

**SURVEY FOR BREEDING BIRDS ON CROW CREEK,  
F.E. WARREN AIR FORCE BASE, WYOMING**

***2011 FINAL PROJECT REPORT***

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## BACKGROUND

This report details the results of breeding bird surveys performed in June of 2011 along Crow Creek on F.E. Warren Air Force Base (FEWAFB) near Cheyenne, Wyoming. These surveys have been conducted annually by the Wyoming Natural Diversity Database (WYNDD) for eight years (from 2001 to 2003 and 2007 to 2011) (Bennett 2002-2004; Griscom and Keinath 2008-2011). 2011 represents the last year of surveys for the current contract. The bird surveys have served two purposes: (1) to document the species that breed along Crow Creek; and (2) to monitor population trends of native and exotic species to help inform resource management of FEWAFB. This report details results from 2011 and compares them to previous years, particularly with respect to trends in native riparian and exotic birds.

The decline of many neotropical migratory birds is a well-documented phenomenon within the scientific literature. The cause of such declines is often attributed to anthropogenic effects such as habitat loss, habitat fragmentation, and associated effects of increased predation and brood parasitism. Some of these neotropical migrants also serve as ‘indicator species’ in that their dependence on healthy riparian ecosystems make them an indicator of environmental health and management. Long-term monitoring of these and other breeding birds can therefore provide valuable information about population trends and, in turn, the effectiveness of natural resource management actions.

Habitat-based point count monitoring is one of the most common ways to monitor bird populations and is currently implemented by many government agencies and private organizations throughout the world. Data from point count surveys can be used to estimate relative abundance of all bird species observed and, with an appropriate sample size (5-10 years depending on the abundance of birds sampled), can detect trends in abundance. Methods used in this project are most effective for monitoring population trends of passerine songbirds breeding in an area. They are not effective for detecting breeding nocturnal birds (e.g. owls), non-vocalizing breeding birds (e.g. waterfowl), or colonial-nesting birds that are tied to a particular feature (e.g. cliff swallows).

## **METHODS**

Point Count Survey: Surveys follow the methods outlined in Huff et al. (2000) and the Rocky Mountain Bird Observatory (Leukering et al. 1998). Each survey consists of visiting 10 fixed stations for 5 minutes each. During the 5-minute period, the observer notes each bird heard or seen, records the species, its radial distance from the observer, and its sex (if known). The 10 stations are located approximately 300m from each other and lie within the main riparian corridor of Crow Creek on the FEWAFB (Figure 1). In 2011, as in previous years, three surveys of the same 10 points were conducted in order to capture breeding birds and some migratory species. Surveys began within 30 minutes of sunrise and ended before 10:00am. This is a standard protocol that allows for comparative analysis with previous years' data and local and regional monitoring programs.

Line Transect Survey: Any given area will support species that occur at naturally low densities. Standard point count surveys typically generate too few detections of these species to estimate trends in abundance. In order to counter this effect and increase the number of detections for naturally rare taxa, we conducted line transect surveys (Figure 1) between points which allows for enumeration of all rare species encountered along a transect rather than just at formal point-count stations.

## RESULTS AND DISCUSSION

A total of 1005 birds comprising 48 species were detected in 2011 (Table 1). Since the initiation of surveys in 2001, 85 species have been observed overall (Table 2). Thirty of these 85 species are thought to regularly breed on the FEWAFB whereas the rest probably use FEWAFB only during migration. Most of these 85 species are neotropical migrants. During all three 2011 surveys, a pair of Swainson's hawks were observed defending a nest 200m west of the FamCamp in a peach willow tree. This successful raptor nest appears to be new as it has not been seen in previous years (exact coordinates available upon request).

A number of sensitive species have been documented on FEWAFB during survey efforts since 2001. Notably, the American white pelican, black-crowned night heron, brewer's sparrow, sage sparrow, rose-breasted grosbeak, blue grosbeak, and chimney swift. These species are currently listed as 'species of concern' or 'possible concern' by WYNDD because of documented population declines, sensitivity to human activities, and/or rarity in Wyoming. Most of these species occur in low numbers on the FEWAFB and use Crow Creek as a migratory stopover, however two separate families of black-crowned night herons with fledged juveniles were observed in 2011, confirming that the species is successfully breeding on the FEWAFB.

Figure 2 shows the number of observations made in 2011 where 'abundant', 'uncommon', and 'rare' categories are used to show relative abundance. Since the beginning of surveys in 2001, 'abundant' species have generally remained 'abundant' and the same with uncommon and rare species. Cliff swallows are consistently the most numerous species along Crow Creek because of their colonial nests under several bridges over the river. The point count method is not an accurate way to monitor cliff swallows so their numbers are not displayed in Figure 2, but cursory observations of nest activity indicate the breeding population is stable or increasing. The Eurasian collared-dove was detected in 2008 & 2009. This species has been moving westward since its introduction on the east coast, is usually associated with inhabited areas, but is not aggressive towards native species. Interestingly, the collared-dove was not found at all in 2010 or 2011.

Figure 4 displays the abundance of exotic or noxious bird species recorded since 2001. Brown-headed cowbirds, common grackles, and European starlings are potentially the most problematic because they are known to either parasitize nests or push-out native passerines

through competitive exclusion (Lowther, 1993). Griscom and Keinath (2011) reported an increase in European starling and brown-headed cowbird numbers in 2009 & 2010. The cause of this increase is unknown. Unfortunately, numbers of European starlings and brown-headed cowbirds continued to remain high in 2011. In contrast, most native riparian passerines have stayed at previous abundance levels as indicated by the song sparrow, gray catbird, and common yellowthroat in Figure 3. However, yellow warbler abundance plummeted in 2011. Brown-headed cowbirds are known to parasitize yellow warblers by laying eggs in their nests. This can result in decreased survival of yellow warbler juveniles or nest abandonment. Although nest parasitism does not appear to be affecting yellow warbler populations within the broader region, it certainly has been documented to cause local declines in yellow warblers (Weatherhead 1989). While the increase in brown-headed cowbirds on FEWAFB may not be the cause of the sharp decline in yellow warblers, it is the most likely explanation. If future surveys are conducted, they will help determine if the downward trend continues or yellow warblers bounce back from this recent setback.

Crow Creek is a biologically valuable resource in southeastern Wyoming as it is one of only a handful of perennial water sources and its riparian vegetation provides habitat for many breeding and migratory birds. Crow Creek has also been heavily impacted by human activities such as urbanization, weed invasion, and water quality impairment. These pressures are all at play on the FEWAFB and limit the extent to which some native birds can prosper. Recent efforts by land managers to control invasive weeds on the Base are commendable although their effectiveness is unknown. Despite these challenges, some sections of Crow Creek are relatively intact (especially to the west) and support sensitive species like the willow flycatcher.

After ten years of monitoring the bird community along Crow Creek, we can see that a few species have increased and others decreased, but there is no clear trend towards overall habitat improvement or degradation. In the last four years, the authors have noticed an increase in beaver activity which has led to more ponds and new willow recruitment. This increase in wetland area is reflected by increases in the numbers of red-winged blackbirds, Canada geese, and other waterfowl. At the same time, undesirable species usually associated with degraded habitats have increased such as European starlings and brown-headed cowbirds. Although the cause of this increase is unknown, its potential effects through nest parasitism and competition are potentially worrisome given the recent decline in yellow warblers.

In 2011, resource managers at FEWAFB removed at least three beaver dams along Crow Creek. In the short-term, this will probably result in a decrease in waterfowl and red-winged blackbirds. In the longer-term, it is possible that some willows will die back as a result of a lower water table which may have a negative impact on nesting birds. In order to support native breeding birds by creating as much 'interior' habitat as possible, we suggest that environmental managers maintain and promote as much vertical and horizontal complexity in the riparian zone as possible. Taking future measures such as planting willows or allowing some beaver activity along the Creek may help serve the dual purpose of controlling weeds while providing nesting habitat for birds. Any actions that increase the width and height of the riparian zone will help provide sanctuary and breeding habitat for native riparian species in the face of competition, nest parasitism, and predation.

## LITERATURE CITED

- Bennett, J.R. 2002. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming. Report prepared for the U.S. Air Force – F.E. Warren Air Force by the Wyoming Natural Diversity Database – University of Wyoming, Laramie, Wyoming.
- Bennett, J.R. 2003. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming. Report prepared for the U.S. Air Force – F.E. Warren Air Force by the Wyoming Natural Diversity Database – University of Wyoming, Laramie, Wyoming.
- Bennett, J.R. 2004. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming. Report prepared for the U.S. Air Force – F.E. Warren Air Force by the Wyoming Natural Diversity Database – University of Wyoming, Laramie, Wyoming.
- Griscom, H. and D.A. Keinath. 2008. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming: 2007 Project Report. Report prepared for the U.S. Air Force-F.E. Warren Air Force Base by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.
- Griscom, H. and D.A. Keinath. 2009. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming: 2008 Project Report. Report prepared for the U.S. Air Force-F.E. Warren Air Force Base by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.
- Griscom, H. and D.A. Keinath. 2010. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming: 2009 Project Report. Report prepared for the U.S. Air Force-F.E. Warren Air Force Base by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.
- Griscom, H. and D.A. Keinath. 2011. Survey for breeding birds on Crow Creek, F.E. Warren Air Force Base, Wyoming: 2010 Project Report. Report prepared for the U.S. Air Force-F.E. Warren Air Force Base by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.
- Huff, M.H., K.A. Bettinger, H.L. Ferguson, M.J. Brown, and B. Altman. 2000. A habitat-based point-count protocol for terrestrial birds, emphasizing Washington and Oregon. USDA Forest Service - Pacific Northwest Research Station General Technical Report. General Technical Report PNW-GTR-501.
- Leukering, T., M. Carter, A. Panjabi, D. Faulkner, and R. Levad. 1998. Rocky Mountain Bird Observatory Point Transect Protocol: Revised May 2006. Rocky Mountain Bird Observatory, Brighton, CO, 113 pp.

Lowther, P. E. 1993. Brown-headed Cowbird (*Molothrus ater*). In *The Birds of North America*, No. 47 (A. Poole, and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Weatherhead, P.J. 1989. Sex ratios, host-specific reproductive success, and impact of brown-headed cowbirds. *Auk* (106): 358-366.

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**TABLES AND FIGURES**

**Table 1: Results of breeding bird surveys along Crow Creek, F.E. Warren Air Force Base, Wyoming during June of 2011.**

Species are listed alphabetically by common name. Observations are classified as those recorded during formal point counts (Point Count) and rare species recorded while walking between points (Transect).

| Species                   | 11-Jun-11   |          | 27-Jun-11   |          | 30-Jun-11   |          | Mean Count Per Survey |
|---------------------------|-------------|----------|-------------|----------|-------------|----------|-----------------------|
|                           | Point Count | Transect | Point Count | Transect | Point Count | Transect |                       |
| American Crow             | 2           |          | 0           |          | 2           |          | 1.3                   |
| American Goldfinch        | 28          |          | 15          |          | 31          |          | 24.7                  |
| American Robin            | 10          |          | 13          |          | 14          |          | 12.3                  |
| American White Pelican    | 1           | 3        | 0           | 7        | 0           | 4        | 0.3                   |
| Belted Kingfisher         | 0           | 1        | 0           |          | 0           |          | 0.0                   |
| Black-billed Magpie       | 1           |          | 0           |          | 1           |          | 0.7                   |
| Black-crowned Night Heron | 1           |          | 1           | 1        | 0           | 5        | 0.7                   |
| Black-headed Grosbeak     | 3           |          | 3           |          | 2           |          | 2.7                   |
| Blue-winged Teal          | 1           |          | 0           |          | 0           |          | 0.3                   |
| Brewer's Blackbird        | 5           |          | 9           |          | 8           |          | 7.3                   |
| Brown-headed Cowbird      | 12          |          | 15          |          | 19          |          | 15.3                  |
| Bullock's Oriole          | 1           |          | 0           |          | 0           |          | 0.3                   |
| Canada Goose              | 0           |          | 10          |          | 0           |          | 3.3                   |
| Cedar Waxwing             | 0           | 2        | 0           |          | 0           |          | 0.0                   |
| Cliff Swallow             | 5           |          | 5           |          | 8           |          | 6.0                   |
| Common Grackle            | 5           |          | 13          |          | 3           |          | 7.0                   |
| Common Raven              | 0           |          | 0           |          | 1           |          | 0.3                   |
| Common Yellowthroat       | 4           |          | 2           |          | 4           |          | 3.3                   |
| European Starling         | 32          |          | 28          |          | 8           |          | 22.7                  |
| Gray Catbird              | 4           |          | 4           |          | 4           |          | 4.0                   |
| Great Blue Heron          | 0           | 1        | 0           | 1        | 1           |          | 0.3                   |
| Hairy Woodpecker          | 1           |          | 0           |          | 0           |          | 0.3                   |
| House Finch               | 1           |          | 1           |          | 0           |          | 0.7                   |
| House Sparrow             | 2           |          | 1           |          | 0           |          | 1.0                   |
| House Wren                | 4           |          | 5           |          | 2           |          | 3.7                   |
| Killdeer                  | 2           |          | 1           |          | 0           |          | 1.0                   |
| Least Flycatcher          | 0           |          | 1           |          | 1           |          | 0.7                   |
| Mallard                   | 1           |          | 1           |          | 0           |          | 0.7                   |
| Mourning Dove             | 12          |          | 15          |          | 16          |          | 14.3                  |
| Northern Flicker          | 1           |          | 2           |          | 2           |          | 1.7                   |
| Orchard Oriole            | 0           | 1        | 0           |          | 0           |          | 0.0                   |
| Red-tailed Hawk           | 0           |          | 0           |          | 1           |          | 0.3                   |
| Red-winged Blackbird      | 45          |          | 51          |          | 48          |          | 48.0                  |
| Rock Pigeon               | 1           |          | 4           |          | 0           |          | 1.7                   |
| Song Sparrow              | 6           |          | 8           |          | 8           |          | 7.3                   |
| Spotted Sandpiper         | 0           |          | 0           |          | 2           |          | 0.7                   |
| Swainson's Hawk           | 1           |          | 3           |          | 2           |          | 2.0                   |
| Western Kingbird          | 1           | 1        | 1           |          | 2           |          | 1.3                   |
| Western Meadowlark        | 11          |          | 4           |          | 17          |          | 10.7                  |
| Western Wood-pewee        | 1           |          | 3           |          | 2           |          | 2.0                   |
| Willow Flycatcher         | 3           |          | 1           |          | 1           |          | 1.7                   |
| Wilson's Snipe            | 1           | 1        | 2           |          | 0           |          | 1.0                   |
| Yellow Warbler            | 8           |          | 0           |          | 0           |          | 2.7                   |
| Yellow-headed Blackbird   | 0           |          | 0           |          | 2           |          | 0.7                   |

**Table 2: Comparison of species observations between years at F. E. Warren Air Force Base.**

If species were detected during the point count sessions, the numbers represent the mean of all three surveys. If a species was observed along the transect between point counts it is represented by “T”, while if a species was not seen it is represented as “-“. Species that are probable breeders on the FEWAFB are marked with a “B”. Species tracked by WYNDD as “sensitive” or “of concern” are marked with “\*”.

| Species<br>* = Species tracked by WYNDD<br>B = Probable breeder on FEWAFB | Mean<br>Count<br>2001 | Mean<br>Count<br>2002 | Mean<br>Count<br>2003 | Mean<br>Count<br>2007 | Mean<br>Count<br>2008 | Mean<br>Count<br>2009 | Mean<br>Count<br>2010 | Mean<br>Count<br>2011 |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| American Crow   | -                     | -                     | -                     | 0.33                  | 0.33                  | -                     | 1.70                  | 1.33                  |
| American Goldfinch - B  | 13                    | 20.33                 | 11.67                 | 10.33                 | 19                    | 26.33                 | 21.30                 | 24.67                 |
| American Kestrel  | 0.25                  | -                     | -                     | T                     | 0.33                  | 0.67                  | T                     | -                     |
| American Redstart   | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| American Robin - B  | 8                     | 6.67                  | 11.00                 | 14.33                 | 9.33                  | 19.33                 | 17.30                 | 12.33                 |
| American White Pelican  | -                     | -                     | -                     | 0.33                  | 3.67                  | T                     | -                     | 0.33                  |
| Barn Swallow  | -                     | -                     | T                     | -                     | -                     | -                     | -                     | -                     |
| Belted Kingfisher - B   | 1.25                  | 0.33                  | 0.67                  | 1                     | T                     | -                     | 0.30                  | T                     |
| Black-billed Magpie   | 1                     | 1                     | 0.33                  | -                     | 0.33                  | -                     | 0.30                  | 0.67                  |
| Black-capped Chickadee  | T                     | T                     | -                     | -                     | 0.67                  | -                     | -                     | -                     |
| Black-crowned Night-Heron - B   | -                     | -                     | T                     | 0.33                  | 0.33                  | 0.33                  | -                     | 0.67                  |
| Black-headed Grosbeak - B   | 0.50                  | 2                     | 2.33                  | 1                     | 3                     | 0.33                  | 1.70                  | 2.67                  |
| Blue Grosbeak   | -                     | -                     | -                     | -                     | 0.67                  | -                     | -                     | -                     |
| Blue Jay  | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Blue-gray Gnatcatcher   | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Blue-winged Teal  | -                     | T                     | -                     | -                     | -                     | -                     | 0.70                  | 0.33                  |
| Brewer's Blackbird - B  | 0.25                  | T                     | -                     | 4.67                  | 2.00                  | 14.67                 | 12.70                 | 7.33                  |
| Brewer's Sparrow  | T                     | T                     | T                     | -                     | -                     | -                     | -                     | -                     |
| Brown Thrasher  | -                     | -                     | 0.33                  | -                     | -                     | -                     | -                     | -                     |
| Brown-headed Cowbird - B  | 9.25                  | 13                    | 7.33                  | 4                     | 8                     | 14.67                 | 17.00                 | 15.33                 |
| Bullock's Oriole - B  | 1                     | 1.33                  | 0.33                  | -                     | 0.67                  | -                     | 0.70                  | 0.33                  |
| Canada Goose  | 0.5                   | T                     | T                     | -                     | 2.67                  | -                     | 6.70                  | 3.33                  |
| Cedar Waxwing   | -                     | -                     | 1                     | -                     | -                     | -                     | -                     | T                     |
| Chimney Swift   | -                     | -                     | -                     | -                     | T                     | -                     | -                     | -                     |
| Chipping Sparrow  | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Clay-colored Sparrow  | T                     | T                     | T                     | -                     | -                     | -                     | -                     | -                     |
| Cliff Swallow - B   | 43.5                  | 87.67                 | 2                     | 7.33                  | 157.67                | 32.67                 | 269.00                | 6.00                  |
| Common Grackle - B  | 2.75                  | 4                     | 2                     | 3.67                  | 4.33                  | 3.67                  | 2.00                  | 7.00                  |
| Common Nighthawk  | -                     | -                     | -                     | -                     | 0.33                  | -                     | -                     | -                     |
| Common Raven  | -                     | -                     | -                     | 0.33                  | -                     | -                     | -                     | 0.33                  |
| Common Yellowthroat - B   | 4.75                  | 8                     | 6.67                  | 5.67                  | 6.67                  | 7.33                  | 5.70                  | 3.33                  |
| Cooper's Hawk   | -                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Double-crested Cormorant  | -                     | -                     | T                     | -                     | -                     | 0.67                  | T                     | -                     |
| Downy Woodpecker  | -                     | T                     | T                     | 0.33                  | T                     | -                     | -                     | -                     |
| Eastern Kingbird  | -                     | T                     | T                     | -                     | 0.33                  | -                     | -                     | -                     |
| Eurasian Collard-Dove   | -                     | -                     | -                     | -                     | T                     | 0.33                  | -                     | -                     |
| European Starling - B   | 1.25                  | 3                     | 18.33                 | 7                     | 7.33                  | 18.33                 | 25.70                 | 22.67                 |
| Gadwall   | -                     | -                     | -                     | -                     | 1.67                  | -                     | -                     | -                     |
| Gray Catbird - B  | 2.5                   | 3                     | 4.67                  | 2.33                  | 1.67                  | 1.33                  | 3.30                  | 4.00                  |
| Great Blue Heron  | -                     | T                     | T                     | T                     | 0.33                  | 0.33                  | 0.30                  | 0.33                  |
| Green-tailed Towhee   | T                     | T                     | -                     | 2.67                  | -                     | -                     | -                     | -                     |
| Green-winged Teal   | -                     | -                     | -                     | -                     | 0.33                  | -                     | T                     | -                     |
| Hairy Woodpecker  | -                     | -                     | -                     | -                     | -                     | -                     | -                     | 0.33                  |
| Horned Lark   | -                     | -                     | -                     | -                     | -                     | 0.33                  | 0.30                  | -                     |

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| Species<br>* = Species tracked by WYNDD<br>B = Probable breeder on FEWAFB | Mean<br>Count<br>2001 | Mean<br>Count<br>2002 | Mean<br>Count<br>2003 | Mean<br>Count<br>2007 | Mean<br>Count<br>2008 | Mean<br>Count<br>2009 | Mean<br>Count<br>2010 | Mean<br>Count<br>2011 |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| House Finch - B   | T                     | T                     | 1.0                   | 3.7                   | 3.0                   | 3.3                   | 0.3                   | 0.67                  |
| House Sparrow - B   | -                     | -                     | -                     | 0.3                   | -                     | 1.0                   | -                     | 1.00                  |
| House Wren - B  | 0.5                   | 0.7                   | 0.7                   | 2.3                   | 6.0                   | 2.0                   | 2.0                   | 3.67                  |
| Killdeer - B  | 0.8                   | T                     | 5.3                   | 0.7                   | 2.0                   | 1.3                   | 0.3                   | 1.00                  |
| Lark Sparrow  | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Least Flycatcher  | -                     | -                     | -                     | -                     | -                     | -                     | -                     | 0.67                  |
| Lincoln's Sparrow   | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| MacGillivray's Warbler  | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Mallard   | 0.8                   | 2.7                   | T                     | 1.0                   | 5.0                   | 0.3                   | 3.0                   | 0.67                  |
| Mourning Dove - B   | 5.8                   | 5.0                   | 8.0                   | 8.7                   | 9.7                   | 8.0                   | 13.3                  | 14.33                 |
| N. Rough-winged Swallow-B   | T                     | 0.7                   | T                     | 0.3                   | 0.3                   | 2.3                   | -                     | -                     |
| Northern Flicker - B  | 0.5                   | 1.0                   | 0.7                   | 0.3                   | 1.3                   | 3.0                   | 1.3                   | 1.67                  |
| Northern Harrier  | -                     | -                     | -                     | -                     | 0.3                   | -                     | -                     | -                     |
| Orchard Oriole  | -                     | -                     | -                     | -                     | 0.7                   | 0.7                   | -                     | T                     |
| Red-tailed Hawk   | -                     | -                     | -                     | 0.3                   | 0.7                   | -                     | -                     | 0.33                  |
| Red-winged Blackbird - B  | 22.3                  | 32.3                  | 42.0                  | 24.0                  | 20.3                  | 35.3                  | 38.7                  | 48.00                 |
| Rock Pigeon - B   | 0.3                   | 0.7                   | T                     | -                     | 11.3                  | 2.3                   | 2.7                   | 1.67                  |
| Rose-breasted Grosbeak  | -                     | 0.3                   | -                     | -                     | 0.7                   | -                     | -                     | -                     |
| Ruby-crowned Kinglet  | T                     | T                     | 1.0                   | -                     | -                     | -                     | -                     | -                     |
| Sage Sparrow  | -                     | -                     | -                     | -                     | -                     | T                     | -                     | -                     |
| Savannah Sparrow - B  | T                     | T                     | 0.7                   | -                     | 0.3                   | 0.3                   | 0.3                   | -                     |
| Song Sparrow - B  | 8.0                   | 8.7                   | 9.0                   | 5.7                   | 4.0                   | 8.7                   | 5.0                   | 7.33                  |
| Spotted Sandpiper   | -                     | T                     | 0.3                   | -                     | -                     | -                     | -                     | 0.67                  |
| Swainson's Hawk   | T                     | 0.7                   | T                     | 0.7                   | 1.3                   | 0.3                   | 1.7                   | 2.00                  |
| Swainson's Thrush   | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Turkey Vulture  | -                     | -                     | T                     | 0.3                   | -                     | -                     | 0.7                   | -                     |
| Vesper Sparrow  | -                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Warbling Vireo  | -                     | -                     | -                     | -                     | 0.3                   | -                     | -                     | -                     |
| Western Kingbird - B  | 0.3                   | T                     | 1.3                   | 1.0                   | -                     | 0.7                   | 1.3                   | 1.33                  |
| Western Meadowlark - B  | 7.5                   | 14.3                  | 12.3                  | 10.7                  | 9.0                   | 11.7                  | 8.0                   | 10.67                 |
| Western Tanager   | 0.3                   | T                     | -                     | -                     | 0.7                   | -                     | -                     | -                     |
| Western Wood-Pewee - B  | 0.8                   | 0.3                   | 0.3                   | -                     | 0.7                   | 3.7                   | 2.0                   | 2.00                  |
| White-breasted Nuthatch   | -                     | -                     | -                     | -                     | -                     | 0.3                   | 0.3                   | -                     |
| White-crowned Sparrow   | T                     | T                     | -                     | -                     | -                     | -                     | -                     | -                     |
| Willow Flycatcher - B   | 0.3                   | T                     | 3.3                   | 1.7                   | 2.0                   | 1.0                   | -                     | 1.67                  |
| Wilson's Snipe  | -                     | 0.3                   | 0.7                   | -                     | T                     | -                     | 1.7                   | 1.00                  |
| Wilson's Warbler  | 0.3                   | -                     | T                     | -                     | 0.3                   | -                     | -                     | -                     |
| Yellow-rumped Warbler   | T                     | T                     | -                     | -                     | 0.3                   | -                     | -                     | -                     |
| Yellow Warbler - B  | 17.3                  | 18.7                  | 14.7                  | 21.0                  | 18.0                  | 21.0                  | 17.0                  | 2.67                  |
| Yellow-breasted Chat - B  | -                     | 1.0                   | 0.3                   | T                     | 0.3                   | -                     | -                     | -                     |
| Yellow-headed Blackbird   | -                     | -                     | 0.3                   | -                     | 0.3                   | -                     | 1.3                   | 0.67                  |

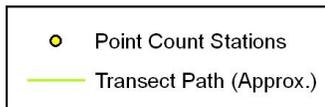
**Figure 1: Map of F.E. Warren Air Force Base showing locations of avian point count stations and approximate transect location along Crow Creek.**



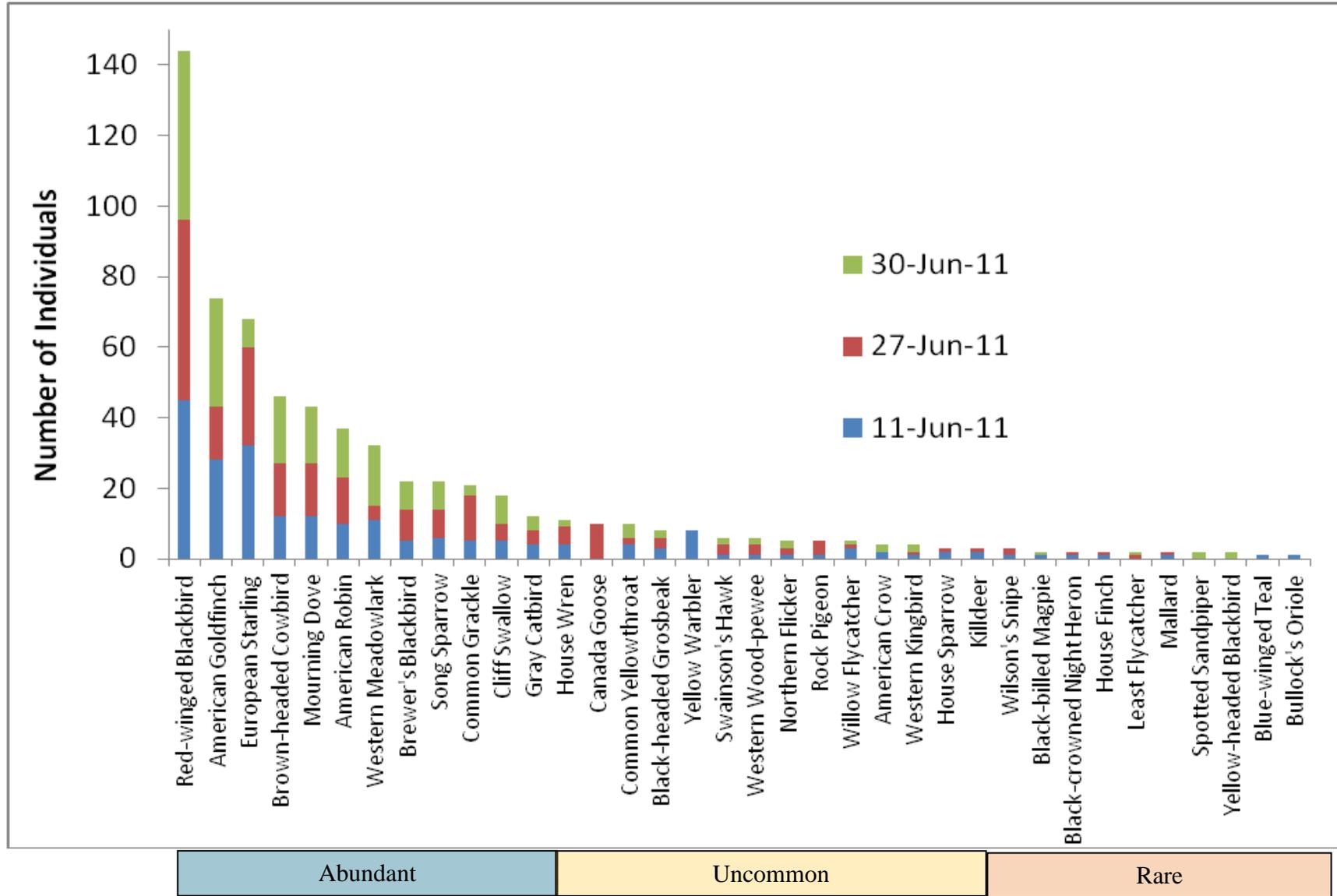
**Riparian Songbird Survey: Crow Creek, F.E. Warren Air Force Base**

Scale 1:11,000

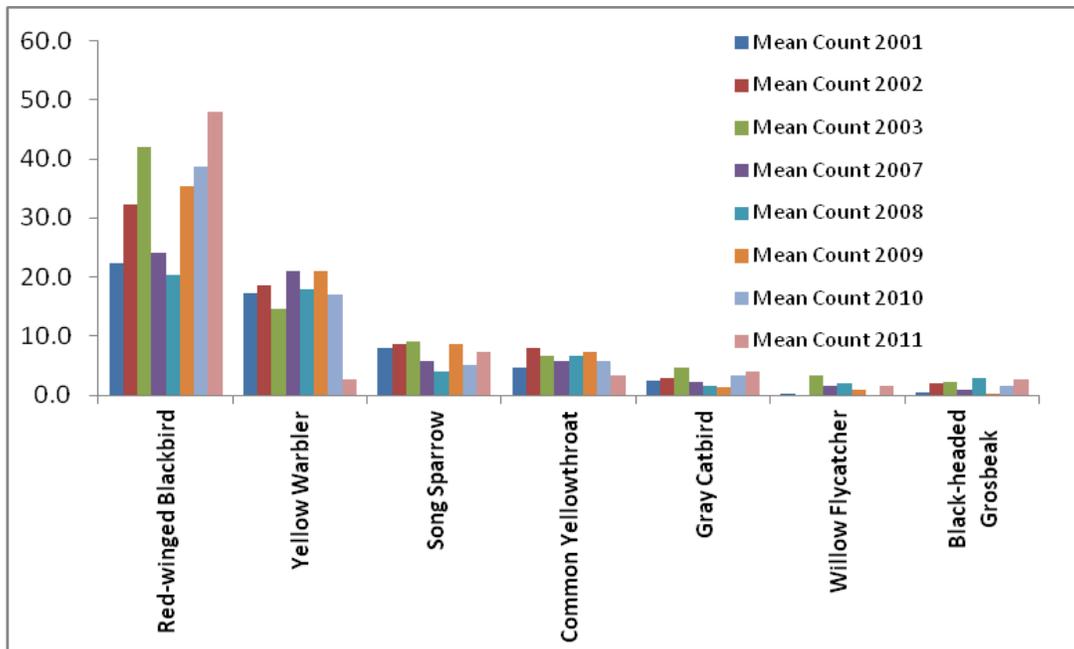
0 0.125 0.25 0.5 Miles



**Figure 2: Chart of survey results along Crow Creek, F.E. Warren Air Force Base, Wyoming during June of 2011.**  
 Species are ordered by decreasing abundance and grouped into coarse, descriptive categories based on mean count.



**Figure 3: Chart of average counts by year for native riparian bird species on F. E. Warren Air Force Base.**



**Figure 4: Chart of average counts by year for exotic or noxious bird species on F. E. Warren Air Force Base.**

