

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

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INTRODUCTION

This long term study of the Black Swamp Bird Observatory 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 was continued on the Ottawa National Wildlife Refuge complex and various other sites in the region. The southwestern shore of Lake Erie represents a barrier to most passerine migrants. Passerines reluctance to navigate open water results in major concentrations, possibly unparalleled in the Midwest along the lake coast. 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 remaining west of Port Clinton along the Lake Erie shoreline. The massive bird use of these in contrast to the adjacent condominium complexes and marinas signify the importance of this habitat component of the Lake Erie marsh system. While not containing major concentrations such as the beach ridges, a wide range of migration corridor and stopover habitat occurs throughout the region. A wide variety of study sites are necessary to fully examine habitat use, migrational timing, and energetic condition of birds.

The importance of studying avian migration and stopover habitat needs has greatly increased over the past two decades as tropical deforestation and temperate forest fragmentation expands. Little information is known about the "problem" 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, free living 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). Whereas these lipid deposits are obviously critical for a successful migration, they may also provide a selective advantage to the migrant with energy reserves remaining (see Sinclair 1983; Ojanen 1984; Krapu et. al. 1985; Krementz & 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 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 a new beach ridge outside the lake front dike in Navarre during fall migration. This location allows the opportunity to study avian use of a beach ridge from its infancy. The primary Darby NWR site is on one of the three remaining small beach ridges and will provide comparisons with the larger more complete ridge of Navarre. The Darby NWR inland site which is approximately a half a mile from the beach ridge is comprised of dogwood travel lanes and thickets and will be used to compare with the beach ridge and will assist in assessing habitat use. The Ottawa NWR station is located approximately 1 mile off the lake and is composed primarily of a dogwood thicket with a few remnant overstory trees. This site will provide comparison of block scrub-shrub in the vicinity of the lake to the ridges. The Shaker Lake site near Cleveland is several miles from the lake and lies on a major riparian corridor to the lake. Habitats include a brook, a 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 will provide comparisons for habitats away from the lake proper and potentially give some indications to how quickly migrants spread out. The Shawnee Lookout site 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 made up of a lot of wild grape, Pawpaw, Hackberry, Walnut, Elm, and Oak species. Pawpaw, Hackberry, and especially wild grape being the dominant species. This can provide information associated with migrational timing, habitat and movement.

METHODS AND MATERIALS

Migrating and resident passerines were sampled on the Navarre, Darby and Ottawa units of the Ottawa National Wildlife Refuge and various sites in the Great Lakes and Ohio River drainage regions.(Figure 1). Sites near Cleveland and Cincinnati, Ohio, and Monroe, Michigan provide comparisons to the three refuge sites that are located at major passerine migration staging areas. Banding and point count efforts should cover a minimum of 75% of the migration period for the study site. Every attempt was made to equalize un-sampled parts at the beginning and end of the migration period. The migration period was considered for short distance migrants as well as neotropicals. Spring migration operation in 2001 began mid-April and continued through early-June. Fall migration banding was July 1 to early November. All sites were monitored through both migration periods.

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. All birds were removed from the net, band and net recorded if previously banded, and placed in a mesh bag for

holding 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 et. al. 1997) and guidelines of the Bird Banding Manual and Woods Manual (Woods 1969). Weather data was compiled from hourly readings of Toledo Edison's Davis Besse Nuclear Power Station.

Point counts were conducted during both spring and fall migration. Counts were conducted at points spaced a minimum of 100 meters 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.

RESULTS AND DISCUSSION

SPRING

Spring migration was monitored, weather permitting, daily in the Navarre Unit and when personnel were available at the Darby, Ottawa, Shaker Lakes, Petersburg, and Shawnee Lookout sites in 2003. April weather patterns resulted in good waves of birds while the month of May saw very good wave development but below normal volume. From our research, expected large neotropical waves arrive in three general movements. The first wave dominated by male White-throated Sparrow, Hermit Thrush, male Myrtle Warbler, and male Ruby-crowned Kinglet occurs around 25 April. In 2003, this wave materialized 19, 28 April and a second pulse 1-3 May. The second wave, known as the big wave, occurs 7-13 May and is represented by the greatest species diversity of the spring and is dominated by female White-throated Sparrow, Swainson's Thrush, female Myrtle Warbler, female Ruby-crowned Kinglet, and male Magnolia Warbler. The second pulse of this wave coming five to seven days after, usually has the largest volume and contains the same species dominants. This wave occurred 10-12 May with the follow up 16-20 May in 2003. The third wave normally comes around Memorial Day weekend and is dominated by female Magnolia Warbler, American Redstart, Mourning Warbler, vireos, and flycatchers. In 2003, the third wave appeared 24-26 and 29 May to 1 June.

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

In spring 2003, the Navarre banding station was operated on 53 days for 6,645.5 net hours. Including hummingbirds, 7,841 new birds were banded and a total of 9,188 birds handled (Table 1). Capture rate (138.3 birds/100 net hours) increased 43% from 2000 (91.5 birds/100 net hours). One hundred and three species plus one hybrid warbler were banded (Table 2) in Navarre during spring 2003. The most unusual species were the stations first Blue Grosbeak and Chimney Swift and additional surprises such as Brewster's Warbler, Yellow Palm Warbler, Prairie Warbler, Marsh Wren, and Whip-poor-Will. The top ten species banded were Magnolia Warbler (660); White-throated Sparrow (474); Gray Catbird (441); Common Yellowthroat (409); Yellow Warbler (369); Traill's Flycatcher

(326); Myrtle Warbler (294); American Redstart (256); Wilson's Warbler (248); and Red-eyed Vireo (234).

Point counts were initiated in 1995 as a part of the data collection at the Navarre site. These counts are of higher quality than listing, but less quality than the banding data. Counts provide the best data for larger birds not sampled by mist nets. Point counts were conducted on 37 days during spring 2003. One hundred and twenty-seven species with 17,396 individuals were recorded (Table 3). Northern Cardinal, Red-winged Blackbird, Brown-headed Cowbird, Common Grackle, Tree Swallow, and Song Sparrow were observed each count day. The most abundant species recorded was Red-winged Blackbird (3,936) followed by Blue Jay (1,480), Tree Swallow (1,086), Common Grackle (1,057), and Canada Goose (929).

Darby NWR Banding Station, Ottawa County, Ohio (412-0825)

This was the twelfth year for the Darby study site. This small beach ridge will allow for comparisons with Navarre and give some indication to the relative value to extremely small habitat islands. The Darby banding station was operated 9 days for a total of 593 net hours. Two hundred and eighty four new birds were banded with a total of 292 birds handled (Table 4). A total of 50 species were banded (Table 5). The top ten species banded were Magnolia Warbler (27); Ruby-crowned Kinglet (23); White-throated Sparrow (19); Hermit Thrush (16); Black and White Warbler (14); Wilson's Warbler (10); American Robin (10); Red-winged Blackbird (7); and Nashville Warbler (7). Darby's capture rate was 49.2 birds/100 net hours in 2003.

Ottawa NWR Banding Station, Ottawa County, Ohio (413-0831)

A new site was initiated on the main unit of Ottawa NWR in 1999. It will permit assessment of a dogwood habitat block during migration and compare to the beach ridges. Four hundred and fifty-nine new birds were banded and a total of 505 birds were handled (Table 8) of 52 species (Table 7) on ten field days. The top ten species banded were Yellow Warbler (53); Myrtle Warbler (48); Gray Catbird (43); Western Palm Warbler (42); Red-winged Blackbird (26); Northern Waterthrush (24); White-throated Sparrow (21); Ruby-crowned Kinglet (17); American Goldfinch (16); and Least Flycatcher (12). Ottawa's capture rate was 83.6 birds per 100 net hours. The most unusual capture was Savannah Sparrow.

Point counts were conducted on 10 days during spring 2003. Fifty-seven species with 733 individuals were recorded (Table 8). The most abundant species recorded was Red-winged Blackbird (237) followed by Common Grackle (59), American Goldfinch (54), Herring Gull (53), and American Robin (44).

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

This site will permit some comparison to the Lake Erie coastal sites as a riverine travel lane. Banding operations were conducted on eleven days with 152 new birds banded in 460.5 net hours (33.0

birds/100 net hours) (Table 9). Thirty-six species (Table 10) were banded with the top nine species banded being Gray Catbird (17); White-throated Sparrow (16); Western Palm Warbler (15); Indigo Bunting (8); Baltimore Oriole (8); Nashville Warbler (7); Ruby-crowned Kinglet (7); Wood Thrush (7); and Song Sparrow (6).

Point counts were conducted on 11 days during spring 2003. Fifty species with 509 individuals were recorded (Table 11). The most abundant species recorded was Song Sparrow (81), followed by Red-winged Blackbird (36), Northern Cardinal (35), American Goldfinch (31), American Robin (31), Brown-headed Cowbird (29), Baltimore Oriole (29), and Gray Catbird (26).

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

This site is located west of Lake Erie and north of Toledo and will permit some comparison to the Lake Erie sites as birds migrate around Lake Erie and disperse through the landscape. Banding operations were conducted on thirty-nine days with 630 new birds banded in 4,240.7 net hours (14.9 birds/100 net hours) (Table 12). Seventy-one species (Table 13) were banded with the top ten species banded being Slate-colored Junco (62); American Goldfinch (61); American Robin (57); Gray Catbird (48); White-throated Sparrow (44); Common Yellowthroat (23); Magnolia Warbler (18); American Redstart (18); Northern Cardinal (17); and Swainson's Thrush (16).

Point counts were conducted on 39 days during spring 2003. Forty-three species with 1,853 individuals were recorded (Table 14). Red-winged Blackbird was observed each count day. The most abundant species recorded was Red-winged Blackbird (435) followed by American Robin (219), Northern Cardinal (174) Common Grackle (168), and Mourning Dove (127).

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

This site is located east of Cleveland at the Nature Center of Shaker Lakes and 2003 was the third year of the banding operation. This site will permit some comparison to the western Lake Erie sites as birds migrate along Lake Erie and disperse through the landscape. Banding operations were standardized to Monday, Wednesday, and Friday and were conducted on nineteen days with 321 new birds banded in 667 net hours (48.1 birds/100 net hours). A total of 349 birds were handled (45.8 birds/100 net hours) during spring migration (Table 15). Fifty-two species (Table 16) were banded with the top ten species banded being Ruby-crowned Kinglet (51); Magnolia Warbler (37); White-throated Sparrow (27); Yellow Warbler (17); American Redstart (15); Canada Warbler (13); Indigo Bunting (12); Gray Catbird (11); American Goldfinch (10); and Wilson's Warbler (10).

Point counts were conducted on 19 days during spring 2003. Fifty-six species with 818 individuals were recorded (Table 17). The most abundant species recorded was Rock Pigeon (138) followed by Red-winged Blackbird (120), Canada Goose (71), American Robin (64), and Song Sparrow (39).

FALL

Fall migration starts in July for many species and some breeding neotropicals such as the Yellow

Warbler are practically gone from the study area by mid-August. Fall temperatures appeared similar to 2002. Temperature tended to be slightly above in August and early-October. Fall bird migration is dominated by different stimuli than in spring. Weather appears 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 64 days for 6,506 net hours. Four thousand one hundred and ninety-one birds were banded with a total of 5,473 birds handled (Table 18). This was the eleventh fall season in which an extensive netting effort had been conducted on a daily basis. The capture rate for 2003 84.1 birds/100 net hours. A total of 84 species were banded during fall 2003 at the main Navarre station (Table 19). The top ten species banded were Swainson's Thrush (420); White-throated Sparrow (373); Gray Catbird (294); Blackpoll Warbler (265); Myrtle Warbler (227); Common Yellowthroat (211); Magnolia Warbler (190); Hermit Thrush (187); Golden-crowned Kinglet (149); and Gray-cheeked Thrush (141).

Fall point counts were run on 54 days during 2003. A total of, 34,391 individuals of 113 species were recorded (Table 20). The Red-winged Blackbird was observed on all days of the counts. The most abundant species were Red-winged Blackbird (15,292); European Starling (5,605); Common Grackle (4,382); Canada Goose (813); and White-throated Sparrow (695).

For the eleventh year, additional nets were run on a newly formed beach ridge just outside the lake front dike near the main study site. This ridge has one band of 30-60 feet tall Cottonwoods about 50 feet wide and 250 yards long. The ridge presents the opportunity to document avian usage as the habitat matures. Five nets were run on 57 days for 1,485 net hours (Table 21). The capture rate for fall 2003 was 98.4 birds/100 net hours. One thousand and one hundred and sixty-eight birds of seventy species were banded on the new beach ridge (Table 22). The top ten species banded were Blackpoll Warbler (105); Myrtle Warbler (104); Gray Catbird (101); Swainson's Thrush (67); Warbling Vireo (63); Ruby-crowned Kinglet (63); White-throated Sparrow (62); Common Yellowthroat (62); Magnolia Warbler (40); Hermit Thrush (37).

Ottawa NWR Banding Station, Ottawa County, Ohio (413-0831)

Two hundred and fifty-four new birds were banded (54.3 birds /100 net hours) and a total of 258 birds (55.1 birds/100 net hours) were handled (Table 23) at the Ottawa site. Forty-two species (Table 24) were banded on eight field days. The top ten species banded were Blackpoll Warbler (27); American Redstart (18); American Goldfinch (17); Northern Cardinal (17); Ruby-crowned Kinglet (15); Myrtle Warbler (13); Gray Catbird (13); American Robin (13); Golden-crowned Kinglet (12); Red-winged Blackbird (9); and Magnolia Warbler (9).

Point counts were conducted on 6 days during fall 2003. Forty-eight species with 3,575 individuals were recorded (Table 25). Canada Goose, Northern Cardinal, Red-winged Blackbird, and American Robin were observed each count day. The most abundant species recorded was Red-winged

Blackbird (2,487) followed by European Starling (258), American Robin (161), Canada Goose (116), and Brown-headed Cowbird (71).

Shawnee Lookout Banding Station, Hamilton County, Ohio (390-0844)

Banding operations were conducted on ten days with 291 new birds banded in 634 net hours (45.9 birds/100 net hours). A total of 301 birds were handled (54.3 birds/100 net hours) during spring migration (Table 26). Forty-one species (Table 27) were banded with the top ten species banded being Common Yellowthroat (41); Tennessee Warbler (39); Magnolia Warbler (24); Wood Thrush (21); Northern Cardinal (20); Indigo Bunting (19); Gray Catbird (14); Swainson's Thrush (14); Carolina Chickadee (9); and Ovenbird (8).

Point counts were conducted on 10 days during fall 2003. Fifty-three species with 2,120 individuals were recorded (Table 28). Eastern Towhee, Northern Cardinal, Carolina Wren, and American Robin were observed each count day. The most abundant species recorded was European Starling (494) followed by Red-winged Blackbird (339), American Robin (159), Turkey Vulture (132), and Cedar Waxwing (117).

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

Banding operations were conducted on 25 days with 630 new birds banded in 2,836 net hours (12.8 birds/100 net hours) (Table 29). Fifty-five species (Table 30) were banded with the top ten species banded being Gray Catbird (79); Magnolia Warbler (60); American Robin (56); Swainson's Thrush (38); American Redstart (35); Blue Jay (34); Ovenbird (32); Tennessee Warbler (31); Hermit Thrush (23); and Blackpoll Warbler (21).

Point counts were conducted on 38 days during fall 2003. Twenty-five species with 3,651 individuals were recorded (Table 33). Blue Jay was observed each count day. The most abundant species recorded was Common Grackle (1,620) followed by American Robin (492), Blue Jay (463), European Starling (399), and Cedar Waxwing (266).

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

Banding operations were standardized to Monday, Wednesday, and Friday and were conducted on twenty-six days with 591 new birds banded in 813.2 net hours (72.7 birds/100 net hours). A total of 600 birds were handled (73.8 birds/100 net hours) during spring migration (Table 32). Sixty-four species (Table 35) were banded with the top ten species banded being American Goldfinch (71); White-throated Sparrow (71); Magnolia Warbler (52); Gray Catbird (41); Song Sparrow (36); Myrtle Warbler (31); American Redstart (29); Wilson's Warbler (18); Swainson's Thrush (17); and Nashville Warbler (15).

Point counts were conducted on 20 days during fall 2003. Fifty-four species with 1,591 individuals were recorded (Table 36). American Goldfinch was observed each count day. The most abundant

species recorded was Chimney Swift (547), followed by Rock Pigeon (241), American Goldfinch (113); American Robin (68); Mourning Dove (62).

SUMMARY BANDINGS

Total combined bandings for passerine migration 2003 for the Black Swamp Bird Observatory is shown in parentheses in Table 37. Totals before parentheses are for the National Wildlife Refuge Complex. The top ten species banded on Ottawa NWR complex were White-throated Sparrow (957); Gray Catbird (907); Magnolia Warbler (877); Myrtle Warbler (703); Common Yellowthroat (703); Swainson's Thrush (696); Yellow Warbler (491); Ruby-crowned Kinglet (454); Blackpoll Warbler (452); and American Redstart (442). Inclusive totals of all sites were topped by White-throated Sparrow (1,134); Gray Catbird (1,117); Magnolia Warbler (1,072); Swainson's Thrush (790); Common Yellowthroat (790); Myrtle Warbler (748); Ruby-crowned Kinglet (547); American Redstart (544); Yellow Warbler (514); and Blackpoll Warbler (477). A combined total of 116 species and one hybrid of 16,541 individuals (64.4 birds/100 net hrs) were banded. Totals for each study site and for each season are shown in Table 36. Species greater than 50 individuals sampled had age ratios generally below 2002 and above the long-term average (Table 37).

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 always return to their breeding grounds to nest. There are substantial signs for this but more research is needed to confirm the rate of this phenomenon. During 2003, 223 birds of 22 species were captured as returning birds at the Navarre sites (Table 38). This total includes 18 Yellow Warblers with the oldest being banded in 1993, 32 Gray Catbirds, and 37 Common Yellowthroats. 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 6 birds of four species were return captures at the Darby station (Table 39). Eight returns were recorded at Shawnee Lookout in 2003 (Table 40). Shaker Lakes had 26 returns of nine species (Table 41) and Ottawa NWR had 40 returns of eight species (Table 42). Several foreign captures were made of study birds and are reported in Table 43.

ENERGETIC CONDITION

The relationship of energetic condition during migration to breeding success is unknown in passerines. There are many factors that could affect the amount of fat a bird may carry at any given time. With this in mind, we are looking at factors that may affect lipid deposition over the next several years. Yearly trends will also be followed. It will be several years before those trends, if any, may be tied to a birds productivity. For 2003, 35 species (Table 44) had adequate sample sizes in both 2002 and 2003 to look at the changes in average fat deposits during spring migration. Nine of

the 35 species had significantly higher ($p < .05$) lipid reserves in 2003. Twenty-two additional species had higher average in 2003 but showed no significance. No species showed significantly higher fat in 2002. While Fat levels in four additional species appeared to be higher in 2002.

Of thirteen species with adequate sample sizes of spring fat and fall age ratios, three appeared to show a similar trend in fat between 2002 and 2003 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 2003, fall fat composition had a tendency to be lower in 8 of 18 species with three species showing significance ($p < .05$). The Gray Catbird demonstrated significantly higher fat levels in 2003 (Table 45).

ENVIRONMENTAL EDUCATION

A secondary goal of this study is to impact the general public on avian migration, research, habitat management, and ecosystems. Project personnel entertained 26 groups at Navarre and 6 at Darby totaling 650 people ranging from elementary to adults for on-site outdoor education. In addition, six presentations were made to 250 people on avian ecology and migration. As a part of International Migratory Bird Day events, banding demonstrations were done on the refuge for some 4,000 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 the basic needs of food, water, and shelter. Wetlands managed for year around ecosystem values form the base for this habitat complex. The invertebrate populations required by the massive bird movement is born from these wetlands and shelters in the scrub and on beach ridges. This scrub-shrub and beach ridge habitat provides the substrate for shelter from the elements and protection from predators needed by this diverse group of migrant birds as well as their needed food source. A dominant plant species making up the shrub habitat is gray dogwood which not only provide vast surface area for invertebrates but is an important source of berries for fall migrating birds. Any management scheme at this latitude needs to recognize the over-riding importance of the region to stopover habitat. With the exception of the gulf coast, no other region of eastern North America can demonstrate concentrations of avian migrants such as recorded along Lake Erie.

Management needs to ensure protection of the remaining beach ridges and to provide for healthy wetlands and adequate shrub habitat. It is not within reality for management to provide forest needs for deep woods breeders that once occurred in the Great Black Swamp. 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 units must be

incorporated for summer and fall management to provide the needs of the vast faunal array of the region. This includes deep water marsh, shallow water marsh and moist soil areas to provide the variety of habitat types. Shrub and grassland habitat need to consider migration as well as breeding needs in management guidelines. Management scenarios need to include migration needs of food and cover as well as protection during breeding season. Dike systems should be designed to incorporate scrub borders to provide migrational travel lanes to mimic the limited beach ridges and to augment passerine breeding of shrub management units. Research has not been conducted to determine to what extent dike nesting success may affect overall regional avian production. This needs to be assessed to fully utilize this habitat use. In theory, dikes should be looked as potential breeder spillover 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 around basis, but will also enhance other avian groups, mammals, reptiles, amphibians, and native plant associations.

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LITERATURE CITED

- Barlein, Franz 1985. Efficiency of food utilization during fat deposition in the long distance migratory garden warbler, Sylvia borin. *Oecologia* 68:118-125.
- Berthold, P. 1975. Migration: control and metabolic physiology. Pp. 77-128. In: *Avian Biology*, D.S. Farner and J.R. King (eds). vol 5. Academic Press: New York.
- Biebach, H., W. Friedrich, and G. Heine. 1986. Interaction of body mass, fat, foraging and stopover period in trans-Sahara migrating passerine birds. *Oecologia* 69:370-379.
- Helms, C.W. and W.H. Drury. 1960. Winter and migratory weight and fat field studies on some North American buntings. *Bird Banding* 31: 1-40.

- Krapu, G.L., G.C. Iverson, K.J. Reinecke, and C.M. Boise. 1985. Fat deposition and usage by arctic-nesting Sandhill Cranes during spring. *Auk* 102: 362-368.
- Krementz, D.G. and C.D. Ankney. 1987. Changes in lipid and protein reserves and in diet of breeding House Sparrows. *Can. J. Zool.* 66: 950-955.
- Moore, F. and P. Kerlinger. 1987. Stopover and fat deposition by North American wood-warblers (Parulinae) following spring migration over the Gulf of Mexico. *Oecologia* 74: 47-54.
- Morse, D.H. 1980. Population limitations: breeding or wintering grounds? In: Smithsonian Press, Washington, D.C. Pp. 437-453.
- Ojanen, M. 1984. The relation between spring migration and the onset of breeding in the Pied Flycatchers *Ficedula hypoleuca* in northern Finland. *Ann. Zool. Fennici* 21: 205-208.
- Pyle, Peter, et. al. 1997. Identification guide to North American passerines. Sand Creek Press, California.
- Sinclair, A.R.E. 1983. The function of distance movements in vertebrates. In: *The Ecology of Animal Movement*. I.R. Swingland and P.R. Greenwood (eds). Pp. 240-258.
- Wood, Merrill. 1969. A bird-banders guide to determination of age and sex of selected species. College of Agriculture, Pennsylvania State Univ., University Park, Pennsylvania.

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Table 1. Daily banding totals for Navarre, spring 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
41203	89.25	29	32.49	5	0	34	38.10
41303	89.25	19	21.29	4	3	27	30.25
41403	105.00	94	89.52	4	7	105	100.00
41503	126.00	85	67.46	4	7	96	76.19
41603	105.00	67	63.81	2	4	73	69.52
41803	119.00	70	58.82	0	9	80	67.23
41903	126.00	156	123.81	1	9	166	131.75
42003	115.50	79	68.40	2	16	99	85.71
42103	112.00	50	44.64	1	13	64	57.14
42203	63.00	22	34.92	1	12	35	55.56
42303	110.25	18	16.33	3	18	40	36.28
42403	99.75	25	25.06	1	11	37	37.09
42503	98.00	23	23.47	2	10	35	35.71
42603	105.00	16	15.24	0	9	27	25.71
42703	110.25	21	19.05	1	10	34	30.84
42803	131.25	129	98.29	2	3	134	102.10
42903	112.00	37	33.04	0	3	40	35.71
43003	110.25	42	38.10	1	6	49	44.44
50103	137.50	545	396.36	0	11	556	404.36
50203	120.75	191	158.18	1	14	206	170.60
50303	136.50	109	79.85	2	40	151	110.62
50403	136.50	52	38.10	3	23	78	57.14
50603	182.00	240	131.87	17	20	278	152.75
50703	84.00	82	97.62	5	18	105	125.00
50803	168.00	211	125.60	8	34	253	150.60
50903	94.50	73	77.25	4	35	113	119.58
51003	133.00	607	456.39	3	10	620	466.17
51103	75.00	352	469.33	8	16	378	504.00
51203	168.00	268	159.52	9	80	357	212.50
51303	168.00	180	107.14	8	64	252	150.00
51403	126.00	118	93.65	5	49	172	136.51
51503	120.75	179	148.24	7	33	219	181.37
51603	141.75	220	155.20	9	36	265	186.95
51703	152.25	233	153.04	9	41	283	185.88
51803	126.00	62	49.21	3	26	93	73.81
51903	147.00	180	122.45	6	32	220	149.66
52003	147.00	606	412.25	2	23	631	429.25
52103	93.00	56	60.22	6	27	89	95.70
52203	126.00	87	69.05	3	17	107	84.92
52303	147.00	115	78.23	5	28	148	100.68
52403	145.00	167	115.17	4	24	195	134.48
52503	147.00	206	140.14	3	14	223	151.70
52603	141.75	133	93.83	4	31	168	118.52
52703	152.25	124	81.45	5	29	158	103.78
52803	141.75	197	138.98	3	35	235	165.79
52903	141.75	269	189.77	3	18	290	204.59
53003	120.75	130	107.66	0	22	152	125.88
60103	126.00	206	163.49	3	20	232	184.13
60203	126.00	178	141.27	5	21	204	161.91
60303	136.50	125	91.58	2	26	153	112.09
60403	115.50	59	51.08	2	23	84	72.73
60503	147.00	194	131.97	2	24	220	149.66
60603	147.00	105	71.43	3	17	125	85.03
TOTAL	6645.50	7841	117.99	196	1131	9188	138.26

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

Table 2. Spring banding totals, Navarre, 2003.

Species	Banded	Species	Banded	Species	Banded
Sharp-shinned Hawk	4	Lincoln Sparrow	143	Blackburnian Warbler	28
American Kestrel	2	Swamp Sparrow	199	Black-th.-Green Warbler	64
Yellow-billed Cuckoo	6	Fox Sparrow	7	Western Palm Warbler	97
Black-billed Cuckoo	3	Eastern Towhee	2	Yellow Palm Warbler	1
Hairy Woodpecker	2	Northern Cardinal	48	Prairie Warbler	1
Downy Woodpecker	3	Rose-breasted Grosbeak	29	Ovenbird	149
Yellow-bellied Sapsucker	1	Blue Grosbeak	1	Northern Waterthrush	149
Red-bellied Woodpecker	2	Indigo Bunting	116	Louisiana Waterthrush	1
Yellow-shafted Flicker	6	Scarlet Tanager	8	Kentucky Warbler	2
Whip-poor-Will	1	Barn Swallow	1	Connecticut Warbler	10
Chimney Swift	1	Tree Swallow	28	Mourning Warbler	126
Ruby-th. Hummingbird	101	Cedar Waxwing	77	Common Yellowthroat	409
Eastern Kingbird	4	Red-eyed Vireo	234	Yellow-breasted Chat	1
Great-crested Flycatcher	9	Philadelphia Vireo	32	Hooded Warbler	5
Eastern Phoebe	4	Warbling Vireo	54	Wilson's Warbler	248
Olive-sided Flycatcher	1	Yellow-throated Vireo	2	Canada Warbler	90
Eastern Wood Pewee	26	Blue-headed Vireo	42	American Redstart	256
Yellow-bellied Flycatcher	105	White-eyed Vireo	12	Gray Catbird	441
Acadian Flycatcher	14	Black and White Warbler	88	Brown Thrasher	11
Trail's Flycatcher	326	Prothonotary Warbler	7	Carolina Wren	3
Least Flycatcher	131	Blue-winged Warbler	17	House Wren	92
Blue Jay	67	Brewster's Warbler	1	Winter Wren	55
Red-winged Blackbird	169	Golden-winged Warbler	2	Marsh Wren	1
Orchard Oriole	2	Nashville Warbler	197	Brown Creeper	26
Baltimore Oriole	72	Orange-crowned Warbler	15	Golden-crowned Kinglet	74
Rusty Blackbird	5	Tennessee Warbler	83	Ruby-crowned Kinglet	204
Common Grackle	21	Northern Parula	16	Blue-gray Gnatcatcher	78
American Goldfinch	61	Cape May Warbler	16	Wood Thrush	25
White-crowned Sparrow	43	Yellow Warbler	369	Veery	69
White-throated Sparrow	474	Black-th.-Blue Warbler	59	Gray-cheeked Thrush	21
American Tree Sparrow	2	Myrtle Warbler	294	Swainson's Thrush	193
Chipping Sparrow	2	Magnolia Warbler	600	Hermit Thrush	123
Field Sparrow	10	Chestnut-sided Warbler	123	American Robin	27
Slate-colored Junco	17	Bay-breasted Warbler	40		
Song Sparrow	48	Blackpoll Warbler	54		

Table 3. Number of days observed and totals of species seen on point counts, Navarre spring 2003.

Species	# days	#Observed	Species	# days	#Observed	Species	# days	#Observed
Pied-bill. Grebe	23	97	E. Wood Pewee	4	4	Nashville Warbler	2	3
Herring Gull	34	170	Acad. Flycatcher	1	1	Tennessee Warbler	4	9
Ring-billed Gull	25	87	Willow Flycatcher	9	20	Northern Parula	2	3
Bonaparte's Gull	3	3	Traill's Flycatcher	1	1	Cape May Warbler	1	1
Caspian Tern	6	7	Least Flycatcher	10	34	Yellow Warbler	20	353
Common Tern	1	1	Blue Jay	33	1480	Blk.-th.-Bl. Warbler	5	9
D-cr Cormorant	36	806	E. Starling	36	619	Myrtle Warbler	17	78
Hood Merganser	2	2	Bobolink	1	1	Magnolia Warbler	9	22
Mallard	18	70	Br.-headed Cowbird	37	498	Chest.-sided Warb.	12	31
Blue-wing Teal	1	7	Red-wng. Blackbird	37	3936	Bay-breast Warbler	1	1
Wood Duck	27	158	Orchard Oriole	2	2	Blackpoll Warbler	6	19
Redhead	1	2	Baltimore Oriole	20	263	Blackburnian Warb.	3	3
Lesser Scaup	14	245	Rusty Blackbird	16	132	Bl.-th.-Green Warb.	3	3
Canada Goose	33	929	Common Grackle	37	1057	W. Palm Warbler	5	10
Trumpeter Swan	4	7	Purple Finch	3	9	Prairie Warbler	1	1
Least Bittern	1	1	House Finch	1	1	Ovenbird	9	15
Great blue Heron	33	154	Am. Goldfinch	36	275	No. Waterthrush	13	78
Great Egret	25	50	White-cr. Sparrow	4	11	Lo. Waterthrush	1	2
Virginia Rail	9	17	White-th. Sparrow	27	427	Mourning Warbler	5	9
Sora	18	60	Slate-colored Junco	2	11	Co. Yellowthroat	31	186
Am. Coot	1	1	Song Sparrow	37	491	Wilson's Warbler	6	17
Sol. Sandpiper	3	6	Lincoln Sparrow	3	3	Canada Warbler	3	4
Spot. Sandpiper	2	2	Swamp Sparrow	23	82	Am. Redstart	12	32
Killdeer	2	2	Fox Sparrow	2	7	Gray Catbird	18	141
Mourning Dove	30	107	Eastern Towhee	11	14	Brown Thrasher	14	37
Rock Pigeon	1	1	No. Cardinal	37	633	Carolina Wren	36	153
No. Harrier	2	2	Rose-br. Grosbeak	8	25	House Wren	27	113
Sharp-sh. Hawk	3	4	Indigo Bunting	16	142	Winter Wren	6	8
Red-tailed Hawk	10	13	Scarlet Tanager	4	6	Marsh Wren	3	3
Bald Eagle		2	Purple Martin	6	9	Brown Creeper	2	3
Am. Kestrel	3	3	Cliff Swallow	1	1	Tufted Titmouse	2	2
Yel.-bill Cuckoo	5	8	Barn Swallow	23	87	Gold-cr. Kinglet	4	23
Blk.-bill Cuckoo	1	1	Tree Swallow	37	1086	Ruby-cr. Kinglet	21	116
Belted Kingfish.	2	2	Bank Swallow	11	29	Bl-gray Gnatcatcher	26	141
Do. Woodpecker	26	70	Ro-winged Swallow	2	2	Wood Thrush	6	16
Y-bel Sapsucker	4	7	Cedar Waxwing	11	474	Veery	6	12
R-b Woodpecker	5	5	Red-eyed Vireo	12	41	Gray-cheek Thrush	1	1
Yel-shaft Flicker	19	81	Warbling Vireo	10	28	Swainson's Thrush	8	28
Chimney Swift	11	35	Yellow-th. Vireo	1	1	Hermit Thrush	8	22
R-t Humming.	5	9	White-eyed Vireo	2	2	American Robin	32	331
E. Kingbird	10	29	Blk & Wh Warbler	9	24	Eastern Bluebird	1	1
Gr-cr. Flycatcher	4	5	Prothonotary Warb.	16	46	Unk. Warbler	12	67
O-sid. Flycatcher	2	2	Blue-wing Warbler	1	2	Unk. Flycatcher	1	1

Table 4. Daily banding totals for Darby, spring 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
41903	78.00	33	42.31	0	0	33	42.31
42303	88.00	17	19.32	0	0	17	19.32
42403	91.00	9	9.89	1	0	10	10.99
50303	91.00	67	73.63	0	0	67	73.63
50903	40.00	11	27.50	2	0	13	32.50
51103	45.00	54	120.00	0	0	54	120.00
51603	65.00	57	87.69	0	0	57	87.69
52503	65.00	28	43.08	5	0	33	50.77
62503	30.00	4	13.33	2	2	8	26.67
TOTAL	593.00	280	47.22	10	2	292	49.24

Table 5. Spring banding totals for Darby 2003.

Species	Banded	Species	Banded	Species	Banded
Downy Woodpecker	2	Red-eyed Vireo	3	Mourning Warbler	1
Yellow-shafted Flicker	2	Philadelphia Vireo	2	Common Yellowthroat	4
Yellow-bell. Flycatcher	2	Warbling Vireo	2	Yellow-breasted Chat	1
Traill's Flycatcher	2	Blue-headed Vireo	3	Hooded Warbler	1
Least Flycatcher	5	White-eyed Vireo	1	Wilson's Warbler	10
Brown-headed Cowbird	5	Black and White Warbler	14	American Redstart	6
Red-winged Blackbird	7	Nashville Warbler	7	Gray Catbird	15
Baltimore Oriole	1	Northern Parula	1	Brown Thrasher	4
Common Grackle	4	Yellow Warbler	4	Carolina Wren	1
White-throated Sparrow	19	Black-th.-Blue Warbler	5	House Wren	5
Field Sparrow	1	Myrtle Warbler	17	Ruby-crowned Kinglet	23
Song Sparrow	2	Magnolia Warbler	27	Wood Thrush	1
Lincoln Sparrow	1	Chestnut-sided Warbler	6	Veery	3
Swamp Sparrow	3	Black-thr. Green Warbler	5	Swainson's Thrush	6
Northern Cardinal	4	Western Palm Warbler	1	Hermit Thrush	16
Indigo Bunting	5	Ovenbird	5	American Robin	10
Cedar Waxwing	1	Northern Waterthrush	4		

Table 6 . Daily banding totals for Ottawa NWR, spring 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total bird	Total bird/ 100 net hr
41803	51.60	9	17.44	1	0	10	19.38
41903	60.80	23	37.83	4	0	27	44.41
42503	70.00	9	12.86	2	0	11	15.71
42603	50.00	1	2.00	0	0	1	2.00
50303	62.50	186	297.60	4	0	190	304.00
51203	49.00	41	83.67	5	0	46	93.88
51303	65.00	77	118.46	6	3	86	132.31
52403	65.00	69	106.15	10	2	81	124.62
60103	65.00	43	66.15	8	1	52	80.00
60603	65.00	1	1.54	0	0	1	1.54
TOTAL	603.90	459	76.00	40	6	505	83.62

Table 7. Spring banding totals, Ottawa NWR, 2003.

Species	# Banded	Species	# Banded	Species	# Banded
Mourning Dove	1	Red-eyed Vireo	6	Northern Waterthrush	24
Yellow-bellied Flycatcher	3	Warbling Vireo	5	Mourning Warbler	3
Traill's Flycatcher	6	Blue-headed Vireo	4	Common Yellowthroat	9
Least Flycatcher	12	White-eyed Vireo	1	Wilson's Warbler	5
Red-winged Blackbird	26	Black & White Warbler	4	Canada Warbler	3
Baltimore Oriole	3	Golden-winged Warbler	1	American Redstart	10
Common Grackle	4	Nashville Warbler	3	Gray Catbird	43
American Goldfinch	16	Cape May Warbler	1	Brown Thrasher	2
Savanna Sparrow	1	Yellow Warbler	53	House Wren	4
Grasshopper Sparrow	1	Black-th.. Blue Warbler	1	Ruby-crowned Kinglet	17
White-throated Sparrow	21	Myrtle Warbler	48	Wood Thrush	6
Field Sparrow	1	Magnolia Warbler	11	Veery	2
Song Sparrow	1	Chestnut-sided Warbler	3	Gray-cheeked Thrush	2
Lincoln Sparrow	11	Blackpoll Warbler	1	Swainson's Thrush	2
Swamp Sparrow	1	Blackburnian Warbler	2	Hermit Thrush	10
Eastern Towhee	2	Black.-th. Green Warbler	6	American Robin	5
Northern Cardinal	3	Western Palm Warbler	42		
Indigo Bunting	2	Ovenbird	5		

Table 8. Point count days conducted and species totals, spring season, Ottawa NWR, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Herring Gull	2	53	Eastern Wood Pewee	1	3	Red-eyed Vireo	1	3
Ring-billed Gull	3	28	Willow Flycatcher	1	6	Warbling Vireo	1	2
Caspian Tern	1	1	Least Flycatcher	1	1	Black & Wh. Warbler	1	1
Dou...-cr. Cormorant	2	6	European Starling	2	17	Tennessee Warbler	1	1
Mallard	2	6	Brown-headed Cowbird	2	14	Yellow Warbler	1	20
Northern Shoveler	1	2	Red-winged Blackbird	3	237	Magnolia Warbler	1	2
Wood Duck	2	6	Eastern Meadowlark	2	5	Chestnut Sided Warbler	1	4
Ring-necked Duck	1	2	Baltimore Oriole	1	1	Mourning Warbler	1	1
Canada Goose	3	14	Rusty Blackbird	1	4	Common Yellowthroat	1	3
Great Blue Heron	1	1	Common Grackle	3	59	Canada Warbler	1	1
Great Egret	1	2	American Goldfinch	3	54	Gray Catbird	1	7
Lesser Yellowlegs	1	1	White-throated Sparrow	2	8	Brown Thrasher	3	7
Killdeer	2	6	Song Sparrow	1	7	House Wren	1	3
Mourning Dove	2	9	Swamp Sparrow	1	1	Golden-cr. Kinglet	1	2
Sharp-shinned Hawk	1	1	Eastern Towhee	2	3	Ruby-cr. Kinglet	2	5
Bald Eagle	3	4	Northern Cardinal	3	34	Blue-gr. Gnatcatcher	2	2
Downy Woodpecker	2	3	Barn Swallow	2	3	Wood Thrush	1	2
Yellow-sh. Flicker	2	3	Tree Swallow	2	5	Hermit Thrush	1	1
			Cedar Waxwing	1	12	American Robin	3	44

Table 9. Daily banding totals for Creek bend, spring 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
42603	37.00	10	27.03	0	0	10	27.03
42703	33.00	2	6.06	0	0	2	6.06
50303	80.50	56	69.57	0	0	56	69.57
50403	44.00	11	25.00	0	0	11	25.00
51303	32.00	11	34.38	0	0	11	34.38
51703	46.00	14	30.43	0	0	14	30.43
51803	36.00	8	22.22	0	0	8	22.22
52403	40.00	12	30.00	0	0	12	30.00
52503	40.00	21	52.50	0	0	21	52.50
52603	36.00	3	8.33	0	0	3	8.33
60803	36.00	4	11.11	0	0	4	11.11
TOTAL	460.50	152	33.01	0	0	152	33.01

Table 10. Daily banding totals Creek Bend, spring 2003.

Species	Banded	Species	Banded	Species	Banded
Hairy Woodpecker	1	Red-eyed Vireo	1	American Redstart	2
Downy Woodpecker	3	Black and White Warbler	2	Gray Catbird	17
Eastern Wood Pewee	1	Nashville Warbler	7	Carolina Wren	3
Yellow-bellied Flycatcher	1	Yellow Warbler	1	House Wren	2
Baltimore Oriole	8	Myrtle Warbler	5	Tufted Titmouse	1
American Goldfinch	5	Magnolia Warbler	4	Ruby-crowned Kinglet	7
White-throated Sparrow	16	Black-th.-Green Warbler	1	Blue-gray Gnatcatcher	1
Chipping Sparrow	1	Western Palm Warbler	15	Wood Thrush	7
Song Sparrow	6	Ovenbird	1	Veery	2
Lincoln Sparrow	2	Northern Waterthrush	5	Swainson's Thrush	3
Northern Cardinal	4	Connecticut Warbler	2	Hermit Thrush	2
Indigo Bunting	8	Common Yellowthroat	3	American Robin	2

Table 11. Point count days conducted and species totals, spring season, Creek Bend, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Mallard	1	2	Red-winged Blackbird	5	36	Magnolia Warbler	2	4
Canada Goose	1	3	Orchard Oriole	2	4	Chest.-sided Warbler	1	2
Great Blue Heron	1	2	Baltimore Oriole	6	29	Blackpoll Warbler	1	1
Killdeer	1	1	Rusty Blackbird			W. Palm Warbler	2	16
Mourning Dove	1	1	Common Grackle	1	3	Common Yellowthroat	1	1
Bald Eagle	1	1	Am. Goldfinch	6	31	Am. Redstart	1	1
Belted Kingfisher	2	2	White-th. Sparrow	2	9	No. Mockingbird	1	4
Downy Woodpecker	3	5	Song Sparrow	6	81	Gray Catbird	5	26
Red-bell. Woodpecker	3	3	Northern Cardinal	6	35	Brown Thrasher	3	4
Red-he. Woodpecker	1	1	Rose-br. Grosbeak	2	2	Carolina Wren	1	1
Yellow-shaft. Flicker	1	2	Indigo Bunting	2	5	House Wren	2	4
Eastern Kingbird	4	10	Barn Swallow	3	10	Tufted Titmouse	3	8
Eastern Phoebe	1	3	Tree Swallow	5	19	Ruby-cr. Kinglet	2	5
Blue Jay	4	15	Cedar Waxwing	2	12	Blue-gr. Gnatcatcher	1	2
American Crow	1	2	Red-eyed Vireo	2	3	Wood Thrush	6	17
Horned Lark	1	1	Yellow Warbler	6	19	American Robin	6	31
Brown-head Cowbird	6	29	Myrtle Warbler	1	1			

Table 12. Daily banding totals for Petersburg, spring 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
40103	125.80	34	27.03	0	0	34	27.03
40203	131.75	16	12.14	0	0	16	12.14
40303	127.50	26	20.39	0	0	26	20.39
41003	117.58	26	22.11	0	0	26	22.11
41103	119.00	19	15.97	0	0	19	15.97
41203	120.53	10	8.30	0	0	10	8.30
41303	121.70	10	8.22	0	0	10	8.22
41403	127.50	13	10.20	0	0	13	10.20
41503	104.90	7	6.67	0	0	7	6.67
41603	120.30	9	7.48	0	0	9	7.48
42103	76.50	8	10.46	0	0	8	10.46
42303	76.50	7	9.15	0	0	7	9.15
42403	137.40	7	5.09	0	0	7	5.09
42503	124.60	7	5.62	0	0	7	5.62
42603	127.50	7	5.49	0	0	7	5.49
42703	131.75	4	3.04	0	0	4	3.04
42803	130.30	8	6.14	0	0	8	6.14
42903	131.75	17	12.90	0	0	17	12.90
43003	82.17	11	13.39	0	0	11	13.39
50303	133.10	34	25.54	0	0	34	25.54
50403	133.10	19	14.28	0	0	19	14.28
50603	136.00	20	14.71	0	0	20	14.71
50803	89.00	29	32.58	0	0	29	32.58
51303	80.80	16	19.80	0	0	165	19.80
51403	97.92	27	27.57	0	0	27	27.57
51603	99.00	33	33.33	0	0	33	33.33
51703	99.00	23	23.23	0	0	23	23.23
51803	99.00	10	10.10	0	0	10	10.10
51903	99.00	18	18.18	0	0	18	18.18
52103	73.92	11	14.88	0	0	11	14.88
52203	99.96	24	24.01	0	0	24	24.01
52303	84.96	19	22.36	0	0	19	22.36
52503	87.00	24	27.59	0	0	24	27.59
52603	99.00	16	16.16	0	0	16	16.16
52703	99.96	13	13.01	0	0	13	13.01
52803	96.96	3	3.09	0	0	3	3.09
53003	99.96	12	12.00	0	0	12	12.00
60103	99.00	20	20.20	0	0	20	20.20
60203	99.00	13	13.13	0	0	13	13.13
TOTAL	4240.67	630	14.86	0	0	630	14.86

Table 13. Daily banding totals Petersburg, spring, 2003.

Species	Banded	Species	Banded	Species	Banded
Mourning Dove	1	Lincoln Sparrow	1	Northern Waterthrush	8
Sharp-shinned Hawk	1	Swamp Sparrow	8	Kentucky Warbler	2
Downy Woodpecker	3	Fox Sparrow	2	Mourning Warbler	3
Yellow-shafted Flicker	2	Eastern Towhee	7	Com. Yellowthroat	23
Eastern Phoebe	1	Northern Cardinal	17	Wilson's Warbler	7
Eastern Wood Pewee	1	Rose-breasted Grosbeak	4	Canada Warbler	3
Yellow-bellied Flycatcher	9	Indigo Bunting	10	American Redstart	18
Acadian Flycatcher	2	Cedar Waxwing	1	House Sparrow	4
Trails' Flycatcher	15	Red-eyed Vireo	2	Gray Catbird	48
Least Flycatcher	5	Warbling Vireo	4	Brown Thrasher	4
Blue Jay	11	Blue-headed Vireo	1	House Wren	2
Brown-headed Cowbird	8	White-eyed Vireo	1	Winter Wren	1
Red-winged Blackbird	4	Black and white Warbler	6	Brown Creeper	3
Orchard Oriole	1	Blue-winged Warbler	3	Black-capped Chickadee	2
Baltimore Oriole	10	Golden-winged Warbler	1	Golden-crowned Kinglet	9
Rusty Blackbird	3	Nashville Warbler	10	Ruby-crowned Kinglet	7
Common Grackle	14	Tennessee Warbler	1	Wood Thrush	3
American Goldfinch	61	Cape May Warbler	1	Veery	3
White-crowned Sparrow	1	Yellow Warbler	4	Grey-cheeked Thrush	1
White-throated Sparrow	44	Magnolia Warbler	18	Swainson's Thrush	16
Chipping Sparrow	11	Chestnut-sided Warbler	1	Hermit Thrush	9
Field Sparrow	9	Bay-breasted Warbler	2	American Robin	57
Slate-colored Junco	62	Blackpoll Warbler	1	Eastern Bluebird	1
Song Sparrow	8	Ovenbird	5		

Table 14. Point count days conducted and species totals, spring season, Petersburg, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Canada Goose	9	18	Baltimore Oriole	11	16	Tree Swallow	2	3
Great Blue Heron	1	1	Common Grackle	28	168	Warbling Vireo	12	25
Ring-necked Pheasant	14	40	House Finch	1	1	Yellow Warbler	1	1
Killdeer	24	30	Am. Goldfinch	24	43	Com. Yellowthroat	10	22
Mourning Dove	34	127	White-th. Sparrow	2	2	House Sparrow	4	7
Downy Woodpecker	1	2	Chipping Sparrow	13	21	Gray Catbird	20	55
Red-bell Woodpecker	1	2	Field Sparrow	9	11	Brown Thrasher	6	6
Yellow-sh. Flicker	11	17	Slate-colored Junco	7	14	White-br. Nuthatch	6	8
East. Wood Pewee	1	1	Song Sparrow	27	63	Tufted Titmouse	21	28
Willow Flycatcher	3	4	Eastern Towhee	11	16	Black-cap Chickadee	12	14
Blue Jay	36	92	No. Cardinal	35	174	Wood Thrush	1	2
American Crow	17	35	Rose-br. Grosbeak	2	2	Veery	1	1
Euro. Starling	9	12	Indigo Bunting	1	1	American Robin	38	219
Br.-headed Cowbird	25	96	Barn Swallow	2	3	East. Bluebird	12	15
Red-wing Blackbird	39	435						

Table 15. Daily banding totals for Shaker Lakes, spring 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
41403	34.02	10	29.39	3	0	13	38.21
41603	34.50	10	28.99	1	0	11	31.88
41803	34.02	16	47.03	1	0	17	49.97
42103	34.98	12	34.31	1	0	13	37.16
42303	34.02	14	41.15	0	0	14	41.15
42503	31.02	6	19.34	0	0	6	19.34
42803	31.98	8	25.02	0	1	9	28.14
43003	36.00	9	25.00	0	0	9	25.00
50203	43.98	38	86.40	1	0	39	88.68
50703	28.98	14	48.31	0	0	14	48.31
50903	24.00	6	25.00	2	0	8	33.33
51203	34.98	17	48.60	0	1	18	51.46
51403	36.48	22	60.31	1	2	25	68.53
51603	37.98	47	123.75	2	0	49	129.02
51903	39.00	17	43.59	2	1	20	51.28
52103	39.48	27	68.39	0	3	30	75.99
52303	37.98	24	63.19	1	0	25	65.82
52603	38.52	19	49.33	3	0	22	57.11
52803	34.98	5	14.29	1	1	7	20.01
TOTAL	666.90	321	48.13	19	8	349	52.33

Table 16. Daily banding totals Shaker Lakes, spring 2003.

Species	Banded	Species	Banded	Species	Banded
Green Heron	2	Song Sparrow	7	Mourning Warbler	2
Solitary Sandpiper	3	Lincoln Sparrow	5	Common Yellowthroat	7
Spotted Sandpiper	1	Swamp Sparrow	2	Wilson's Warbler	10
Hairy Woodpecker	1	Northern Cardinal	2	Canada Warbler	13
Eastern Phoebe	3	Indigo Bunting	12	American Redstart	15
Yellow-bellied Flycatcher	1	Cedar Waxwing	2	Gray Catbird	11
Traill's Flycatcher	4	Warbling Vireo	1	House Wren	2
Least Flycatcher	6	Black and White Warbler	1	Winter Wren	1
Blue Jay	1	Nashville Warbler	3	Brown Creeper	2
Brown-headed Cowbird	1	Northern Parula	2	Tufted Titmouse	1
Red-winged Blackbird	3	Yellow Warbler	17	Black-capped Chickadee	2
Baltimore Oriole	1	Black-th. Blue Warbler	4	Golden-crowned Kinglet	3
Common Grackle	4	Myrtle Warbler	2	Ruby-crowned Kinglet	51
American Goldfinch	10	Magnolia Warbler	37	Veery	3
White-crowned Sparrow	1	Chestnut-sided Warbler	3	Swainson's Thrush	6
White-throated Sparrow	27	Western Palm Warbler	2	Hermit Thrush	4
Field Sparrow	1	Northern Waterthrush	9	American Robin	6
Slate colored Junco	1				

Table 17. Point count days conducted and species totals, spring season, Shaker Lakes, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Herring Gull	4	6	Blue Jay	15	22	Magnolia Warbler	6	8
Caspian Tern	1	2	American Crow	1	1	Chest.-sided Warbler	1	1
Mallard	14	25	Euro. Starling	3	4	No. Waterthrush	2	2
Wood Duck	5	16	Brown-head. Cowbird	12	21	Wilson's Warbler	1	1
Canada Goose	16	71	Red-winged Blackbird	19	120	American Redstart	5	6
Great Blue Heron	9	15	Baltimore Oriole	9	22	Gray Catbird	5	10
Great Egret	1	1	Common Grackle	11	18	Carolina Wren	1	2
Solitary Sandpiper	2	2	White-th. Sparrow	9	18	Winter Wren	1	1
Spotted Sandpiper	1	1	Slate-colored Junco	1	1	Marsh Wren	1	1
Mourning Dove	7	10	Song Sparrow	19	39	White-br. Nuthatch	4	4
Rock Pigeon	16	138	No. Cardinal	12	21	Tufted Titmouse	1	1
Belted Kingfisher	1	1	Rose-br. Grosbeak	3	4	Ruby-cr. Kinglet	2	2
Hairy Woodpecker	1	1	Indigo Bunting	1	1	Wood Thrush	1	1
Downy Woodpecker	8	8	Scarlet Tanager	1	1	Swainson's Thrush	2	2
Red-bell. Woodpecker	9	22	N. Rough-wing Swal.	2	6	American Robin	19	64
Yellow-shaft. Flicker	5	6	Red-eyed Vireo	3	4	Unk. Gull	13	38
Chimney Swift	4	9	Warbling Vireo	7	15	Unk. Woodpecker	2	2
Great-cr. Flycatcher	2	3	Yellow Warbler	4	4	Unk. Duck	1	2
Eastern Phoebe	4	5	Black-th.-Blue Warbler	1	1	Unk. Flycatcher	2	2
Olive-sid. Flycatcher	1	1	Myrtle Warbler	2	2			

Table 18. Daily banding totals for Navarre, fall 2003.

Date	Net Hour	Banded	Banded/100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
70203	105.00	39	37.14	3	11	53	50.48
71503	94.00	46	48.94	5	11	62	65.96
72503	84.00	116	138.10	2	9	127	151.19
80803	84.00	44	52.38	1	9	54	64.29
82503	110.25	29	26.30	0	2	31	28.12
82603	105.00	32	30.48	0	5	37	35.24
82703	105.00	45	42.86	0	5	50	47.62
82803	94.50	25	26.46	0	2	27	28.57
82903	85.00	15	17.65	0	4	19	22.35
83003	94.50	15	15.87	1	4	20	21.16
83103	94.50	27	28.57	0	3	30	31.75
90303	94.50	24	25.40	1	4	29	30.69
90403	99.75	26	26.07	1	5	32	32.08
90503	89.25	37	41.46	0	3	40	44.82
90603	120.75	68	56.32	0	7	75	62.11
90703	105.00	49	46.67	0	4	53	50.48
90803	89.25	35	39.22	0	1	36	40.34
90903	94.50	20	21.16	0	8	28	29.63
91003	99.75	35	35.09	0	6	41	41.10
91103	99.75	29	29.07	1	11	41	41.10
91203	84.00	21	25.00	1	5	27	32.14
91303	77.00	32	41.56	0	10	42	54.55
91403	89.25	23	25.77	0	3	26	29.13
91603	105.00	129	122.86	0	7	136	129.52
91703	105.00	87	82.86	0	11	98	93.33
91803	105.00	31	29.52	1	10	42	40.00
91903	73.50	25	34.01	1	5	31	42.18
92003	120.75	128	106.00	0	22	150	124.22
92103	101.50	75	73.89	1	15	91	89.66
92203	52.50	29	55.24	0	6	35	66.67
92303	115.50	78	67.53	0	22	100	86.58
92403	94.50	114	120.64	0	18	132	139.68
92503	110.50	102	92.31	0	31	133	120.36
92603	115.50	163	141.13	1	21	185	160.17
92703	94.50	87	92.06	0	29	117	123.81
92803	115.50	95	82.25	0	40	135	116.88
92903	89.50	76	84.92	0	32	108	120.67
93003	89.50	49	54.75	0	21	70	78.21
100103	126.00	120	95.24	0	37	157	124.60
100203	120.75	39	32.30	0	30	69	57.14
100303	90.00	59	65.56	0	28	87	96.67
100403	110.25	46	41.72	0	32	78	70.75
100503	115.00	64	55.65	0	40	104	90.44
100603	110.25	98	88.89	0	18	116	105.22
100703	105.00	71	67.62	0	18	89	84.76
100803	105.00	65	61.91	0	19	84	80.00
100903	122.50	64	52.25	0	26	94	76.74
101003	84.00	46	54.076	0	19	65	77.38
101103	105.00	120	114.29	0	21	141	134.29
101203	115.50	97	83.98	0	18	115	99.57
101303	105.00	147	140.00	0	22	169	160.95
101403	78075	89	113.02	0	17	106	134.60
101503	84.00	73	86.91	0	22	95	113.10
101603	147.00	180	122.45	0	51	231	157.14
101703	105.00	93	88.57	0	31	146	139.05
101903	105.00	45	42.86	0	37	163	155.24
102003	131.25	114	86.86	0	41	155	118.10
102103	94.50	57	60.32	1	23	81	85.71
102203	94.50	62	65.61	1	44	107	113.23
102303	152.25	160	105.09	1	36	197	129.39
102403	105.00	58	55.24	0	41	99	94.29
102503	91.00	54	59.34	0	36	90	98.90
103103	105.00	35	33.33	0	17	52	49.52
110603	112.00	35	31.25	0	5	40	35.71
TOTAL	6506.25	4191	64.41	23	1151	5473	84.12

Table 19. Fall banding totals, Navarre 2003.

Species	Banded	Species	Banded	Species	Banded
Yellow-billed Cuckoo	1	Lincoln Sparrow	17	Blackburnian Warbler	2
Downy Woodpecker	18	Swamp Sparrow	77	Black-th Green Warbler	7
Yellow-bellied Sapsucker	5	Fox Sparrow	38	Western Palm Warbler	5
Red-bellied Woodpecker	1	Eastern Towhee	2	Ovenbird	56
Yellow-shafted Flicker	3	Northern Cardinal	54	Northern Waterthrush	28
Ruby-th Hummingbird	8	Rose-breasted Grosbeak	11	Connecticut Warbler	7
Eastern Kingbird	4	Indigo Bunting	16	Mourning Warbler	6
Great-crested Flycatcher	2	Scarlet Tanager	3	Common Yellowthroat	211
Eastern Phoebe	18	Cedar Waxwing	10	Yellow-breasted Chat	2
Eastern Wood Pewee	14	Red-eyed Vireo	86	Wilson's Warbler	11
Yellow-bellied Flycatcher	9	Philadelphia Vireo	9	Canada Warbler	2
Trail's Flycatcher	2	Warbling Vireo	8	American Redstart	124
Least Flycatcher	2	Blue-headed Vireo	3	Gray Catbird	294
Blue Jay	4	Black. & Wh. Warbler	19	Brown Thrasher	4
Red-winged Blackbird	21	Prothonotary Warbler	3	Carolina Wren	20
Baltimore Oriole	12	Golden-winged Warbler	1	House Wren	76
Rusty Blackbird	24	Nashville Warbler	34	Winter Wren	31
Common Grackle	24	Orange-cr. Warbler	4	Brown Creeper	43
Purple Finch	28	Tennessee Warbler	78	Red-breasted Nuthatch	1
House Finch	9	Northern Parula	3	Black-capped Chickadee	3
American Goldfinch	11	Cape May Warbler	81	Golden-crowned Kinglet	149
White-crowned Sparrow	13	Yellow Warbler	55	Ruby-crowned Kinglet	132
White-throated Sparrow	373	Black-th.-Blue Warbler	30	Wood Thrush	6
American Tree Sparrow	1	Myrtle Warbler	227	Veery	20
Chipping Sparrow	3	Magnolia Warbler	190	Gray-cheeked Thrush	141
Field Sparrow	4	Chestnut-sided Warbler	17	Swainson's Thrush	420
Slate-colored Junco	31	Bay-breasted Warbler	15	Hermit Thrush	187
Song Sparrow	90	Blackpoll Warbler	265	American Robin	109

Table 20. Number of days observed and totals of species seen on point counts, fall 2003.

Species	# days	#Observed	Species	# days	#Observed	Species	# days	#Observed
Common Loon	1	24	Eastern Kingbird	12	75	Warbling Vireo	7	11
Herring Gull	43	193	Great-cr Flycatcher	2	3	Blue-head Vireo	1	1
Ring-billed Gull	43	286	Eastern Phoebe	6	6	Black & Wh Warb.	4	4
Bonaparte's Gull	20	258	E. Wood Pewee	8	12	Tennessee Warbler	4	6
Caspian Tern	3	7	Horned Lark	3	3	Cape May Warbler	12	30
Forster's Tern	7	27	Blue Jay	54	281	Yellow Warbler	1	1
D-c. Cormorant	16	276	American Crow	3	41	Bl-th-Blue Warb.	1	1
Mallard	34	291	Euro. Starling	53	5605	Myrtle Warbler	28	211
Am. Black Duck	2	8	Br.-hd. Cowbird	16	186	Magnolia Warbler	21	43
Gadwall	12	93	Red-w. Blackbird	54	15292	Ches.-sided Warb.	3	6
Am. Wigeon	16	188	East. Meadowlark	1	2	Bay-br. Warbler	2	2
Gr-wing teal	1	22	Balt. oriole	12	49	Blackpoll warb	24	78
Blue-winged Teal	4	11	Rusty Blackbird	14	561	Bl-th-Gr. Warbler	4	5
No. Shoveler	1	12	Common Grackle	50	4382	W. Palm Warbler	1	2
Northern Pintail	10	30	Purple Finch	18	183	Ovenbird	2	2
Wood Duck	11	24	House Finch	13	39	No. Waterthrush	2	2
Redhead	2	14	Unk. Finch	2	3	Com. Yellowthroat	21	42
Lesser Scaup	4	28	Am. Goldfinch	30	99	Wilson's Warbler	1	1
Canada Goose	45	813	Pine siskin	7	12	Canada warbler	1	1
Great- Blue Heron	12	16	White-cr. Sparrow	2	5	Am. Redstart	15	26
Great Egret	3	3	White-th. Sparrow	26	695	Gray Catbird	40	258
Virginia Rail	1	1	Slate-col. Junco	5	10	Brown Thrasher	14	28
Common Snipe	1	3	Song Sparrow	31	76	Carolina Wren	53	233
Lesser Yellowlegs	1	1	Lincoln Sparrow	1	1	House Wren	26	40
Black-bell. Plover	1	1	Swamp Sparrow	2	3	Winter Wren	6	8
L. Golden Plover	1	5	Fox Sparrow	9	16	Marsh Wren	1	1
Killdeer	9	12	Eastern Towhee	10	15	Brown Creeper	5	6
Mourning Dove	21	47	No. Cardinal	53	360	White-br Nuthatch	1	1
No. Harrier	1	1	Rose-br. Grosbeak	6	20	Red-br. Nuthatch	5	7
Sharp-shin. Hawk	5	6	Indigo Bunting	5	10	Bl.-cap. Chickadee	1	1
Cooper's Hawk	1	1	Scarlet Tanager	1	1	Golden-cr. Kinglet	14	44
Bald Eagle	11	16	Purple Martin	8	44	Ruby-cr. Kinglet	13	26
Peregrine Falcon	1	1	Barn Swallow	9	37	Veery	1	1
Merlin	1	1	Tree Swallow	15	40	Gray-cheek Thrush	19	52
Great-horned Owl	1	1	Bank Swallow	5	30	Swainson's Thrush	34	332
Downy Wood.	42	117	Rough-w. Swallow	1	4	Hermit Thrush	6	8
Yel-bel Sapsuck.	6	10	Cedar Waxwing	35	222	American Robin	47	823
Yellow-sh. Flicker	38	110	Red-eyed Vireo	9	13	Unk. Warbler	41	489
Chimney Swift	19	163						

Table 21. Daily banding totals for Navarre Beach, fall 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ net hr
82503	25.00	52	208.00	0	2	55	220.00
82603	28.75	46	160.00	3	4	53	184.35
82703	25.00	26	104.00	0	2	28	112.00
82803	25.00	2	8.00	0	0	2	8.00
82903	22.50	5	22.22	0	2	7	31.11
83003	24.20	3	12.40	1	1	5	20.66
83103	25.00	25	100.00	0	4	29	116.00
90303	23.75	8	33.68	0	3	11	46.32
90403	26.25	9	34.29	1	1	11	41.91
90503	25.00	13	52.00	0	0	13	52.00
90603	30.00	27	90.00	0	7	35	116.67
90703	25.00	42	168.00	0	5	47	188.00
90803	25.00	13	52.00	0	2	15	60.00
90903	15.00	1	6.67	0	0	1	6.67
91003	25.00	10	40.00	0	4	14	56.00
91103	25.00	6	24.00	1	0	7	28.00
91203	23.75	9	37.90	0	2	11	46.32
91303	22.50	7	31.11	0	1	8	35.56
91403	25.00	22	88.00	0	4	26	104.00
91603	27.50	31	112.73	1	5	37	134.55
91703	26.25	34	129.52	0	5	39	148.57
91803	22.50	6	26.67	0	0	6	26.67
92003	31.25	36	115.20	0	2	38	121.60
92103	25.00	7	28.00	0	8	15	60.00
92203	15.00	2	13.33	0	3	5	33.33
92303	28.75	39	135.65	0	6	45	156.52
92403	23.75	37	155.79	0	7	44	185.26
92503	30.00	34	113.33	1	7	42	140.00
92603	33.75	28	82.96	0	7	35	103.70
92703	25.00	18	72.00	0	8	26	104.00
92803	30.00	38	126.67	1	11	50	166.67
92903	23.75	9	37.90	0	8	17	71.58
93003	23.75	19	80.00	0	6	25	105.26
100103	32.50	39	120.00	1	11	51	156.92
100203	28.75	26	90.44	0	4	30	104.35
100303	27.50	14	50.91	0	8	22	80.00
100403	27.50	14	50.91	0	12	26	94.55
100503	26.25	32	121.91	0	9	41	156.19
100603	32.50	26	80.00	0	4	52	160.00
100703	27.50	14	50.91	0	2	16	58.18
100803	28.30	28	98.94	0	7	35	123.68
100903	31.25	57	182.40	0	5	74	236.80
101003	22.50	25	111.11	0	3	28	124.44
101103	30.00	21	70.00	0	2	23	76.67
101203	28.30	10	35.34	0	4	14	49.47
101303	27.50	25	90.91	0	5	30	109.09
101403	16.25	14	86.15	0	0	14	86.15
101503	21.25	22	103.53	0	7	29	136.47
101603	38.50	33	85.71	0	8	41	106.49
101703	27.50	20	72.73	0	4	24	87.27
101903	26.25	5	19.05	0	8	13	49.52
102003	27.50	15	54.55	0	2	17	61.82
102103	22.50	8	35.56	0	2	10	44.44
102203	8.00	5	62.50	0	1	6	75.00
102303	38.75	27	69.68	0	4	31	80.00
102403	27.50	20	72.73	0	6	26	94.55
103103	27.50	4	14.55	0	2	6	21.82
TOTAL	1484.80	1168	78.66	10	247	1461	98.40

Table 22. Fall banding totals, Navarre Beach 2003.

Species	Banded	Species	Banded	Species	Banded
Yellow-billed Cuckoo	1	Fox Sparrow	5	Blackpoll Warbler	105
Downy Woodpecker	5	Northern Cardinal	15	Black-th. Green Warbler	3
Yellow-shafted Flicker	9	Rose-breasted Grosbeak	2	Western Palm Warbler	8
Eastern Kingbird	4	Indigo Bunting	11	Ovenbird	6
Eastern Phoebe	19	Cedar Waxwing	3	Northern Waterthrush	12
Eastern Wood Pewee	4	Red-eyed Vireo	10	Mourning Warbler	3
Yellow-bellied Flycatcher	3	Philadelphia Vireo	3	Common Yellowthroat	62
Traill's Flycatcher	3	Warbling Vireo	63	Wilson's Warbler	2
Least Flycatcher	4	Yellow-throated Vireo	1	American Redstart	28
Blue Jay	3	Blue-headed Vireo	3	Gray Catbird	101
Red-winged Blackbird	17	White-eyed Vireo	1	Brown Thrasher	8
Baltimore Oriole	17	Black and White Warbler	2	Carolina Wren	10
Rusty Blackbird	6	Prothonotary Warbler	2	House Wren	7
Common Grackle	5	Nashville Warbler	11	Winter Wren	3
House Finch	2	Orange-cr. Warbler	3	Brown Creeper	6
American Goldfinch	1	Tennessee Warbler	20	Black-capped Chickadee	1
White-crowned Sparrow	2	Cape May Warbler	27	Golden-crowned Kinglet	23
White-throated Sparrow	62	Yellow Warbler	9	Ruby-crowned Kinglet	63
Field Sparrow	3	Black-th.-blue Warbler	5	Veery	3
Slate-colored Junco	16	Myrtle Warbler	104	Gray-cheeked Thrush	23
Song Sparrow	13	Magnolia Warbler	40	Swainson's Thrush	67
Lincoln Sparrow	5	Chestnut-sided Warbler	4	Hermit Thrush	37
Swamp Sparrow	20	Bay-breasted Warbler	5	American Robin	14

Table 23 . Daily banding totals for Ottawa NWR, fall 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
90703	60.00	22	36.67	1	1	24	40.00
91603	60.00	43	71.67	0	0	43	71.67
92503	60.00	45	75.00	0	0	45	75.00
100503	54.00	32	59.26	0	0	32	59.26
100603	54.00	6	11.11	0	0	6	11.11
101203	60.00	48	80.00	0	2	50	83.33
101803	60.00	38	63.33	0	0	38	63.33
110803	60.00	20	33.33	0	0	20	33.33
TOTAL	468.00	254	54.27	1	3	258	55.13

Table 24. Fall banding totals for Ottawa NWR site, 2003.

Species	Banded	Species	Banded	Species	Banded
Least Flycatcher	1	Nashville Warbler	7	Wilson's Warbler	1
Red-winged Blackbird	9	Orange-crowned Warbler	1	Canada Warbler	1
Common Grackle	1	Tennessee Warbler	5	American Redstart	18
American Goldfinch	17	Yellow Warbler	1	Gray Catbird	13
White-crowned Sparrow	1	Black-th. Blue Warbler	1	House Wren	2
White-throated Sparrow	8	Myrtle Warbler	13	Winter Wren	1
Slate-colored Junco	5	Magnolia Warbler	9	Black-capped Chickadee	3
Song Sparrow	3	Blackpoll Warbler	27	Golden-crowned Kinglet	12
Lincoln Sparrow	2	Black-th. Green Warbler	1	Ruby-crowned Kinglet	15
Northern Cardinal	17	Western Palm Warbler	4	Wood Thrush	2
Indigo Bunting	3	Ovenbird	7	Gray-cheeked Thrush	3
Scarlet Tanager	1	Northern Waterthrush	1	Swainson's Thrush	8
Cedar Waxwing	3	Connecticut Warbler	1	Hermit Thrush	3
Red-eyed Vireo	2	Common Yellowthroat	8	American Robin	13

Table 25. Point count days conducted and species totals, fall season, Ottawa NWR, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Herring Gull	3	18	Rusty Blackbird	1	12	Myrtle Warbler	4	13
Ring-billed Gull	2	2	Common Grackle	5	70	Magnolia Warbler	2	13
Mallard	2	21	Purple Finch	1	4	Blackpoll Warbler	3	12
American Wigeon	2	3	American Goldfinch	6	35	Bl-th-green Warbler	1	1
Wood Duck	1	8	White-cr. Sparrow	1	1	American Redstart	2	8
Canada Goose	6	116	White-th. Sparrow	4	35	Gray Catbird	4	16
Tundra Swan	1	23	Slate-colored Junco	1	2	Carolina Wren	1	1
Great Egret	1	1	Song Sparrow	4	7	Brown Creeper	1	2
Killdeer	4	11	Swamp Sparrow	1	1	White-br. Nuthatch	1	1
Mourning Dove	6	22	No. Cardinal	7	31	Golden-cr. Kinglet	2	4
Downy Woodpecker	5	8	Cedar Waxwing	4	31	Ruby-cr. Kinglet	2	3
Yellow-shaft. Flicker	2	3	Red-eyed Vireo	2	8	Swainson's Thrush	2	7
Blue Jay	4	11	Warbling Vireo	2	5	Hermit Thrush	1	2
Euro. Starling	5	258	Nashville Warbler	2	7	American Robin	7	161
Brown-head. Cowbird	6	71	Tennessee Warbler	1	1	Unk. Duck	1	8
Red-winged Blackbird	7	2487	Cape May Warbler	2	2	Unk. Warbler	1	4
East. Meadowlark	2	3	Black-th-Blue warbler	1	1			

Table 26. Daily banding totals for Shawnee Lookout, fall 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
91403	50.00	41	82.00	0	0	41	82.00
91603	60.96	23	37.73	1	0	24	39.37
92103	71.00	33	46.48	1	0	34	47.89
92303	70.00	37	52.86	0	0	37	52.86
92803	72.00	49	68.06	2	0	51	70.83
93003	66.00	22	33.33	1	0	23	34.85
100503	72.00	25	34.72	2	0	27	37.50
100703	72.00	25	34.72	1	0	26	36.11
101203	56.04	18	32.12	0	0	18	32.12
101903	44.04	18	40.87	1	1	20	45.41
TOTAL	634.04	291	45.90	9	1	301	47.47

Table 27. Daily banding totals Shawnee Lookout, fall 2003.

Species	Banded	Species	Banded	Species	Banded
Eastern Screech Owl	1	Rose-br. Grosbeak	1	Yellow-breasted Chat	1
Hairy Woodpecker	1	Indigo Bunting	19	Wilson's Warbler	6
Downy Woodpecker	4	Philadelphia Vireo	2	American Redstart	3
Eastern Phoebe	1	Yellow-throated Vireo	1	Gray Catbird	14
Eastern Wood Pewee	1	White-eyed Vireo	3	Brown Thrasher	1
Acadian Flycatcher	1	Blue-winged Warbler	1	Carolina Wren	7
Traill's Flycatcher	1	Nashville Warbler	6	House Wren	1
Blue Jay	2	Tennessee Warbler	39	White-br. Nuthatch	1
White-throated Sparrow	7	Myrtle Warbler	2	Tufted Titmouse	6
Field Sparrow	2	Magnolia Warbler	24	Carolina Chickadee	9
Song Sparrow	5	Chestnut-sided Warbler	2	Wood Thrush	21
Lincoln Sparrow	1	Ovenbird	8	Grey-cheeked Thrush	5
Eastern Towhee	5	Northern Waterthrush	1	Swainson's Thrush	14
Northern Cardinal	20	Common Yellowthroat	41		

Table 28. Point count days conducted and species totals, fall season, Shawnee Lookout, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Ring-billed Gull	1	1	Brown-head. Cowbird	4	16	Blue-winged Warbler	1	1
Canada Goose	1	15	Red-winged Blackbird	6	339	Tennessee Warbler	5	19
Killdeer	1	1	Common Grackle	5	163	Myrtle Warbler	3	9
Turkey Vulture	6	132	House Finch	1	1	Magnolia Warbler	4	5
Black Vulture	5	44	American Goldfinch	8	28	Ovenbird	1	1
Cooper's Hawk	1	1	White-th. Sparrow	3	11	Com. Yellowthroat	6	13
Yellow-billed Cuckoo	1	1	Song Sparrow	5	7	Gray Catbird	4	5
Downy Woodpecker	5	7	Eastern Towhee	10	46	Brown Thrasher	1	1
Pileated Woodpecker	6	9	Northern Cardinal	10	89	Carolina Wren	10	39
Red-bell. Woodpecker	9	22	Rose-br. Grosbeak	5	8	White-br. Nuthatch	2	2
Yellow-shaft. Flicker	5	14	Indigo Bunting	8	20	Tufted Titmouse	5	10
Chimney Swift	1	10	Scarlet Tanager	1	1	Carolina Chickadee	8	16
Eastern Wood Pewee	3	4	Summer Tanager	2	2	Golden-cr. Kinglet	1	1
Acadian Flycatcher	4	8	Rough.-wing Swallow	1	1	Wood Thrush	6	23
Traill's Flycatcher	1	1	Cedar Waxwing	8	117	Gray-cheeked Thrush	1	2
Blue Jay	7	69	Red-eyed Vireo	1	1	Swainson's Thrush	7	29
American Crow	5	26	Yellow-th. Vireo	3	6	American Robin	10	159
European Starling	6	494	White-eyed Vireo	3	5	Unid. Warbler	10	67

Table 29. Daily banding totals for Petersburg, fall 2003.

Date	Net Hour	Banded	Banded/ 100 net hr	Returns	Recaptures	Total birds*	Total bird/ 100 net hr
082503	121.4	17	0.14	0	0	17	0.14
083003	120.0	66	0.55	0	0	66	0.55
083103	72.0	18	0.25	0	0	18	0.25
090303	117.2	34	0.29	0	0	34	0.29
090403	125.0	15	0.12	0	0	15	0.12
090503	123.8	26	0.21	0	0	26	0.21
090603	122.2	22	0.18	0	0	22	0.18
090703	71.4	15	0.21	0	0	15	0.21
090803	123.8	26	0.21	0	0	26	0.21
090903	126.7	19	0.15	0	0	19	0.15
091003	116.7	14	0.12	0	0	14	0.12
091103	116.7	7	0.06	0	0	7	0.06
091303	128.6	9	0.07	0	0	9	0.07
091403	75.0	6	0.08	0	0	6	0.08
091603	120.0	24	0.20	0	0	24	0.20
091703	121.4	17	0.14	0	0	17	0.14
091803	128.6	9	0.07	0	0	9	0.07
092003	116.7	14	0.12	0	0	14	0.12
092103	121.1	23	0.19	0	0	23	0.19
092503	117.4	27	0.23	0	0	27	0.23
092603	114.3	8	0.07	0	0	8	0.07
092703	112.5	9	0.08	0	0	9	0.08
092803	114.3	8	0.07	0	0	8	0.07
092903	123.1	16	0.13	0	0	16	0.13
093003	120.0	12	0.10	0	0	12	0.10
100103	121.4	17	0.14	0	0	17	0.14
100203	140.0	7	0.05	0	0	7	0.05
100303	125.0	5	0.04	0	0	5	0.04
100503	120.0	24	0.20	0	0	24	0.20
100603	125.0	5	0.04	0	0	5	0.04
100703	111.1	10	0.09	0	0	10	0.09
100803	116.7	21	0.18	0	0	21	0.18
100903	115.4	15	0.13	0	0	15	0.13
101103	116.7	14	0.12	0	0	14	0.12
101303	120.0	12	0.10	0	0	12	0.10
101803	107.7	14	0.13	0	0	14	0.13
101903	71.4	15	0.21	0	0	15	0.21
TOTAL	4260.3	620	0.15	0	0	620	0.15

Table 30. Daily banding totals Petersburg, fall 2003.

Species	Banded	Species	Banded	Species	Banded
Mourning Dove	1	Warbling Vireo	2	Wilson's Warbler	3
Sharp-shinned Hawk	6	Black and White Warbler	4	Canada Warbler	3
Cooper's Hawk	1	Nashville Warbler	15	American Redstart	35
Black-billed Cuckoo	1	Orange-crowned Warbler	1	Gray Catbird	79
Downy Woodpecker	4	Tennessee Warbler	31	Brown Thrasher	2
Yellow-bellied Flycatcher	3	Yellow Warbler	1	House Wren	6
Least Flycatcher	1	Black-th. Blue Warbler	14	Winter Wren	2
Blue Jay	34	Myrtle Warbler	5	Brown Creeper	1
House Finch	9	Magnolia Warbler	60	White-br. Nuthatch	1
White-throated Sparrow	12	Chestnut-sided Warbler	14	Tufted Titmouse	6
Field Sparrow	2	Bay-breasted Warbler	3	Black-capped Chickadee	5
Slate colored Junco	1	Blackpoll Warbler	21	Golden-crowned Kinglet	8
Song Sparrow	3	Blackburnian Warb.	1	Ruby-crowned Kinglet	17
Eastern Towhee	2	Black-th. Green Warbler	3	Veery	2
Northern Cardinal	12	Ovenbird	32	Gray-cheeked Thrush	5
Indigo Bunting	1	Northern Waterthrush	1	Swainson's Thrush	38
Cedar Waxwing	11	Mourning Warbler	1	Hermit Thrush	23
Red-eyed Vireo	7	Common Yellowthroat	6	American Robin	56
Philadelphia Vireo	2				

Table 31. Point count days conducted and species totals, fall season, Petersburg, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Canada Goose	4	12	Red-winged Blackbird	5	27	House Sparrow	14	36
Killdeer	3	3	Common Grackle	10	1620	Gray Catbird	23	81
Mourning Dove	12	31	House Finch	3	32	Brown Thrasher	1	1
American Kestrel	1	1	American Goldfinch	31	100	White-br. Nuthatch	2	2
Downy Woodpecker	3	3	Northern Cardinal	21	38	Tufted Titmouse	2	3
Yellow-sh. Flicker	2	2	Barn Swallow	2	3	Black-cap Chickadee	6	6
Blue Jay	38	463	Cedar Waxwing	19	266	American Robin	37	492
American Crow	11	26	Warbling Vireo	1	1	Eastern Bluebird	2	3
European Starling	26	399						

Table 32. Daily banding totals for Shaker Lakes, fall 2003.

Date	Net hour	Banded	Banded/ 100 net hr	Returns Recaptures	Recaptures	Total birds*	Total bird/ 100 net hr
82203	34.98	17	48.60	3	1	21	60.03
82503	34.50	9	26.09	0	0	9	26.09
82703	34.98	7	20.01	1	0	8	22.87
82903	38.52	19	49.33	0	0	19	49.33
90303	30.00	13	43.33	1	0	14	46.67
90503	32.52	14	43.05	0	0	14	43.05
90603	27.48	22	80.06	0	0	22	80.06
90803	34.50	17	49.28	0	0	17	49.28
91003	40.02	55	137.43	0	0	55	137.43
91503	31.98	41	128.21	0	0	41	128.21
91703	30.00	7	23.33	0	0	7	23.33
92203	28.50	16	56.14	0	0	16	56.14
92403	27.24	18	66.08	0	0	18	66.08
92603	29.52	15	50.81	0	0	15	50.81
100103	32.52	15	46.13	0	0	15	46.13
100303	33.48	13	38.83	0	0	13	38.83
100603	30.48	18	59.06	0	0	18	59.06
100803	37.50	50	133.33	1	0	51	136.00
101003	37.98	54	142.18	0	0	54	142.18
101303	27.00	27	100.00	0	0	27	100.00
101503	30.48	28	91.86	0	1	29	95.14
101703	33.00	40	121.21	0	0	40	121.21
102203	29.52	21	71.14	0	0	21	71.14
103103	34.50	21	60.87	0	0	21	60.87
110703	31.98	34	106.32	1	0	35	109.44
Total	813.18	591	72.68	7	2	600	73.78

Table 33. Daily banding totals Shaker Lakes, fall 2003.

Species	Banded	Species	Banded	Species	Banded
Mourning Dove	1	Northern Cardinal	11	Common Yellowthroat	7
Black-billed Cuckoo	1	Rose-breasted Grosbeak	11	Wilson's Warbler	18
Downy Woodpecker	12	Cedar Waxwing	1	Canada Warbler	2
Yellow-shafted Flicker	2	Red-eyed Vireo	7	American Redstart	29
Great-crested Flycatcher	1	Warbling Vireo	2	Gray Catbird	41
Eastern Phoebe	12	Blue-headed Vireo	6	Brown Thrasher	1
Eastern Wood Pewee	1	Black and White Warbler	4	Carolina Wren	2
Traill's Flycatcher	1	Blue-winged Warbler	1	House Wren	3
Least Flycatcher	1	Nashville Warbler	15	Winter Wren	1
Blue Jay	7	Orange-crowned Warbler	3	Brown Creeper	1
Common Grackle	2	Black-th. Blue Warbler	4	White-breasted Nuthatch	1
House Finch	9	Myrtle Warbler	31	Tufted Titmouse	4
American Goldfinch	71	Magnolia Warbler	52	Black-capped Chickadee	6
White-crowned Sparrow	4	Chestnut-sided Warbler	7	Golden-crowned Kinglet	2
White-throated Sparrow	71	Bay-breasted Warbler	3	Ruby-crowned Kinglet	11
American Tree Sparrow	1	Blackpoll Warbler	3	Wood Thrush	2
Field Sparrow	1	Black-th.-Green Warbler	3	Veery	2
Slate colored Junco	3	Western Palm Warbler	1	Grey-cheeked Thrush	6
Song Sparrow	36	Ovenbird	5	Swainson's Thrush	17
Lincoln Sparrow	1	Northern Waterthrush	4	Hermit Thrush	8
Swamp Sparrow	8	Connecticut Warbler	1	American Robin	5
Fox Sparrow	1				

Table 34. Point count days conducted and species totals, fall season, Shaker Lakes, 2003.

Species	# days	# birds	Species	# days	# birds	Species	# days	# birds
Herring Gull	1	1	Ruby-th. Hummingbird	3	3	Magnolia Warbler	1	1
Ring-billed Gull	1	1	Eastern Phoebe	3	3	Bay-breasted Warbler	1	1
Mallard	16	49	Olive-sided Flycatcher	1	1	Blackpoll Warbler	1	1
Wood Duck	15	61	East. Wood Pewee	5	6	Black-th. Gr. Warbler	1	2
Canada Goose	7	39	Blue Jay	16	29	Wilson's Warbler	1	2
Great Blue Heron	2	3	Euro. Starling	4	28	American Redstart	3	4
Mourning Dove	15	62	Red-winged Blackbird	10	59	House Sparrow	1	2
Rock Pigeon	18	241	Baltimore Oriole	1	1	Gray Catbird	19	48
Cooper's Hawk	2	2	Rusty Blackbird	1	1	Carolina Wren	3	4
Red-tailed Hawk	2	3	Common Grackle	5	32	Brown Creeper	1	1
Belted Kingfisher	3	4	Am. Goldfinch	20	113	White-br. Nuthatch	17	26
Hairy Woodpecker	3	3	White-th. Sparrow	3	6	Black-cap Chickadee	5	6
Downy Woodpecker	13	16	Song Sparrow	13	22	Golden-cr. Kinglet	1	1
Yellow-bel Sapsucker	1	1	No. Cardinal	5	5	Ruby-cr. Kinglet	1	1
Red-bell Woodpecker	16	19	Rose-br. Grosbeak	6	8	Swainson's Thrush	2	2
Yellow-shaft. Flicker	8	12	Barn Swallow	2	4	American Robin	15	68
Common Nighthawk	1	2	Black & Wh. Warbler	1	1	Unk. Gull	7	10
Chimney Swift	14	547	Myrtle Warbler	2	19	Unk. Warbler	1	1

Table 35. Total bandings Black Swamp Bird Observatory, passerine migration , 2003.

Species	Banded	Species	Banded	Species	Banded
Green Heron	0 (2)	Am. Tree Sparrow	3 (4)	Blackburn. Warbler	32 (33)
Solitary Sandpiper	0 (3)	Chipping Sparrow	5 (17)	Bl-th.-Gr. Warbler	86 (93)
Spotted Sandpiper	0 (1)	Field Sparrow	19 (34)	W. Palm Warbler	157 (175)
Mourning Dove	1 (4)	Slate-colored Junco	69 (136)	Prairie Warbler	1
Sharp-shinned Hawk	4 (11)	Song Sparrow	157 (222)	Ovenbird	228 (279)
American Kestrel	2	Lincoln Sparrow	179 (189)	No. Waterthrush	218 (246)
Eastern Screech Owl	0 (1)	Swamp Sparrow	300 (318)	La. Waterthrush	1
Yellow-billed Cuckoo	8	Fox Sparrow	50 (53)	Kentucky Warbler	2 (4)
Black-billed Cuckoo	3 (5)	Eastern Towhee	6 (20)	Connecticut Warbler	18 (21)
Hairy Woodpecker	2 (5)	Northern Cardinal	141 (207)	Mourning Warbler	139 (145)
Downy Woodpecker	28 (54)	Rose-breasted Grosbeak	42 (58)	(4) C. Yellowthroat	703 (790)
Yellow-bell. Sapsucker	6	Blue Grosbeak	1	Yellow-br. Chat	4 (5)
Red-bellied Woodpecker	3	Indigo Bunting	153 (203)	Hooded Warbler	6
Yellow-shafted Flicker	20 (24)	Scarlet Tanager	12	Wilson's Warbler	277 (321)
Whip-poor-will	1	Tree Swallow	28	Canada Warbler	96 (117)
Chimney Swift	1	Cedar Waxwing	94 (109)	(8) Am. Redstart	442 (544)
Eastern Kingbird	12	Red-eyed Vireo	341 (358)	House Sparrow	0 (4)
Great-crest. Flycatcher	11 (12)	Philadelphia Vireo	46 (50)	(2) Gray Catbird	907 (1117)
Eastern Phoebe	41 (58)	Warbling Vireo	132 (141)	Brown Thrasher	29 (37)
Olive-sided Flycatcher	1	Yellow-throated Vireo	3 (4)	Carolina Wren	34 (46)
Eastern Wood Pewee	44 (48)	Blue-headed Vireo	55 (56)	House Wren	186 (202)
Yellow-bell. Flycatcher	122 (136)	White-eyed Vireo	15 (19)	Winter Wren	90 (95)
Acadian Flycatcher	14 (17)	Black and White Warbler	127 (144)	Brown Creeper	75 (82)
Traill's Flycatcher	339 (360)	Prothonotary Warbler	12	White-br Nuthatch	0 (3)
Least Flycatcher	155 (168)	Blue-winged Warbler	17 (22)	Rose-br. Nuthatch	1
Blue Jay	74 (129)	Brewster's Warbler	1	Tufted Titmouse	0 (18)
Brown-headed Cowbird	5 (14)	Golden-winged Warbler	4 (5)	Black-cap Chickadee	7 (22)
Red-winged Blackbird	249 (256)	Nashville Warbler	259 (315)	Carolina Chickadee	0 (9)
Orchard Oriole	2 (3)	Orange-crowned Warbler	23 (27)	Golden-cr. Kinglet	258 (280)
Baltimore Oriole	105 (124)	Tennessee Warbler	186 (257)	(7) Ruby-cr. Kinglet	454 (547)
Rusty Blackbird	35 (38)	Northern Parula	20 (22)	Bl-gray Gnatcatcher	78 (79)
Common Grackle	59 (79)	Cape May Warbler	125 (126)	Wood Thrush	40 (73)
Purple Finch	28	(9) Yellow Warbler	491 (514)	Veery	77 (89)
House Finch	11 (29)	Black-th.-Blue Warbler	101 (123)	Gray-cheek Thrush	190 (207)
American Goldfinch	106 (253)	(6) Myrtle Warbler	703 (748)	(5) Swainson Thrush	696 (790)
Savanna Sparrow	1	(3) Magnolia Warbler	877 (1072)	Hermit Thrush	376 (422)
Grasshopper Sparrow	1	Chestnut-sided Warbler	153 (180)	American Robin	178 (304)
White-cr. Sparrow	59 (65)	Bay-breasted Warbler	60 (68)	Eastern Bluebird	0 (1)
(1) White-th. Sparrow	957 (1134)	(10) Blackpoll Warbler	452 (477)	Ruby-th. Humming.	109

() numbers in bold are top ten banded species

Table 36. Banding effort totals by area and by season, 2003.

Area	Sample Days	Net Hours	Birds Banded	Birds/ 100 Net Hr	Total Captured	Total/ 100 Net Hr
Navarre	116	14,636.6	13,200	90.2	16,122	110.1
Darby	9	593.0	280	47.2	292	49.2
Ottawa	18	1,071.9	713	66.5	763	71.2
Petersburg	64	7,076.7	993	14.0	993	14.0
Shawnee Lookout	10	634.0	291	45.9	301	47.5
Shaker Lakes	44	1,480.1	912	61.6	949	64.1
Creek Bend	11	460.5	152	33.0	152	33.0
Season	Sample Days	Net Hours	Birds Banded	Birds/ 100 Net Hr	Total Captured	Total/ 100 Net Hr
All Stations						
Spring	52	12,923.5	9,683	74.9	11,116	86.0
Fall	64	12,742.3	6,858	53.8	8,456	66.4
TOTAL	116	25,665.8	16,541	64.4	19,572	76.3
ONWR Stations						
Spring	52	7,842.4	8,580	109.4	9,985	127.3
Fall	64	8,459.1	5,613	66.4	7,192	85.0
TOTAL	116	16,301.5	14,193	87.1	17,177	105.4

Table 37. Fall age ratios of selected species, Navarre 2003.

Species	2003		2002		Percent Change	91-02Ave. HY/AHY	2003 %Change from avg.
	Sample	HY/AHY	Sample	HY/AHY			
Baltimore Oriole	29	3.83	86	6.82	-44	6.78	-44
White-th Sparrow*	435	3.83	528	8.10	-53	4.68	-18
Song Sparrow	103	4.42	51	1.68	+163	1.95	+127
Cedar Waxwing	13	2.25	2	-	-	1.81	+24
Red-eyed Vireo	96	5.40	80	15.00	-64	5.67	-5
Warbling Vireo	71	6.10	87	7.70	-21	6.89	-11
Black & Wh Warb.	21	1.63	21	2.00	-18	2.20	-26
Nashville Warbler	45	3.09	31	4.17	-26	3.37	-8
Tenn. Warbler	98	8.80	152	14.20	-38	5.76	+53
Cape May Warb.	108	1.77	275	3.23	-45	1.13	+57
Black-th.-Bl Warb.	35	1.33	57	4.70	-72	4.13	-68
Myrtle Warbler	331	3.09	945	4.43	-30	1.95	+58
Magnolia Warbler	230	4.11	175	4.00	+3	3.03	+36
Blackpoll Warbler	370	2.21	622	4.50	-51	1.95	+13
Ovenbird	62	14.50	96	15.00	-3	7.14	+103
No. Waterthrush	40	1.22	30	2.00	-39	4.34	-72
Com. Yellowthroat	273	5.83	333	6.09	-4	6.89	-15
Am. Redstart	152	1.20	78	2.55	-53	2.94	-59
Gray Catbird	395	11.22	347	17.26	-35	9.02	+24
House Wren	83	4.19	81	4.40	-5	6.50	-36
Gray-cheek Thrush	164	1.56	169	2.60	-40	1.95	-20
Swainson's Thrush	487	2.34	659	1.53	+47	1.43	+64
Hermit Thrush	224	6.47	155	9.33	-31	5.73	+13
American Robin	123	3.73	114	8.50	-56	3.44	+8

*Species in bold have samples sizes for both 2002 and 2003 over 50.

Table 38. Banding year of returning birds captured at Navarre study site, 2003.

Species	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	Total
Yellow-billed Cuckoo	2										2
Downy Woodpecker	2	1									3
Eastern Kingbird				1							1
Blue Jay	1										1
Red-winged Blackbird	7	4	2	2	2	1					18
Baltimore Oriole	19	1		2		1					23
American Goldfinch	2	1	1								4
Song Sparrow	11	2	3	2							18
Swamp Sparrow	1										1
Northern Cardinal	12	4	6				1				23
Indigo Bunting	9	2	2	1		2					16
Tree Swallow	1	2									3
Warbling Vireo	3	1									4
Prothonotary Warbler	2			1		1					4
Blue-winged Warbler	1										1
Yellow Warbler	10	2	5							1	18
Common Yellowthroat	20	9	4	4							37
Gray Catbird	21	9	2								32
Carolina Wren	5	2									7
Black-cap Chickadee	1										1
House Wren	4	1									5
Winter Wren	1										1
Total	135	41	25	13	2	5	1	0	0	1	223

Table 39. Banding year of returning birds captured at Darby study site, 2003.

Species	2002	2001	2000	1999	1998	1997	1996	1995	1994	Total
Blue Jay						1				1
Baltimore Oriole		1								1
Northern Cardinal	1	1		1						3
House Wren		1								1
Total	1	3	0	1	0	1	0	0	0	6

Table 40. Banding year of returning birds captured at Shawnee Lookout study site, 2003.

Species	2002	2001	2000	1999	Total
White-th. Sparrow		1			1
Indigo Bunting		1			1
Common Yellowthroat	1				1
Tufted Titmouse	1	1			2
Carolina Chickadee	1				1
Wood Thrush		1		1	2
Total	3	4	0	1	8

Table 41. Banding year of returning birds captured at Shaker Lakes study site, 2003.

Species	2002	2001	Total
Hairy Woodpecker	1		1
Downy Woodpecker		1	1
Red-winged Blackbird	1		1
American Goldfinch	2	2	4
Song Sparrow		6	6
Northern Cardinal		3	3
Gray Catbird	3	4	7
Carolina Wren	1		1
Black-capped Chickadee	1	1	2
Total	9	17	26

Table 42. Banding year of returning birds captured at Ottawa NWR study site, 2003.

Species	2002	2001	2000	1999	Total
Trail's Flycatcher	1				1
American Goldfinch	5		1		6
Northern Cardinal	4	1		2	7
Indigo Bunting	1				1
Yellow Warbler	17				17
Gray Catbird	4			1	5
Wood Thrush	1				1
American Robin	2				2
Total	35	1	1	3	40

Table 43. Foreign recoveries of study banded birds since last progress report.

Species	Band Number	Band Date	Band Location	Recovery Date	Recovery Location*
Black billed Cuckoo	1192-02798	05-21-01	Navarre (413-0830))	06-22-01	New York (432-0782)
Yellow-sh. Flicker	1543-00232	10-11-00	Navarre	04-19-01	So. Carolina (331-0811)
Blue Jay	1162-49754	05-05-99	Navarre	11-14-00	Ontario (431-0793)
White-th. Sparrow	1511-33676	09-23-95	Sabroske (413-0831)	04-20-00	Ontario (423-0802)
White-th. Sparrow	1591-29786	09-26-99	Darby (413-0825)	07-?-00	Quebec (494-0745)
Fox Sparrow	8101-59475	10-19-00	Navarre	04-25-01	Manitoba (544-1015)
Yellow Warbler	1980-09687	05-11-96	Sabroske	05-31-01	Michigan (415-0834)
Yellow Warbler	2090-89548	05-07-99	Navarre	05-08-01	Michigan (424-0842)
Yellow Warbler	2090-93384	05-19-99	Navarre	05-14-00	Ontario (461-0792)
Com. Yellowthroat	2090-88984	05-31-97	Navarre	10-13-00	Indiana (414-0872)
Swainson's Thrush	1761-61840	05-18-01	Navarre	05-24-01	Ontario (442-0763)

*Banding coordinates for study sites: Navarre 413-0830, Darby 413-0825, Sabroske 413-0831, Ottawa NWR 413-0831.

Table 44. Spring fat composition comparisons of selected species for 2002 and 2003, Navarre.

Sign. Higher 2003	Non-sign. Higher 2003	Sign. Higher 2002	Non- sign. Higher 2002
Red eyed Vireo	Western Palm Warbler		Swamp Sparrow
Bay-breasted Warbler	Blackpoll Warbler		Indigo Bunting
Traill's Flycatcher	American Redstart		Ovenbird
White-throated Sparrow	House Wren		No. Waterthrush
Magnolia Warbler	Golden-cr. Kinglet		
Chestnut-sided Warbler	Blue-gray Gnatcatcher		
Mourning Warbler	Veery		
Wilson's Warbler	Hermit Thrush		
Ruby-crowned Kinglet	Tennessee Warbler		
	Yellow Warbler		
	Myrtle Warbler		
	Gray-cheeked Thrush		
	Swainson's Thrush		
	Yellow-bellied Flycatcher		
	Least Flycatcher		
	Canada Warbler		
	Common Yellowthroat		
	Gray Catbird		
	Lincoln Sparrow		
	Black & White Warbler		
	Nashville Warbler		
	Cape May Warbler		

Table 45. Fall fat composition comparisons of selected species for 2002 and 2003, Navarre.

Sign. Higher 2003	Non-sign. Higher 2003	Sign. Higher 2002	Non- sign. Higher 2002
Gray Catbird	Myrtle Warbler	Cape May Warbler	Black & White Warbler
	Swamp Sparrow	Blackpoll Warbler	Magnolia Warbler
	Red-eyed Vireo	House Wren	American Redstart
	Gray-cheeked Thrush		Hermit Thrush
	Swainson's Thrush		Ovenbird
	White-th. Sparrow		
	Golden-cr. Kinglet		
	Ruby-cr. Kinglet		
	Com. Yellowthroat		

Figure 1. Migration field sites, 2003.

