

**MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP
AT THE OXBOW PARK AND PRESERVE**



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BACKGROUND

The City of Durango acquired the Oxbow Park and Preserve (Oxbow), a 44-acre parcel along the Animas River, in the fall of 2012 with the assistance of a Great Outdoors Colorado (GOCO) Openspace Grant and subsequently donated a Conservation Easement on the parcel to the La Plata Openspace Conservancy.

During deliberations of the Oxbow Management Plan (finalized and approved in March 2014), species inventory work was identified by Natural Lands Preservation Board and the Parks and Recreation Advisory Board (the advisory boards), the public, and Colorado Parks and Wildlife (CPW) as important to help guide future management decisions that may affect the conservation value at the Oxbow property. Input from the advisory boards directed the City to collect site specific wildlife data to establish baseline wildlife use of the property, and to utilize community volunteers and Fort Lewis College (FLC) students under the direction of faculty to the extent practicable to accomplish the tasks.

Specifically, the public and the advisory boards identified birds as an important focus for site inventory work, in part because riparian habitat is historically rich in avian species, and there was no existing bird inventory data on parcel. The advisory boards recognized information on avian distribution, use, and abundance at that the property could be useful in developing future property management metrics to monitor and evaluate management strategies and objectives on the property. City of Durango staff, CPW, and several FLC faculty developed a two-pronged approach for collecting bird inventory data at Oxbow. First, the Durango Bird Club (DBC) agreed to do twice per month bird observation inventory breeding activity surveys March–December 2014, and secondly CPW and the City of Durango (with approval from the advisory boards), jointly funded a bird banding station to collect population vital rates within the Preserve.

The Management Plan specified that the Preserve portion of the Oxbow would be closed to public entry 1 January–30 June 2014 to minimize human (and dog) influence on the species composition within the Preserve while the inventories were ongoing.

Monitoring Avian Productivity and Survivorship Project Description

The Monitoring Avian Productivity and Survivorship (MAPS) Program was initiated in 1989 by The Institute for Bird Populations (IBP), to assess and monitor population dynamics of North American landbirds. The MAPS Program utilizes constant-effort mist netting and banding at a network of monitoring stations throughout North America that are managed and operated by professional biologists and highly trained volunteers. Currently, there are over 500 MAPS banding stations, including those managed by federal agencies and conservation organizations. However, there are no existing MAPS stations in southwest Colorado.

Research objectives of MAPS are to identify and describe 1) temporal and spatial patterns in the demographic indices and estimates provided by MAPS, and 2) relationships between these temporal and spatial patterns including: a) ecological characteristics and population trends of the target species, b) station-specific and landscape-level habitat characteristics, and c) spatially-

explicit weather data. These patterns and relationships can be used to identify the causes of population declines, develop management plans and conservation strategies for species and/or populations of concern, and evaluate the effectiveness of specific management actions over time (DeSante et al. 2014). Because of the large scale of the MAPS Program, these objectives may be met for multiple target species at multiple spatial scales and may result in important information on a variety of topics with respect to avian ecology (DeSante 2000, DeSante et al. 1998, 1999). To insure reliable productivity indices and survivorship estimates, MAPS Stations should realize standardization from year to year and continued operation for at least 5 consecutive years. Continued operation for 10 to 20 consecutive years may be necessary for some MAPS stations to obtain reliable trend information.

STUDY AREA AND METHODS

STUDY AREA

We established a MAPS station at the Oxbow along the Animas River corridor in Durango, CO (Fig. 1). Oxbow is mostly enclosed by a Fremont cottonwood (*Populus fremontii*) gallery forest, with an average height ~15 m (50 ft). Understory vegetation consists of patches of coyote willow (*Salix exigua*) and young Fremont and narrowleaf (*P. anugustifolia*) cottonwood, with grassy openings dominated by smooth brome (*Bromus inermis*). Several dead, standing Russian olive (*Elaeagnus angustifolia*) trees occur along the shoreline in the southern portion of the Oxbow. The southwestern portion of the MAPS area overlaps a dry, open area dominated by rabbitbrush (*Ericameria* spp.) and various grasses. The site is flanked to the west by railroad tracks, paved road, and residential developments. The steep, rocky slopes of Animas City Mountain are situated immediately west of the residential area. The Animas River occurs east and south of the Oxbow. Elevation at the MAPS station is approximately 1993 m (6,540 ft).

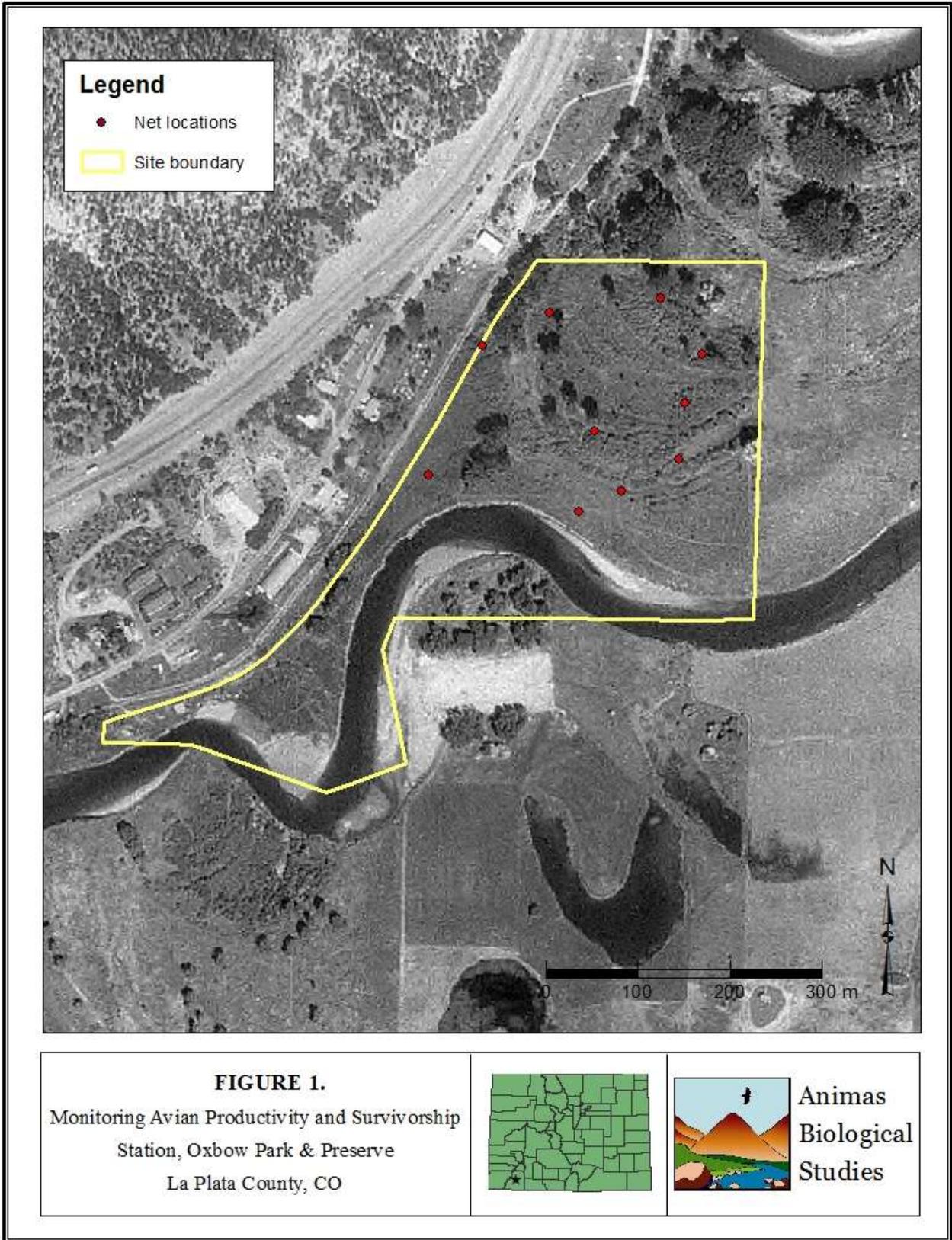
METHODS

MAPS Station Design

The MAPS station was designed by biologists from Animas Biological Studies (ABS) and CPW. We established 10 permanent mist net locations following MAPS protocol (a typical MAPS station consists of 10, 12-meter mist nets encompassing an area of about 20 ha [~50 ac; DeSante et al. 2014]). We chose mist net locations opportunistically rather than uniformly, in areas we thought would yield the maximum number of bird captures. We mapped the mist net locations in the field using handheld GPS units and later mapped their locations in ARCGIS (Fig. 1). Representative photos of mist net locations are provided in Appendix A.

Mist Netting and Banding

Mist netting and banding activities were conducted under Federal Bird Marking and Salvage Permit # 23488, from the U.S. Geological Survey Bird Banding Laboratory (BBL), and CPW Scientific Collection Permit # 14TRb2071, issued to Lynn Wickersham of ABS. Per MAPS protocol (DeSante et al. 2014), each mist net is operated for 6 morning hours per day, for 1 day during each of the following 10-day periods: 1) 1–10 May; 2) 11–20 May; 3) 21–30 May; 4) 31



May–9 June; 5) 10–19 June; 6) 20–29 June; 7) 30 June–9 July; 8) 10–19 July; 9) 20–29 July; and 10) 30 July–8 August. MAPS stations should be operated during as many 10-day periods as possible beginning with the first period during which 1) the majority of breeding birds have established territories; and 2) individuals migrating to more northerly breeding grounds are no longer passing through the area. Thus, the start of MAPS operation varies depending on latitude and elevation. Based on latitude and elevation at the Oxbow and the recommendations from the MAPS Manual (DeSante et al. 2014), we began official MAPS data collection during the third 10-day period (21–30 May), for a total of eight banding days. However, we also collected banding data during two practice sessions occurring in early and mid-May.

On each MAPS banding day, mist nets were opened at approximately local sunrise and remained open for approximately 6 hours, except during adverse weather conditions. We checked the nets every 30 minutes, removed and bagged captured birds, and brought them to a centrally-located processing station for banding. At the end of the 6-hour period, nets were closed and removed from the property.

Each captured bird was identified to species and banded with a uniquely-numbered aluminum leg band. Recaptured birds (i.e. birds already marked with an aluminum leg band) were not issued a new band unless the old band was unreadable or damaged in some way so that it might cause injury to the bird. For each bird, we recorded primary MAPS data, which are the basis for which the IBP analyzes productivity, survival-rates, and population trends (DeSante et al. 2014). Primary MAPS data include:

- Capture code (i.e., new, recapture)
- Band number
- Species name
- Age and how aged
- Sex and how sexed
- Status/disposition (i.e., healthy, stressed, injured)
- Date and capture time
- Net number

We followed the criteria in Pyle (1997) to age and sex birds, carefully examining each bird in the hand. Birds may be aged by a variety of characteristics but most commonly by one or more of the following: plumage; degree of skull pneumaticization; evidence of breeding condition; presence of a molt limit or active molt; flight feather wear; and mouth, bill, and/or eye color. Adult birds may be sexed by plumage if the species is sexually dimorphic, or by the presence of a cloacal protuberance (males) or brood patch (females). Males of some species may also develop partial brood patches, but usually also exhibit a cloacal protuberance during the breeding season to distinguish them from females. Other common sexing characteristics include mouth/bill color, eye color, wing chord length, and tail length.

In addition to primary MAPS data, we also collected as much supplemental data as possible for each bird captured, including recaptures. Supplemental data are used to verify the accuracy of the species, age, and sex determinations and may also provide important information on spatial and temporal variation in the timing and extent of breeding and molt as well as the physiological

condition of the bird (DeSante et al. 2014). We followed the criteria in Pyle (1997) and DeSante et al. 2014) to collect the following supplemental data:

- Extent of skull pneumaticization
- Condition of cloacal protuberance (males) and brood patch (males and females)
- Extent of body molt, flight-feather molt, and flight feather wear
- Extent of juvenile plumage
- Existence of molt limits and information on feather generation for selected feather tracts
- Wing chord and tail length
- Body mass
- Fat class

Volunteer personnel

DBC members and members within the Community with experience and enthusiasm for bird banding were solicited to assist at the MAPS station. Volunteers were trained to carefully extract, handle, and band birds captured in mist nets. In addition, they underwent intensive instruction and training in the determination and recording of each bird's age, sex, and breeding condition as described above.

Habitat Structure Assessment

Habitat structure assessment (HSA) data serve three functions, including: 1) providing a habitat classification for each station; 2) facilitating detection of gross changes in habitat structure that may explain changes in population demographics; and 3) providing station-specific habitat data to complement remotely-sensed landscape data at a fine resolution. Per MAPS protocol, HSA's are conducted every 5 years, unless habitat at the station has undergone a major change due to fire, logging, construction, natural disasters, etc. (DeSante et al. 2014).

Data Analysis and Reporting

All mist netting and banding data will be submitted to the BBL and CPW, per federal and state permit regulations, and to the IBP using MAPSPROG, a Windows-based computer program for entry/import, editing, verification, and error tracking of MAPS data (Froehlich et al. 2006). The IBP incorporates data from MAPS Stations across North America into annual reports that include data on 1) regional between-year changes in adult bird populations and productivity; 2) regional adult apparent annual survival rate estimates; 3) location, years of operation, and habitat information of all MAPS stations; and 4) breeding status for each species captured, seen, or heard at each station.

RESULTS

We operated five mist nets during practice sessions on 7 and 17 May, logging 54.50 net hours. We operated all 10 mist nets during MAPS periods 3–10 on the following dates: 23 May; 3, 16, and 24 June; 2, 14, and 28 July; and 2 August. We logged 455.00 net hours during the official MAPS season; total net hours for 2014 was 509.50 (Table 1).

We captured 316 individuals of 43 species (Tables 1–2). Capture success was high, with 0.6 birds per net hour and an average of 34 birds captured per day (10 nets; MAPS periods 3–10). Of the 316 captures, 212 were new encounters; we banded 144 birds and released 68 unbanded (Table 1). Unbanded birds included those that escaped before we could band them, or individuals of species for which we were not authorized to band (e.g., hummingbirds). Additionally, two birds died in the nets or shortly after extracting from the nets and were thus not banded; these birds were reposit to FLC’s Biology department as study specimens. We captured 36 birds that were previously banded at the MAPS Station (Table 1). Representative photos of birds captured at the MAPS Station are provided in Appendix A.

We collected as much primary and supplemental MAPS data as possible for all new captures and recaptures. When individuals were recaptured, we recorded primary and secondary MAPS data without reviewing the data collected during the previous capture to avoid bias. A few birds escaped during the data collection process; therefore, we only recorded partial data for those individuals. Not all supplemental data were collected for several individuals due to a high volume of captures occurring at the same time, during which we attempted to release each bird as quickly as possible to resume their pre-capture activities.

SPECIES OF SPECIAL CONSERVATION STATUS

We captured a Willow Flycatcher (*Empidonax traillii*) on 23 May. The Oxbow is within the geographic range for the endangered Southwestern subspecies (*E.t. extimus*); thus, we were not authorized to band this bird. Although the Oxbow provides potential nesting habitat for the Southwestern Willow Flycatcher, we did not observe this subspecies or any other Willow Flycatchers at the site during any other banding days. The late May date suggests this bird was a migrant.

We captured two U.S. Forest Service sensitive species during MAPS activities, Brewer’s Sparrow (*Spizella breweri*) and Ovenbird (*Seiurus aurocapilla*). The Brewer’s Sparrow, a sagebrush obligate species, was captured on 17 May in the portion of the MAPS station dominated by rabbitbrush. This was the only observation for this species in 2014 at Oxbow. The mid-May date and the lack of extensive nesting habitat at the Oxbow suggest this individual was a migrant. The Ovenbird, captured on 24 June, was the most unexpected bird in 2014. This species is not known to breed in western Colorado. It is rare and localized along the Front Range, where it breeds in ponderosa pine-oak (*Pinus ponderosa-Quercus gambelli*) or mixed conifer habitats with shrubby understory vegetation. This was the only observation for this species in 2014, indicating this individual was either a very late migrant or a vagrant.

Table 1. Summary of MAPS activities at the Oxbow Park and Preserve, Durango, CO, 2014.

Period	Date	Net Hours	Banded	Unbanded	Recaptures	Total
1	7 May	25.50	15	4	0	19
2	17 May	29.00	16	12	0	28
3	23 May	52.00	37	10	2	49
4	3 Jun	60.00	23	7	1	31
5	16 Jun	60.00	27	3	6	36
6	24 Jun	60.00	20	2	9	31
7	2 Jul	60.00	14	4	7	25
8	14 Jul	60.00	30	10	5	45
9	28 Jul	43.00	6	6	2	14
10	2 Aug	60.00	24	10	4	38
Total		509.50	212	68	36	316

Table 2. Number of individuals and proportion of species captured at the Oxbow Park and Preserve MAPS station, Durango, CO, 2014.

Species	Banded	Unbanded	Recapture	Total	Proportion
House Wren (<i>Troglodytes aedon</i>)	13	22	6	41	13.0%
Yellow Warbler (<i>Setophaga petechia</i>)	15	3	8	26	8.2%
Bullock's Oriole (<i>Icterus bullockii</i>)	20	2	3	25	7.9%
Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)	13	0	3	16	5.1%
American Goldfinch (<i>Spinus tristis</i>)	13	0	2	15	4.7%
Black-capped Chickadee (<i>Poecile atricapillus</i>)	12	1	1	14	4.4%
American Robin (<i>Turdus migratorius</i>)	11	1	2	14	4.4%
Gray Catbird (<i>Dumetella carolinensis</i>)	11	0	2	13	4.1%
Western Wood-Pewee (<i>Contopus sordidulus</i>)	9	0	4	13	4.1%
Black-chinned Hummingbird (<i>Archilochus alexandri</i>)	0	12	0	12	3.8%
Rufous Hummingbird ^a (<i>Selasphorus rufus</i>)	0	12	0	12	3.8%
Yellow-rumped Warbler ^b (<i>Setophaga coronata</i>)	9	1	0	10	3.2%
Song Sparrow (<i>Melospiza melodia</i>)	4	4	2	10	3.2%
House Sparrow (<i>Passer domesticus</i>)	9	0	0	9	2.8%
Wilson's Warbler ^a (<i>Cardellina pusilla</i>)	8	0	0	8	2.5%
Western Bluebird (<i>Sialia mexicana</i>)	5	0	1	6	1.9%
Warbling Vireo (<i>Vireo gilvus</i>)	4	0	2	6	1.9%
Lazuli Bunting (<i>Passerina amoena</i>)	5	0	0	5	1.6%
Downy Woodpecker (<i>Picoides pubescens</i>)	4	0	0	4	1.3%
House Finch (<i>Haemorhous mexicanus</i>)	4	0	0	4	1.3%
Lincoln's Sparrow ^a (<i>Melospiza lincolni</i>)	4	0	0	4	1.3%
Northern Flicker (<i>Colaptes auratus</i>)	4	0	0	4	1.3%
White-breasted Nuthatch (<i>Sitta carolinensis</i>)	4	0	0	4	1.3%

Species	Banded	Unbanded	Recapture	Total	Proportion
White-crowned Sparrow ^a (<i>Zonotrichia leucophrys</i>)	4	0	0	4	1.3%
Broad-tailed Hummingbird (<i>Selasphorus platycercus</i>)	0	4	0	4	1.3%
Cordilleran Flycatcher (<i>Empidonax occidentalis</i>)	3	0	0	3	0.9%
MacGillivray's Warbler ^a (<i>Geothlypis tolmiei</i>)	3	0	0	3	0.9%
Northern Rough-winged Swallow (<i>Stelgidopteryx serripennis</i>)	3	0	0	3	0.9%
Green-tailed Towhee ^a (<i>Pipilo chlorurus</i>)	2	1	0	3	0.9%
Lesser Goldfinch (<i>Spinus psaltria</i>)	2	1	0	3	0.9%
Brown-headed Cowbird (<i>Molothrus ater</i>)	2	0	0	2	0.6%
Dusky Flycatcher (<i>Empidonax oberholseri</i>)	2	0	0	2	0.6%
Red-winged Blackbird (<i>Agelaius phoeniceus</i>)	2	0	0	2	0.6%
Virginia's Warbler ^a (<i>Oreothlypis virginiae</i>)	2	0	0	2	0.6%
Calliope Hummingbird ^a (<i>Selasphorus calliope</i>)	0	2	0	2	0.6%
Ash-throated Flycatcher (<i>Myiarchus cinerascens</i>)	1	0	0	1	0.3%
Brewer's Sparrow ^a (<i>Spizella breweri</i>)	1	0	0	1	0.3%
Hairy Woodpecker (<i>Picoides villosus</i>)	1	0	0	1	0.3%
Ovenbird ^a (<i>Seiurus aurocapilla</i>)	1	0	0	1	0.3%
Western Scrub-Jay (<i>Aphelocoma californica</i>)	1	0	0	1	0.3%
Yellow-breasted Chat (<i>Icteria virens</i>)	1	0	0	1	0.3%
Blue Grosbeak (<i>Passerina caerulea</i>)	0	1	0	1	0.3%
Willow Flycatcher ^a (<i>Empidonax traillii</i>)	0	1	0	1	0.3%

^a Migrant; not known to breed at the Oxbow.

^b Most individuals of this species were migrants; a few individuals breed at the Oxbow.

DISCUSSION

Our first season of MAPS operation at Oxbow was successful. We established permanent mist net locations, trained volunteers, and collected data on over 300 birds of 43 species. After only a single year of operation, we have not collected enough data to develop productivity indices nor estimate survivorship. MAPS Stations should operate for at least 5 years, and as long as 10 to 20 consecutive years to obtain reliable trend information (DeSante et al. 2014). However, we captured 31 species of birds that are confirmed to be breeding with the Oxbow. We expect that number to increase once the data for the DBC effort is summarized.

The Oxbow is a high-quality habitat for a variety of resident and migratory birds; thus continued MAPS operation will provide a wealth of important data on local riparian bird populations. Of other public and/or accessible portions of the Animas River corridor in Durango, CO, the Oxbow provides some of the largest and extensive stands of mature cottonwoods, and some of the tallest and oldest patches of coyote willow. Additionally, the mature cottonwood overstory, in combination with the tall, mature willow understory, provides plentiful foraging and nesting opportunities for raptors, woodpeckers, and songbirds. Additionally, the Oxbow serves as important migratory habitat for short-distance and Neotropical migrants. During our banding activities in May and early June, we captured a number of migrants that breed at higher elevations and in differing habitats. The Oxbow likely serves as both a staging area for some of Colorado's high-elevation breeders as well as stopover habitat for birds traveling further north to breed in the spring. We would expect the Oxbow to provide fall migration rest and stopover habitat for a variety of species as they migrate to their wintering grounds in Central and South America.

Bird banding opportunities within any community are not common, yet it is one of the few wildlife management activities that most people can participate in. It serves to take the public from casual wildlife observers to active participants in species conservation, wildlife management, habitat preservation, and scientific inquiry. It helps to develop and reaffirm support for stewardship activities, habitat preservation efforts, the policies, and the mission of the Openspace Program and City of Durango Comprehensive Plan, thus its value is unparalleled.

A central tenet of conservation education is that learners move along a continuum that begins with entry level nature experiences, moves into the acquisition of basic skills, then on to regular participation and advanced learning, and ideally culminates in taking stewardship action. The Oxbow bird project afforded enriching opportunities at every point along this conservation education continuum. Certainly nature neophytes gained an inspiring introduction to birds and bird science. Having marveled at the "birds in hand" at the banding station, Gametime day campers and camp counselors were then given a chance to explore bird watching with binoculars bird field guides, moving in a single day from introductory experience to basic skills development. Further along the same continuum, members of the DBC, already indoctrinated bird enthusiasts, assumed a stewardship role as they shared their birding skills and enthusiasm with novices from FLC and Gametime.

By incorporating service learning and volunteerism, the ongoing Oxbow project not only maximizes economic efficiency, but creates rich learning and training opportunities within the Durango Community. Volunteers at the MAPS station donated approximately 400 hours

throughout this effort. This effort has great potential for expansion of conservation education and public participation within the community while providing data at multiple scales to inform species conservation efforts and property management.

RECOMMENDATIONS

This is the first year of a multiple year effort. To establish reliable baseline data on breeding birds at the Oxbow, we recommend the existing seasonal closure (through 30 June) remain in place at least one more year. We recommend that MAPS activities continue for at least another 4 to as many as 19 consecutive years, to collect long-term data on breeding birds and to document use of the Oxbow by species of special conservation status. If one or more of the proposed recreational developments are implemented at the Oxbow, the MAPS Station could serve as important experimental data to assess the short- and long-term impacts of recreation on breeding birds, and to test various management strategies to minimize and mitigate those potential impacts. In addition, the MAPS Station will provide continued volunteer and educational opportunities for the Durango community.

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APPENDIX A.

**REPRESENTATIVE PHOTOS OF MIST NET LOCATIONS
AND BIRDS CAPTURED AT THE OXBOW PARK AND PRESERVE
MAPS STATION IN 2014**

Photos by Lynn Wickersham



Mist net # 1.



Mist net # 2.



Mist net # 7.



Coyote willow patch flanking mist net # 8.



Mist net # 9.



Mist net # 10.



Banding a Black-headed Grosbeak.



Sexing a male American Robin.



Ageing a male Downy Woodpecker.



Cordilleran Flycatcher.



CPW Education Coordinator, Leigh Gillette and a Song Sparrow.



Female Bullock's Oriole.



Western Wood-Pewee captured in mist net.



ABS biologist Lynn Wickersham extracting a Northern Flicker from mist net.



Measuring wing chord length of Yellow Warbler.



Weighing a Black-capped Chickadee.



MAPS volunteer Martin Cuntz and a Western Scrub-Jay.



New Mexico ornithologist Raymond VanBuskirk and an Ovenbird.



Male Lesser Goldfinch.



Gray Catbird.



MAPS volunteers and Durango Bird Club members at the MAPS Station.



Fort Lewis College biology students, MAPS volunteers, CPW, and banding experts at the central banding location.



MAPS Volunteer, Kristi Dranginis discusses bird identification with Parks and Recreation GameTime 4th at the banding station.



Parks and Recreation GameTime 4th at the banding station.