



## Monitoring Avian Productivity and Survivorship on Kodiak Island, Alaska, 2010-2014

Robin Corcoran, Cindy Trussell, and Rich MacIntosh.



Photo credit Cindy Trussell, Kodiak College

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## **Monitoring Avian Productivity and Survivorship on Kodiak Island, Alaska, 2010-2014**

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### **Abstract**

The Monitoring Avian Productivity and Survivorship (MAPS) Program was established in 1989 to monitor spatial and temporal patterns in adult survival rates and productivity for populations of landbirds across North America. The MAPS program currently consists of nearly 500 monitoring stations sampled annually, many of which have been operated for  $\geq 10$  years. The MAPS program provides estimates of adult apparent survival and recruitment rates and indices of productivity for about 150 landbird species. From 2010-2014, we established and annually operated a MAPS site at the Kodiak National Wildlife Refuge Headquarters on the Buskin River State Recreation Area along the Kodiak road system in Alaska. Habitat at the site was primarily mixed alder-willow riparian with some Sitka spruce upland. In five years of mist net operation, we captured and banded 1006 birds representing 20 species, and recaptured between years 68 individuals representing 11 species. The four most commonly caught species were Fox Sparrow, Hermit Thrush, and Wilson's and Yellow Warbler. In general, across all years, non-migratory and short- to-medium distance migrant species had higher productivity compared to long-distance migrant warblers. An additional goal of the Kodiak MAPS project was communicating science and conservation to the public through bird banding. Approximately 30 volunteers contributed time to the Kodiak MAPS project each season, and 65 people in total participated across the five years. A cumulative total of approximately 1500 hours of service was donated to the Refuge by volunteer participation in the MAPS program. A final goal of the Kodiak MAPS program was to serve as a successful example of how to initiate and conduct a MAPS program, incorporating partnerships, volunteers and public outreach, and encourage others in the Alaska region to become active in the program.

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## **Introduction**

The Monitoring Avian Productivity and Survivorship (MAPS) Program was established in 1989 to monitor spatial and temporal patterns in adult survival rates and productivity for populations of landbirds across North America. Over 1,000 MAPS stations have been established and operated, a large proportion of them providing many consecutive years of data. The MAPS program, administered through the Institute for Bird Populations (IBP), currently consists of nearly 500 monitoring stations sampled annually that provide estimates of adult apparent survival and recruitment rates and indices of productivity for about 150 landbird species (DeSante et al. 1995, 2004, 2007).

The program uses a network of constant effort mist netting stations where individual birds are banded and recaptured over time. The MAPS program has a centralized data repository and employs qualified biometricians for the analyses that have emerged from over two decades of standardized data collection. MAPS methods enable field personnel to mark individuals so that survival can be estimated from modified Cormack-Jolly-Seber mark-recapture models (DeSante and Nott 2000). MAPS has begun to incorporate habitat information by using landscape metrics within a 4 km radius of the mist-netting stations, and this appears to be a useful characterization for the targeted species that have been evaluated (DeSante and Nott 2000). Additionally, MAPS data have been successfully used to correlate forest management actions with bird productivity, demographics, and abundance (Nott et al. 2003, 2005).

Effective management of habitats and conservation of bird populations is facilitated by monitoring demographic rates (i.e., reproduction, recruitment, survival) in addition to abundance and trend (DeSante et al. 2005). Demographic rates can be modeled as functions of environmental variables (e.g., land uses, habitat, climate), and these relationships can be incorporated into predictive population models to assess the viability of populations (Noon and Sauer 1992).

MAPS data provide a wealth of information about the responses of bird populations to annual weather variation and climate change. Increasingly scientists are using MAPS results to detect signals of climate change in progress, to predict the effects of climate change on bird populations, and to help land managers design strategies for conserving bird populations in light of accelerating climate change (Nott et al. 2002, IBP and partners 2012). Increased MAPS coverage, better coordination between MAPS and the North American Breeding Bird Survey program, and continued development of analytical methods that link the two programs will enhance the value of these monitoring efforts to land managers and conservation planners working at a variety of spatial scales (Saracco et al. 2008).

The Alaska Department of Fish and Game (ADF&G) Comprehensive Wildlife Conservation Strategy emphasized the extremely limited information on the status and trends of most of the 135 species of landbirds that breed in Alaska (ADF&G 2006). More effective community and species-specific inventory and monitoring programs are necessary for landbirds in Alaska to establish baselines of population size for future comparison, identify key areas and habitats for conservation, and detect population declines before species become imperiled. Landbird monitoring on Kodiak consists of two annual road-based North American Breeding Bird Survey Routes (BBS), two Christmas Bird Counts, and one biennial Alaska Landbird Monitoring

(ALMS) plot. Initiating a MAPS program on Kodiak has contributed to local monitoring needs and was designed to complement the two road-based BBS currently conducted on the Island.

### Public Outreach

The goals of the project were to contribute to a nation-wide program for monitoring migratory landbirds while communicating science and conservation to the public through bird banding. To achieve these goals we instituted the MAPS program on the Buskin River State Recreation Area along the Kodiak road system where it would be easily accessible to the community.

The conservation of migratory birds is one of the central unifying themes of the National Wildlife Refuge System. Outreach and education were major components of the MAPS program on Kodiak. Involving the public in mist netting helps bridge the gap between scientists and the public, connects people with birds through in-the-hand observation, and helps build appreciation and understanding of birds and their habitats. Through the bird banding education program we stressed the importance of an interconnected system of refuges necessary to breeding, migrating, and wintering birds and fostered public stewardship of refuges in general.

### Study Area

The study area was located on the Buskin River State Recreation Area (SRA), Kodiak Island, Alaska, (Figure 1) on Rezanof Drive approximately five kilometers southwest of the city of Kodiak. Net locations were in the riparian habitat surrounding the headquarters of the Kodiak National Wildlife Refuge (Figure 2).

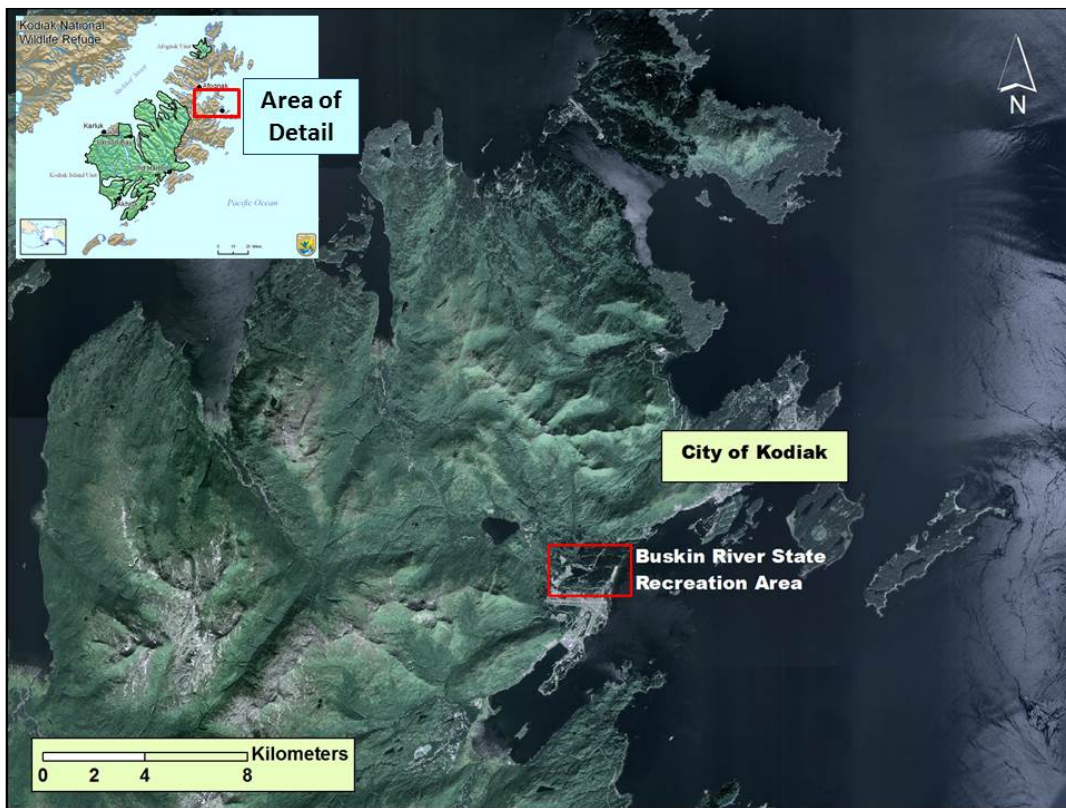


Figure 1. Location of the Buskin River State Recreation Area on Kodiak Island, Alaska.



**Figure 2. Location of the mist net sites (1-10) on the Buskin River State Recreation Area, Kodiak Island, Alaska, for the 2010-2014 Monitoring Avian Productivity and Survivorship (MAPS) project.**

The Buskin River supports one of the most productive and popular sport fisheries on the Kodiak road system. The SRA has two picnic shelters, a fishing platform, 20 campsites which are suitable for RV hookups, and an RV overflow area. There are extensive old military roads on the north side of the park that are now used as hiking trails. The Kodiak National Wildlife Refuge headquarters is located adjacent to the SRA lands and include two administrative buildings, three shop and storage buildings, and five residences. The mist net sites were located between the Refuge headquarters and the SRA campgrounds.

## Methods

### MAPS Protocols

We established 10 mist net sites, the Institute for Bird Populations recommended number for operation by one to two people. The MAPS station was roughly rectangular in shape and encompassed an area of about 20 hectares (50 acres). Mist nets were distributed more or less uniformly but opportunistically (where birds were most likely to be caught) within a core area of



about eight hectares (20 acres, about 280 meters on a side; Figure 2). The core study site was mixed riparian habitat along an ephemeral stream. Sitka alder (*Alnus crispa*) and willow (*Salix* spp.) dominated, interspersed with small stands of Sitka spruce (*Picea sitchensis*) and black cottonwood (*Populus balsamifera*). Salmonberry (*Rubus spectabilis*) and pushki (cow parsnip, *Heracleum lanatum*) dominated in the understory.

The 10 nets were distributed so that all nets could be checked within 15 minutes if no birds were extracted (empty net run). We used standard 12 meter long-2.6 meter tall nylon nets of 30mm mesh size appropriate for warblers and sparrows. Nets were operated one day during each of six consecutive 10-day periods between June and August (Table 1). Nets were opened at official local sunrise and were left open for exactly six hours. Nets were checked every 40-60 minutes.

**Table 1. Schedule of bird banding for the Kodiak Island Monitoring Avian Productivity and Survivorship (MAPS) site on the Buskin River State Recreation Area, Alaska, (Regions 5 of the MAPS Program; from DeSante et al. 2014).**

| Period | Range of Dates for Banding | Period | Range of Dates for Banding |
|--------|----------------------------|--------|----------------------------|
| 5      | June 10-19                 | 8      | July 10-19                 |
| 6      | June 20-29                 | 9      | July 20-29                 |
| 7      | June 30- July 9            | 10     | July 30- August 8          |

### Bird Banding

All birds captured throughout the season, including recaptures, were identified to species and aged and sexed when possible. Plumage, breeding condition, molt characteristics, and to a lesser extent skull pneumatization, were used to determine age (Table 2) and/or sex using information from the Identification Guide to North American Birds Part I (Pyle 1997). The Institute for Bird Populations website with materials for MAPS Station Operators was consulted each season prior to mist netting (<http://www.birdpop.org/MANUALS.HTM>). This site maintains an annual MAPS manual (DeSante et al. 2014) and all related data forms. All birds were banded with a numbered aluminum band issued by the USGS Bird Banding Laboratory, Patuxent Wildlife Research Center.



**Figure 3. Mist net showing habitat and birds being extracted from a net on the Kodiak Island Monitoring Avian Productivity and Survivorship (MAPS) project, Alaska.**

**Table 2. Age class descriptions for birds captured on the Kodiak Island Monitoring Avian Productivity and Survivorship (MAPS) site on the Buskin River State Recreation Area, Alaska, 2010-2014 (from DeSante et al. 2014).**

| Age Class           | Description   |
|---------------------|---|
| Local               | A young bird incapable of sustained flight.   |
| Hatching Year       | A bird capable of sustained flight and known to have hatched during the calendar year it is captured.   |
| After Hatching Year | A bird known to have hatched before the calendar year in which it is captured; year of hatching otherwise unknown.  |
| Second Year         | A bird known to have hatched in the calendar year preceding the year in which it is captured (known to be in its second calendar year of life).   |
| After Second Year   | A bird known to have hatched earlier than the calendar year preceding the year in which it is captured (known to be at least in its third calendar year); year of hatching otherwise unknown. |
| Third Year          | A bird known to have hatched two calendar years prior to the year in which it is captured (known to be in its third calendar year).   |
| After Third Year    | A bird known to have hatched more than two calendar years prior to the year in which it is captured (known to be at least in its fourth calendar year); year of hatching otherwise unknown.   |
| Indeterminable      | Age unknown because age indeterminable; i.e., age determination attempted but not possible with confidence.   |
| Not attempted       | Age unknown because age determination not attempted.  |

**Bird Safety**

In accordance with the MAPS protocol (DeSante et al. 2014), every effort was made to gather data on individual birds quickly and efficiently. We released birds immediately after data collection was completed. Birds that exhibited higher levels of stress were immediately released without being processed. If weather conditions deteriorated (precipitation, average wind speed exceeding 10 knots or gusts exceeding 20 knots) nets were closed and any unprocessed birds were immediately released. Other efforts ensuring bird safety included closing or raising nets when predators were in the area, knowing which species were most vulnerable to stress, wing strain, or other injuries and attending these sensitive species first, and having materials on hand such as medical tape, disinfectant wipes, and styptic powder to treat any injuries. When necessary, stressed or lethargic birds were placed in a “hospital box” warmed with HotHands© hand warmers in a quiet dark location. These birds typically revived within one to two hours and were then released.

**Public Outreach – Connecting People with Nature**

One of the primary goals of the Kodiak MAPS project was communicating science and conservation to the public through bird banding. Through cooperation with the Kodiak Refuge Volunteer Coordinator we advertised the opportunity to the Kodiak community to join us each morning we banded. Volunteers had the option of observing or participating. In order to participate, and be trained to extract birds from nets and band, volunteers had to agree to commit to greater than three banding sessions each season. Our goal was to develop a small group of volunteers who became fully trained on banding and data recording while also allowing others to come and occasionally view the field operations and learn about bird banding.

## Results and Discussion

### Capture Rates

In five years of mist net operations we captured and banded 1006 birds representing 20 species (Table 3). The most commonly caught species included Fox Sparrow, Hermit Thrush, Wilson's Warbler, and Yellow Warbler. Capture rates for several resident non-migratory species were also high, including Pacific Wren, Black-capped Chickadee, Golden-crowned Kinglet, and Pine Grosbeak. Varied Thrush, a short-distance to partial migrant, and Pine Siskin (nomadic) were also frequently captured. Capture rates between years were relatively consistent for Fox Sparrow and Hermit Thrush. Wilson's Warbler were captured in high numbers the first year of banding (n=76 in 2010) but dropped to less than half that number in 2011 and remained lower in subsequent years. Yellow Warbler numbers were variable across the five seasons (Table 3). A summary of all birds captured in mist nets, including recaptures and unbanded birds, is presented in Appendix A.

**Table 3. Summary of mist net captures for newly banded birds at the Kodiak Island Monitoring Avian Productivity and Survivorship (MAPS) site on the Buskin River State Recreation Area, Alaska, 2010-2014.**

| Species                        | Year*      |            |            |            |            | Total       | No. Recaptured Between Years | Mean Hatching Year to Adult Ratio |
|--------------------------------|------------|------------|------------|------------|------------|-------------|------------------------------|-----------------------------------|
|                                | 2010       | 2011       | 2012       | 2013       | 2014       |             |                              |                                   |
| Fox Sparrow                    | 46         | 44         | 33         | 48         | 58         | 229         | 17                           | 1.2                               |
| Hermit Thrush                  | 52         | 41         | 47         | 30         | 43         | 213         | 17                           | 1.9                               |
| Wilson's Warbler               | 76         | 26         | 29         | 16         | 29         | 176         | 10                           | 0.2                               |
| Yellow Warbler                 | 29         | 15         | 26         | 23         | 8          | 101         | 11                           | 0.2                               |
| Pacific Wren                   | 16         | 24         | 0          | 1          | 21         | 62          | 1                            | 0.4                               |
| Black-capped Chickadee         | 13         | 5          | 5          | 10         | 7          | 40          | 4                            | 2.1                               |
| Varied Thrush                  | 3          | 12         | 9          | 12         | 2          | 38          | 2                            | 1.2                               |
| Golden-crowned Kinglet         | 3          | 27         | 0          | 0          | 4          | 34          |                              | 0.9                               |
| Pine Siskin                    | 1          | 12         | 3          | 12         | 0          | 28          |                              |                                   |
| Pine Grosbeak                  | 1          | 5          | 4          | 10         | 2          | 22          | 3                            |                                   |
| Orange-crowned Warbler         | 7          | 3          | 2          | 2          | 4          | 18          |                              |                                   |
| Red-breasted Nuthatch          | 2          | 2          | 2          | 7          | 1          | 14          | 1                            |                                   |
| Golden-crowned Sparrow         | 6          | 0          | 1          | 2          | 0          | 9           |                              |                                   |
| Brown Creeper                  | 0          | 0          | 1          | 4          | 2          | 7           | 1                            |                                   |
| Downy Woodpecker               | 1          | 0          | 0          | 0          | 4          | 5           |                              |                                   |
| Yellow-rumped Warbler          | 1          | 0          | 2          | 2          | 0          | 5           |                              |                                   |
| Song Sparrow                   | 2          | 0          | 0          | 0          | 0          | 2           |                              |                                   |
| Common Redpoll                 | 0          | 1          | 0          | 0          | 0          | 1           |                              |                                   |
| American Three-toed Woodpecker | 0          | 0          | 0          | 1          | 0          | 1           | 1                            |                                   |
| Red Crossbill                  | 0          | 0          | 0          | 0          | 1          | 1           |                              |                                   |
| <b>TOTALS</b>                  | <b>259</b> | <b>217</b> | <b>164</b> | <b>180</b> | <b>186</b> | <b>1006</b> | <b>68</b>                    |                                   |
| <i>Total Net Hours</i>         | <i>371</i> | <i>341</i> | <i>358</i> | <i>357</i> | <i>347</i> |             |                              |                                   |

\*Newly banded birds only, within- and between-season recaptures are not included in yearly totals.

The Kodiak Archipelago experienced low winter temperatures and deep snow in 2011-2012; the average low and high temperatures were 3-6 degrees (°C) cooler than average, and snowfall was at near record high, with January 2012 being the snowiest month on record (135.65cm) (National Weather Service). Local residents reported seeing very few non-migratory Pacific Wrens and Golden-crowned Kinglets in late winter and suspected high winter mortality rates. The MAPS data support these observations, capture rates for these two species dropped to zero in 2012, the summer after the harsh winter of 2011-2012. Capture rates remained low for these species the following year as well, with only one Pacific Wren and no Golden-crowned Kinglets captured in 2013. In 2014, Pacific Wrens appeared to recover with capture rates returning to similar numbers as before the harsh winter (Table 3).

**Between-year Recapture Rates**

Yellow Warblers had the highest between year recapture rate (11 of 101 banded birds; 11%) on the Kodiak MAPS site from 2011-2014 (Table 4). Recapture histories for the 68 banded birds recaptured in subsequent years are presented in Appendix B. Two Fox Sparrow and two Hermit Thrush recaptured were originally banded on the MAPS site as recently fledged, suggesting their parents had nested on or near the mist net locations. Observations of hatching year birds returning to nest near their original nest sites are not well documented. While adult breeding site fidelity is common in many landbird species, juveniles of either or both sexes often disperse (natal dispersal) and nest a considerable distance from the sites where they were born (Greenwood and Harvey 1982, Paradis et al. 1998).

**Table 4. Summary of the most common birds recaptured between years at the Kodiak Island Monitoring Avian Productivity and Survivorship (MAPS) site, 2010-2014, on the Buskin River State Recreation Area, Alaska.**

| Species          | No. Recaptured Between Years | Recapture Rate = No. Recaptured/ No. Banded (%) | No. Captured in Multiple Years After Banding | No. Recaptured Banded as Hatching Year |
|------------------|------------------------------|---|--|--|
| Fox Sparrow      | 17                           | 7   | 4  | 2                                      |
| Hermit Thrush    | 17                           | 8   | 4  | 2                                      |
| Wilson’s Warbler | 10                           | 6   | 3  | 0                                      |
| Yellow Warbler   | 11                           | 11  | 2  | 0                                      |

**Productivity**

Establishing population trends for the most abundant landbird species is extremely important, however, information on demographic rates, such a productivity and survivorship, is also critical to identifying potential causes for specific trends. This type of information is lacking for most landbird species and impedes the development of effective management and conservation strategies. The MAPS program estimates post-fledging productivity from data on the numbers and proportions of young and adult birds captured. These young birds, referred to as either juvenile or hatching year, have plumage characteristics that identify them as in their first calendar year of life (from hatch until 31 December of the year they fledged; Table 2).

Birds are often classified by their general movement patterns. Residents, or non-migratory birds, are present in one location year round and do not migrate. Short distance migrants may move only a few kilometers, while medium distance migrants typically cover distances during migration that span from one to several states. Long-distance migrants, also referred to as

Neotropical migrants in North America, are species with ranges that extend from the United States and Canada in the summer to Mexico and points further south in winter.

In general, across all years on the Kodiak MAPS site, resident and short to medium distance migrants (including Fox Sparrow, Varied Thrush and Black-capped Chickadee) had higher productivity compared to the long-distance migrants (Wilson’s and Yellow Warbler) (Figure 4). Hermit Thrush productivity was consistently high. The range of the Hermit Thrush extends into northern Mexico; however, this species does not migrate as far south as the two warbler species frequently caught on the Kodiak MAPS site (Figure 5). In fact, based on hydrogen stable-isotope analysis of feathers from Wilson’s Warblers, this species exhibits a leapfrog migration pattern, where the birds that breed furthest north wintered furthest south (Kelly et al. 2001). Wilson’s Warblers winter throughout southern Central America, and the Yellow Warblers winter range extends from southern Central America to northern South America (Figure 5).

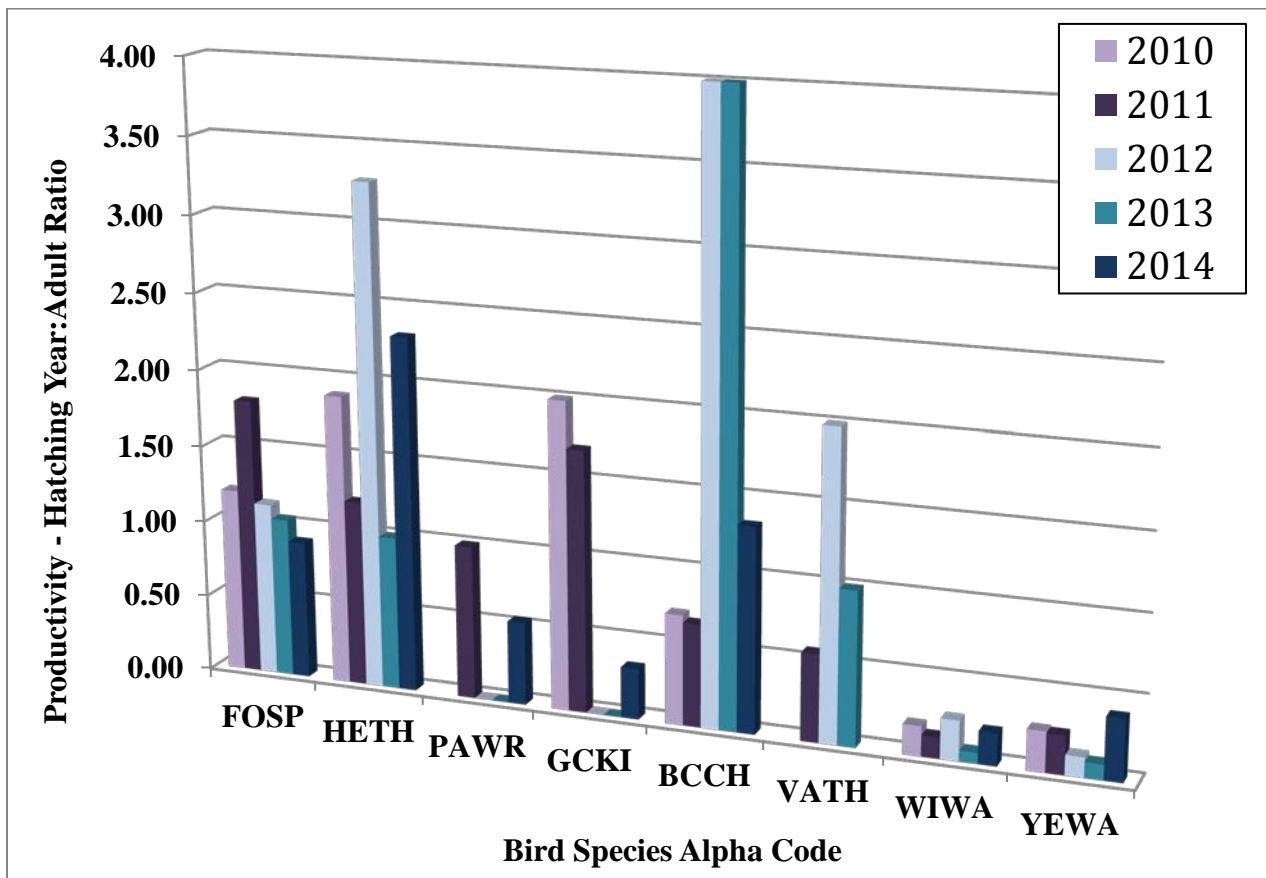
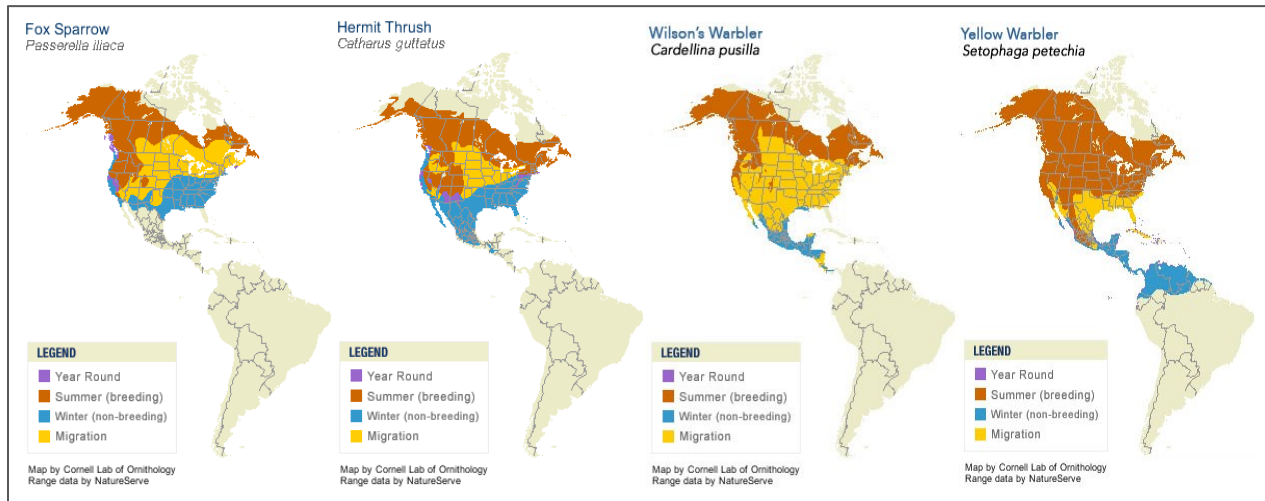


Figure 4. Productivity as measured by the ratio of hatching year to adult birds by species on the Kodiak Island Monitoring Avian Productivity and Survivorship (MAPS) site on the Buskin River State Recreation Area, Alaska. A large number indicates high productivity or a large number of recently fledged birds relative to the number of adult birds captured. Bird species alpha codes: Fox Sparrow (FOSP), Hermit Thrush (HETH), Pacific Wren (PAWR), Golden-crowned Kinglet (GCKI), Black-capped Chickadee (BCCH), Varied Thrush (VATH), Wilson’s Warbler (WIWA), and Yellow Warbler (YEWA).



**Figure 5. Range maps for the four most commonly captured birds (Fox Sparrow, Hermit Thrush, and Wilson's and Yellow Warbler) on the Kodiak Island Monitoring Avian Productivity and Survivorship site, Alaska. Maps from the Cornell Laboratory of Ornithology: <http://www.allaboutbirds.org/guide/search>**

Many Neotropical migratory birds have experienced significant population declines since systematic continent-wide surveys began in 1966. Based on analyses of Breeding Bird Survey and Christmas Bird Count data, 127 species of Neotropical migratory birds are in decline. Of those, 60 species, including the Wilson's Warbler, have declined by at least 45% in the past 40 years (Butcher and Niven 2007). In addition, the recent 2014 State of the Birds Report listed Wilson's Warbler as one of the common birds in steep decline (North American Bird Conservation Initiative, U.S. Committee. 2014). Patterns in landbird productivity on the Kodiak MAPS site echo the results of other landbird monitoring projects at northern latitudes, for instance analysis of 15 years of data (1995-2009) from Denali National Park in interior Alaska estimated that Wilson's Warbler abundance had declined by approximately 48% while Fox Sparrow abundance had increased by 250% (Schmidt et al. 2013).

Unfortunately, very few MAPS sites are currently operating at northern latitudes, so we do not have recent survival or productivity information derived from this program to use for comparison. However, 40 MAPS stations in Alaska and western boreal Canada were operated for various lengths of time between 1992 and 2001, providing for some comparisons. The most abundant species captured at these sites during the 10 years of banding was the Wilson's Warbler, but Hermit Thrush, Fox Sparrow, and Yellow Warbler were caught frequently enough that adult survival rates, recapture probabilities, and productivity in relation to temporal, spatial, and habitat variation could be modeled (DeSante et al. 2003). Figures 7 and 8 compare productivity as measured by the number of hatching year to adult birds captured on the Kodiak MAPS site from 2010-2014 with data from MAPS sites in Alaska and boreal Canada from 1992-2001. Fox Sparrow productivity on the Kodiak MAPS site was nearly identical to the average productivity across all stations from the previous time period. Hermit Thrush productivity on Kodiak was the highest recorded at any site and was more than three times the average productivity from the earlier time period. Productivity for Wilson's Warbler on the Kodiak MAPS site was extremely low, matching the lowest productivity recorded in the earlier time period at Johnson Pass (Figure 8). Yellow Warbler productivity was also lower on Kodiak than the combined average productivity from the previous time period, and in general Yellow Warblers had lower productivity than the other species examined across all stations and years.

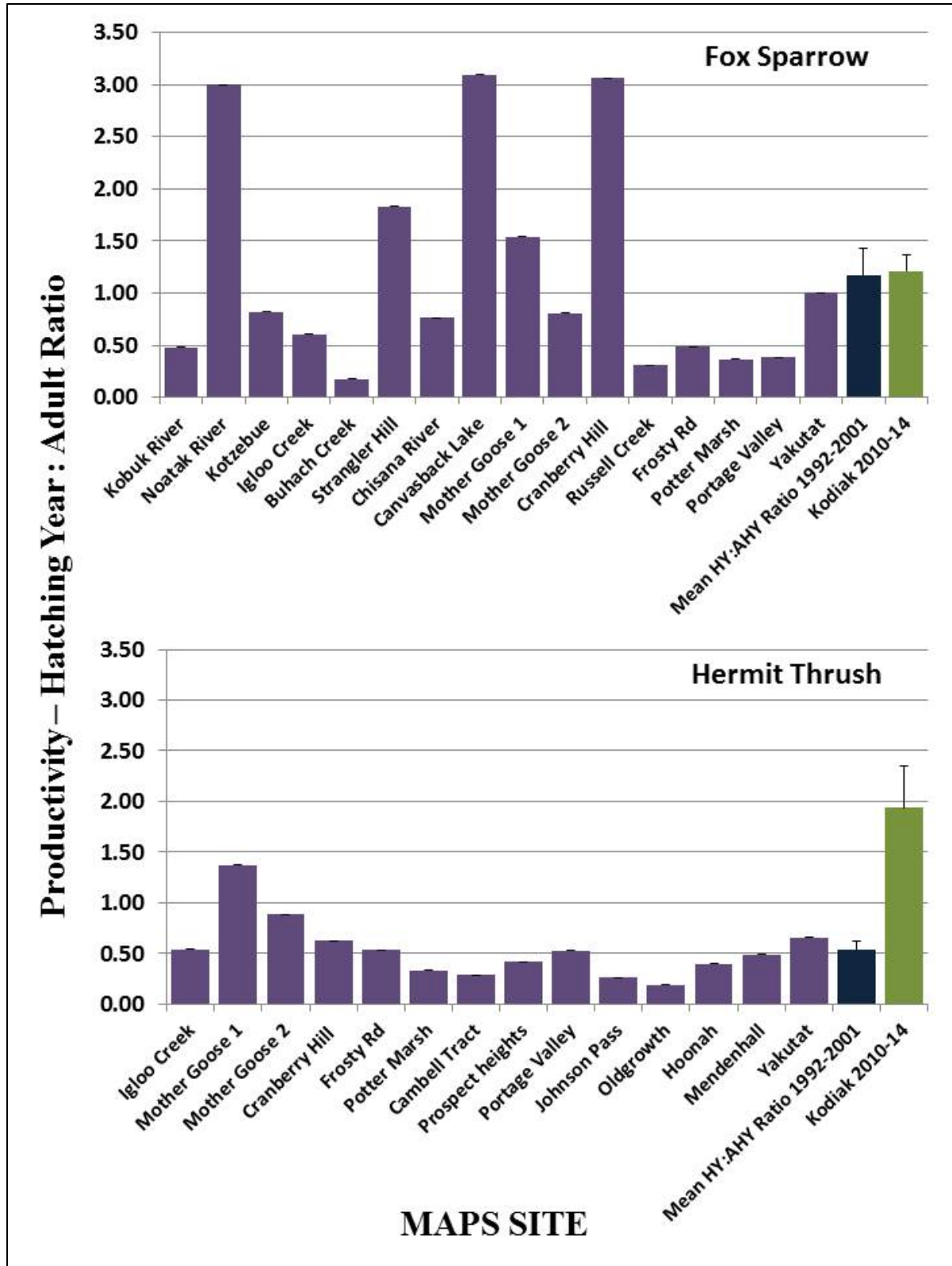


Figure 6. Comparisons of Fox Sparrow and Hermit Thrush productivity as measured by the ratio of hatching year (HY) to adult (AHY) birds between MAPS sites active in Alaska and western boreal Canada from 1992-2001 (from DeSante et al. 2003) and Kodiak Island (2010-2014). Error bars = 1 standard error.

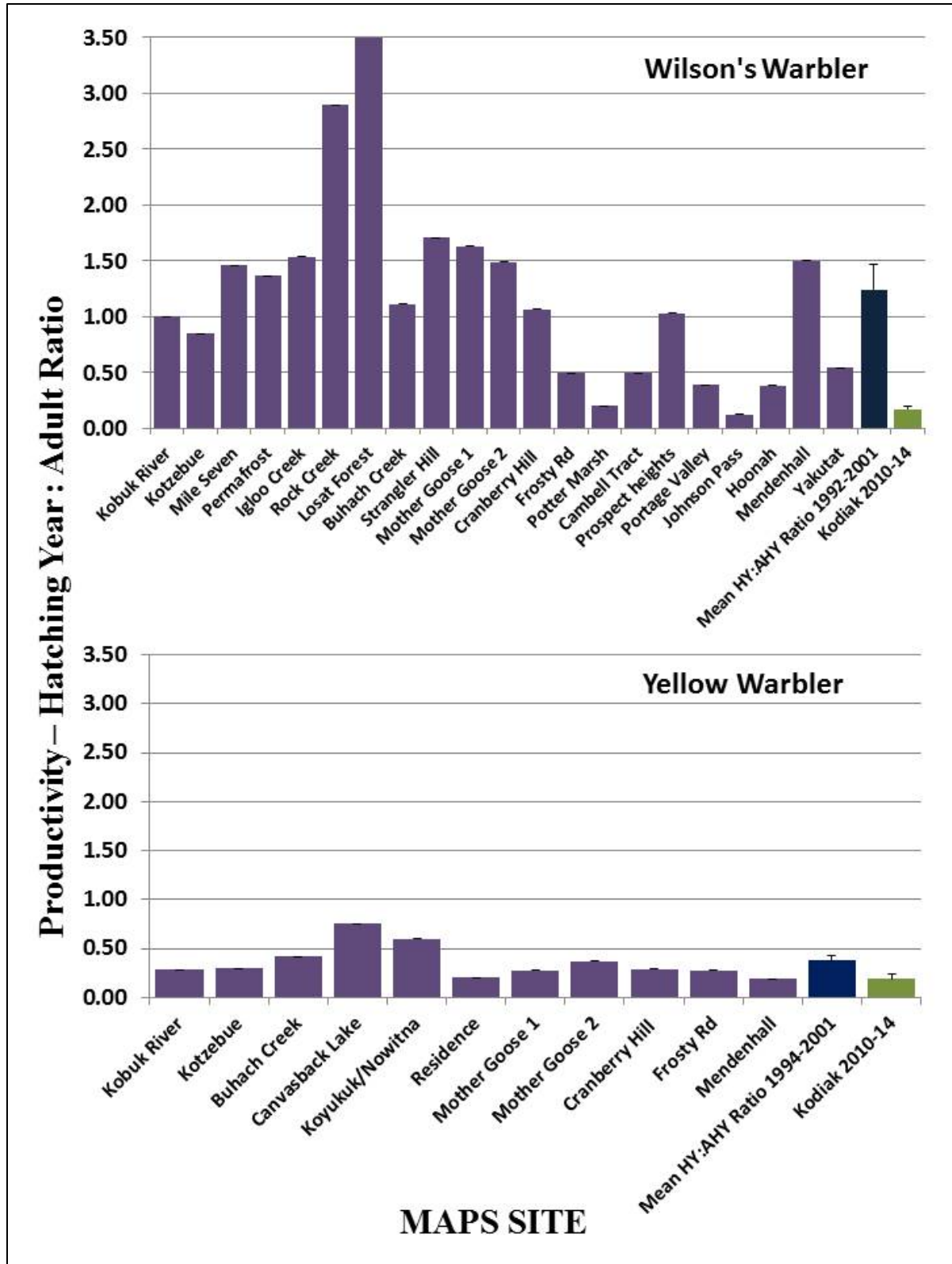


Figure 7. Comparisons of Wilson’s and Yellow Warbler productivity as measured by the ratio of hatching year (HY) to adult (AHY) birds between MAPS sites active in Alaska and western boreal Canada from 1992-2001 (from DeSante et al. 2003) and Kodiak Island (2010-2014) . Error bars = 1 standard error.



### Public Outreach – Connecting People with Nature

One of the primary goals of the Kodiak MAPS project was communicating science and conservation to the public through bird banding. We invited members of the Kodiak community to join us each morning of mist netting and developed a small group of volunteers who became fully trained in banding and data recording while also allowing others to come and occasionally view the field operations and learn about bird banding. The core team of trained volunteers consisted of six to eight people, depending on the year, and often included seasonal staff and volunteers with the Refuge’s biological and visitor services programs. The Kodiak MAPS project has attracted more than 65 people in the community who have a budding interest in migratory birds. Returning volunteers were given the opportunity to build skills that many biologists do not acquire until graduate school. The long-term investment of volunteers who return each year connects the community with emerging data trends that may be directly relevant to conservation of Kodiak’s birds. For example, the 2012 and 2013 MAPS volunteers discovered and documented the lack of Pacific Wrens and Golden-crowned Kinglets following a particularly harsh 2011-2012 winter. A cumulative total of approximately 1500 hours of service was donated to the refuge by volunteer participation in the MAPS program (Figures 8-9).



**Figure 8. Kodiak Daily Mirror cover story on the Monitoring Avian Productivity and Survivorship Program on July 11, 2011**



**Figure 9. Volunteer Pauline Hsieh with a Hermit Thrush (left) and bird banding participants (right) on the Monitoring Avian Productivity and Survivorship Program on Kodiak Island, Alaska.**

### **Institute for Bird Populations Advanced Bird Banding Course**

The Institute for Bird Populations (IBP) administers the MAPS program and offers training programs on bird banding. A July 2014 grant secured by Cindy Trussell through the University of Alaska Foundation allowed the Kodiak MAPS project to bring a trainer (Erin Rowan) from IBP to Kodiak to help the core MAPS banding team improve their bird ageing skills. The four-day course consisted of bird banding at the Refuge headquarters using five nets adjacent to the official Kodiak MAPS site for three mornings, with classroom instruction at Kodiak College in the afternoon. One of the mornings the official MAPS session was conducted for that time period (July 16; MAPS Period 8). Training participants included primary Kodiak MAPS collaborators Robin Corcoran, Cindy Trussell, and Rich MacIntosh; local volunteers Brenda Castonguay and Arielle Himelbloom; and seasonal volunteers Emma Schlatter and Erynn Rebol. We intend to produce a video based on the IBP advanced course on Kodiak to aid in training new volunteers for the MAPS program.

During IBP training we banded 42 birds and recaptured 18 birds including two Fox Sparrows banded in 2013 on the MAPS site that were not recaptured as part of the official MAPS banding effort in 2014. Figure 10 illustrates the locations of the five mist nets used for the training in relation to the official MAPS site.

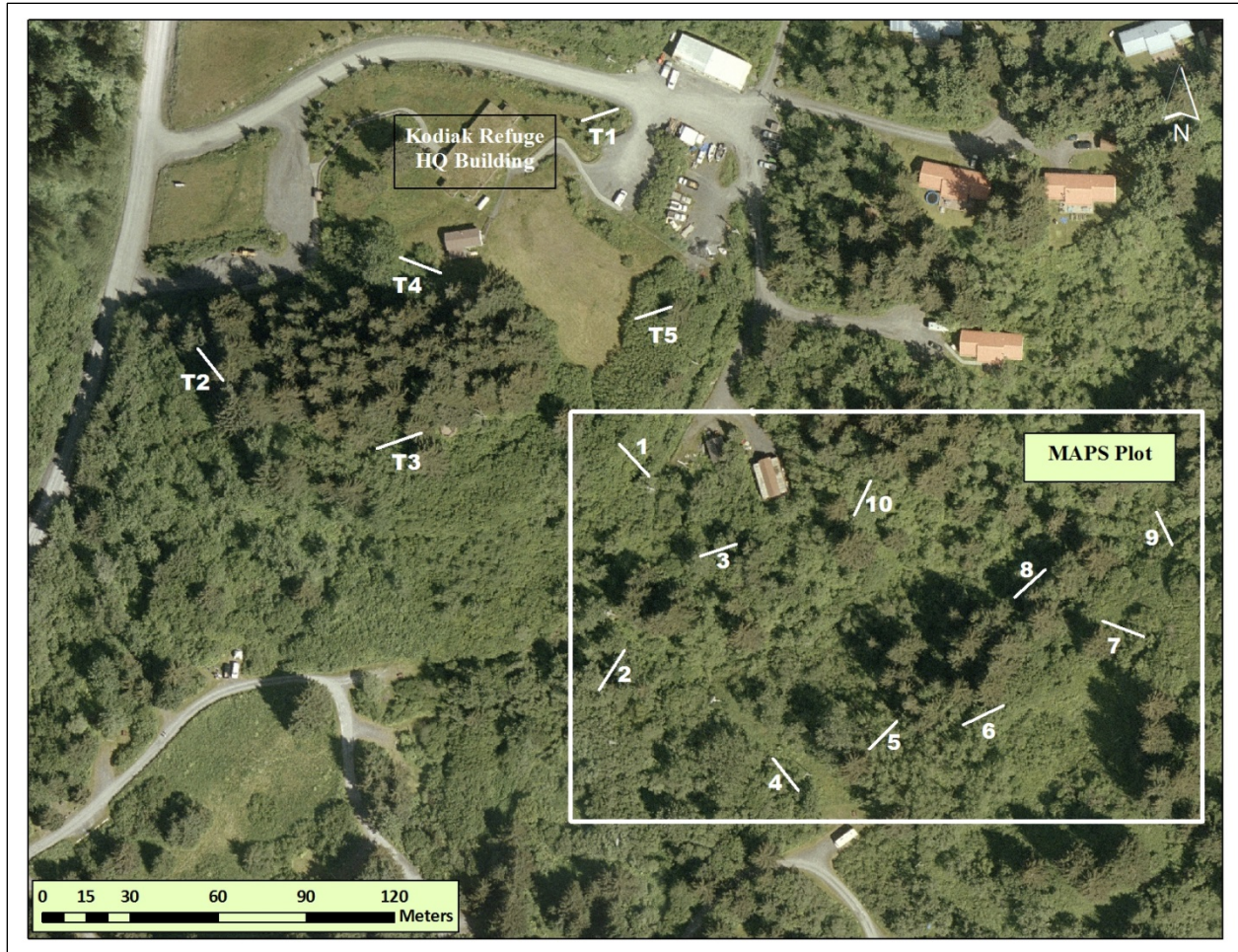


Figure 10. Locations of mist nets (T1-T5) for the Institute for Bird Populations Advanced Training Workshop, July 14-17, 2014, in relation to the Monitoring Avian Productivity and Survivorship (MAPS) Plot on Kodiak Refuge Headquarters, Buskin River State Recreation Area, Alaska.

### Management Implications

The goals of the project were to contribute to a nation-wide program for monitoring migratory landbirds, and as such management implications for the refuge are limited by the small scale of the project. Unfortunately the MAPS program is not as active at northern latitudes as it has been in the past, and the Kodiak site is the only one in Alaska at this time. However, detailed analysis of 10 years of MAPS data in Alaska from 1992-2001 demonstrated variation in the vital rates of landbird populations across geographic areas, major habitat types, and time (DeSante et al. 2003). Productivity was correlated to large scale climatic patterns affecting conditions on the wintering grounds over broad geographic regions that led to predictable variation in annual production of young by landbirds in Alaska. These results support re-initiation of the program at northern latitudes where baseline information on landbirds is sorely lacking. For a land management agencies inventory and monitoring program to be successful it should be a combination of survey types, some targeted to the land management unit but others contributing to larger-scale regional and national monitoring efforts. Broad scale monitoring provides information for determining species in highest need of management and conservation action, and

identifies where to invest resources to determine the causes of declining populations. A final goal of the Kodiak MAPS program was to serve as a successful example of a landbird mist netting program that incorporates partnerships, volunteers, and public outreach.

### **Acknowledgements**

This monitoring effort would not have been possible without the small army of regular volunteers willing to get up very early in the morning to help put up and take down mist nets, and safely and efficiently extract and band birds. We thank all the volunteers who participated across the five seasons, especially those who made it on multiple (if not most) mornings across several seasons including: Cindy Bower, Brenda Castonguay, Arielle, Brian, and Linda Himelbloom, and Nia, Brent, and Natasha Pristas. Thanks to Kodiak Refuge Volunteer Coordinator Lisa Hupp for her work promoting the MAPS program and organizing volunteers. Thanks to Alaska State Parks for allowing us to use the site each season and issuing a special use permit for mist net activities. Funding sources included USFWS Kodiak National Wildlife Refuge, USFWS Challenge Cost Share Program for start-up costs, Audubon Toyota Together Green Grant for trail improvement, and the Kodiak Audubon Society and a University of Alaska Foundation Angus Gavin Migratory Bird Research Grant to bring an Institute for Bird Populations trainer to Kodiak.

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**Appendix A. Capture summary for all birds caught in mist nets during the Kodiak Island Monitoring Avian Productivity and Survivorship Program at the Buskin River State Recreation Area, Alaska, 2010-2014. N = Newly Banded, R = Recaptures\*, U = Unbanded.**

| SPECIES   | 2010       |           |           | 2011       |           |          | 2012       |           |          | 2013       |           |           | 2014       |           |          | 2010-2014   |
|---|------------|-----------|-----------|------------|-----------|----------|------------|-----------|----------|------------|-----------|-----------|------------|-----------|----------|-------------|
|   | N          | R         | U         | N          | R         | U        | N          | R         | U        | N          | R         | U         | N          | R         | U        |             |
| Fox Sparrow ( <i>Passerella iliaca</i> )                    | 46         | 25        | 2         | 44         | 18        | 1        | 33         | 19        | 1        | 48         | 20        | 5         | 58         | 21        | 2        | <b>343</b>  |
| Hermit Thrush ( <i>Catharus guttatus</i> )                  | 52         | 20        | 0         | 41         | 16        | 0        | 47         | 20        | 0        | 30         | 19        | 3         | 43         | 18        | 0        | <b>309</b>  |
| Wilson's Warbler ( <i>Cardellina pusilla</i> )              | 76         | 26        | 2         | 26         | 11        | 1        | 29         | 17        | 1        | 16         | 7         | 1         | 29         | 9         | 0        | <b>251</b>  |
| Yellow Warbler ( <i>Setophaga petechia</i> )                | 29         | 13        | 2         | 15         | 11        | 1        | 26         | 9         | 0        | 23         | 8         | 0         | 8          | 8         | 0        | <b>153</b>  |
| Pacific Wren ( <i>Troglodytes pacificus</i> )               | 16         | 3         | 3         | 24         | 5         | 1        | 0          | 0         | 0        | 1          | 0         | 0         | 21         | 5         | 1        | <b>80</b>   |
| Black-capped Chickadee ( <i>Poecile atricapillus</i> )      | 13         | 1         | 1         | 5          | 1         | 0        | 5          | 5         | 0        | 10         | 1         | 0         | 7          | 3         | 0        | <b>52</b>   |
| Varied Thrush ( <i>Ixoreus naevius</i> )                    | 3          | 0         | 0         | 12         | 1         | 0        | 9          | 1         | 2        | 12         | 1         | 0         | 2          | 0         | 0        | <b>43</b>   |
| Golden-crowned Kinglet ( <i>Regulus satrapa</i> )           | 3          | 0         | 0         | 27         | 2         | 2        | 0          | 0         | 0        | 0          | 0         | 0         | 4          | 0         | 0        | <b>38</b>   |
| Pine Siskin ( <i>Spinus pinus</i> )                         | 1          | 0         | 0         | 12         | 1         | 2        | 3          | 0         | 0        | 12         | 0         | 0         | 0          | 0         | 0        | <b>31</b>   |
| Pine Grosbeak ( <i>Pinicola enucleator</i> )                | 1          | 0         | 0         | 5          | 0         | 1        | 4          | 2         | 0        | 10         | 0         | 0         | 2          | 2         | 0        | <b>27</b>   |
| Orange-crowned Warbler ( <i>Oreothlypis celata</i> )        | 7          | 0         | 0         | 3          | 0         | 0        | 2          | 0         | 0        | 2          | 1         | 0         | 4          | 0         | 0        | <b>19</b>   |
| Red-breasted Nuthatch ( <i>Sitta canadensis</i> )           | 2          | 0         | 0         | 2          | 1         | 0        | 2          | 0         | 0        | 7          | 0         | 1         | 1          | 0         | 0        | <b>16</b>   |
| Golden-crowned Sparrow ( <i>Zonotrichia atricapilla</i> )   | 6          | 0         | 0         | 0          | 0         | 0        | 1          | 0         | 0        | 2          | 0         | 0         | 0          | 0         | 0        | <b>9</b>    |
| Brown Creeper ( <i>Certhia americana</i> )                  | 0          | 0         | 0         | 0          | 0         | 0        | 1          | 0         | 0        | 4          | 1         | 0         | 2          | 3         | 0        | <b>11</b>   |
| Downy Woodpecker ( <i>Picoides pubescens</i> )              | 1          | 1         | 0         | 0          | 0         | 0        | 0          | 0         | 0        | 0          | 0         | 0         | 4          | 1         | 0        | <b>7</b>    |
| Yellow-rumped Warbler ( <i>Setophaga coronata</i> )         | 1          | 0         | 0         | 0          | 0         | 0        | 2          | 0         | 0        | 2          | 0         | 0         | 0          | 0         | 0        | <b>5</b>    |
| Song Sparrow ( <i>Melospiza melodia</i> )                   | 2          | 0         | 0         | 0          | 0         | 0        | 0          | 0         | 0        | 0          | 0         | 0         | 0          | 0         | 0        | <b>2</b>    |
| Common Redpoll ( <i>Acanthis flammea</i> )                  | 0          | 0         | 0         | 1          | 0         | 0        | 0          | 0         | 0        | 0          | 0         | 0         | 0          | 0         | 0        | <b>1</b>    |
| American Three-toed Woodpecker ( <i>Picoides dorsalis</i> ) | 0          | 0         | 0         | 0          | 0         | 0        | 0          | 0         | 0        | 1          | 0         | 0         | 0          | 1         | 0        | <b>2</b>    |
| Red Crossbill ( <i>Loxia curvirostra</i> )                  | 0          | 0         | 0         | 0          | 0         | 0        | 0          | 0         | 0        | 0          | 0         | 0         | 1          | 0         | 0        | <b>1</b>    |
| <b>All Species Pooled</b>                                   | <b>259</b> | <b>89</b> | <b>10</b> | <b>217</b> | <b>67</b> | <b>9</b> | <b>164</b> | <b>73</b> | <b>4</b> | <b>180</b> | <b>58</b> | <b>10</b> | <b>186</b> | <b>71</b> | <b>3</b> | <b>1400</b> |
| <i>Total Net Hours</i>                                      | 371        |           |           | 341        |           |          | 358        |           |          | 357        |           |           | 347        |           |          |             |
| <i>Capture Rates (Birds/100 net hours)</i>                  | 97         |           |           | 86         |           |          | 67         |           |          | 70         |           |           | 75         |           |          |             |

\*Recaptures include repeat captures of banded birds within and between seasons.

**Appendix B. Recapture history for birds banded and then recaptured in subsequent years during the Kodiak Island Monitoring Avian Productivity and Survivorship Program at the Buskin River State Recreation Area, Alaska, 2010-2014.**

| Band      | Species          | Sex | Year   |            |            |            |            |
|-----------|------------------|-----|--------|------------|------------|------------|------------|
|           |                  |     | 2010   | 2011       | 2012       | 2013       | 2014       |
| 134250704 | Fox Sparrow      | M   | BANDED | Recap (3X) |            |            |            |
| 242146602 | Fox Sparrow      | M   | BANDED | Recap (3X) |            |            |            |
| 242146616 | Fox Sparrow      | F   | BANDED | Recap (2X) |            |            |            |
| 242146642 | Fox Sparrow      | F   | BANDED |            |            | Recap (1X) |            |
| 242146650 | Fox Sparrow      | M   |        | BANDED     | Recap (1X) |            |            |
| 242146653 | Fox Sparrow      | M   |        | BANDED     |            | Recap (3X) | Recap (1X) |
| 242146660 | Fox Sparrow      | M   |        | BANDED     | Recap (1X) |            |            |
| 242146672 | Fox Sparrow*     | M   |        | BANDED     |            | Recap (3X) | Recap (1X) |
| 242146674 | Fox Sparrow      | F   |        | BANDED     | Recap (1X) |            |            |
| 242146675 | Fox Sparrow*     | F   |        | BANDED     | Recap (1X) |            |            |
| 242146698 | Fox Sparrow      | M   |        |            | BANDED     | Recap (3X) | Recap (1X) |
| 242146699 | Fox Sparrow      | M   |        |            | BANDED     | Recap (3X) | Recap (2X) |
| 242146735 | Fox Sparrow      | M   |        |            |            | BANDED     | Recap (1X) |
| 242146736 | Fox Sparrow      | F   |        |            |            | BANDED     | Recap (1X) |
| 242146783 | Fox Sparrow      | M   |        |            |            | BANDED     | Recap (1X) |
| 242146747 | Fox Sparrow**    | F   |        |            |            | BANDED     | Recap (1X) |
| 242146789 | Fox Sparrow**    | M   |        |            |            | BANDED     | Recap (1X) |
| 134250703 | Hermit Thrush*   | M   | BANDED | Recap (1X) |            |            |            |
| 254156208 | Hermit Thrush    | F   | BANDED |            |            | Recap (2X) |            |
| 254156219 | Hermit Thrush*   | M   | BANDED | Recap (1X) |            |            |            |
| 254156254 | Hermit Thrush    | M   | BANDED | Recap (2X) | Recap (1X) | Recap (1X) |            |
| 254156260 | Hermit Thrush    | M   |        | BANDED     | Recap (1X) |            |            |
| 254156262 | Hermit Thrush    | M   |        | BANDED     | Recap (4X) |            |            |
| 254156264 | Hermit Thrush    | F   |        | BANDED     | Recap (1X) |            |            |
| 254156266 | Hermit Thrush    | F   |        | BANDED     | Recap (1X) |            |            |
| 254156271 | Hermit Thrush    | M   |        | BANDED     | Recap (4X) | Recap (2X) | Recap (4X) |
| 254156272 | Hermit Thrush    | F   |        | BANDED     |            | Recap (1X) |            |
| 257147302 | Hermit Thrush    | M   |        |            | BANDED     |            | Recap (1X) |
| 257147307 | Hermit Thrush    | M   |        |            | BANDED     | Recap (1X) | Recap (3X) |
| 257147318 | Hermit Thrush    | M   |        |            | BANDED     | Recap (1X) |            |
| 257147325 | Hermit Thrush    | F   |        |            | BANDED     | Recap (3X) |            |
| 257147331 | Hermit Thrush    | F   |        |            | BANDED     |            | Recap (1X) |
| 257147346 | Hermit Thrush*   | F   |        |            | BANDED     | Recap (3X) | Recap (2X) |
| 257147354 | Hermit Thrush    | F   |        |            |            | BANDED     | Recap (3X) |
| 262080931 | Wilson's Warbler | F   | BANDED | Recap (3X) |            |            |            |
| 262080940 | Wilson's Warbler | F   | BANDED | Recap (1X) |            |            |            |
| 262080963 | Wilson's Warbler | M   | BANDED | Recap (2X) | Recap (2X) |            |            |
| 262081007 | Wilson's Warbler | M   |        | BANDED     | Recap (2X) |            |            |
| 262081008 | Wilson's Warbler | M   |        | BANDED     |            |            | Recap (1X) |
| 262081010 | Wilson's Warbler | M   |        | BANDED     | Recap (1X) | Recap (1X) |            |
| 262081044 | Wilson's Warbler | M   |        | BANDED     | Recap (3X) |            |            |
| 262081080 | Wilson's Warbler | M   |        |            | BANDED     | Recap (2X) |            |
| 262081092 | Wilson's Warbler | M   |        |            | BANDED     | Recap (2X) | Recap (1X) |
| 262081093 | Wilson's Warbler | M   |        |            | BANDED     | Recap (1X) |            |

**Appendix B. (Continued)**

| Band      | Species                           | Sex | Year   |            |            |            |            |            |
|-----------|-----------------------------------|-----|--------|------------|------------|------------|------------|------------|
|           |                                   |     | 2010   | 2011       | 2012       | 2013       | 2014       |            |
| 264079101 | Yellow Warbler                    | F   | BANDED | Recap (2X) |            |            |            |            |
| 264079102 | Yellow Warbler                    | M   | BANDED | Recap (2X) |            |            |            |            |
| 264079110 | Yellow Warbler                    | M   | BANDED | Recap (1X) | Recap (2X) |            |            |            |
| 264079120 | Yellow Warbler                    | M   | BANDED | Recap (1X) |            |            |            |            |
| 264079161 | Yellow Warbler                    | M   |        | BANDED     | Recap (2X) |            |            |            |
| 264079169 | Yellow Warbler                    | M   |        | BANDED     | Recap (3X) | Recap (2X) |            |            |
| 264079208 | Yellow Warbler                    | F   |        |            | BANDED     | Recap (1X) |            |            |
| 264079232 | Yellow Warbler                    | M   |        |            |            | BANDED     | Recap (1X) |            |
| 264079241 | Yellow Warbler                    | M   |        |            |            | BANDED     | Recap (1X) |            |
| 264079242 | Yellow Warbler                    | M   |        |            |            | BANDED     | Recap (1X) |            |
| 264079275 | Yellow Warbler                    | F   |        |            |            | BANDED     | Recap (1X) |            |
| 264079108 | Black-capped Chickadee            | M   | BANDED |            | Recap (2X) |            |            |            |
| 264079203 | Black-capped Chickadee            | F   |        |            | BANDED     | Recap (1X) |            |            |
| 264079239 | Black-capped Chickadee            | F   |        |            |            | BANDED     | Recap (1X) |            |
| 264079270 | Black-capped Chickadee*           | U   |        |            |            | BANDED     | Recap (1X) |            |
| 134250730 | American<br>Three-toed Woodpecker | M   |        |            |            |            | BANDED     | Recap (1X) |
| 134250701 | Varied Thrush                     | M   | BANDED | Recap (1X) |            |            |            |            |
| 134250718 | Varied Thrush                     | M   |        | BANDED     | Recap (1X) |            |            |            |
| 242146665 | Pine Grosbeak                     | M   |        | BANDED     | Recap (1X) |            |            |            |
| 242146693 | Pine Grosbeak                     | F   |        | BANDED     | Recap (1X) |            |            |            |
| 242146780 | Pine Grosbeak                     | F   |        |            |            |            | BANDED     | Recap (2X) |
| 262080964 | Pacific Wren                      | M   | BANDED | Recap (1X) |            |            |            |            |
| 263052107 | Brown Creeper*                    | M   |        |            |            | BANDED     | Recap (1X) |            |
| 264079106 | Red-breasted Nuthatch             | F   | BANDED | Recap (1X) |            |            |            |            |

\*Banded as a hatching year or local bird.

\*\* Recaptured in mist nets adjacent to the Kodiak MAPS site during the Institute for Bird Populations Training Course in July 2014 only, not during a regular MAPS session.