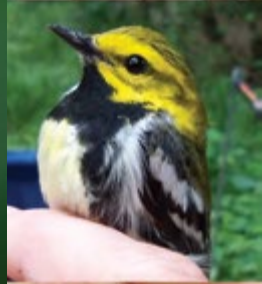


Spring Migration Monitoring of Non-Game Birds at Grand Pass Conservation Area 2009-2013



Background

In 2009, Dana Ripper of the Missouri River Bird Observatory (MRBO) and Professor Michele Reinke of Missouri Valley College established a passerine migration monitoring station at

Grand Pass Conservation (CA). The goals for this station were 1) to pilot a study of migratory bird habitat use on the Missouri River corridor, and 2) to provide a location where college students and others could learn about birds, conservation, and scientific methodology in a field setting.

The Mississippi and Missouri River flyways are of critical importance to migratory birds, including wood-warblers, thrushes, and flycatchers. In central Missouri, the Missouri River corridor has undergone very little monitoring other than for waterfowl species. Grand Pass CA staff collect comprehensive yearly data on waterfowl numbers within the Area, assisted by hunter reports. Additionally, Missouri birders intermittently collect observational data at Grand Pass CA and document their sightings in the Audubon Society of Missouri's CACHE-SPARKS database. However, data standardized by timing, frequency, and methodology were not collected for non-game taxa using Grand Pass CA until the establishment of the MRBO station.

The migration monitoring station was placed in the 200-m wide riparian corridor along the banks of the Missouri River on the northwest side of Pool 1 (map on page 8). We operated an array of 21 mist-nets strategically placed within a 400-m long band within the riparian zone. The nets were erected at the beginning of the migration season and opened before sunrise every morning, weather permitting. Nets were opened for a minimum of five hours per day and checked every 20 to 30 minutes. All captured birds were banded on their lower leg with a U.S.G.S.-issue aluminum band. Each band is serially numbered such that a bird re-captured at our station or elsewhere can be individually identified. Standard measurements were taken on each bird, including wing, tail, and tarsus length, presence of fat reserves, muscle development, age, and gender. All data are presented to the Bird Banding Laboratory and the Missouri Department of Conservation (MDC) on a yearly basis.

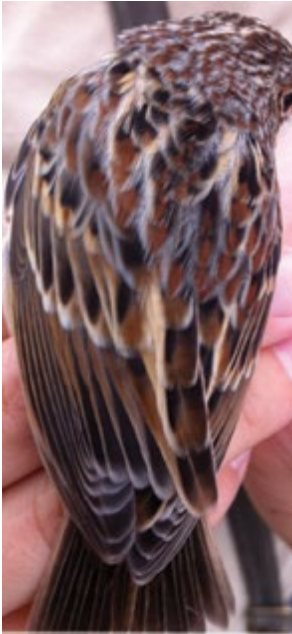
Preliminary data from 2009 indicated that Grand Pass is an important stopover and breeding location for several species of conservation concern, and the Grand Pass station was operated daily during spring migration during 2009-2013. This station, coupled with the associated education programs and internship opportunities, evolved in 2010 into what is now the Missouri River Bird Observatory. Over the five spring seasons, we documented almost 100 species of migrants that use this corridor as stopover and, in the case of some individuals, breeding habitat. More than 3,500 individual birds were banded at the Grand Pass station and we had many returns of breeding birds that use the area year after year; for example, a Great-crested Flycatcher banded as an adult in 2009 was recaptured in 2011, and recaptured once again in 2013. Although the Grand Pass CA has always been well known as a refuge for large numbers of migrating shorebirds and waterfowl, we documented that the forested corridor along the Missouri River provides habitat for a wide variety of passerine and near-passerine species.

2009

Spring 2009 was the pilot year for the station. The site was selected for its proximity to the Missouri River and the mature bottomland forest habitat it contained. Fifteen mist-nets were originally deployed in 2009, and those remained in the same locations throughout the duration of the study. Staff and students of Missouri Valley College assisted in net placement and many days of operation during this first season. We were only able to operate the until May 9th, which was the middle of peak migration, but even this short season was enough to demonstrate that the riparian buffer zone of Grand Pass CA provides crucial habitat for migrating passerines as well as breeding habitat for some summer residents, such as Wood Thrush, Great-crested Flycatcher, Warbling Vireo, Indigo Bunting, and Common Yellowthroat.

2010

In Spring 2010, with full-time assistance from two Missouri Valley College students, we deployed an additional four mist-nets at the station and were able to run a full season. Though we started operation on March 31st, we did not see the first of the spring migrants until mid-April. The peak migration period occurred from approximately May 5th – May 23rd, with an average of 72 birds per day banded. The highest daily total for new captures was May 14th, with 186 new individuals. 2010 was a very successful season in terms of numbers and diversity of migrants documented. Additionally, we had a number of returns amongst the aforementioned summer breeders, suggesting successful brood-rearing in the previous year.



Lincoln's Sparrow



Blue-winged Warbler



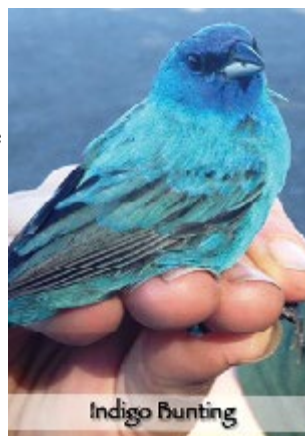
Brown Creeper



Blue-headed Vireo

2011

Spring 2011 was dominated by rainy weather and a steadily rising Missouri River. We planned a later start based on capture rates and species diversity in 2009 and 2010, and began operation on April 10th with a full suite of 21 mist-nets. Bird numbers and diversity were quite similar to 2011, with fewer winter and year-round residents captured. Overall, daily capture totals were far more consistent than in previous years, with the peak migration period of May 1st- 20th yielding approximately 45 birds per day with little variation. Some of the highlights in 2011 included the recapture of breeding residents originally banded in 2011, plus our first Western Palm Warbler, Blue-winged Warbler, and Clay-Colored Sparrow. Though we planned to operate until May 31st this year, the Missouri River flooded out the station and 15 of the 21 net sites, forcing a close to the season on May 27th. Water inundated the area for several months, effectively killing the vegetative understory, which had ramifications for the following spring.



Indigo Bunting

2012

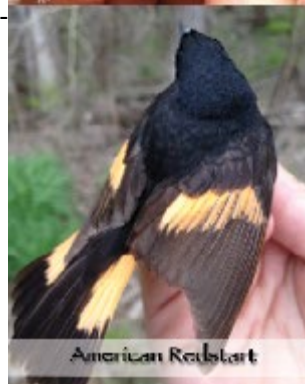
A much-reduced understory in 2012 resulting from the 2011 Missouri River floods resulted in sparse habitat for shrub-dwelling and low- to mid-canopy migrants. Spring 2012 showed a very sparse migration in general, with far lower numbers of birds captured than 2010 or 2011. Additionally, numbers of breeding residents, notably Wood Thrush, were far reduced. Many migrants were documented as having low body weight, muscle score, and fat score upon arrival. This may have been due to the extreme weather patterns occurring throughout the U.S. in mid-spring. However, after a very mild winter, plants were blooming, flowering, and fruiting extremely early in 2012 that there was a great deal of nutrition available to stopover migrants site. In addition to banding activities, in 2012 we implemented a series of five daily point counts in the riparian zone surrounding the nets. We wanted to supplement banding data and ensure that species not usually captured (e.g., canopy-dwelling) were being documented. Surprisingly, the resulting point count data did not add significantly to the information already collected by mist-net captures, suggesting that at the Grand Pass CA site, mist-netting is a suitable tool for documenting migrant presence.



Magnolia Warbler

2013

Spring of 2013 was an extremely unusual year due to abnormal weather conditions. A cool, wet spring gave way to snow on May 3rd, followed by a cold weather front sustained just north of Grand Pass for several days. May 6th-10th at the Grand Pass banding station were marked by an event we hardly ever see in the center of the country: a true migrant fall-out. A fall-out occurs when there is a proverbial “perfect storm” of conditions having to do with geography and weather. Such events are quite common on the Gulf Coast and the Great Lakes – if migrating birds encounter a weather front as they are about to cross a large body of water, they will “fall out” of migration and simply pile up on the coast. There is little geography in Missouri to cause this, but in early May the weather front to our north caused just such an event. In just a few days, we banded more than 300 birds and observed several hundred more – it appeared as though songbirds were “dripping from the trees”. As exciting as this event was to document, several bird mortalities forced us to close the station on May 10th in the interest of bird safety. The difficult migration conditions meant that birds were experiencing a stressful journey, and we did not want to detain or stress them any further. On subsequent days, MRBO staff visited Grand Pass CA to record standardized observational data.



American Redstart

Conservation Potential

The five years of data collected at Grand Pass indicate that the CA’s riparian zone is an extremely important migration corridor, and especially critical as stopover habitat during adverse conditions. The habitat provided at Grand Pass is doubly important given that the land surrounding the CA and on the opposite side of the Missouri River is almost completely deforested and devoted to agricultural uses, with the exception of a few well-managed private marshes located north of the River. We suggest that Grand Pass CA managers continue the practices that maintain this critical corridor, and even expand the bottomland forest area wherever possible. The staff MRBO would like to express our deepest thanks to the Grand Pass CA management team for conserving not only the game resources of the CA but also for providing crucial habitat for non-game birds.



Lincoln's Sparrow

Mist-netting Results 2009 - 2013

Species	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Total
Acadian Flycatcher		2	5			7
Alder Flycatcher		2				2
American Goldfinch		4	21	4	3	32
American Redstart		27	19	5	4	55
American Robin	1	4	2	1		8
Baltimore Oriole	3	16	17	5	1	42
Bell's Vireo	1				2	3
Black-and-White Warbler	3	21	16	8	10	58
Black-billed Cuckoo		1				1
Black-capped Chickadee	3	8	2	1	4	18
Black-throated Green Warbler		1		1		2
Blackpoll Warbler		2		1	4	7
Blue Jay	1	4	10	4	12	31
Blue-grey Gnatcatcher			2		3	5
Blue-headed Vireo		6	2		1	9
Blue-winged Warbler			1			1
Brown Creeper	1					1
Brown Thrasher	7	9	15	5	5	41
Brown-headed Cowbird	5	3	10	5	1	24
Canada Warbler		6	4	4		14
Carolina Wren	9					9
Chestnut-sided Warbler		5	1	4		10
Chipping Sparrow	1		1			2
Clay-colored Sparrow			1			1
Common Yellowthroat	20	127	80	16	21	264
Dickcissel				1		1
Downy Woodpecker		10	2	3	3	18
Eastern Bluebird					2	2
Eastern Kingbird					1	1
Eastern Phoebe	3					3
Eastern Screech Owl		3				3
Eastern Towhee	1			3		4
Eastern Wood-Pewee		1	5	3		9
Field Sparrow	1	2	1		1	5
Fox Sparrow	1					1
Golden-crowned Kinglet	4					4
Golden-winged Warbler		2	3			5
Great-crested Flycatcher	4	6	4	1	1	16
Grey Catbird	28	73	66	23	33	223
Grey-cheeked Thrush	2	19	6	11	17	55
Hairy Woodpecker		1	2		3	6

Species	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Total
Harris' Sparrow					1	1
Hermit Thrush	7	9	8	6	4	34
House Wren	1	16	9	2	9	37
Indigo Bunting	31	160	94	48	14	347
Kentucky Warbler		1	3			4
Least Flycatcher	1	29	14	1	13	58
Lincoln's Sparrow	6	3	6	2	15	32
Louisiana Waterthrush		1				1
Magnolia Warbler		17	9	1	1	28
Marsh Wren			2		1	3
Mourning Warbler	1	16	11	7		35
Myrtle Warbler	1	13	60	4	79	157
Nashville Warbler	1	13	6	8	12	40
Northern Cardinal	15	36	22	15	15	103
Northern Parula		3	1	2	1	7
Northern Waterthrush	31	38	39	9	21	138
Orange-crowned Warbler	5	7	7	4	12	35
Orchard Oriole	3	16	7	3		29
Ovenbird	14	25	13	11	4	67
Pileated Woodpecker	1	1				2
Prothonotary Warbler		2				2
Red-bellied Woodpecker		4	2	3	2	11
Red-eyed Vireo		7	4		2	13
Red-headed Woodpecker		2			2	4
Red-winged Blackbird	6	2		7		15
Rose-breasted Grosbeak	3	12	26	6	5	52
Ruby-crowned Kinglet	24	29	36	5	41	135
Sharp-shinned Hawk	1		2	2		5
Slate-colored Junco	6	2	1	1	3	13
Song Sparrow	7	5	4		5	21
Summer Tanager	1		1	1		3
Swainson's Thrush	25	85	83	29	27	249
Swamp Sparrow	5	17	27	2	18	69
Tennessee Warbler		1	6	17	2	26
Traill's Flycatcher		27	57	16	1	101
Tufted Titmouse	4	5	6	4	8	27
Veery	1		3	2		6
Warbling Vireo	12	18	22	7	3	62
Western Palm Warbler			1		1	2
White-breasted Nuthatch		2			1	3
White-crowned Sparrow	4	5	5		7	21
White-eyed Vireo		2	1	1	1	5
White-throated Sparrow	87	91	115	59	125	477
Wilson's Warbler	3	34	17	8	5	67
Winter Wren	1	2	1			4

Species	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Total
Wood Thrush	8	11	10	6	1	36
Yellow Warbler	2	5	5		8	20
Yellow-bellied Flycatcher		9	5	3		17
Yellow-bellied Sapsucker	1					1
Yellow-billed Cuckoo				1		1
Yellow-breasted Chat		3	2			5
Yellow-shafted Flicker		2	2	1	3	8
Yellow-throated Vireo		1	1			2
Total Individuals	418	1154	1054	413	605	3644
Diversity	53 Species	72 Species	70 species	57 species	58 species	98 Species
Net Effort (hours)	1126	4117	3465	2684	1471	
Banding Dates	25 March - 8 May	31 March - 28 May	10 April - 28 May	2 April - 22 May	15 April - 10 May	
New Birds/100 net hours	37	28	30	15	41	

Education & Outreach at Grand Pass

The Grand Pass CA migration station provided internship opportunities for 13 students between 2010 and 2013. These students all learned the operation of mist-nets for research and monitoring purposes, safe bird handling, and how to conduct education programs with birds in hand. Outside of regular banding station operation, interns learned data compilation and analysis, study design, project management, and a variety of field techniques. *Our thanks to River Bluffs Audubon Society, Burroughs Audubon Society, the Audubon Society of Missouri, and MRBO members for providing funding for internships.*

Each spring at Grand Pass, we hosted a wide variety of visitors from elementary home-schooled students to college classes to adult groups. The largest event each spring was held for 5th grade students of Marshall's Bueker Middle School. In 2010, one class visited the station and each year thereafter, all eight of the school's 5th grade classes came out. The Grand Pass CA station provided a unique experience for the students where they viewed birds in hand, discussed ecology and adaptations in conjunction with their science curriculum, learned to use binoculars, and engaged in Project and Flying WILD activities.



Above: a class from Marshall's Bueker Middle School at the migration station. Below: Students view a Baltimore Oriole in hand. Below left: Students learn to use binoculars.



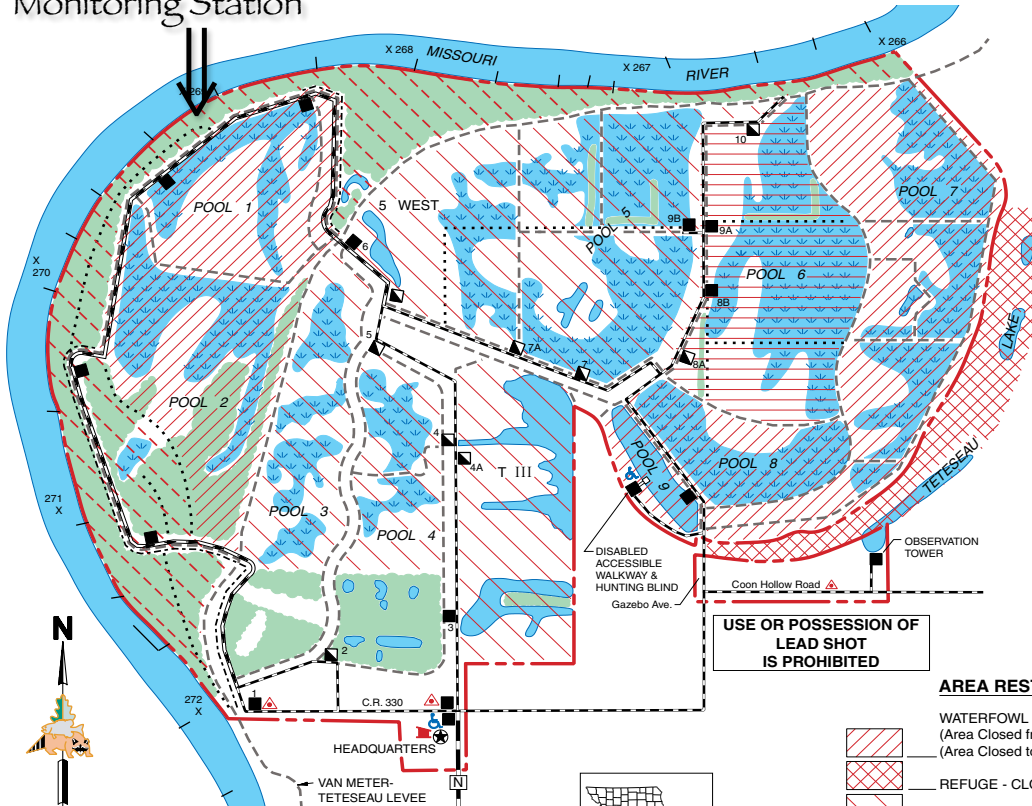
Grand Pass CA Species Checklist

compiled by the Audubon Society of Missouri CACHE Program,
including results from MRBO monitoring 2009-2013

<input type="checkbox"/> Greater White-fronted Goose	<input type="checkbox"/> American Avocet	<input type="checkbox"/> Least Flycatcher	<input type="checkbox"/> Kentucky Warbler
<input type="checkbox"/> Snow Goose	<input type="checkbox"/> Spotted Sandpiper	<input type="checkbox"/> Eastern Phoebe	<input type="checkbox"/> Common Yellowthroat
<input type="checkbox"/> Ross's Goose	<input type="checkbox"/> Solitary Sandpiper	<input type="checkbox"/> Great Crested Flycatcher	<input type="checkbox"/> American Redstart
<input type="checkbox"/> Cackling Goose	<input type="checkbox"/> Greater Yellowlegs	<input type="checkbox"/> Eastern Kingbird	<input type="checkbox"/> Cerulean Warbler
<input type="checkbox"/> Canada Goose	<input type="checkbox"/> Willet	<input type="checkbox"/> Loggerhead Shrike	<input type="checkbox"/> Northern Parula
<input type="checkbox"/> Wood Duck	<input type="checkbox"/> Lesser Yellowlegs	<input type="checkbox"/> White-eyed Vireo	<input type="checkbox"/> Magnolia Warbler
<input type="checkbox"/> Gadwall	<input type="checkbox"/> Hudsonian Godwit	<input type="checkbox"/> Bell's Vireo	<input type="checkbox"/> Blackburnian Warbler
<input type="checkbox"/> American Wigeon	<input type="checkbox"/> Marbled Godwit	<input type="checkbox"/> Yellow-throated Vireo	<input type="checkbox"/> Yellow Warbler
<input type="checkbox"/> American Black Duck	<input type="checkbox"/> Ruddy Turnstone	<input type="checkbox"/> Blue-headed Vireo	<input type="checkbox"/> Chestnut-sided Warbler
<input type="checkbox"/> Mallard	<input type="checkbox"/> Semipalmated Sandpiper	<input type="checkbox"/> Warbling Vireo	<input type="checkbox"/> Blackpoll Warbler
<input type="checkbox"/> Blue-winged Teal	<input type="checkbox"/> Least Sandpiper	<input type="checkbox"/> Red-eyed Vireo	<input type="checkbox"/> Palm Warbler
<input type="checkbox"/> Cinnamon Teal	<input type="checkbox"/> White-rumped Sandpiper	<input type="checkbox"/> Blue Jay	<input type="checkbox"/> Yellow-rumped Warbler
<input type="checkbox"/> Northern Shoveler	<input type="checkbox"/> Baird's Sandpiper	<input type="checkbox"/> American Crow	<input type="checkbox"/> Black-throated Green Warbler
<input type="checkbox"/> Northern Pintail	<input type="checkbox"/> Pectoral Sandpiper	<input type="checkbox"/> Fish Crow	<input type="checkbox"/> Canada Warbler
<input type="checkbox"/> Green-winged Teal	<input type="checkbox"/> Dunlin	<input type="checkbox"/> Horned Lark	<input type="checkbox"/> Wilson's Warbler
<input type="checkbox"/> Canvasback	<input type="checkbox"/> Stilt Sandpiper	<input type="checkbox"/> Purple Martin	<input type="checkbox"/> Yellow-breasted Chat
<input type="checkbox"/> Redhead	<input type="checkbox"/> Short-billed Dowitcher	<input type="checkbox"/> Tree Swallow	<input type="checkbox"/> Eastern Towhee
<input type="checkbox"/> Ring-necked Duck	<input type="checkbox"/> Long-billed Dowitcher	<input type="checkbox"/> Northern Rough-winged Swallow	<input type="checkbox"/> American Tree Sparrow
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<input type="checkbox"/> Lesser Scaup	<input type="checkbox"/> Wilson's Phalarope	<input type="checkbox"/> Cliff Swallow	<input type="checkbox"/> Clay-colored Sparrow
<input type="checkbox"/> Bufflehead	<input type="checkbox"/> Bonaparte's Gull	<input type="checkbox"/> Barn Swallow	<input type="checkbox"/> Field Sparrow
<input type="checkbox"/> Common Goldeneye	<input type="checkbox"/> Ring-billed Gull	<input type="checkbox"/> Black-capped Chickadee	<input type="checkbox"/> Vesper Sparrow
<input type="checkbox"/> Hooded Merganser	<input type="checkbox"/> Herring Gull	<input type="checkbox"/> Tufted Titmouse	<input type="checkbox"/> Lark Sparrow
<input type="checkbox"/> Common Merganser	<input type="checkbox"/> Least Tern	<input type="checkbox"/> White-breasted Nuthatch	<input type="checkbox"/> Savannah Sparrow
<input type="checkbox"/> Ruddy Duck	<input type="checkbox"/> Caspian Tern	<input type="checkbox"/> Brown Creeper	<input type="checkbox"/> Grasshopper Sparrow
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<input type="checkbox"/> Least Bittern	<input type="checkbox"/> Eastern Screech-Owl	<input type="checkbox"/> Eastern Bluebird	<input type="checkbox"/> White-crowned Sparrow
<input type="checkbox"/> Great Blue Heron	<input type="checkbox"/> Great Horned Owl	<input type="checkbox"/> Veery	<input type="checkbox"/> Dark-eyed Junco
<input type="checkbox"/> Great Egret	<input type="checkbox"/> Snowy Owl	<input type="checkbox"/> Gray-cheeked Thrush	<input type="checkbox"/> Summer Tanager
<input type="checkbox"/> Snowy Egret	<input type="checkbox"/> Barred Owl	<input type="checkbox"/> Swainson's Thrush	<input type="checkbox"/> Scarlet Tanager
<input type="checkbox"/> Little Blue Heron	<input type="checkbox"/> Common Nighthawk	<input type="checkbox"/> Hermit Thrush	<input type="checkbox"/> Northern Cardinal
<input type="checkbox"/> Green Heron	<input type="checkbox"/> Eastern Whip-poor-will	<input type="checkbox"/> Wood Thrush	<input type="checkbox"/> Rose-breasted Grosbeak
<input type="checkbox"/> White-faced Ibis	<input type="checkbox"/> Chimney Swift	<input type="checkbox"/> American Robin	<input type="checkbox"/> Blue Grosbeak
<input type="checkbox"/> Turkey Vulture	<input type="checkbox"/> Ruby-throated Hummingbird	<input type="checkbox"/> Gray Catbird	<input type="checkbox"/> Indigo Bunting
<input type="checkbox"/> Bald Eagle	<input type="checkbox"/> Belted Kingfisher	<input type="checkbox"/> Northern Mockingbird	<input type="checkbox"/> Dickcissel
<input type="checkbox"/> Northern Harrier	<input type="checkbox"/> Red-headed Woodpecker	<input type="checkbox"/> Brown Thrasher	<input type="checkbox"/> Bobolink
<input type="checkbox"/> Sharp-shinned Hawk	<input type="checkbox"/> Red-bellied Woodpecker	<input type="checkbox"/> European Starling	<input type="checkbox"/> Red-winged Blackbird
<input type="checkbox"/> Cooper's Hawk	<input type="checkbox"/> Yellow-bellied Sapsucker	<input type="checkbox"/> American Pipit	<input type="checkbox"/> Eastern Meadowlark
<input type="checkbox"/> Red-shouldered Hawk	<input type="checkbox"/> Downy Woodpecker	<input type="checkbox"/> Cedar Waxwing	<input type="checkbox"/> Western Meadowlark
<input type="checkbox"/> Broad-winged Hawk	<input type="checkbox"/> Hairy Woodpecker	<input type="checkbox"/> Ovenbird	<input type="checkbox"/> Yellow-headed Blackbird
<input type="checkbox"/> Red-tailed Hawk	<input type="checkbox"/> Northern Flicker	<input type="checkbox"/> Louisiana Waterthrush	<input type="checkbox"/> Rusty Blackbird
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<input type="checkbox"/> Virginia Rail	<input type="checkbox"/> American Kestrel	<input type="checkbox"/> Golden-winged Warbler	<input type="checkbox"/> Common Grackle
<input type="checkbox"/> Sora	<input type="checkbox"/> Merlin	<input type="checkbox"/> Blue-winged Warbler	<input type="checkbox"/> Great-tailed Grackle
<input type="checkbox"/> Common Gallinule	<input type="checkbox"/> Peregrine Falcon	<input type="checkbox"/> Black-and-white Warbler	<input type="checkbox"/> Brown-headed Cowbird
<input type="checkbox"/> American Coot	<input type="checkbox"/> Olive-sided Flycatcher	<input type="checkbox"/> Prothonotary Warbler	<input type="checkbox"/> Orchard Oriole
<input type="checkbox"/> Sandhill Crane	<input type="checkbox"/> Eastern Wood-Pewee	<input type="checkbox"/> Tennessee Warbler	<input type="checkbox"/> Baltimore Oriole
<input type="checkbox"/> Black-bellied Plover	<input type="checkbox"/> Yellow-bellied Flycatcher	<input type="checkbox"/> Orange-crowned Warbler	<input type="checkbox"/> House Finch
<input type="checkbox"/> American Golden-Plover	<input type="checkbox"/> Acadian Flycatcher	<input type="checkbox"/> Nashville Warbler	<input type="checkbox"/> American Goldfinch
<input type="checkbox"/> Semipalmated Plover	<input type="checkbox"/> Willow Flycatcher	<input type="checkbox"/> Mourning Warbler	<input type="checkbox"/> House Sparrow
<input type="checkbox"/> Killdeer			



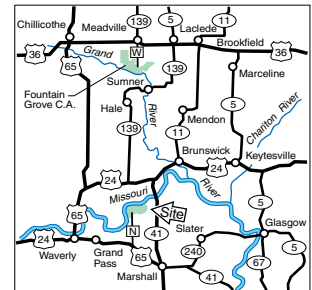
Monitoring Station



LEGEND

- BOUNDARY
- PAVED ROAD
- GRAVEL ROAD
- ONE-WAY ROAD
- AREA ACCESS TRAIL
- LEVEE
- BIKE ACCESS TRAIL
- PARKING LOT
- PARKING WITH BOAT LAUNCH
- ♿ DISABLED ACCESSIBLE
- △ PRIMITIVE CAMPING AREA
- △ PRIVY
- MARSH
- WATER
- TIMBER

VICINITY MAP



USE OR POSSESSION OF
LEAD SHOT
IS PROHIBITED

AREA RESTRICTIONS

- WATERFOWL REFUGE
(Area Closed from Oct. 15 to Jan. 31)
(Area Closed to Hunting from Feb. 1 to Mar. 31)
- REFUGE - CLOSED TO ALL HUNTING
- WATERFOWL HUNTING ZONE
- WATERFOWL REFUGE
(Area Closed from end of North Zone Duck Season to Jan. 31)
(Area Closed to Hunting from Feb. 1 to Mar. 31)
- ARCHERY DEER HUNTING ONLY ZONE
(Oct. 15 to end of North Zone Duck Season)

GRAND PASS CONSERVATION AREA

SALINE COUNTY
5,096 ACRES

SCALE
0 1/4 1/2 1 Mile

Conservation Commission of the State of Missouri © 07/13

Ripper, D. and E. Duke. 2013. Spring migration monitoring of non-game birds at Grand Pass Conservation Area 2009-2013. Missouri River Bird Observatory, Marshall MO.

Our most sincere thanks go to Chris Freeman, Bryan Anderson, Robert Henry, and Gary Gorrell of Grand Pass Conservation Area for their encouragement and support over the past five years.

Funding for the Grand Pass migration monitoring station was provided by:

