BANNER MARSH
INSPECTION OF COMPLETED WORKS
2017

I. PROJECT
Banner Marsh Habitat Rehabilitation and Enhancement Project (HREP)

II. AUTHORITY
Upper Mississippi River Restoration (UMRR) Program

III. LOCATION
LaGrange Pool, Illinois River, Miles 138-144, Fulton and Peoria Counties, Illinois

IV. PREVIOUS REPORTS
Reports listed below are posted at this website:
http://www.mvr.usace.army.mil/Missions/Environmental-Protection-and-Restoration/Upper-Mississippi-River-Restoration/Habitat-Restoration/Rock-Island-District/Banner-Marsh/

U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River System, Environmental Management Program, Definite Project Report (R-11F) with Integrated Environmental Assessment, Banner Marsh Rehabilitation and Enhancement, September 1995.

U.S. Army Corps of Engineers, Rock Island District, Operation and Maintenance Manual, Banner Marsh Habitat Rehabilitation and Enhancement Program, January 2005.

U.S. Army Corps of Engineers, Rock Island District, Pump Operation and Maintenance Manual, Banner Marsh Habitat Rehabilitation and Enhancement Program, 2004.

U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River System, Environmental Management Program, Performance Evaluation Report, Banner Marsh Habitat Rehabilitation and Enhancement, 2002.

U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River System, Environmental Management Program, Performance Evaluation Report, Banner Marsh Habitat Rehabilitation and Enhancement, 2004.

U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River System, Environmental Management Program, Performance Evaluation Report, Banner Marsh Habitat Rehabilitation and Enhancement, 2014.

V. PROJECT GOAL & OBJECTIVES:

The project goals and objectives were outlined in the original Definite Project Report and are summarized in Table 1 below.

Table 1: Project Goals and Objectives

Project Goals and Objectives		
Goals	**Objectives**	**Project Features**
Enhance Wetland, Terrestrial, and Aquatic Habitat	Increase littoral zone for fish and waterfowl	Clear and stabilize levee
	Improve water level control reliability	Pump station rehabilitation
	Increase food and cover for terrestrial birds and mammals	Plant native warm season grasses
	Increase diversity in aquatic habitat	Littoral zone grading
		Water Control Structures

VI. MONITORING PLAN EVALUATION CRITERIA:

Table 2 was copied from the following report: U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River Restoration, Environmental Management Program, Performance Evaluation Report, Banner Marsh Habitat Rehabilitation and Enhancement, 2014.

No changes or discussion of these tables was made during this site assessment.

Table 2 Performance Evaluation and Monitoring Schedule

Goal	Objective	Enhancement Measure	Units	Year 0 Values	Year 50 Target	Feature Measurement
Enhance Wetland Habitat	Increase Littoral Zone for ducks and fish	Water control structures Littoral Zone Grading	Acres of aquatic vegetation	0	350	Perform Aerial Surveys
Enhance Wetland Habitat	Improve flood control reliability	Levee Restoration	Lineal feet of eroded levee	22900	0	Levee system transects, profiles and observations
Enhance Aquatic Habitat	Increase Diversity in Aquatic Habitat	Littoral Zone Grading	Acres of habitat < 18 inches deep	0	106	Hydrograph soundings
Enhance Terrestrial Habitat	Increase food and cover for terrestrial birds and mammals	Native warm season grasses	Acres of grass	0	144	Aerial Photography

VII. SIGNIFICANT EVENTS SINCE LAST INSPECTION

Recent significant high water events are compiled in Table 3 below.

Table 3: Recent Significant Events at the Site

April 2013	Largest flood event on record. Two peaks above flood stage.
July 2015	Significant flood event. Above flood stage for just over 5 weeks.
January 2016	Significant flood event.

VIII. PROJECT SPONSOR UPDATES

There are no project sponsor updates at this time.

IX. DATE OF FIELD VISIT: June 26, 2017, Warm, overcast, mid 70's °F

X. ATTENDEES

Table 4 outlines the list of personnel who visited the site in 2017.

Table 4: 2017 Site Visit Attendees

Name	Office	Title	Number
Kara Mitvalsky	USACE – Rock Island	Environmental Engineer	(309) 794-5623
Steve Gustafson	USACE – Rock Island	Environmental Protection Specialist	(309) 794-5202
Jessica Steslow	USACE – Rock Island	Civil Engineer	(309) 794-5874
Daniel Smith	USACE – Rock Island	Civil Engineer	(309) 794-5361
Nicole Manasco	USACE – Rock Island	Supervisory Hydrologist	(309) 794-5558
Breann Popkin	USACE – Rock Island	Biologist	(309) 794-5817
Scott Schlueter	ILDNR – Canton, IL	Site Superintendent	(309) 647-9184
Arthur Neal	ILDNR – Springfield, IL	Civil Engineer	(217) 782-2605
Lawrence Patterson	ILDNR – Springfield, IL	Federal Programs Coordination Manager	(217) 782-9211

XI. OBSERVATIONS

Pump Station:

The pump station contains two pumps, one is a 24" diameter pump and the other is a 48" diameter pump. The rated capacity of the 24" 100-horsepower pump is 13,600 gallons per minute at a 21 foot total hydraulic head with 885 revolutions per minute. The rated capacity of the 48" 265-horsepower pump is 39,000 gallons per minute at a 15.2 foot total dynamic head with 710 revolutions per minute. The 24" pump operates as designed and automatically pumps to keep the elevation of the marsh between 436 and 437 feet.

The pump station is designed for the 48” pump to be the primary pump and the 24” pump to be the backup pump when the marsh is at high water. However, the system does not operate as designed. The mercury floats and electronics are damaged and malfunctioning on the 48” pump. The pump is working but must be operated manually. The labor cost to operate it manually are prohibitively expensive except in emergency situations. The Illinois Department of Natural Resources (ILDNR) has spoken with a local electrician/pump contractor who stated that the damaged electrical components could be replaced for approximately $20,000, and this would allow the pump to operate as designed. The contractor also stated that the mercury floats could be replaced with a more reliable laser system to determine water surface elevation.

Condensation has been an issue in the pump station in the past and the ILDNR confirmed that it is still in issue, especially during the humid summer months. According to the 2014 PER, the pump station was designed to keep water levels between 429 and 431. The ILDNR is currently operating the pumps to keep water levels in the marsh between 436 and 437. At this elevation there is no extra capacity for water storage, but it is the minimum elevation required to keep the site roads from being submerged. They stated that if they were able to get the 48” pump operating as designed, they would like to lower the marsh water levels by 8-12 inches. There were no concerns with the sump in regards to sediment or debris.

Water Control Structures:
There are two corrugated metal pipe stoplog structures. Each structure consists of a 48” horizontal inlet pipe, a 60” vertical riser pipe with 4” stoplog slots, and a 48” horizontal outlet pipe. The structures allow water levels to be varied within an 8-foot range. The North Water Control Structure is in good condition. However it is difficult to manipulate. The stoplogs are not changed due to limitations with pumping capacity. Images of this water control structure can be viewed in Attachment A. The south water control structure was not accessed during the site visit but the sponsor reported no concerns.

Perimeter Levee:
Repairs were completed within the past few years following flood events. It is believed by ILDNR staff that a beaver attempted to build a lodge when the river was high causing the damage. The compromised area covered approximately 30 feet by 30 feet about 6 feet from the top of the levee, and the hole was about 3 feet deep. Following these repairs the levee is well maintained and in good condition. The work was done by the ILDNR Department’s Heavy Equipment Crew. Some landside areas of the levee are too steep to mow and are burned instead to manage vegetation. The annual burning to keep weeds down was not done in 2017.

Vegetation:
Native and non-native species were noted, including Indian grass, moth mullein, poison hemlock, big blue stem, common milkweed, golden rod, swamp milkweed, water plantain, false indigo bush and some willows. The project measures continue to provide terrestrial habitat, meeting increased food and cover for birds and mammals. The prairie plantings are providing excellent cover for nesting waterfowl. Native grasses and forbs are dominate throughout the prairie planting. ILDNR crew burn the area biannually to prevent woody encroachment.

Invasive prairie species were also noted. Pastinaca sativa, a specific parsnip, which was noted on site, produces sap that can harm skin if exposed to UV light. It is recommended to mow down species before it seeds, using an enclosed mower and ensuring material does not get on the operator. Chemical treatment such as a broadleaf treatment is also a recommended management technique, but this will harm other prairie species. Addressing this concern as soon as possible will reduce future maintenance. The sponsor reports plans to do mechanical control of the parsnip on site.

Phragmites are also very invasive and were located throughout the complex. The IDNR plans to start a 5 years treatment with a 3% Rodeo solution focusing on access areas near the boat ramps and fishing docks. They plan on treating the phragmites in late summer as was recommended to them by other IDNR Fisheries biologists.

Teasel was also present on site, requiring either chemical treatment or burning as a management method. The sponsor reports that efforts to spot mow teasel as it is found on site will be taken.

White and yellow sweetclover was not present in the prairie area but sporadic through the rest of the site. Burning is the recommended management method. This invasive species will also be spot mowed as the sponsor becomes aware of it.

Several of the species listed above can be viewed in Attachment A.

Access Road:
No concerns were noted with the service road.

Additional Comments:
Mute swans have become an issue at the site. They impact wetlands through degradation of submerged aquatic vegetation communities. These invasive swans are a concern because they damage other wildlife and discourage goose nesting. One option to manage nuisance birds is herding dogs.

The ILDNR stated that they have a mating pair of Ospreys that have been nesting on site for approximately the last 10 years. They will start raising Osprey chicks that they are scheduled to receive from Langley, Virginia. The Osprey nest and an image of invasive mute swans can be viewed in Attachment A.

The post construction conditions in 2017 remain useful to waterfowl. The project measures were successful in providing the ability to increase the littoral zone for ducks and fish based on the abundance of aquatic vegetation used by fish for spawning and rearing habitat and by waterfowl during the nesting and migration seasons. Ongoing fisheries and waterfowl migration data is being collected for the site. Both sets of recent data can be viewed in Attachments C and D.

Old mines are also present on and near the site. Several buildings remain from when these facilities were operational. There were several historic documents displayed in one of the buildings with information on past workers at the mines. These documents and buildings are pictured in Attachment A.

XII. SUMMARY

Overall the Banner Marsh HREP appears to be generally meeting its goals and objectives through continued operation and maintenance by the ILDNR.

XIII. RECOMMENDATIONS

- Additional invasive species management in the prairie planting area
- Replace/repair electronics and floats for the 48 inch pump

XIV. LESSONS LEARNED

Maintenance of the Perimeter Levee is difficult due to very steep slopes. It cannot be mowed, and at this height only burning is feasible. Constructing future projects with flatter slopes will improved maintenance and be more convenient for staff.

Water control structures need to be designed with operation and maintenance capabilities of the likely sponsor staff in mind.

Attachment A
2017 Photos

Banner Marsh Site Visit

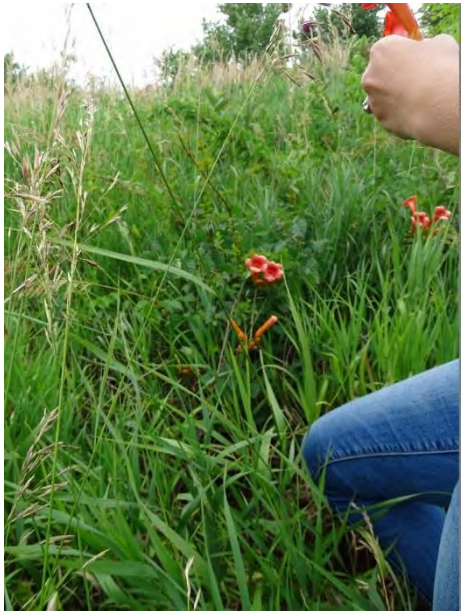
6/26/17 Photos

2017 Site Visit Attendees from USACE and ILDNR

Vegetation

Water Plantain

Thistle



Vine on Levee

Vegetation

Milkweeds are thriving, providing pollinator habitat. The ILDNR has programs in place to counteract invasive species at the site.

Milkweed

Moth mullein

Wildlife

The Illinois River Flyway is one of the most important waterfowl migration routes throughout the United States, with bottomland lakes and marshes providing aquatic food plants and small animals that naturally attract migrating water fowl.

Cliff Swallow Nest

Mute Swans

Wildlife

Osprey nest

The project was designed to improve habitat for waterfowl, fish and furbearers. The project provides sufficient depth for diving ducks. Species such as the bald eagle, great blue heron, river otter, northern pike, walleye, Muskie, largemouth and smallmouth bass benefit from this project. Islands left during littoral zone grading create nesting opportunities for waterfowl.

Pump Station

Interior of Pump Station

Exterior of Pump Station

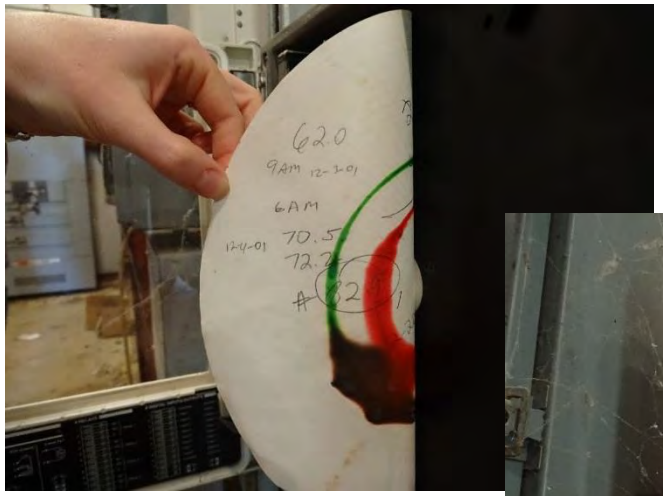
Pump Station

Interior of Pump Station

Food production and availability is optimized because of the improved ability to manipulate water levels. A pump station, connected channels, and various gates and structures allow the ILDNR to manage water levels to mimic the natural historic hydrology of the river, providing reliable water control and feeding and resting areas for migratory waterfowl and other species.

Pump Station

Pump Station



Water Control Structure

Water Control Structure

Water Control Structure

Intake structure for the pump station

Snake skin

Vegetation encroaching on intake structure

Water Control Structure

Pump station intake structure

Old mine buildings

Interior of out-buildings

Exterior of out-buildings

Old mine buildings

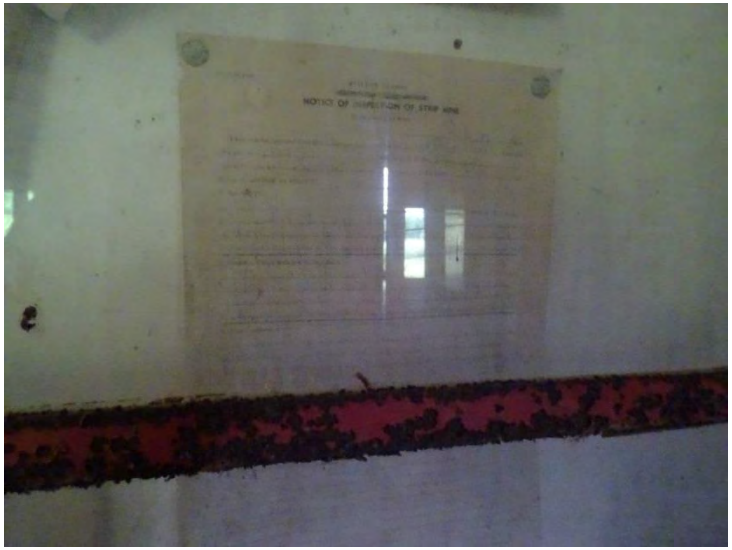
Exterior of out-buildings

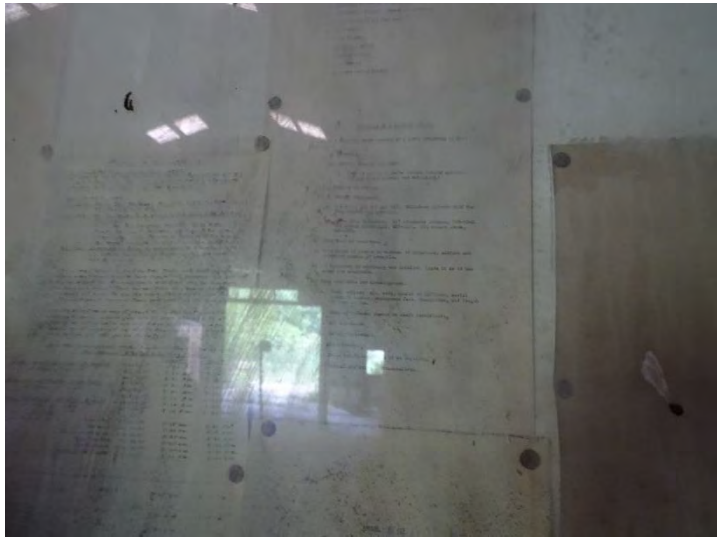
Old mine buildings

Interior of out-buildings

Historic documents

Historic Documents





Within the old mine building is a glass covered board that listed the name and birthdays of every person who had worked on the site.

Equipment

Equipment

Vegetation

Vegetation

Native warm season grasses and prairie species increase food and provide cover for species who utilize the site.

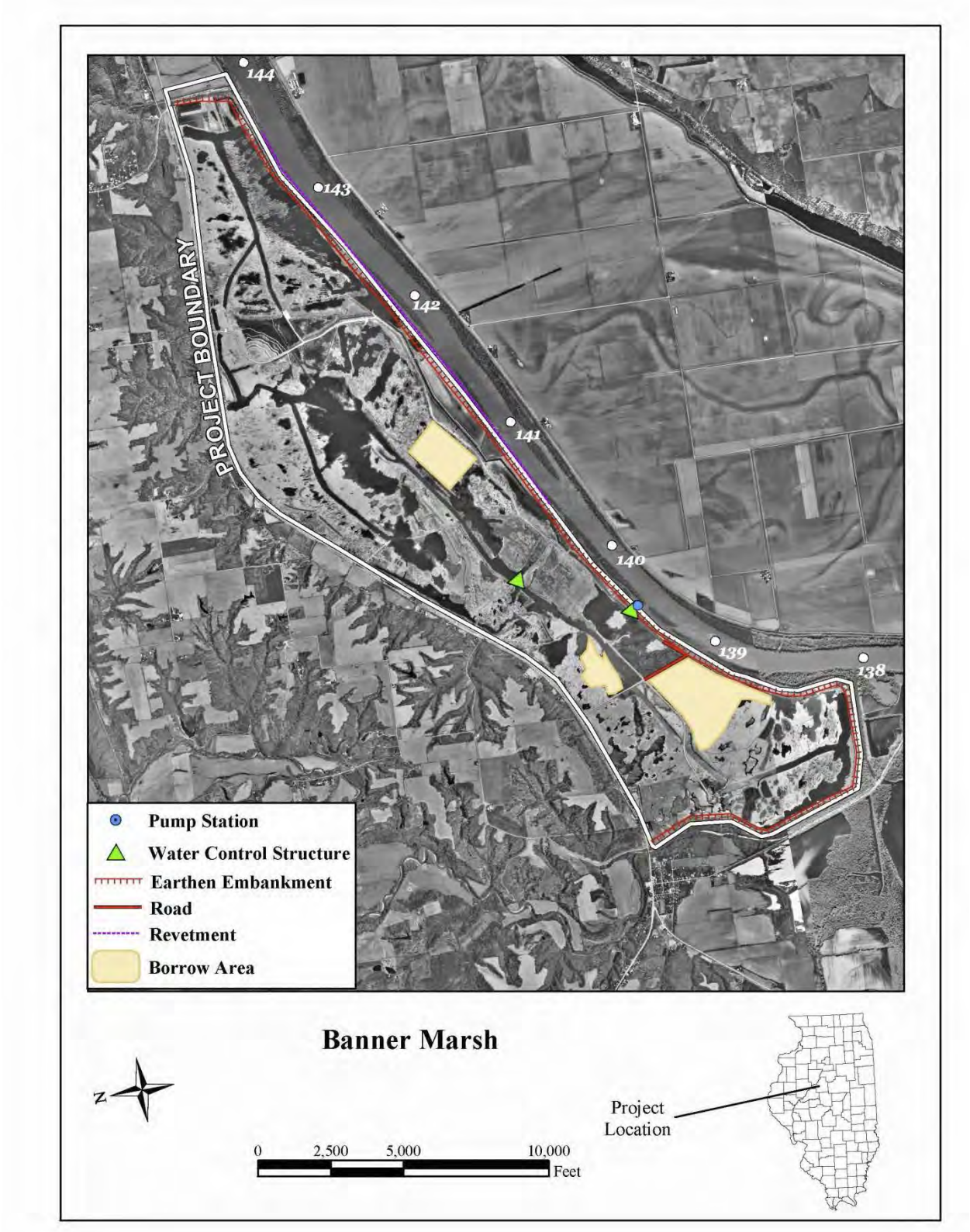
Landscape

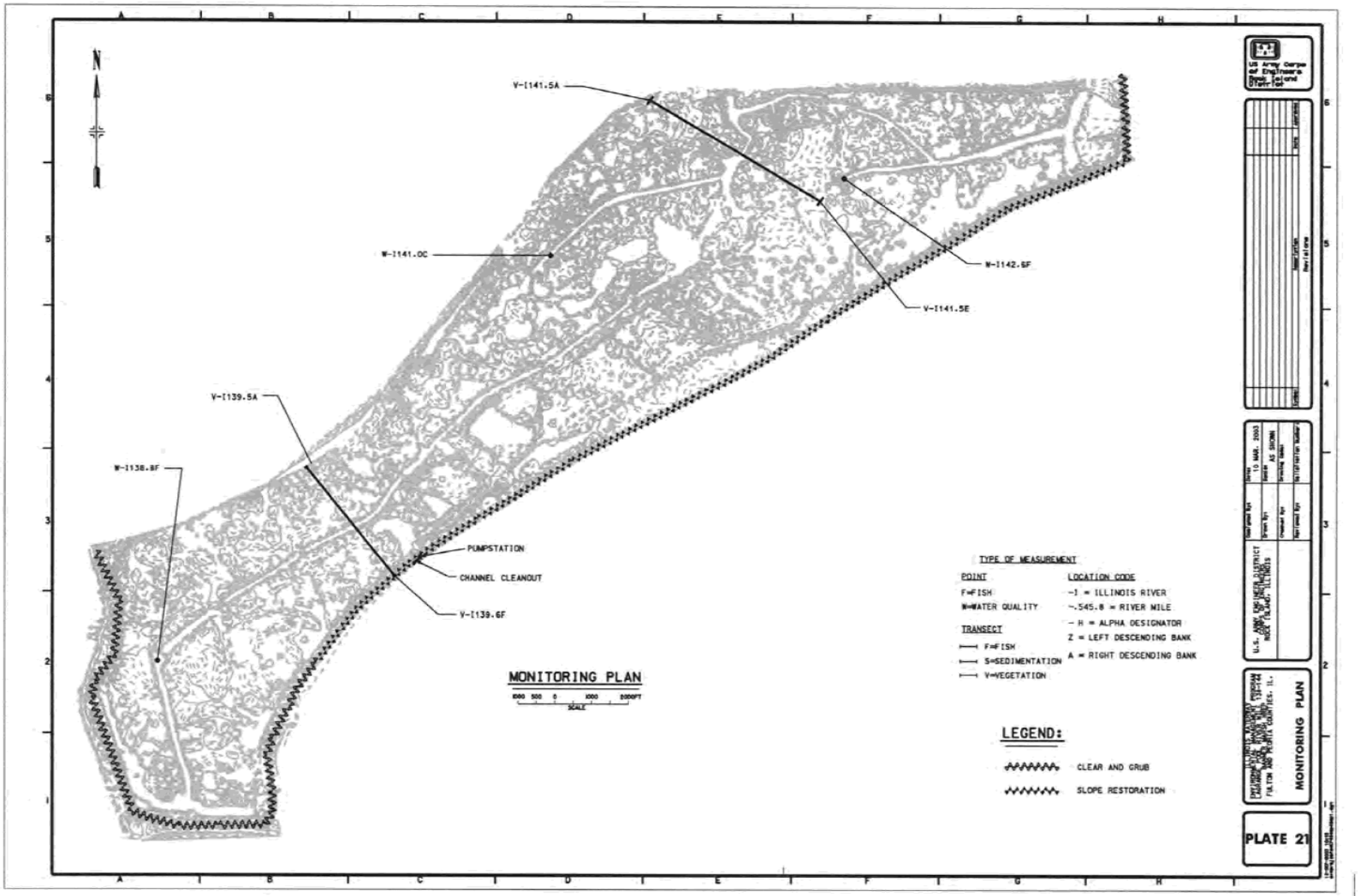
Levee and Channel

Levee

The 9 mile levee surrounding the site continues to provide protection to the interior wetland, terrestrial and aquatic habitat.

Attachment B
Site Plan and Monitoring Plan Plates


144
143
142
141
140
139
138
PROJECT BOUNDARY
Pump Station
Water Control Structure
Earthen Embankment
Road
Revetment
Borrow Area
Banner Marsh
N
0
2,500
5,000
10,000
Feet
Project Location


V-I141.5A
W-I141.0C
W-I142.6F
V-I141.5E
V-I139.5A
W-I138.8F
PUMPSTATION
CHANNEL CLEANOUT
V-I139.6F
MONITORING PLAN
TYPE OF MEASUREMENT
POINT
F=FISH
W=WATER QUALITY
TRANSECT
F=FISH
S=SEDIMENTATION
V=VEGETATION
LOCATION CODE
-I = ILLINOIS RIVER
-545.8 = RIVER MILE
- H = ALPHA DESIGNATOR
Z = LEFT DESCENDING BANK
A = RIGHT DESCENDING BANK
LEGEND:
CLEAR AND GRUB
SLOPE RESTORATION
MONITORING PLAN
PLATE 21

Attachment C
Fisheries Data

Johnson Lake – Banner Marsh

DC Electrofishing 2016
2016S. Johnson Lake Banner Marsh. SPECIES FREQUENCY

BLC 5	LMB 111	MUE 8	WHC 1

Total frequency: 125.

Trapnets 2016
2016T. Johnson Lake Banner Marsh. SPECIES FREQUENCY

BLC 16	BLG 2	BRH 1	CAP 14	CCF 18	FCF 3	LMB 7
MUE 51	NOP 1	RSF 4	WAE 3	WHC 7	YEB 3	

Total frequency: 130.

Largemouth Bass 2016
2016S. Johnson Lake Banner Marsh. LMB STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	20cm,7.9in	23cm,9.1in	30cm,11.8in	36cm,14.2in	41cm,16.1in	46cm,18.1in
2016	97	0.4 (24)	61.9 (60)	34.0 (33)	22.7 (22)	5.2 (5)

Largemouth Bass 2016 2016S. Johnson Lake Banner Marsh. LMB STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	20cm,7.9in	23cm,9.1in	30cm,11.8in	38cm,15.0in	43cm,16.9in	48cm,18.9in
2016	97	0.4 (24)	61.9 (60)	27.8 (27)	12.4 (12)	1.0 (1)

Bluegill 2016
2016 Johnson Lake Banner Marsh. BLG STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	8cm,3.1in	0cm,0.0in	15cm,5.9in	16cm,6.3in	17cm,6.7in	18cm,7.1in
2016	2	- 0	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)

Black Crappie 2016
2016 Johnson Lake Banner Marsh. BLC STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	13cm,5.1in	0cm,0.0in	20cm,7.9in	23cm,9.1in	25cm,9.8in	28cm,11.0in
2016	21	NA NA	90.5 (19)	61.9 (13)	28.6 (6)	28.6 (6)

White Crappie 2016
2016 Johnson Lake Banner Marsh. WHC STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	13cm,5.1in	0cm,0.0in	20cm,7.9in	23cm,9.1in	25cm,9.8in	28cm,11.0in
2016	8	NA NA	100.0 (8)	75.0 (6)	75.0 (6)	62.5 (5)

Walleye 2016
2016 Johnson Lake Banner Marsh. WAE STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	25cm,9.8in	0cm,0.0in	38cm,15.0in	38cm,15.0in	46cm,18.1in	0cm,0.0in
2016	3	NA NA	100.0 (3)	100.0 (3)	100.0 (3)	NA NA

Channel Catfish 2016
2016 Johnson Lake Banner Marsh. CCF STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	28cm,11.0in	0cm,0.0in	41cm,16.1in	46cm,18.1in	0cm,0.0in	0cm,0.0in
2016	18	NA NA	100.0 (18)	94.4 (17)	NA NA	NA NA

Muskie 2016
2016 Johnson Lake Banner Marsh. MUE STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	51cm,20.1in	0cm,0.0in	76cm,29.9in	106cm,41.7in	0cm,0.0in	0cm,0.0in
2016	59	NA NA	83.1 (49)	8.5 (5)	NA NA	NA NA

Shovel Lake – Banner Marsh

Northern Pike 2016
2016 Johnson Lake Banner Marsh. NOP STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	35cm,13.8in	0cm,0.0in	53cm,20.9in	66cm,26.0in	0cm,0.0in	0cm,0.0in
2016	1	NA NA	100.0 (1)	100.0 (1)	NA NA	NA NA

DC Electrofishing 2016
2016S. Shovel Lake Banner Marsh. SPECIES FREQUENCY

BLB 1	BLC 21	LMB 232	MUE 7	RSF 1	WAM 3	YEB 7
YLB 1						

Total frequency: 273.

2016T. Shovel Lake Banner Marsh. SPECIES FREQUENCY

BLC 10	BLG 19	BRH 3	CAP 3	CCF 13	LMB 6	MUE 40
RSF 3	WAM 1					

Total frequency: 98.

2016S. Shovel Lake Banner Marsh. LMB STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	20cm,7.9in	0cm,0.0in	30cm,11.8in	36cm,14.2in	41cm,16.1in	46cm,18.1in
2016	219	NA NA	59.4 (130)	29.2 (64)	12.3 (27)	3.7 (8)

2016S. Shovel Lake Banner Marsh. LMB STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	20cm,7.9in	18cm,7.1in	30cm,11.8in	38cm,15.0in	43cm,16.9in	48cm,18.9in
2016	219	0.1 (10)	59.4 (130)	23.7 (52)	7.8 (17)	1.8 (4)

2016 Shovel Lake Banner Marsh. BLC STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	13cm,5.1in	0cm,0.0in	20cm,7.9in	23cm,9.1in	25cm,9.8in	28cm,11.0in
2016	31	NA NA	93.5 (29)	67.7 (21)	51.6 (16)	32.3 (10)

2016 Shovel Lake Banner Marsh. BLG STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	8cm,3.1in	0cm,0.0in	15cm,5.9in	16cm,6.3in	17cm,6.7in	18cm,7.1in
2016	19	NA NA	52.6 (10)	15.8 (3)	0.0 (0)	0.0 (0)

2016 Shovel Lake Banner Marsh. CCF STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	28cm,11.0in	0cm,0.0in	41cm,16.1in	46cm,18.1in	0cm,0.0in	0cm,0.0in
2016	13	NA NA	100.0 (13)	100.0 (13)	NA NA	NA NA

2016 Shovel Lake Banner Marsh. MUE STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	51cm,20.1in	0cm,0.0in	76cm,29.9in	106cm,41.7in	0cm,0.0in	0cm,0.0in
2016	47	NA NA	85.1 (40)	8.5 (4)	NA NA	NA NA

Wheel Lake – Banner Marsh

DC Electrofishing
2016S. Wheel Lake Banner Marsh. SPECIES FREQUENCY

BGB 1	BLC 5	CCF 4	FCF 3	FRD 2	LMB 227	MUE 1
WAM 3	WHB 8	WHC 11				

Total frequency: 265.

Trapnets 2016
2016T. Wheel Lake Banner Marsh. SPECIES FREQUENCY

BLC 80	BLG 2	CAP 11	CCF 43	FCF 7	GOS 1	GZS 10
LMB 37	MUE 25	WAM 1	WHB 1	WHC 76	YEB 1	

Total frequency: 295.

2016S. Wheel Lake Banner Marsh. LMB STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	20cm,7.9in	18cm,7.1in	30cm,11.8in	36cm,14.2in	41cm,16.1in	46cm,18.1in
2016	207	0.1 (10)	46.4 (96)	18.8 (39)	10.1 (21)	2.9 (6)

2016S. Wheel Lake Banner Marsh. LMB STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	20cm,7.9in	18cm,7.1in	30cm,11.8in	38cm,15.0in	43cm,16.9in	48cm,18.9in
2016	207	0.1 (10)	46.4 (96)	15.0 (31)	5.3 (11)	2.4 (5)

2016 Wheel Lake Banner Marsh. BLC STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	13cm,5.1in	0cm,0.0in	20cm,7.9in	23cm,9.1in	25cm,9.8in	28cm,11.0in
2016	85	NA NA	80.0 (68)	34.1 (29)	18.8 (16)	9.4 (8)

2016 Wheel Lake Banner Marsh. WHC STOCK INDEX TABLE

YEAR	STOCK N	YAR (N)	PSD (N)	RSD1 (N)	RSD2 (N)	RSD3 (N)
	13cm,5.1in	0cm,0.0in	20cm,7.9in	23cm,9.1in	25cm,9.8in	28cm,11.0in

2016	87	NA	NA	98.9	(86)	87.4	(76)	83.9	(73)	60.9	(53)

2016 Wheel Lake Banner Marsh. BLG STOCK INDEX TABLE

YEAR	STOCK	N	YAR	(N)	PSD	(N)	RSD1	(N)	RSD2	(N)	RSD3	(N)
	8cm,3.1in		0cm,0.0in		15cm,5.9in		16cm,6.3in		17cm,6.7in		18cm,7.1in	
2016		2	NA	NA	100.0	(2)	0.0	(0)	0.0	(0)	0.0	(0)

2016 Wheel Lake Banner Marsh. MUE STOCK INDEX TABLE

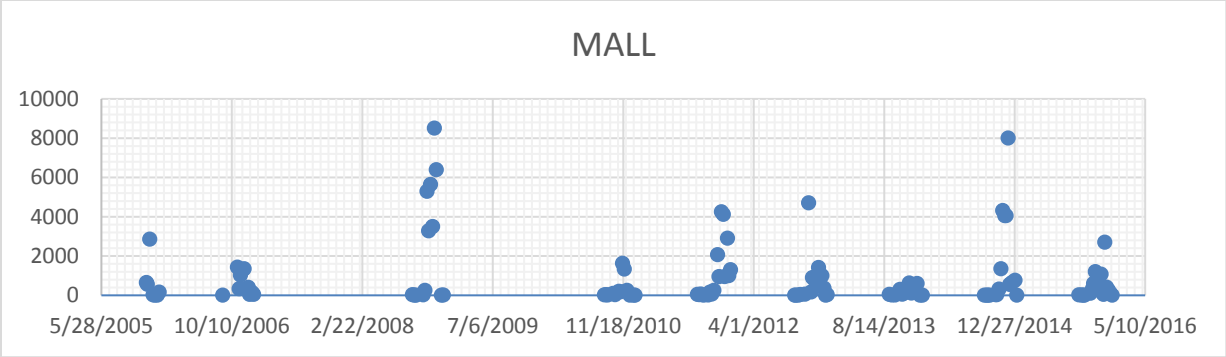
YEAR	STOCK	N	YAR	(N)	PSD	(N)	RSD1	(N)	RSD2	(N)	RSD3	(N)
	51cm,20.1in		0cm,0.0in		76cm,29.9in		106cm,41.7in		0cm,0.0in		0cm,0.0in	
2016		26	NA	NA	65.4	(17)	3.8	(1)	NA	NA	NA	NA

2016 Wheel Lake Banner Marsh. CCF STOCK INDEX TABLE

YEAR	STOCK	N	YAR	(N)	PSD	(N)	RSD1	(N)	RSD2	(N)	RSD3	(N)
	28cm,11.0in		0cm,0.0in		41cm,16.1in		46cm,18.1in		0cm,0.0in		0cm,0.0in	
2016		46	NA	NA	97.8	(45)	97.8	(45)	NA	NA	NA	NA

Attachment D
Waterfowl Migration Survey

	Date	1/5/2016	12/29/2015	12/22/2015	12/15/2015	12/8/2015	12/3/2015	11/24/2015	11/9/2015	11/2/2015
Mallard	MALL	0	105	255	410	2,700	45	1,070	510	1,200
American Black Duck	ABDU	0	0	0	0	0	0	0	0	0
Northern Pintail	NOPI	0	0	0	0	0	0	0	0	600
Blue-winged Teal	BWTE	0	0	0	0	0	0	0	0	0
American Green-winged Teal	AGWT	0	0	0	500	0	1,500	100	0	500
American Wigeon	AMWI	0	0	0	0	0	0	0	5	200
Gadwall	GADW	0	25	565	465	700	605	1,200	510	1,350
Northern Shoveler	NSHO	0	0	0	0	0	0	0	0	100
Lesser Scaup	LESC	0	0	0	0	0	0	0	0	0
Ring-necked Duck	RNDU	0	0	0	0	0	0	0	0	0
Canvasback	CANV	0	0	0	0	0	0	0	0	0
Redhead	REDH	0	0	0	0	0	0	0	0	0
Ruddy Duck	RUDU	0	0	0	0	10	0	0	0	0
Canada Goose	COGO	0	0	0	0	0	0	0	0	0
Bufflehead	BUFF	0	0	0	0	10	0	0	0	0
Common Merganser	COME	0	0	0	0	0	0	0	0	0
Hooded Merganser	HOME	0	5	5	0	0	0	0	0	0
	TOTAL DUCKS	0	135	825	1,375	3,420	2,150	2,370	1,025	3,950
Common Gallinule	CAGO	500	35	250	40	375	245	550	865	270
Greater White-fronted Goose	GWFG	0	0	0	0	0	0	0	0	0
Lesser Snow Goose	LSGO	0	0	0	0	0	0	0	0	0
American White Pelican	AWPE	0	0	0	0	0	0	0	50	225
American Coot	AMCO	0	330	100	200	160	805	105	5	350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8000
6000
4000
2000
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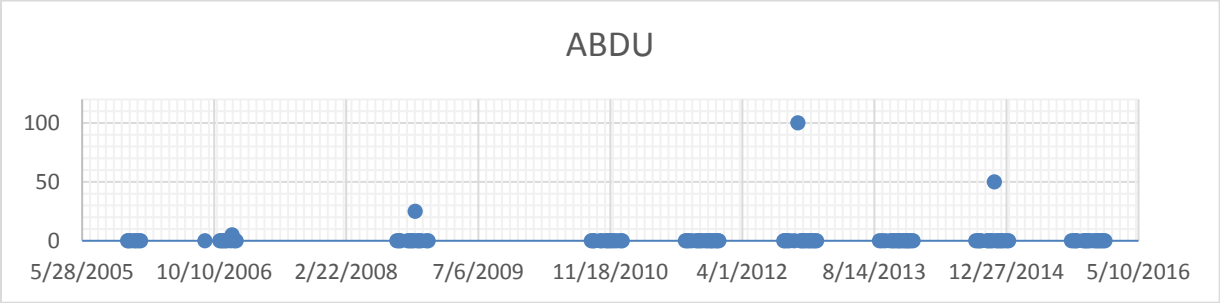
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016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2/22/2008
7/6/2009
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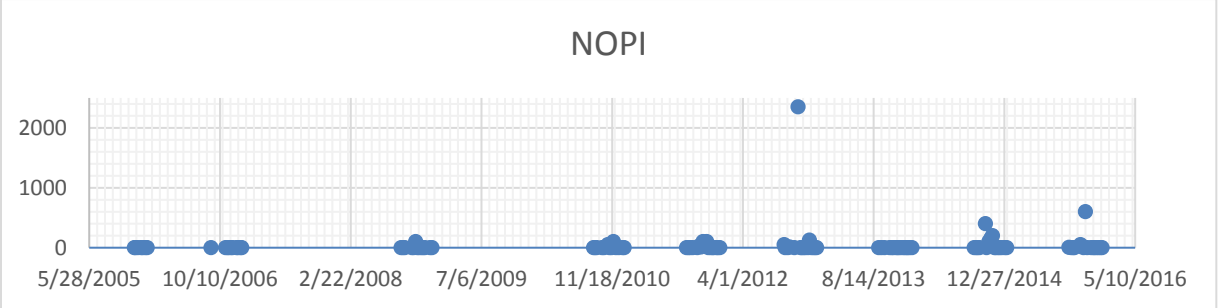
12/27/2014
5/10/2016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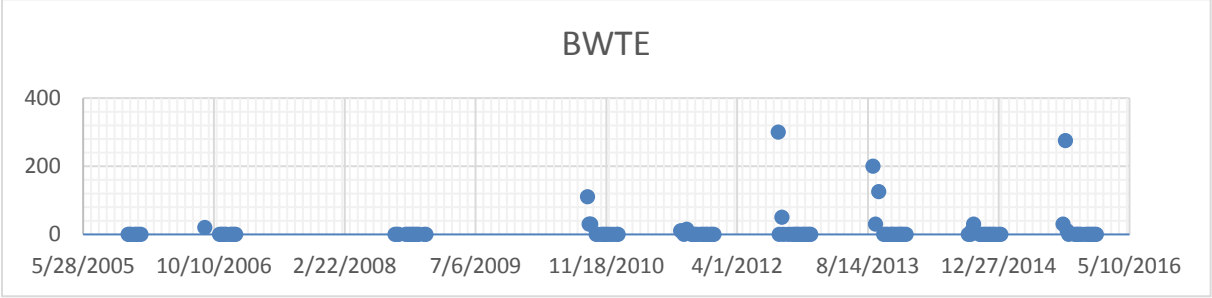
8/14/2013
12/27/2014
5/10/2016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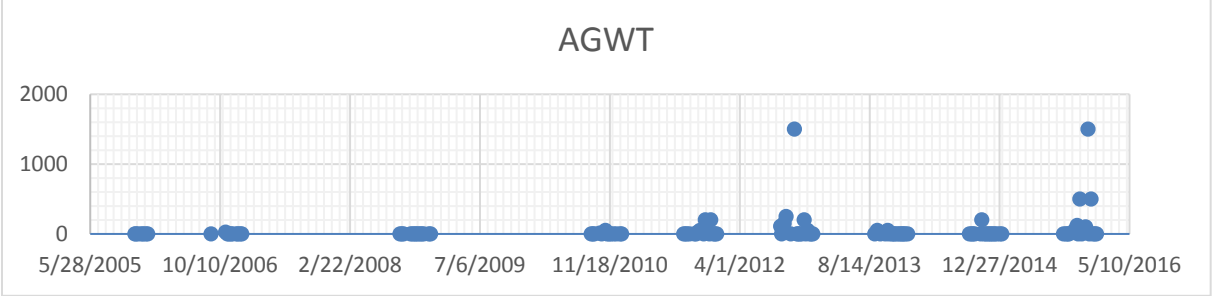
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016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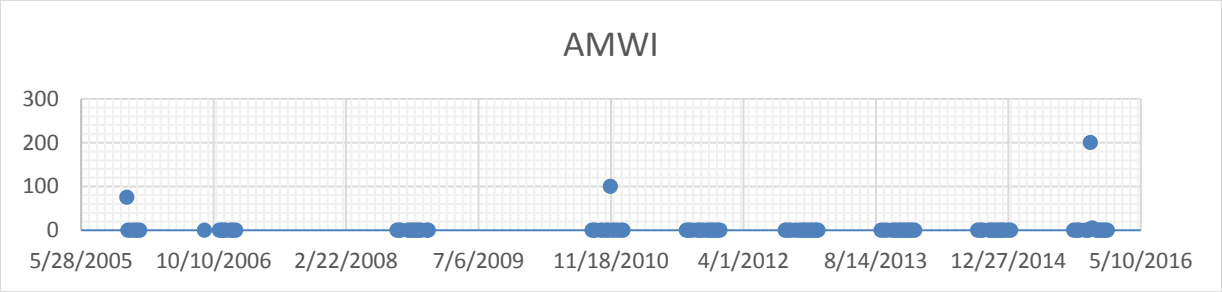
12/27/2014
5/10/2016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200
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2/22/2008
7/6/2009
11/18/2010
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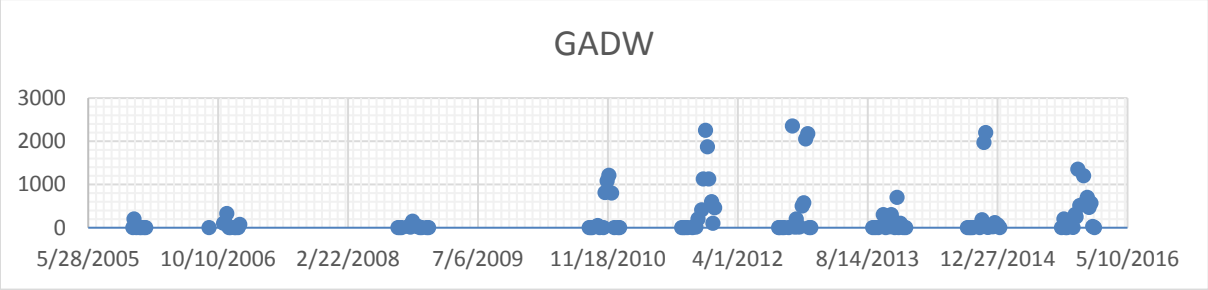
12/27/2014
5/10/2016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2000
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2/22/2008
7/6/2009
11/18/2010
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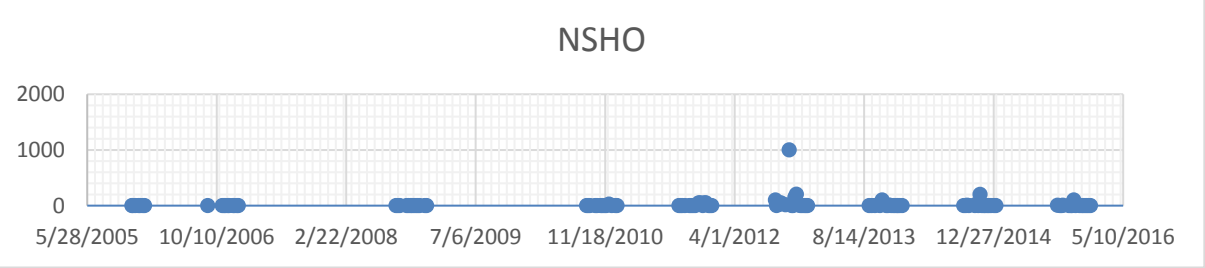
12/27/2014
5/10/2016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7/6/2009
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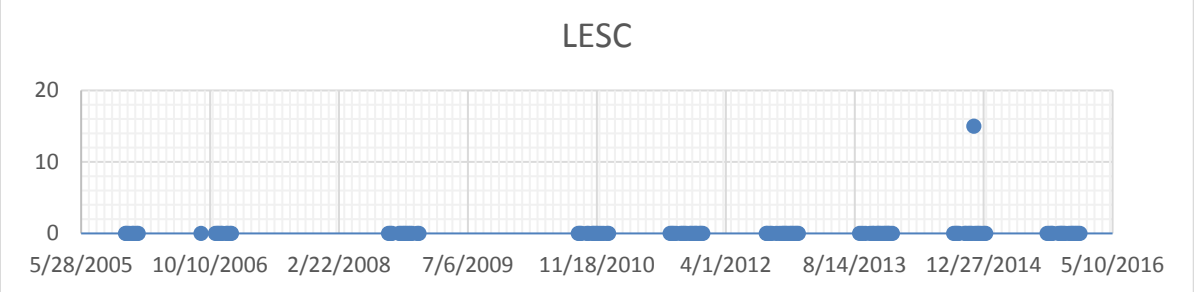
12/27/2014
5/10/2016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2/22/2008
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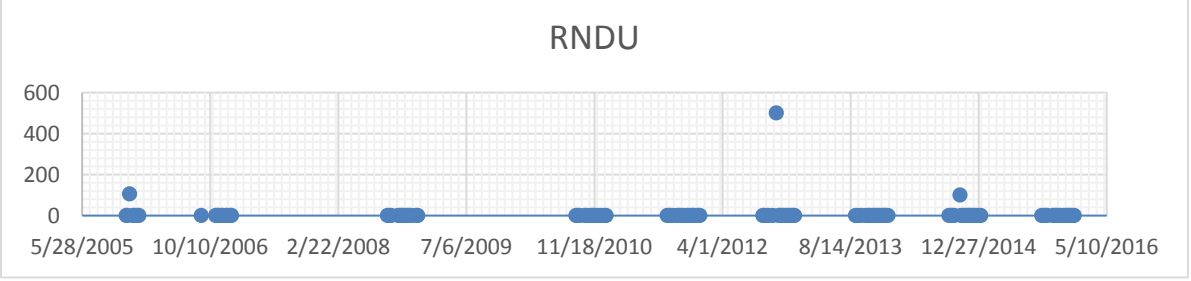
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016


RNDU
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400
200
0
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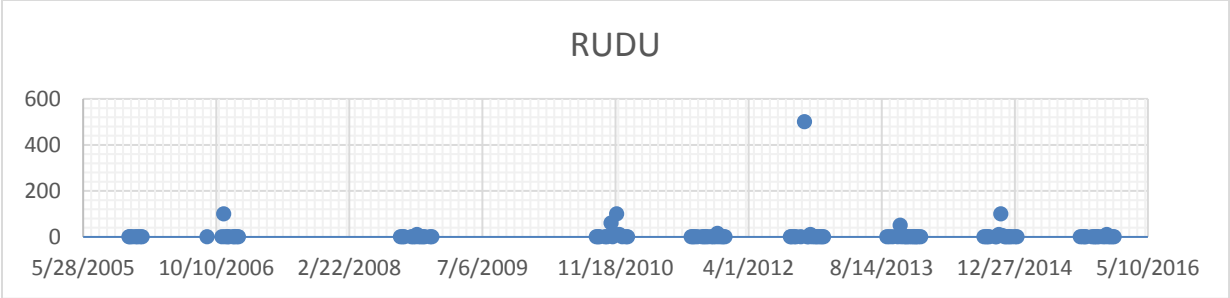
10/10/2006
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016


RUDU
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400
200
0
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2/22/2008
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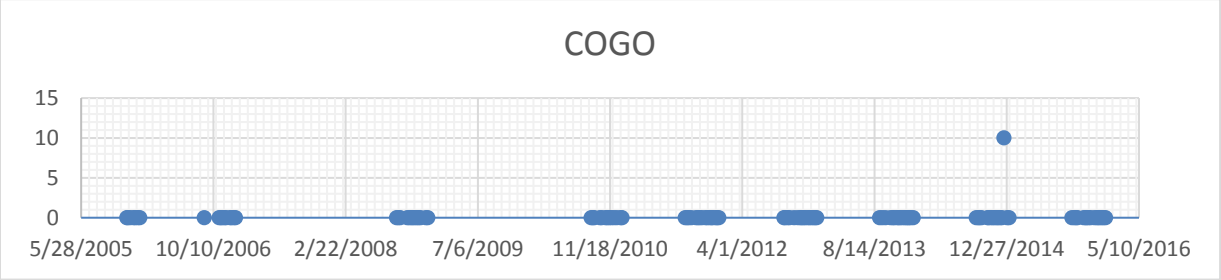
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016


COGO
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10
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0
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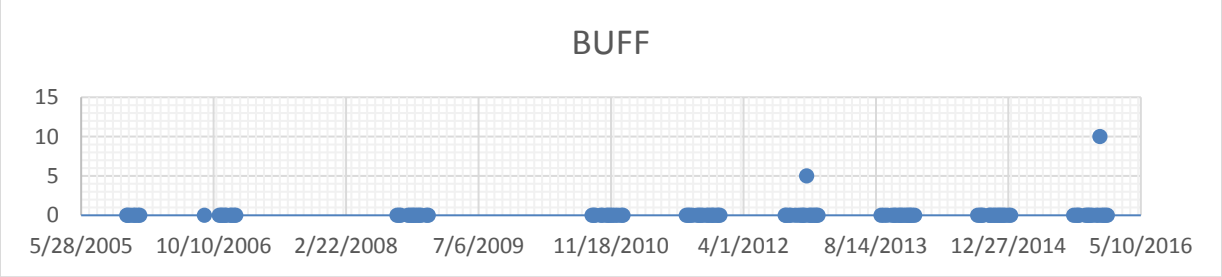
BUFF
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2/22/2008
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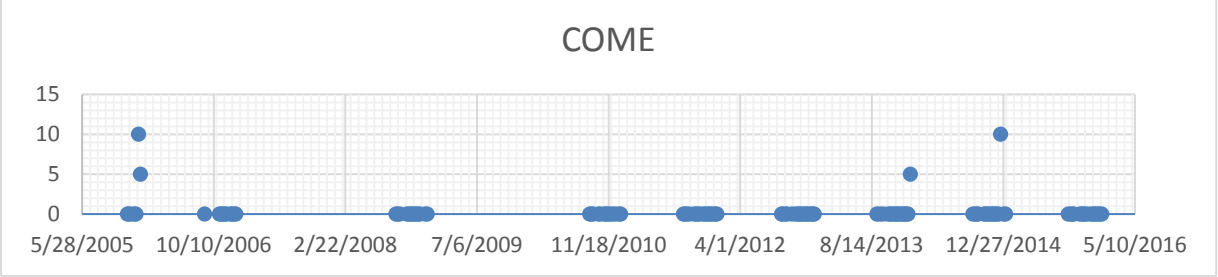
COME
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10
5
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11/18/2010
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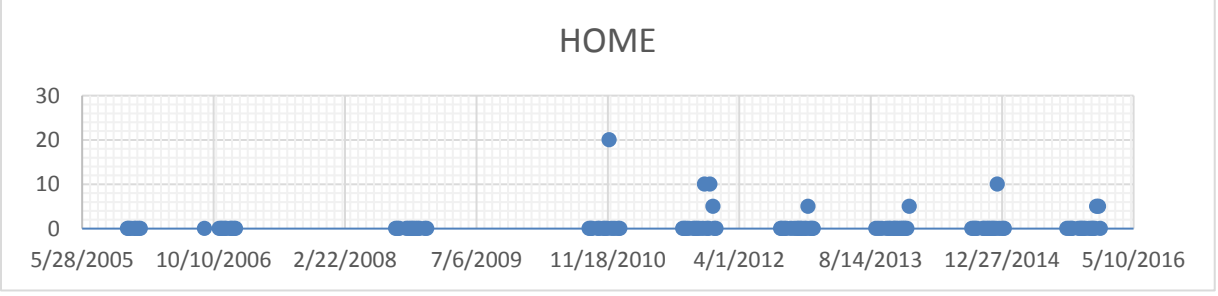
5/10/2016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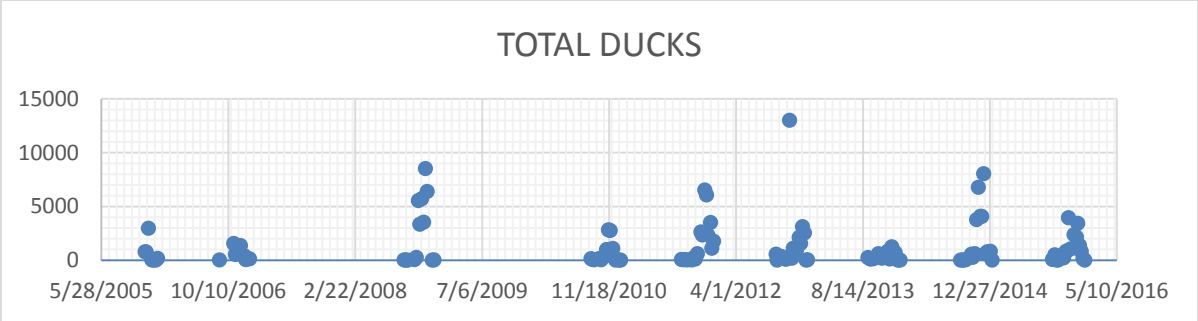
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016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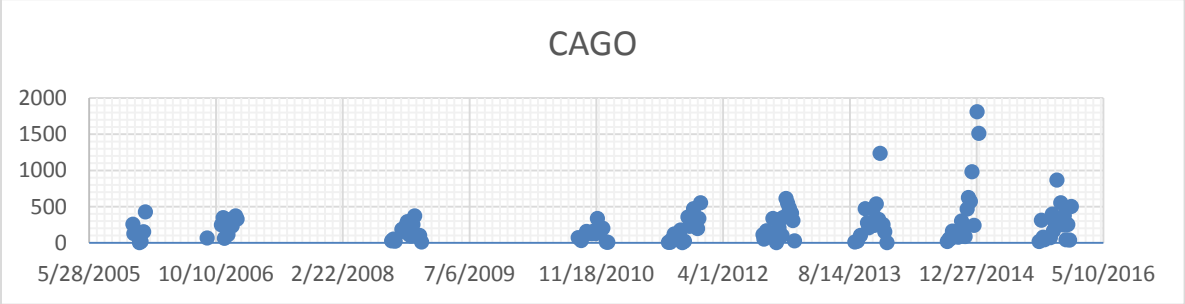
10/10/2006
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016


CAGO
2000
1500
1000
500
0
5/28/2005
10/10/2006
2/22/2008
7/6/2009
11/18/2010
4/1/2012
8/14/2013
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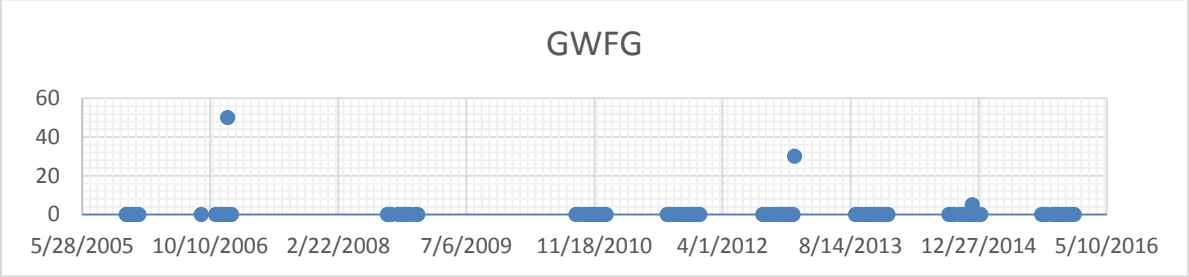
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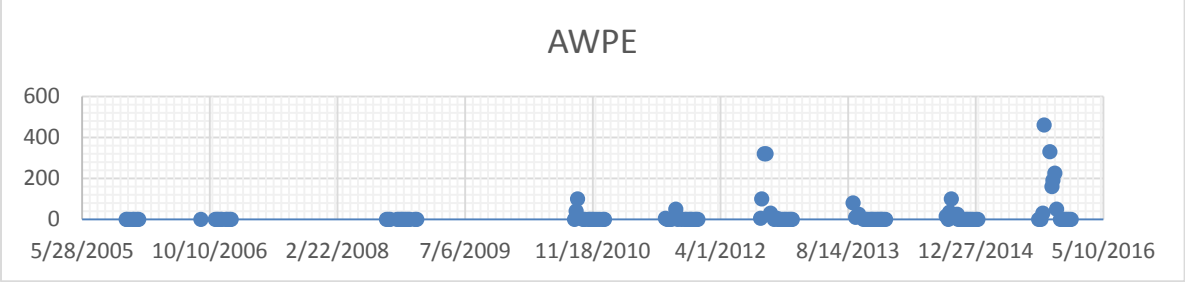
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400
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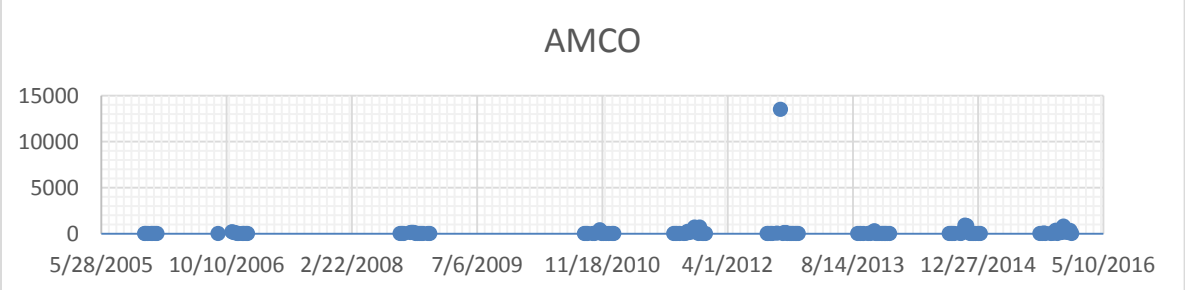
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