	27.27
430	40	9	22.5	0	0	9	22.5
504	44	25	56.82	2	1	28	63.64
505	44	12	27.27	1	1	14	31.82
506	44	28	63.64	5	3	36	81.82
507	10	4	40	1	1	6	60
510	48	19	39.58	5	2	26	54.17
512	12	6	50	0	2	8	66.67
517	24	13	54.17	0	2	15	62.5
520	30	11	36.67	4	3	18	60
524	44	8	18.18	1	1	10	22.73
525	44	13	29.55	0	3	16	36.36
526	44	7	15.91	2	2	11	25
527	44	9	20.45	3	5	17	38.64
TOTAL	737	201	27.27	29	30	260	35.28

Table 5. Daily banding totals Creek Bend, spring, 2010.

Species	Banded	Species	Banded	Species	Banded
Solitary Sandpiper	1	Lincoln Sparrow	4	Northern Waterthrush	2
Great-crested Flycatcher	1	Swamp Sparrow	10	Mourning Warbler	2
Eastern Wood-pewee	2	Northern Cardinal	1	Common Yellowthroat	10
Yellow-bellied Flycatcher	1	Rose-breasted Grosbeak	1	Canada Warbler	3
Trail's Flycatcher	4	Indigo Bunting	7	Gray Catbird	13
Least Flycatcher	1	Barn Swallow	2	Brown Thrasher	2
Red-winged Blackbird	1	Cedar Waxwing	4	House Wren	10
Orchard Oriole	2	Red-eyed Vireo	2	White-breasted Nuthatch	1
Baltimore Oriole	3	Warbling Vireo	2	Tufted Titmouse	1
Rusty Blackbird	1	Yellow-throated Vireo	1	Ruby-crowned Kinglet	7
Common Grackle	1	Nashville Warbler	3	Blue-gray Gnatcatcher	1
American Goldfinch	28	Tennessee Warbler	2	Wood Thrush	2
White-crowned Sparrow	3	Yellow Warbler	14	Swainson's Thrush	3
White-throated Sparrow	19	Myrtle Warbler	4	Hermit Thrush	1
Field Sparrow	5	Western Palm Warbler	3	American Robin	1
Song Sparrow	6	Ovenbird	1	Eastern Bluebird	2

Table 6. Daily banding totals for Petersburg, spring 2010.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds	Total bird/ 100 net hr
403	108.33	12	11.08	0	0	12	11.08
410	123.33	11	8.92	0	0	11	8.92
504	183.33	10	5.45	0	4	14	7.64
523	180	24	13.33	0	7	31	17.22
TOTAL	594.99	57	9.58	0	11	68	11.43

Table 7. Daily banding totals Petersburg, spring, 2010.

Species	Banded	Species	Banded	Species	Banded
Downy Woodpecker	2	Slate-colored Junco	3	Brown Creeper	2
Blue Jay	1	Song Sparrow	1	Black-capped Chickadee	1
Brown-headed Cowbird	2	Northern Cardinal	8	Golden-crowned Kinglet	1
Common Grackle	4	Nashville Warbler	1	Gray-cheeked Thrush	1
White-throated Sparrow	1	Northern Waterthrush	2	Swainson's Thrush	1
Chipping Sparrow	1	Gray Catbird	7	American Robin	17
Field Sparrow	1				

Table 8. Point count days conducted and species totals, spring season, Petersburg, 2010.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Ring-billed Gull	1	2	Am. Crow	4	6	Barn Swallow	1	1
Wood Duck	1	2	Br.-headed Cowbird	1	3	Warbling Vireo	1	1
Canada Goose	3	5	Common Grackle	4	19	Yellow Warbler	2	3
Great Blue Heron	1	2	Am. Goldfinch	1	3	Gray Catbird	1	4
Ring-necked Pheasant	2	10	White-th. Sparrow	1	2	Brown Thrasher	2	3
Killdeer	1	2	Field Sparrow	4	13	White-br. Nuthatch	1	1
Mourning Dove	2	4	Slate-colored Junco	1	5	Black-cap Chickadee	4	5
Downy woodpecker	1	1	Eastern Towhee	1	2	American Robin	4	27
Yellow-sh. Flicker	1	3	No. Cardinal	4	16	E. Bluebird	1	1
Blue Jay	3	7						

Table 9. Daily banding totals for Shaker Lakes, spring 2010.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds	Total bird/ 100 net hr
419	31.5	9	28.57	8	0	17	53.97
421	30	7	23.33	3	0	10	33.33
423	30.5	6	19.67	3	4	13	42.62
426	18.5	11	59.46	1	1	13	70.27
428	33	5	15.15	2	5	12	36.36
430	32	7	21.88	1	2	10	31.25
503	35	9	25.71	3	0	12	34.29
505	33.5	5	14.93	2	3	10	29.85
507	34	8	23.53	5	2	15	44.12
510	36	15	41.67	1	3	19	52.78
512	34.5	26	75.36	3	4	33	95.65
514	21.75	29	133.33	4	5	38	174.71
517	35	20	57.14	2	10	32	91.43
519	38.5	23	59.74	0	7	30	77.92
521	35	12	34.29	2	1	15	42.86
524	36	7	19.44	2	3	12	33.33
526	35.5	13	36.62	1	2	16	45.07
528	35	7	20	3	5	15	42.86
531	36.5	5	13.7	2	1	8	21.92
602	35.5	2	5.63	2	4	8	22.54
604	36	10	27.78	4	5	19	52.78
TOTAL	693.25	236	34.04	54	67	357	51.5

Table 10. Daily banding totals Shaker Lakes, spring 2010.

Species	Banded	Species	Banded	Species	Banded
Downy Woodpecker	2	Swamp Sparrow	6	Mourning Warbler	1
Great-crested Flycatcher	2	Northern Cardinal	5	Common Yellowthroat	7
Eastern Phoebe	3	Indigo Bunting	2	Wilson's Warbler	1
Eastern Wood Pewee	1	Red-eyed Vireo	7	Canada Warbler	2
Yellow-bellied Flycatcher	1	Warbling Vireo	1	American Redstart	6
Acadian Flycatcher	1	Blue-headed Vireo	1	Gray Catbird	23
Traill's Flycatcher	1	Black and White Warbler	2	Brown Thrasher	1
Blue Jay	1	Nashville Warbler	13	House Wren	1
Brown-headed Cowbird	3	Tennessee Warbler	1	Winter Wren	1
Red-winged Blackbird	4	Northern Parula	1	Tufted Titmouse	1
Baltimore Oriole	5	Yellow Warbler	4	Ruby-crowned Kinglet	14
Common Grackle	1	Myrtle Warbler	2	Blue-gray Gnatcatcher	1
American Goldfinch	11	Magnolia Warbler	16	Wood Thrush	6
White-crowned Sparrow	1	Chestnut-sided Warbler	6	Veery	2
White-throated Sparrow	19	Blackburnian Warbler	1	Gray-cheeked Thrush	2
Song Sparrow	7	Ovenbird	1	Swainson's Thrush	9
Lincoln Sparrow	3	Northern Waterthrush	13	American Robin	10

Table 11. Point count days conducted and species totals, spring season, Shaker Lakes, 2010.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Herring Gull	2	2	Blue Jay	6	11	Bay breasted Warbler	1	1
Mallard	7	9	Brown-head. Cowbird	12	20	Blk-th.-Green Warbler	2	2
Wood Duck	5	13	Red-wing . Blackbird	21	77	Northern Waterthrush	3	3
Canada Goose	8	59	Baltimore Oriole	14	29	Common Yellowthroat	1	1
Great Blue Heron	8	17	Common Grackle	5	5	Gray Catbird	14	37
Mourning Dove	6	11	American Goldfinch	20	112	House Wren	3	5
Rock Pigeon	13	62	Wh.-throated Sparrow	7	10	White-br. Nuthatch	4	4
Cooper's Hawk	2	2	Song Sparrow	21	68	Tufted Titmouse	13	23
Black-billed Cuckoo	1	1	No. Cardinal	21	71	Black-cap. Chickadee	18	33
Belted Kingfisher	2	2	Rose-br. Grosbeak	1	1	Ruby-cr. Kinglet	2	3
Hairy Woodpecker	5	7	Indigo Bunting	1	2	Blue-gray Gnatcatcher	2	2
Downy Woodpecker	6	7	Scarlet Tanager	4	5	Wood Thrush	11	19
Yellow-bellied Sapsu.	1	1	N. Rough-wing Swal.	7	12	Swainson's Thrush	4	7
Red -bell Woodpecker	17	31	Red-eyed Vireo	10	21	Hermit Thrush	1	1
Yell-shaft Flicker	3	4	Warbling Vireo	14	37	American Robin	20	91
Chimney Swift	7	12	Blk and White Warbler	1	1	Unk. Blackbird	2	12
Ru.-th. Hummingbird	3	4	Tennessee Warbler	2	2	Unk. Gull	10	15
Gr-cr Flycatcher	10	16	Yellow Warbler	14	33	Unk. Shorebird	1	2
Eastern Phoebe	9	9	Myrtle Warbler	1	2	Unk. Swallow	2	2
Olive-sided Flycatcher	1	1	Magnolia Warbler	2	3	Unk. Warbler	1	2
Eastern Wood Pewee	6	10	Chest.-sid. Warbler	2	3	Unk. Woodpecker	1	1

Table 12. Daily banding totals for Navarre, fall 2010.

Date	Net Hour	Banded	Banded/100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
704	99.6	63	63.25	7	14	84	84.34
714	92	50	54.35	1	7	59	64.13
725	103.5	88	85.02	3	6	97	93.72
803	107.41	27	25.14	2	8	37	34.45
823	138	32	23.19	1	0	33	23.91
824	99.59	15	15.06	0	1	16	16.07
825	122.59	13	10.6	1	4	18	14.68
826	122.59	18	14.68	0	2	20	16.32
827	134.17	40	29.81	0	1	41	30.56
828	118.68	38	32.02	0	7	45	37.92
829	118.68	31	26.12	0	8	39	32.86
830	126.5	24	18.97	0	6	30	23.72
831	109.25	35	32.04	0	6	41	37.53
901	107.4	22	20.48	0	4	26	24.21
902	122.59	61	49.76	0	11	72	58.73
903	124.43	52	41.79	0	8	60	48.22
904	115	46	40	0	5	51	44.35
905	143.75	76	52.87	0	11	87	60.52
906	143.75	62	43.13	0	9	71	49.39
907	113.08	36	31.84	0	9	45	39.8
908	132.25	75	56.71	0	26	101	76.37
909	122.59	85	69.34	0	12	97	79.13
910	134.17	72	56.66	0	16	88	65.59
911	111.17	64	57.57	0	10	74	66.57
912	130.41	106	81.28	0	15	121	92.78
913	120.75	115	95.24	1	15	131	108.49
914	143.75	170	118.26	1	17	188	130.78
915	124.58	133	106.76	0	18	151	121.21
916	134.17	66	49.19	0	21	87	64.84
917	155.25	117	75.36	1	34	152	97.91
918	136.08	160	117.58	0	39	199	146.24
919	149.5	59	39.47	0	26	86	57.53
920	132.25	55	41.59	0	41	96	72.59
921	130.41	79	60.58	0	24	103	78.98
922	138	102	73.91	0	22	124	89.86
923	138	99	71.74	1	23	123	89.13
924	143.75	117	81.39	0	20	137	95.3
925	139.92	127	90.77	1	37	165	117.93
926	141.83	130	91.66	0	33	163	114.93
927	107.41	27	25.14	0	19	46	42.83
928	RAIN						
929	159.08	139	87.38	0	32	171	107.49
930	164.83	116	70.38	0	42	158	95.86
1001	141.83	73	51.47	2	31	106	74.74
1002	RAIN						
1003	130.41	133	101.99	0	38	171	131.13
1004	157.17	185	117.71	0	36	221	140.61
1005	147.58	134	90.8	0	43	177	119.94
1006	139.15	92	66.12	2	33	127	91.27
1007	162.92	133	81.64	1	49	183	112.33
1008	145.59	110	75.56	0	32	142	97.53
1009	153.41	110	71.7	1	39	150	97.78
1010	185.37	121	65.28	1	23	145	78.22
1011	136.08	154	113.17	0	36	190	139.62
1012	126.5	85	67.19	0	34	119	94.07
1013	115	56	48.7	0	34	90	78.26
1014	126.5	38	30.04	0	25	63	49.8
1015	101.58	51	50.21	0	30	81	79.74
1016	143.75	92	64	0	27	120	83.48
1017	126.5	39	30.83	0	22	61	48.22
1020	101.58	17	16.74	0	19	36	35.44
1031	180.17	102	56.61	0	17	119	66.05
1103	69	17	24.64	1	6	24	34.78
TOTAL	7942.8	4784	60.23	28	1243	6058	76.27

* Total birds include Brown-headed Cowbirds and European Starlings released unbanded.

Table 13. Fall banding totals, Navarre 2010.

Species	Banded	Species	Banded	Species	Banded
American Woodcock	4	Song Sparrow	24	Ovenbird	116
Yellow-billed Cuckoo	5	Lincoln Sparrow	11	Northern Waterthrush	20
Downy Woodpecker	19	Swamp Sparrow	26	Connecticut Warbler	6
Yellow-bellied Sapsucker	6	Fox Sparrow	33	Mourning Warbler	13
Red-bellied Woodpecker	1	Eastern Towhee	1	Common Yellowthroat	110
Yellow-shafted Flicker	8	Northern Cardinal	61	Hooded Warbler	1
Ruby-th. Hummingbird	14	Rose-breasted Grosbeak	13	Wilson's Warbler	23
Great-crested Flycatcher	3	Indigo Bunting	3	Canada Warbler	11
Eastern Phoebe	5	Cedar Waxwing	32	American Redstart	95
Eastern. Wood Pewee	10	Red-eyed Vireo	61	Gray Catbird	263
Yellow-bellied Flycatcher	19	Philadelphia Vireo	5	Brown Thrasher	4
Acadian Flycatcher	2	Warbling Vireo	3	Carolina Wren	3
Traill's Flycatcher	3	Blue-headed Vireo	8	House Wren	23
Least Flycatcher	6	Black and White Warbler	31	Winter Wren	26
Blue Jay	6	Prothonotary Warbler	3	Marsh Wren	4
Red-winged Blackbird	11	Nashville Warbler	34	Brown Creeper	71
Orchard Oriole	2	Orange-crowned Warbler	4	White-breasted Nuthatch	1
Baltimore Oriole	15	Tennessee Warbler	55	Red-breasted Nuthatch	13
Rusty Blackbird	6	Northern Parula	2	Tufted Titmouse	1
Common Grackle	62	Cape May Warbler	40	Black-capped Chickadee	4
Purple Finch	5	Yellow Warbler	107	Golden-crowned Kinglet	293
American Goldfinch	1	Black-th.-Blue Warbler	74	Ruby-crowned Kinglet	108
Grasshopper Sparrow	1	Myrtle Warbler	197	Wood Thrush	8
White-crowned Sparrow	14	Magnolia Warbler	165	Veery	24
White-throated Sparrow	348	Chestnut-sided Warbler	17	Gray-cheeked Thrush	264
American Tree Sparrow	2	Bay-breasted Warbler	28	Swainson's Thrush	679
Chipping Sparrow	1	Blackpoll Warbler	656	Hermit Thrush	240
Field Sparrow	1	Blackburnian Warbler	1	American Robin	63
Slate-colored Junco	11	Black-th.-Green Warbler	11		

Table 14. Number of days observed and totals of species seen on point counts, Navarre fall 2010.

Species	# days	#Observed	Species	# days	#Observed	Species	# days	#Observed
Herring Gull	13	35	Eastern Kingbird	1	1	Bl. And Wh. Warbler	3	3
Ring-billed Gull	33	200	Eastern Phoebe	3	3	Tennessee Warbler	4	4
Bonaparte's Gull	5	13	Eastern Wood Pewee	6	7	Cape May Warbler	1	1
Caspian Tern	1	1	Willow Flycatcher	1	1	Myrtle Warbler	23	231
Forster's Tern	1	32	Horned Lark	2	5	Magnolia Warbler	18	24
D-c. Cormorant	4	11	Blue Jay	45	273	Chestnut-sided Warbler	1	1
Hooded Merganser	1	2	American Crow	1	1	Bay-breasted Warbler	1	2
Mallard	23	304	European Starling	49	1628	Blackpoll Warbler	35	172
American Black Duck	4	8	Brown-headed Cowbird	14	58	Blk.-th-green Warbler	1	1
Gadwall	7	22	Red-winged Blackbird	52	11551	Western Palm Warbler	1	1
American Wigeon	5	38	Baltimore Oriole	14	68	Ovenbird	9	12
Am. Green-winged Teal	1	1	Rusty Blackbird	13	322	No. Waterthrush	1	1
Blue-winged Teal	3	3	Common Grackle	51	1084	Common Yellowthroat	19	27
Northern Pintail	4	21	Purple Finch	9	20	Canada Warbler	2	2
Northern Shoveler	1	2	House Finch	3	5	American Redstart	8	11
Wood Duck	9	10	American Goldfinch	26	66	House Sparrow	1	1
Canada Goose	50	1928	Pine Siskin	11	16	Gray Catbird	44	286
Trumpeter Swan	3	3	White-cr. Sparrow	3	4	Brown Thrasher	12	15
Great- blue Heron	29	57	White-th. Sparrow	27	789	Carolina Wren	38	96
Great Egret	7	8	Slate-colored Junco	1	2	House Wren	12	15
Sora	1	1	Song Sparrow	14	21	Winter Wren	10	21
American Woodcock	2	2	Lincoln Sparrow	1	1	Brown Creeper	6	8
Solitary Sandpiper	1	1	Swamp Sparrow	3	3	White-br. Nuthatch	4	4
Lesser Yellowlegs	8	17	Fox Sparrow	3	7	Red-br. Nuthatch	21	49
Greater Yellowlegs	1	1	Eastern Towhee	9	24	Black.-cap. Chickadee	14	22
Killdeer	24	49	Northern Cardinal	53	567	Golden-cr. Kinglet	18	157
Mourning Dove	14	28	Rose-br. Grosbeak	18	28	Ruby-cr. Kinglet	9	47
Bald Eagle	13	16	Scarlet Tanager	1	1	Wood Thrush	1	1
Belted Kingfisher	2	2	Purple Martin	8	11	Veery	4	5
Downy Woodpecker	42	109	Barn Swallow	3	10	Gray-cheeked Thrush	23	164
Yellow-bel. Sapsucker	1	1	Tree Swallow	18	280	Swainson's Thrush	40	348
Red-bell. Wood.	5	10	Bank Swallow	4	13	Hermit Thrush	9	42
Yellow-sh. Flicker	20	29	Cedar Waxwing	46	523	American Robin	50	562
Common Nighthawk	1	1	Red-eyed Vireo	6	9	Unk. Finch	1	2
Chimney Swift	15	85	Philadelphia Vireo	1	1	Unk. Flycatcher	1	1
Ruby-th. Hummingbird	2	2	Warbling Vireo	14	20	Unk. Warbler	47	376

Table 15. Daily banding totals for Navarre Beach, fall 2010.

Date	Net Hour	Banded	Banded/100 nh	Returns	Recaptures	Total birds*	Totalbird/100nh
825	26.25	5	19.05	0	1	6	22.86
827	29.17	14	48	1	3	18	61.71
828	27.05	29	107.21	0	0	29	107.21
829	25.8	4	15.5	1	0	5	19.38
830	27.5	12	43.64	0	0	12	43.64
831	25.83	14	54.2	0	1	15	58.07
901	24.15	6	24.85	0	1	7	28.99
902	23.35	14	59.96	0	1	15	64.24
903	26.25	7	26.67	0	0	7	26.67
904	25	7	28	0	0	7	28
905	30	39	130	1	5	45	150
906	32.5	32	98.46	0	0	32	98.46
907	25	21	84	0	1	22	88
908	29.15	21	72.04	0	2	23	78.9
909	27.08	13	48.01	0	1	14	51.7
910	28.75	9	31.3	0	1	10	34.78
911	25.42	8	31.47	0	2	10	39.34
912	29.17	19	65.14	0	3	22	75.42
913	30	49	163.33	0	5	54	180
914	32.08	56	174.56	0	3	59	183.92
915	28.35	7	24.69	0	0	7	24.69
916	30	86	286.67	0	12	98	326.67
917	33.75	12	35.56	0	2	14	41.48
918	30	25	83.33	0	4	29	96.67
919	15	3	20	0	0	3	20
921	28.35	14	49.38	1	4	19	67.02
922	30	60	200	2	4	66	220
923	28.35	3	10.58	0	0	3	10.58
924	30.83	24	77.85	0	2	26	84.33
925	30.83	25	81.09	0	1	26	84.33
926	31.65	64	202.21	0	8	72	227.49
929	35.83	79	220.49	0	6	85	237.23
930	35.8	63	175.98	1	17	81	226.26
1001	30.8	8	25.97	0	2	10	32.47
1005	32.08	110	342.89	0	9	119	370.95
1006	31.25	85	272	0	17	102	326.4
1007	35	71	202.86	0	12	83	237.14
1008	32.5	59	181.54	1	14	74	227.69
1009	32.5	61	187.69	0	11	72	221.54
1010	32.92	31	94.17	0	8	39	118.47
1011	29.17	43	147.41	0	10	53	181.69
1013	28.35	28	98.77	0	6	34	119.93
1014	25.42	9	35.41	0	3	12	47.21
1016	42.08	35	83.18	0	11	46	109.32
1017	27.5	11	40	0	8	19	69.09
1020	18.35	20	108.99	0	1	21	114.44
TOTAL	1336.16	1415	105.9	8	202	1625	121.62

* Total birds include Brown-headed Cowbirds and European Starlings released unbanded.

Table 16. Fall banding totals, Navarre Beach 2010.

Species	Banded	Species	Banded	Species	Banded
Downy Woodpecker	4	Indigo Bunting	1	Pine Warbler	1
Yellow-shafted Flicker	2	Cedar Waxwing	5	Ovenbird	10
Ruby-th. Hummingbird	4	Red-eyed Vireo	10	Connecticut Warbler	1
Eastern Phoebe	10	Philadelphia Vireo	3	Common Yellowthroat	40
Eastern Wood Pewee	8	Warbling Vireo	23	Wilson's Warbler	11
Yellow-bellied Flycatcher	5	Blue-headed Vireo	1	Canada Warbler	3
Trail's Flycatcher	1	Black and White Warbler	7	American Redstart	16
Least Flycatcher	1	Prothonotary Warbler	1	Gray Catbird	68
Red-winged Blackbird	12	Nashville Warbler	31	Brown Thrasher	3
Baltimore Oriole	5	Orange-crowned Warbler	2	Carolina Wren	2
Common Grackle	7	Tennessee Warbler	41	House Wren	7
American Goldfinch	11	Northern Parula	6	Winter Wren	14
White-crowned Sparrow	1	Cape May Warbler	28	Marsh Wren	4
White-throated Sparrow	66	Yellow Warbler	1	Brown Creeper	14
Field Sparrow	1	Black-th. Blue Warbler	18	Red-breasted Nuthatch	5
Slate-colored Junco	3	Myrtle Warbler	19	Tufted Titmouse	3
Song Sparrow	9	Magnolia Warbler	35	Black-capped Chickadee	4
Lincoln Sparrow	1	Chestnut-sided Warbler	3	Golden-crowned Kinglet	180
Swamp Sparrow	8	Bay-breasted Warbler	5	Ruby-crowned Kinglet	151
Fox Sparrow	1	Blackpoll Warbler	352	Gray-cheeked Thrush	11
Northern Cardinal	5	Blackburnian Warbler	5	Swainson's Thrush	65
Rose-breasted Grosbeak	1	Black-th.-Green Warbler	8	Hermit Thrush	31

Table 17 . Daily banding totals for Creek Bend County Park, fall 2010.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds	Total bird/ 100 net hr
910	16.5	52	315.15	0	0	52	315.15
911	22	59	268.18	0	0	59	268.18
912	22	47	213.64	0	0	47	213.64
913	22	46	209.09	0	0	46	209.09
915	26.25	30	114.29	0	1	31	118.1
917	47.5	69	145.26	1	8	78	164.21
918	40.5	30	74.07	1	3	34	83.95
919	54	27	50	2	6	35	64.82
921	38	17	44.74	0	10	27	71.05
923	5	4	80	0	0	4	80
925	63	238	377.78	4	9	251	398.41
926	47.25	67	141.8	0	0	67	141.8
929	54	82	151.85	1	12	95	175.93
1001	54	227	420.37	0	2	229	424.07
1006	67.5	196	290.37	3	4	203	300.74
1007	67.5	159	235.56	0	0	159	235.56
1008	54	106	196.3	1	19	126	233.33
1010	81	265	327.16	1	3	269	332.1
1011	54	106	196.3	1	19	126	233.33
1013	54	43	79.63	1	12	56	103.7
1015	54	50	92.59	1	9	60	111.11
1017	54	51	94.44	0	20	71	131.48
1019	67.5	59	87.41	1	14	74	109.63
1020	40.5	19	46.91	1	4	24	59.26
1022	50	56	112	0	8	64	128
1023	51.75	67	129.47	0	6	73	141.06
1025	42.75	31	72.52	0	7	38	88.89
1101	24	54	225	0	1	55	229.17
1102	60.5	125	206.61	0	14	139	229.75
1108	37.5	96	256	0	7	103	274.67
1109	14	71	507.14	0	1	72	514.29
1111	24	66	275	0	2	68	283.33
1112	24	24	100	1	0	25	104.17
TOTAL	1434.5	2639	183.97	20	201	2860	199.37

Table 18. Fall banding totals for Creek Bend County Park, fall 2010.

Species	Banded	Species	Banded	Species	Banded
Mourning Dove	1	Lincoln's Sparrow	34	Ovenbird	3
Yellow-billed Cuckoo	1	Swamp Sparrow	43	Northern Waterthrush	1
Downy Woodpecker	5	Fox Sparrow	1	Wilson's Warbler	14
Eastern Phoebe	4	Northern Cardinal	13	American Redstart	4
Eastern Wood Pewee	3	Indigo Bunting	204	Gray Catbird	36
Yellow-bellied Flycatcher	4	Scarlet Tanager	1	Brown Thrasher	2
Blue Jay	3	Cedar Waxwing	1	Carolina Wren	4
Red-winged Blackbird	24	Red-eyed Vireo	1	House Wren	31
Common Grackle	1	Philadelphia Vireo	1	Winter Wren	3
Purple Finch	2	Warbling Vireo	1	Brown Creeper	4
House Finch	17	Black and White Warbler	3	White-breasted Nuthatch	2
American Goldfinch	1141	Nashville Warbler	50	Tufted Titmouse	10
Pine Siskin	1	Orange-crowned Warbler	2	Black-capped Chickadee	4
Savannah Sparrow	12	Tennessee Warbler	23	Golden-crowned Kinglet	63
White-crowned Sparrow	47	Yellow Warbler	2	Ruby-crowned Kinglet	49
White-throated Sparrow	132	Black-th. Blue Warbler	2	Gray-cheeked Thrush	7
American Tree Sparrow	35	Myrtle Warbler	116	Swainson's Thrush	7
Chipping Sparrow	90	Magnolia Warbler	19	Hermit Thrush	23
Field Sparrow	51	Bay-breasted Warbler	1	American Robin	2
Slate-colored Junco	29	Blackpoll Warbler	4	Eastern Bluebird	3
Song Sparrow	225	Western Palm Warbler	15		

Table 19. Daily banding totals for Petersburg, fall 2010.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds	Total bird/ 100 net hr
912	170	32	18.82	5	0	37	21.76
1017	168.33	23	13.66	1	6	30	17.82
TOTAL	338.33	55	16.26	6	6	67	19.8

Table 20. Daily banding totals Petersburg, fall 2010.

Species	Banded	Species	Banded	Species	Banded
Hairy Woodpecker	1	Black and White Warbler	1	Tufted Titmouse	1
Downy Woodpecker	2	Nashville Warbler	2	Black-capped Chickadee	5
White-throated Sparrow	2	Black-th.-Blue Warbler	2	Golden-crowned Kinglet	7
Slate-colored Junco	2	Magnolia Warbler	6	Ruby-crowned Kinglet	2
Northern Cardinal	3	Chestnut-sided Warbler	1	Veery	1
Rose-breasted Grosbeak	1	Blackpoll Warbler	2	Swainson's Thrush	3
Red-eyed Vireo	2	American Redstart	1	Hermit Thrush	3
Philadelphia Vireo	1	Gray Catbird	1	American Robin	1
Blue-headed Vireo	2				

Table 21. Point count days conducted and species totals, fall season, Petersburg, 2010.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Mourning Dove	1	2	Brown-headed Cowbird	1	1	Gray Catbird	1	3
Downy Woodpecker	1	1	American Goldfinch	1	2	White-br. Nuthatch	1	1
Blue Jay	2	122	Northern Cardinal	1	2	Black-cap. Chickadee	1	1
American Crow	2	4	Cedar Waxwing	1	4	American Robin	2	198

Table 22. Daily banding totals for Shaker Lakes, fall 2010.

Date	Net hour	Banded	Banded/ 100 net hr	Returns Recaptures	Recaptures	Total birds	Total bird/ 100 net hr
823	32.52	18	55.36	2	3	23	70.73
825	34	25	73.53	0	2	27	79.41
827	34	14	41.18	0	2	16	47.06
830	32	11	34.38	0	3	14	43.75
901	29.5	11	37.29	0	3	14	47.46
903	27.5	12	43.64	0	1	13	47.27
906	32	23	71.88	0	2	25	78.13
908	28.5	11	38.6	0	2	13	45.61
910	29.5	35	118.64	0	5	40	135.59
913	31	39	125.81	1	2	42	135.48
915	31.5	34	107.94	0	8	42	133.33
917	38	51	134.21	1	7	59	155.26
920	30.5	8	26.23	0	4	12	39.34
922	29	14	48.28	0	3	17	58.62
924	31.5	35	111.11	1	1	37	117.46
927	31.5	72	228.57	1	7	80	253.97
929	26.5	8	30.19	0	8	16	60.38
1001	30	97	323.33	0	6	103	343.33
1004	34.5	76	220.29	0	6	82	237.68
1006	30	32	106.67	0	8	40	133.33
1008	26	27	103.85	1	3	31	119.23
1011	32	55	171.88	1	6	62	193.75
1013	24.5	13	53.06	0	6	19	77.55
1015	24.5	8	32.65	0	8	16	65.31
1018	26	22	84.62	0	2	24	92.31
1020	26.5	8	30.19	0	5	13	49.06
1022	26.5	28	105.66	0	10	38	143.4
1027	25.5	13	50.98	0	8	21	82.35
1103	22	13	59.09	0	4	17	77.27
1110	28	11	39.29	1	0	12	42.86
Total	885.02	824	93.1	9	135	968	109.38

Table 23. Daily banding totals Shaker Lakes, fall 2010.

Species	Banded	Species	Banded	Species	Banded
Downy Woodpecker	7	Cedar Waxwing	2	Mourning Warbler	1
Yellow-bellied Sapsucker	2	Red-eyed Vireo	2	Common Yellowthroat	1
Red-bellied Woodpecker	1	Philadelphia Vireo	2	Wilson's Warbler	17
Eastern Phoebe	2	Blue-headed Vireo	14	Canada Warbler	3
Eastern Wood-Pewee	3	Black and White Warbler	7	American Redstart	24
Yellow-bellied Flycatcher	2	Nashville Warbler	31	Gray Catbird	42
Traill's Flycatcher	1	Orange-crowned Warbler	3	House Wren	3
Least Flycatcher	1	Tennessee Warbler	4	Winter Wren	18
Blue Jay	6	Northern Parula	1	Brown Creeper	3
Common Grackle	1	Cape May Warbler	3	White-breasted Nuthatch	2
Purple Finch	4	Black-thr. Blue Warbler	7	Tufted Titmouse	9
House Finch	8	Myrtle Warbler	64	Black-capped Chickadee	16
American Goldfinch	17	Magnolia Warbler	58	Golden-crowned Kinglet	60
White-throated Sparrow	82	Chestnut-sided Warbler	1	Ruby-crowned Kinglet	44
American Tree Sparrow	3	Bay-breasted Warbler	8	Wood Thrush	1
Slate-colored Junco	11	Blackpoll Warbler	12	Veery	1
Song Sparrow	21	Blackburnian Warbler	1	Gray-cheeked Thrush	15
Swamp Sparrow	4	Black-th. Green Warbler	9	Swainson's Thrush	89
Fox Sparrow	3	Western Palm Warbler	2	Hermit Thrush	28
Northern Cardinal	10	Ovenbird	6	American Robin	5
Rose-breasted Grosbeak	4	Northern Waterthrush	12		

Table 24. Point count days conducted and species totals, fall season, Shaker Lakes, 2010.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Mallard	9	16	Least Flycatcher	1	1	Black-th.-Blue Warbler	2	2
Wood Duck	6	13	Blue Jay	11	15	Myrtle Warbler	4	13
Canada Goose	8	19	American Crow	2	2	Northern Waterthrush	3	5
Great Blue Heron	5	5	European Starling	2	3	House Sparrow	1	1
Mourning Dove	6	10	Red-winged Blackbird	2	2	Gray Catbird	15	29
Rock Pigeon	16	118	American Goldfinch	26	130	House Wren	4	4
Cooper's Hawk	3	3	White-throated Sparrow	11	18	Winter Wren	3	3
Red-shouldered Hawk	1	1	Chipping Sparrow	1	1	White-br. Nuthatch	24	44
Osprey	2	2	Slate-colored Junco	1	1	Tufted Titmouse	7	10
Belted Kingfisher	4	4	Song Sparrow	23	52	Black-capped Chickadee	22	40
Hairy Woodpecker	12	13	Swamp Sparrow	2	2	Golden-crowned Kinglet	4	7
Downy Woodpecker	20	26	Fox Sparrow	1	1	Ruby-crowned Kinglet	7	13
Red-bellied Woodpecker	23	39	No. Cardinal	11	12	Swainson's Thrush	8	19
Yellow-shafted Flicker	5	17	Rose-breasted Grosbeak	5	9	American Robin	21	77
Chimney Swift	13	253	Cedar Waxwing	5	16	Unk. Warbler	9	14
Ruby-th. Hummingbird	4	7	Red-eyed Vireo	4	5	Unk. Blackbird	1	7
Olive-sided Flycatcher	1	1	Warbling Vireo	2	2	Unk. Kinglet	3	8
E. Wood-Pewee	6	13	Nashville Warbler	1	1	Unk. Thrush	3	4

Table 25. Total bandings Black Swamp Bird Observatory, passerine migration , 2010.

Species	Banded	Species	Banded	Species	Banded
American Woodcock	5	Chipping Sparrow	3 (94)	Bay-breasted Warbler	44 (53)
Solitary Sandpiper	0 (1)	Field Sparrow	13 (70)	(3) Blackpoll Warbler	1033(1051)
Mourning Dove	0 (1)	Slate-colored Junco	26 (71)	Blackburnian Warbler	17 (19)
Sharp-shinned Hawk	3	Song Sparrow	50 (310)	Blk.-th. Grn. Warbler	32 (41)
Cooper's Hawk	1	Lincoln Sparrow	87 (128)	Pine Warbler	2
Yellow-billed Cuckoo	5 (6)	Swamp Sparrow	83 (146)	West. Palm Warbler	55 (75)
Black-billed Cuckoo	3	Fox Sparrow	45 (49)	Ovenbird	252 (263)
Hairy Woodpecker	0 (1)	Eastern Towhee	6	Northern Waterthrush	130 (160)
Downy Woodpecker	27 (45)	Northern Cardinal	115 (155)	Kentucky Warbler	1
Yellow-bell. Sapsucker	12 (14)	Rose-breasted Grosbeak	24 (30)	Connecticut Warbler	10
Red-bellied Woodpecker	2 (3)	Indigo Bunting	57 (270)	Mourning Warbler	103 (107)
Yellow-shafted Flicker	12	Scarlet Tanager	2 (3)	Com. Yellowthroat	359 (397)
Whip-poor-will	1	Purple Martin	2	Yellow-breasted Chat	3
Ruby-th. Hummingbird	53	Barn Swallow	1 (3)	Hooded Warbler	9
Eastern Kingbird	4	Tree Swallow	16	Wilson's Warbler	170 (202)
Great-crested Flycatcher	14 (17)	Cedar Waxwing	41 (48)	Canada Warbler	116 (124)
Eastern Phoebe	17 (26)	Red-eyed Vireo	130 (144)	American Redstart	257 (292)
Eastern Wood-Pewee	37 (46)	Philadelphia Vireo	9 (13)	(5) Gray Catbird	760 (882)
Yellow-bell. Flycatcher	116 (124)	Warbling Vireo	51 (55)	Brown Thrasher	23 (28)
Acadian Flycatcher	16 (17)	Yellow-throated Vireo	1 (2)	Carolina Wren	10 (14)
Traill's Flycatcher	221 (227)	Blue-headed Vireo	16 (33)	House Wren	93 (138)
Least Flycatcher	61 (63)	White-eyed Vireo	6	Winter Wren	46 (68)
Blue Jay	31 (42)	Black and White Warbler	91 (104)	Marsh Wren	8
Brown-headed Cowbird	0 (5)	Prothonotary Warbler	13	Brown Creeper	101 (110)
Red-winged Blackbird	160 (189)	Worm-eating Warbler	2	White-br Nuthatch	1 (6)
Orchard Oriole	4 (6)	Blue-winged Warbler	6	Red-br. Nuthatch	19
Baltimore Oriole	46 (54)	Golden-winged Warbler	2	Tufted Titmouse	4 (26)
Rusty Blackbird	7 (8)	(10) Nashville Warbler	234 (334)	Black-cap. Chickadee	11 (37)
Common Grackle	80 (88)	Orange-crowned Warbler	14 (19)	(7) Golden-cr. Kinglet	505 (636)
Purple Finch	5 (11)	Tennessee Warbler	155 (185)	(9) Ruby-cr Kinglet	354 (470)
House Finch	0 (25)	Northern Parula	14 (16)	Blue-gray Gnatcatch.	17 (19)
(1) American Goldfinch	34 (1231)	Cape May Warbler	72 (75)	Wood Thrush	34 (43)
Pine Siskin	0 (1)	Yellow Warbler	378 (398)	Veery	77 (81)
Savannah Sparrow	0 (12)	Black-th. Blue Warbler	113 (124)	Gray-cheek Thrush	322 (347)
Grasshopper Sparrow	1	(8) Myrtle Warbler	398 (584)	(4) Swainson Thrush	938(1050)
White-cr. Sparrow	71 (122)	(6) Magnolia Warbler	596 (695)	(10) Hermit Thrush	368 (423)
(2) White-th. Sparrow	840 (1095)	Cerulean Warbler	1	American Robin	87 (123)
Am. Tree Sparrow	2 (40)	Chestnut-sided Warbler	93 (101)	Eastern Bluebird	0 (5)

() numbers in bold are top ten banded species

Table 26. Banding effort totals by area and by season, 2010.

Area	Sample Days	Net Hours	Birds Banded	Birds/ 100 Net Hr	Total Captured	Total/ 100 Net Hr
Navarre	114	16266.42	11228	69.03	13742	84.48
Petersburg	6	933.32	112	12	135	14.46
Shaker Lakes	51	1578.27	1060	67.16	1325	83.95
Creek Bend	55	2171.5	2840	130.79	3120	143.68
Season	Sample Days	Net Hours	Birds Banded	Birds/ 100 Net Hr	Total Captured	Total/ 100 Net Hr
All Stations						
Spring	51	9012.7	5523	61.28	6744	74.83
Fall	73	11936.81	9717	81.4	11578	96.99
TOTAL	124	20949.51	15240	72.76	18322	87.46
ONWR Stations						
Spring	51	6987.46	5029	71.97	6059	86.71
Fall	63	9278.96	6199	66.8	7683	82.8
TOTAL	114	16266.42	11228	69.03	13742	84.48

Table 27. Fall age ratios of selected species, Navarre 2010.

Species	2010		2009		Percent Change	91-09Ave. HY/AHY	2010 % Change from avg.
	Sample	HY/AHY	Sample	HY/AHY			
Baltimore Oriole	20	1.86	22	1.75	6	6.1	-70
Wh-th Sparrow*	414	2.09	291	2.1	NC	4.07	-49
Song Sparrow	33	5.6	30	2.33	140	2.16	159
Cedar Waxwing	37	5.17	46	2.07	150	1.75	195
Red-eyed Vireo	71	4.92	47	5.71	-14	6.94	-29
Warbling Vireo	26	7.67	59	5.56	38	10.65	-28
Bl. and Wh. Warbler	38	1.71	13	0.86	99	1.99	-14
Nashville Warbler	65	2.25	50	1.17	92	2.77	-19
Tennessee Warbler	96	8.6	23	2.83	2.04	6.82	26
Cape May Warbler	68	1.06	47	1.94	-45	1.2	-12
Bl-thr. Blue Warb.	92	4.41	64	1.91	131	3.52	25
Myrtle Warbler	216	3.41	196	1.8	89	2.07	64
Magnolia Warbler	200	3.55	124	2.26	57	3.51	1
Blackpoll Warbler	1008	2.32	539	2.01	15	2.11	10
Ovenbird	126	6	63	4.73	27	7.2	-17
No. Waterthrush	20	2.33	31	2.44	-4	4.29	-46
Com. Yellowthroat	150	6.5	83	5.38	21	7.04	-8
American Redstart	111	1.64	50	1.27	29	2.51	-35
Gray Catbird	331	5.37	272	6.35	-15	8.73	-38
House Wren	30	1.31	52	5.5	-76	6.35	-79
Gray-cheek Thrush	275	2.44	164	2.9	-16	2.1	16
Swainson's Thrush	744	1.43	350	1.38	4	1.53	-7
Hermit Thrush	271	6.13	239	4.83	27	5.36	14
American Robin	63	2.94	102	1.62	81	3.35	-12

*Species in bold have samples sizes for both 2009 and 2010 over 50.

Table 28. Banding year of returning birds captured at Navarre study site, 2010.

Species	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	Total
Eastern Screech Owl		1										1
Downy Woodpecker		2										2
Blue Jay	1			1								2
Red-winged Blackbird	12	8	2		4				1			27
Baltimore Oriole	5	1	1	3	2							12
Common Grackle	1	2	1	1		1						6
Song Sparrow	1		1	2								4
Northern Cardinal	11	11	5	1	1	1					1	31
Indigo Bunting	1	1										2
Tree Swallow		1										1
Warbling Vireo	1	1										2
Prothonotary Warbler	2	3										5
Yellow Warbler	28	15	2	7		1						53
Com. Yellowthroat	7	4	1	2		2						16
Gray Catbird	38	17	7	9	5	1						77
Brown Thrasher	4	2										6
Carolina Wren	2											2
Black-cap. Chickadee	1	1										2
House Wren	6	2	1									9
American Robin	4	2	2	3	2							13
Total	125	74	23	29	14	6			1		1	273

Table 29. Banding year of returning birds captured at Shaker Lakes study site, 2010.

Species	2009	2008	2007	2006	2005	2004	Total
Hairy Woodpecker		1	1				2
Downy Woodpecker	2	2					4
Red-bellied Woodpecker		1					1
Blue Jay	1						1
Red-winged Blackbird	1						1
Brown-headed Cowbird	2						2
American Goldfinch	4	1	1				6
White-throated Sparrow				1			1
Song Sparrow	5	1	2				8
Northern Cardinal	3	1			2		6
Warbling Vireo			1	1			2
Yellow Warbler	1	1	1				3
Gray Catbird	4	1	3	2		1	11
Tufted Titmouse	3						3
Black-capped Chickadee	5	1		1			7
Wood Thrush	2						2
American Robin	2						2
Total	35	10	9	5	2	1	62

Table 30. Banding year of returning birds captured at Creek Bend study site, 2010

Species	2009	2008	Total
Downy Woodpecker		1	1
Baltimore Oriole	2		2
American Goldfinch	6		6
Field Sparrow	3		3
Song Sparrow	10	3	13
Northern Cardinal	3		3
Indigo Bunting	5	3	8
Tree Swallow	1		1
Warbling Vireo	1		1
Yellow Warbler	1		1
Gray Catbird	4	1	5
Northern Mockingbird	1		1
House Wren	1		1
Black-capped Chickadee	3		3
Eastern Bluebird	1		1
Total	42	8	50

Table 31. Banding year of returning birds captured at Petersburg study site, 2010.

Species	2009	2008	2007	2006	2005	2004	Total
Downy Woodpecker	1						1
Northern Cardinal	1						1
Gray Catbird						1	1
Tufted Titmouse	1						1
Black-capped Chickadee	2						2
Total	5					1	6

Table 32. Foreign recoveries of study banded birds since last progress report.

Species	Band Number	Band Date	Band Location*	Recovery Date	Recovery Location
Great crested Flycatcher	1891-22638	38136	Navarre	39947	Ohio 413-0824
Red-winged Blackbird	1212-28804	38455	Ohio 4135-08305	40317	Navarre
Red-winged Blackbird	1232-80773	39920	Navarre	40235	Georgia 323-0834
Common Grackle	1543-00499	39266	Navarre	39559	Ohio 413-0832
American Goldfinch	2560-61003	40091	Creek Bend	40228	Ohio 412-0830
American Goldfinch	2560-61329	40110	Creek Bend	40479	Ontario 425-0795
American Goldfinch	2560-61872	40127	Creek Bend	40215	Ohio 412-0830
White-throated Sparrow	2431-16534	40110	Creek Bend	40215	Kentucky 370-0850
Lincoln's Sparrow	2311-41788	39945	Navarre	40318	Ontario 425-0793
Northern Cardinal	2331-73636	39964	Navarre	40295	Shaker Lakes
Rose-breasted Grosbeak	1891-65058	39206	Navarre	40306	Ontario 451-0745
Philadelphia Vireo	2610-81396	40438	Ontario 4235-08025	40450	Navarre
Yellow Warbler	2490-74925	39589	Ohio 4135-08315	39953	Ottawa NWR
Ovenbird	1911-21132	40073	Ottawa NWR	40313	Ontario 452-0781
American Redstart	2530-33847	39680	Ontario 4815-8855	39963	Navarre
Gray Catbird	1991-79778	39693	Michigan 4215-8315	39941	Navarre
Gray Catbird	2331-73130	39931	Navarre	40344	Michigan 430-0853
Gray Catbird	2411-33262	40311	Navarre	40375	Ohio 413-0830
Hermit Thrush	2431-17254	40101	Navarre	40495	Arkansas 361-0911

*Banding coordinates for study sites: Navarre 413-0830, Shaker Lakes 412-0813, Ottawa NWR 413-0831, Creek Bend 412-0832.

Table 33. Spring fat composition comparisons of selected species for 2009 and 2010, Navarre (Two sample T-Test, alpha = .05).

Sign. Higher 2010	Non-sign. Higher 2010	Sign. Higher 2009	Non- sign. Higher 2009
Least Flycatcher	Traill's Flycatcher	Lincoln Sparrow	Yellow-bellied Flycatcher
Nashville Warbler	Indigo Bunting	Gray Catbird	White-throated Sparrow
Tennessee Warbler	Black & White Warbler	Hermit Thrush	Swamp Sparrow
Myrtle Warbler	Cape May Warbler	Swainson's Thrush	Red eyed Vireo
Magnolia Warbler	Chestnut-sided Warbler		Yellow Warbler
Bay-breasted Warbler	Western Palm Warbler		Northern Waterthrush
Blackpoll Warbler	Mourning Warbler		House Wren
Ovenbird	Canada Warbler		Veery
Common Yellowthroat	Golden-cr. Kinglet		Gray-ch. Thrush
Wilson's Warbler			
American Redstart			
Ruby-cr. Kinglet			
Bl.-gr. Gnatcatcher			

Table 34. Fall fat composition comparisons of selected species for 2009 and 2010, Navarre (Two sample T-Test, alpha = .05).

Sign. Higher 2010	Non-sign. Higher 2010	Sign. Higher 2009	Non- sign. Higher 2009
	Red-eyed Vireo	Wh.-throated Sparrow	Black & White Warbler
	Cape May Warbler	Swamp Sparrow	Magnolia Warbler
		Myrtle Warbler	Common Yellowthroat
		Blackpoll Warbler	House Wren
		Ovenbird	Ruby-cr. Kinglet
		American Redstart	
		Gray Catbird	
		Golden-cr. Kinglet	
		Gray-ch. Thrush	
		Swainson's Thrush	
		Hermit Thrush	

Figure 1. Migration field sites, 1989- 2010.

