Summary D

Fish Population Studies 2011

Jim Jenniges
Environmental Specialist Nebraska Public Power District

Mark Peyton
Senior Biologist The Central Nebraska Public Power and Irrigation District

Introduction

On January 25, 1999 Nebraska Public Power District and Central Nebraska Public Power and Irrigation District (Districts) filed with the Federal Energy Regulatory Commission a plan to monitor baseline conditions for least terns, piping plovers, fish, vegetation, channel configuration changes and whooping crane use of habitat areas. Monitoring of fish was included in the Monitoring Plan with the following goals and objectives. This protocol has been slightly modified and utilized as the Platte River Recovery Program fish monitoring protocol up to now.

Goal: Assess fish populations and species diversity in the area of properties acquired by the Districts.

Objectives:
Monitor the abundance of fish and evaluate fish species diversity on or near areas owned/or managed by the Districts.

Compare the abundance and species diversity in an area of the river that went dry to areas that have continuously had water.

Study Areas

In 1999 four study sites were established based on their relationship to areas managed as least tern nesting habitat.

The Lexington sampling site is immediately upstream of Nebraska Public Power Districts (NPPD) Lexington Island and less than 400 meters from NPPD's Lexington Sandpit both of which are managed as least tern nesting areas. The Lexington sampling site is 1.6 km upstream of Central Nebraska Public Power Districts (Central) Jeffrey Island habitat area. This site is approximately 1.6 km downstream of the U. S. Highway 283 River Bridge.

The Overton sampling site in 1999, 2003 and 2010 was upstream of NPPD's Overton Island. This island is managed as a least tern nesting area. This site is on the downstream end of Central's Jeffry Island habitat area and 2.3 km upstream of the Overton River Bridge. In 1999 all channels were sampled otherwise only the south (J-2 Return) channel was sampled.

In 2005 the sample site was moved upstream 1.6 km due to landownership changes in this section of river.

The Elm Creek sampling site is 1 km downstream of the U. S. Highway 183 River Bridge. This site is adjacent to NPPD's Elm Creek Island and Bluehole Sandpit. Both of these areas are managed as least tern nesting areas. This site is also within 1.6 km of Johnson's Sandpit a least tern nesting area managed by NPPD.

The Cottonwood Ranch sampling site is on NPPD's Cottonwood Ranch Property 8 km upstream of the U. S. Highway 183 River Bridge. When study sites were picked the management plans for this property were being developed that would include construction of least tern nesting habitat as required under the FERC License for Project 1835, Article 407. Since fish monitoring begin prior to construction of tern habitat the study area was established on the western edge of the property in the area sampled in the past by the Districts (Chadwick 1993).

Methods

Each study area is a 200 m reach of river (600 foot reach was sampled in 1999, 2003 and 2005) within the banks of the main river channel. The 200 m reach of river was established by measuring along each bank with a laser range finder or pacing the distance. Only open channel habitat was sampled in 2011. Open channel was defined as the flowing portion of the active channel area greater than 23 m.

From 1999 – 2005 open channel area was determined by taking three channel width measurements equally spaced in the 600 foot reach. From 2007 on channel width was measured at 6 equally spaced transects. Each one of these measurements consisted of walking a straight line perpendicular to the flows and measuring the width of water on each sub-channel with a laser range finder. A mean water width was calculated based on these measurements and multiplied by the length to get total open channel area. Open channel area was determined in 2011 by measuring wetted channel width off of aerial photography flown in June. High flows of 2011 meant the entire channel was inundated at both the time of photography and fish sampling, and made it impossible to wade across the entire channel to measure width.

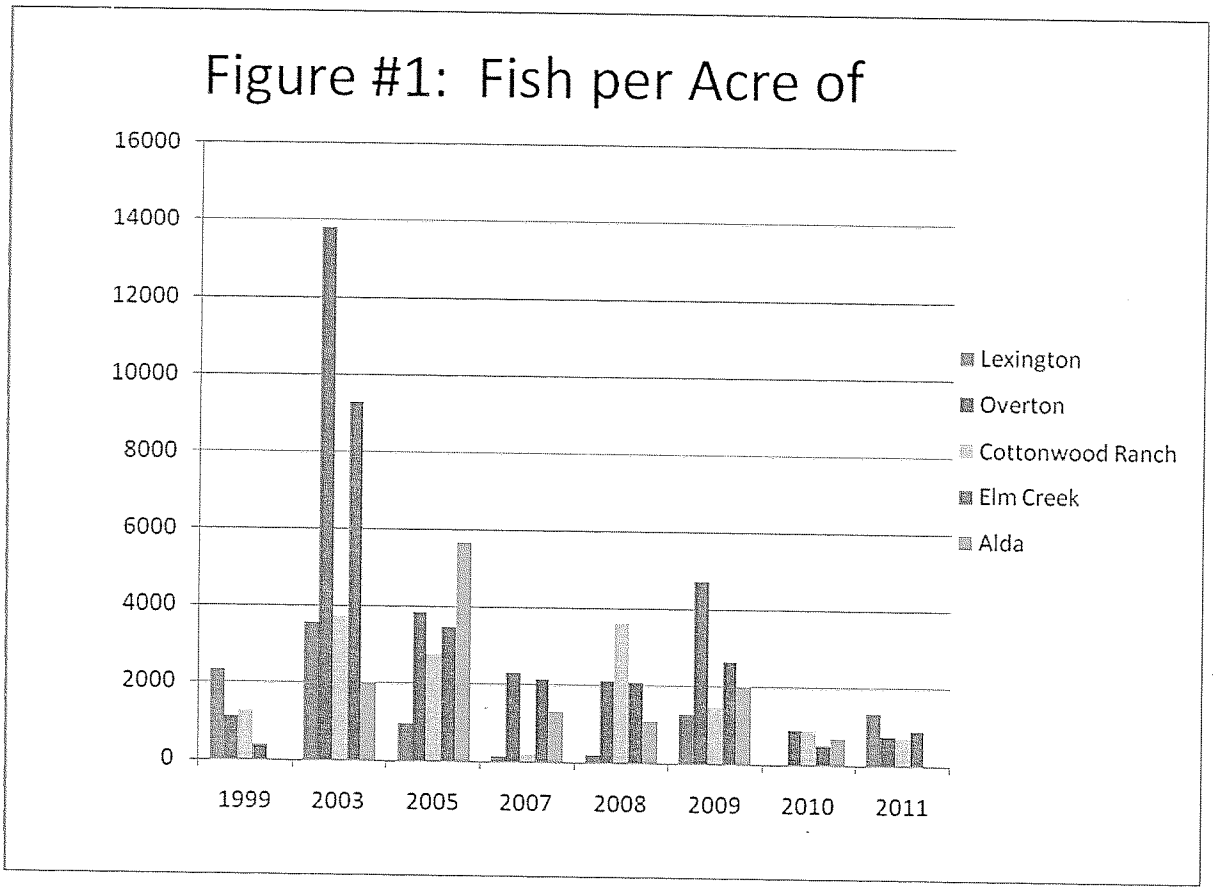
Fish Abundance Sampling

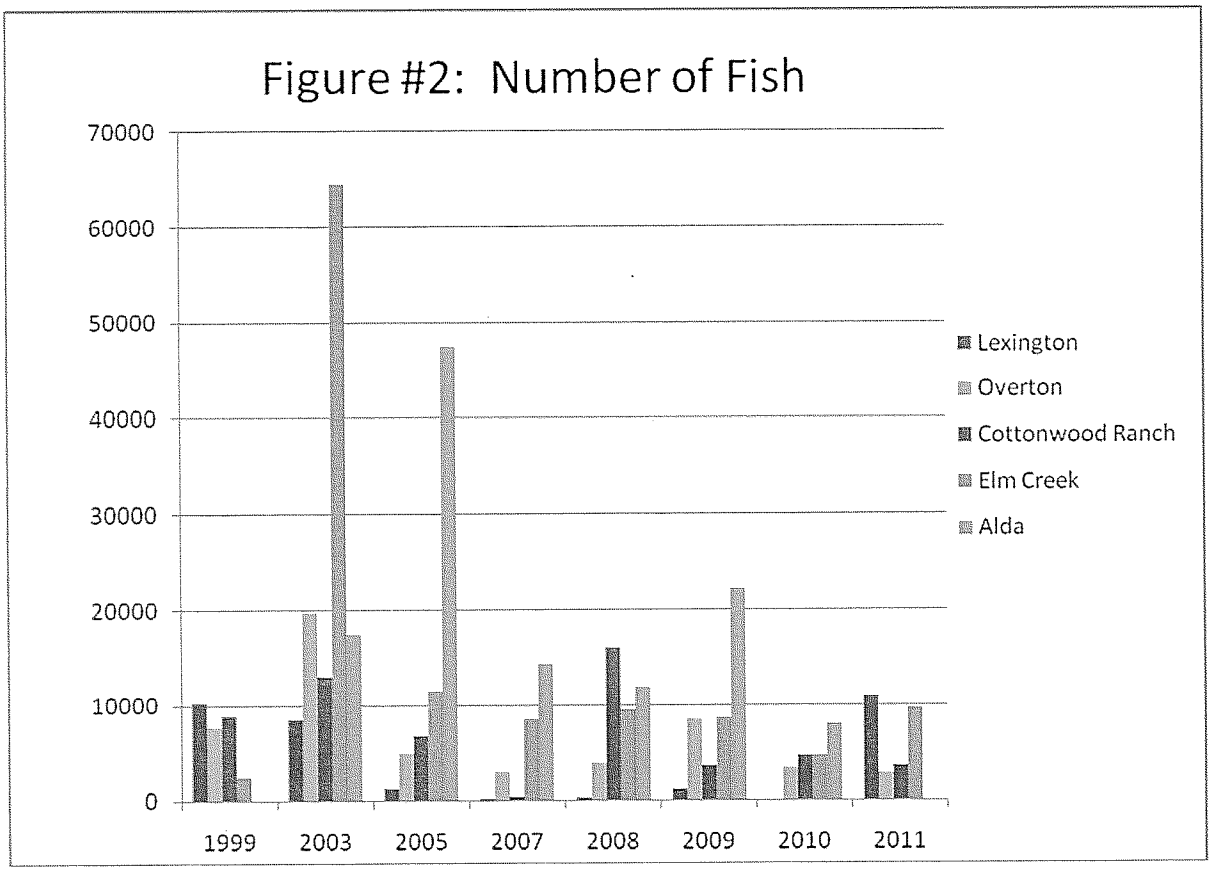
In all years past a block seining technique was used to sample open water however, the high water of 2011 made block seining impracticable so fish abundance was estimated by utilizing a mini-trawl methodology developed to sample least tern forage fishes on the Missouri River. A trawl that has an opening 3 meters wide by 1 meter tall is pulled for a length of 50 meters sampling 150 square meters. This allows for a density estimate which can be compared to the block seine method (112.5 square meters area sampled) utilized in other years. Five trawls were taken at each site for a total area sampled of 750 square meters verses the typical 6 seines or 675 square meters.

Results

Fish sampling was completed at Lexington on August 4 and the Elm Creek, Overton and Cottonwood Ranch sites on August 5, 2011.

Fish abundance may be examined in two manners one is density of fish in the open water areas where terns forage. This density estimate however, does not estimate the total number of fish within a given reach of river due to varying amounts of open water that is dependent on channel width. Therefore we have calculated both fish per acre of open water (Figure 1) and number of fish within the open water area of each study site (Figure 2). In 2011 the highest fish densities and fish per site occurred at Lexington.





A total of 35 fish species have been identified in this study. In 1999, 2003, 2005, 2007, 2008 there were twenty-six, twenty-six , twenty-four, twenty-two and twenty-seven species of fish captured respectively. In 2009 and 2010 there were twenty-three species collected. In 2011 14 species were identified. However, it needs to be noted that the only habitat sampled was open water and that often the more rare species come from sampling banks, snags and backwaters.

In years 1999 – 2009 six species (red shiners, sand shiners, bigmouth shiners, brassy minnow, plains killifish and mosquito fish) and the unidentified group of young of the year in made up 68 to over 90% of all fish caught. However, the proportion that each species contributed in any given year varied greatly, Figure 3 compares 2011 numbers to previous years. In 2011 sand shiners made up 60% of all fish caught (Table 1).

Table 1. Fish were collected at Overton, Lexington, Cottonwood Ranch Property, Elm Creek on August 4, 5, 2011.

		Total Catch	Proportion of Catch
Red Shiner	*Cyprinella lutrenis*	10	0.01
Sand Shiner	*Notropis stramineus*	439	0.60
Bigmouth Shiner	*Notropis dorsalis*	150	0.20
Emerald Shiner	*Notropis atherinoides*	0	0.00
Suckermouth Minnow	*Phenacobius mirabilis*	0	0.00
Brassy Minnow	*Hybognathus hankinsoni*	17	0.02
Plains Minnow *	*Hybognathus placitus*	3	0.00
Western Silvery Minnow *	*Hybognathus nuchalis*	0	0.00
River Carpsucker/Quillback	*Carpoides sp.*	6	0.01
Misquitofish	*Gambusia affinis*	0	0.00
Creek Chub	*Semotilus atromaculatus*	45	0.06
Largemouth Bass	*Micropterus salmoides*	11	0.01
Carp	*Cyprinus carpio*	4	0.01
White Sucker	*Catostomus commersoni*	23	0.03
Green Sunfish	*Lepomis cyanellus*	0	0.00
Bluegill	*Lepomis macrochirus*	0	0.00
Oreange Spotted Sunfish	*Lepomis humilis*	0	0.00
Central Stoneroller	*Campostoma anomaium*	0	0.00
Plains Killifish	*Fundulus zebrinus*	1	0.00
Fathead Minnow	*Pimephales promelas*	19	0.03
Yellow Bullhead	*Ameiurus natalis*	0	0.00
Black Bullhead	*Ameriurus melas*	1	0.00
Gizzard Shad	*Dorosoma cepedianum*	0	0.00
Channel Catfish	*Ictalurus punctatus*	2	0.00
Black Crappie	*Pomoxis nigromaculatus*	0	0.00
White Crappie	*Pomoxis annularis*	0	0.00
Brook Silverside	*Labidesthes sicculus*	0	0.00
Brook Sticklebacks	*Culaea inconstans*	0	0.00
Longnose Dace	*Rhinichthys cataractae*	3	0.00

Walleye	*Stizostedion vitreum*	0	0.00
Madtom **	*Noturus gyrinus*	0	0.00
Shorthead Redhorse	*Moxostoma macrolepidotum*	0	0.00
White Bass	*Morone chrysops*	0	0.00
Long nose Gar	*Lepisosteus osseus*	0	0.00
Drum	*Aplodiotus grunniens*	0	0.00
River Shiner	*Notropis blennius*	0	0.00
Bigmouth Buffalo	*Ictiobus cyprinellus*	1	0.00
Young of Year	*Unidentified*	0	0.00
	Total Fish Sampled	**735**	1.00

* Species combined under plains minnow count

Discussion

When comparing 2011 data to previous years, the fact that Alda was not sampled in 2011 needs to be taken into account. Also it needs to be noted that only open water habitat was sampled and the technique used was different employing a trawl method instead of block seines.

Notable findings are that the Lexington site which has had significantly fewer fish than all other study sites in 2008 and 2009 had the highest fish densities and number of fish per site. Channels at the Lexington site had become entrenched and all shallow water areas had been invaded by phragmites. The higher flows of 2011 inundated areas not normally inundated and the phragmites provide areas of reduced velocity. It would appear the fish were able to exploit these habitat conditions. Overall fish densities were pretty low, as is common in years with high water throughout the summer.

The objective of this study is to look at fish abundance and species composition. Fish abundance was low much like in 2010. Low fish abundance is likely due to higher flow levels not providing the depth and velocity areas selected for by the smaller fishes (i.e. sand shiners and red shiners) common in the central Platte River. Species composition was dominated by sand shiners which is the norm in the central Platte River.

Literature Cited

Chadwick &Associate, Inc. 1992. Forage fish monitoring study central Platte River, Nebraska, 1992. Prepared for Nebraska Public Power District and The Central Nebraska Public Power and Irrigation District. June 1993. Pp.64.

Appendix A
Fish Species and Abbreviations

RS	Red Shiner	*Cyprinella lutrensis*
SS	Sand Shiner	*Notropis stramineus*
BMS	Bigmouth Shiner	*Notropis dorsalis*
RVS	River Shiner	*Notropis blennius*
ES	Emerald Shiner	*Notropis armeneus*
STS	Spottail Shiner	*Notropis hudsonius*
BRM	Brassy Minnow	*Hybognathus hankinsoni*
WSM	Western Silvery Minnow	*Hybognathus argyrits*
CS	Central Silver Minnow	Hybognathus nuchalis
PM	Plains Minnow	*Hybognathus placitus*
RH	Shorthead Redhorse	*Moxostoma macrolepidotum*
RCS/QB	River Carpsucker/Quillback	*Carpoides carpio/Carpoides cyprinus*
MF	Mosquitofish	*Gambusia affinis*
CC	Creek Chub	*Semotilus atromaculatus*
LMB	Largemouth Bass	*Micropterus salmoides*
CARP	Carp	*Cyprinus carpio*
SMM	Suckermouth Minnow	*Phenacobius mirabilis*
WS	White Sucker	Catostomus commersoni
GSF	Green Sunfish	*Lepomis cyanellus*
BG	Bluegill	*Lepomis macrochirus*
OSS	Orangespotted Sunfish	*Lepomis humilis*
REAR	Redear	*Lepomis microlophus*
LNG	Longnose Gar	*Lepisosteus osseus*
BC	Black Crappie	*Proximus nigromaculatus*
PKF	Plains Killifish	*Fundulus zebrinus*
GS	Gizzard Shad	*Dorosoma cepedianum*
FHM	Fathead Minnow	*Pimephales promelas*
BSS	Brook Silverside	*Labidesthes sicculus*
BST	Brook Stickleback	*Culaea inconstans*
CCAT	Channel Catfish	*Ictalurus punctatus*
FHCH	Flathead Chub	*Hybopsis gracilis*
SR	Central Stoneroller	*Campostoma anomalum*
BLBH	Black Bullhead	*Ictalurus melas*
YEBH	Yellow Bullhead	*Ictalurus natalis*
ID	Iowa Darter	*Etheostoma exile*
LD	Longnose Dace	*Rhinichthys cataractae*
WALL	Walleye	*Stizostedion vitreum*
WB	Whitebass	*Morone chrysops*
MADT	Madtom	*Noturus gyrinus*
BMB	Bigmouth Buffalo	*Ictiobus cyprinellus*