

**Programmatic Environmental Impact Statement  
Technical Appendix**

**GIS and Land Appendix**

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## GIS & Land Appendix

Geographical Information System (GIS) is the technology that manages, analyzes and disseminates geographic information.

### Development of the GIS Database

The U.S. Bureau of Reclamation's (Reclamation) Remote Sensing and Geographic Information group (RSGIG) was contracted to develop a land cover/use (LCLU) database that would serve as a baseline for future analyses by the Platt River EIS office. Prior to the development of the baseline staff with the RSGIG evaluated the potential of two other land cover/use database to serve as a baseline: 1) 1982 Western Energy and Land Use Team (WELUT) prepared a coverage for the Platte River Whooping Crane Maintenance Trust, and 2) 1995 University of Nebraska at Lincoln (UNL) prepared a coverage commonly referred to as the CALMIT database. After further review it was determined that neither database could serve as a baseline because thematic accuracy could not be verified for the CALMIT database and data prepared by WELUT were not statistically verified.

On August 19, 21, and 24, 1998 (1998 CIR) color infrared aerial photography was acquired by Horizons, Incorporated using a river-centered flight line, flown west to east, to capture the entire seven mile-wide Platte River Corridor between Lexington to Chapman, Nebraska. Photos were taken at 1:24,000 scale (1" = 2000') and printed as 9 x 9-inch contact glass positive prints. Overlap for these photos was approximately 50 – 60%. Platte River Flows at the time of aerial over-flight were recorded between 446 cfs at Overton, Nebraska gauge and 1,030 cfs at the Grand Island, Nebraska gauge. Figure 1 identifies the GIS project study area which extends approximately 90 miles from Lexington, Nebraska (bridge segment 13) downstream to Chapman, Nebraska (bridge segment 1).

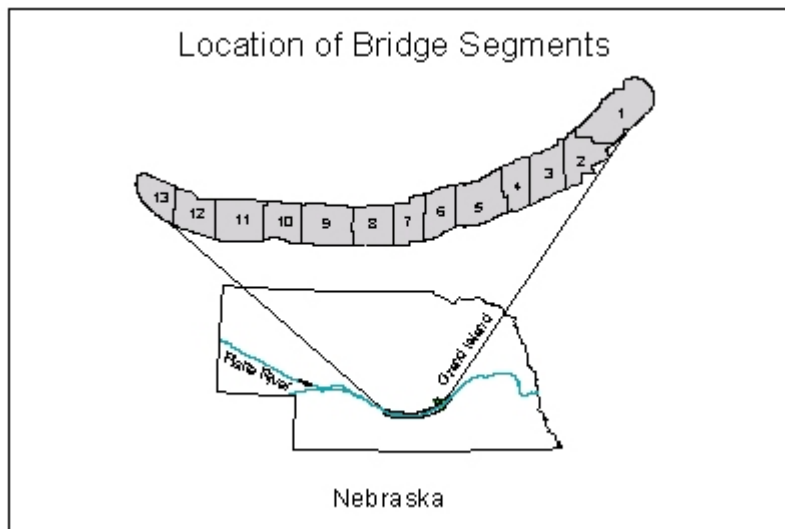


Figure 1: Location of GIS project Area and Bridge Segments.

An initial field inventory was conducted by a RSGIG biologist and a GIS specialist in October 1998, to examine land-cover and land-use elements on the ground and assess the quality and photo signatures of the 1998 CIR aerial photography. A more detailed field survey effort, conducted during the summer of 1999, focused on describing the non-agricultural vegetation sufficiently to meet the National Vegetation Classification Standard (NVCS) (Butler, 1999, TNC-ESRI 1994). Methods used to classify the vegetation of the Central Platte River were based on a modification of the standards presented in Field Methods for Vegetation Mapping (TNC-ESRI 1994). Modifications were necessary because of limited access to potential sample sites, as most of the study corridor lies on private land.

Photo-interpretation consisted of covering each CIR photograph with drafting film (Mylar) overlays, registration points were traced onto each overlay. Aerial photo portions with overlays were backlit and systematically interpreted, delineated, and each polygon labeled with the appropriate land use/map unit number. Interpreted linework marked on the overlays was then transferred to the digital database. This transfer involved scanning the Mylar to create a raster image which was then converted to vector (line) coverage in ArcInfo. Each registration point on vector coverage was matched electronically to the registration point on the digital orthophoto provided to us by Horizons Inc. The vector coverage was then edited for scanning flaws using ArcEdit module in ArcInfo. Each polygon was then attributed according to the features identified during photo-interpretation.

Classification was in accordance with the Federal Geographic Data Committee's National Vegetation Classification Standard. Figure 2 is an example of the mapping effort and the CIR aerial photography for an area in bridge segment 3 near Doniphan, Nebraska.

Figure 2—GIS land cover/use map with 1998 CIR.

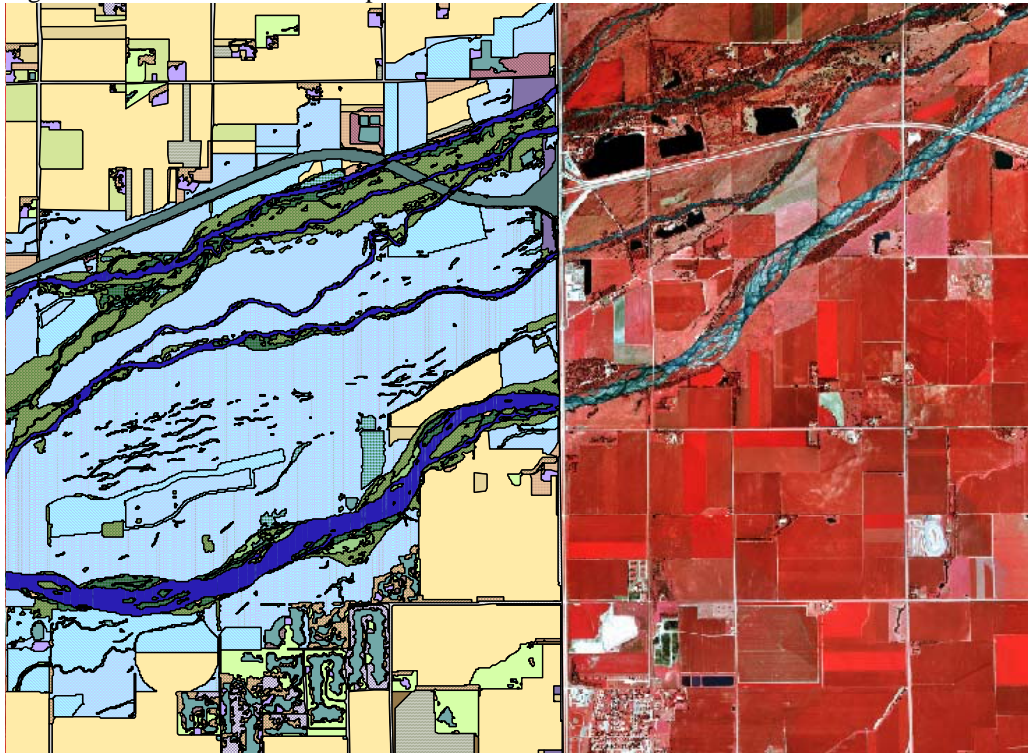


Table 1 shows the vegetation and land use classes that were mapped for this project along with acreage amounts of each map unit.

	Segment 1		Segment 2		Segment 3		Segment 4		Segment 5		Segment 6		Segment 7		Segment 8		Segment 9		Segment 10		Segment 11		Segment 12		Segment 13		Totals
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
<b>Natural/Semi-Natural Vegetation Map Units</b>																											
Emergent	62	0.1	61	0.2	160	0.5	64	0.3	63	0.2	179	0.6	149	0.6	29	0.1	101	0.3	114	0.4	184	0.5	126	0.4	113	0.5	1405.2
Shrubs inside floodplain	628	1.1	278	0.9	337	1.0	269	1.1	550	1.3	316	1.1	501	1.9	531	1.7	741	1.9	270	1.0	478	1.2	266	0.9	235	0.9	5401.7
Upland grasses	5109	9.3	2105	6.7	1193	3.6	2010	8.0	2684	6.4	864	3.1	1671	6.2	2239	7.3	7322	18.4	3045	11.0	2890	7.4	2924	9.6	1582	6.3	35637.3
Lowland grasses	4156	7.5	3184	10.2	6453	19.7	3673	14.7	4160	9.9	2564	9.1	3023	11.2	1043	3.4	2863	7.2	1872	6.8	1973	5.0	3050	10.0	899	3.6	38914.6
Shrubs outside floodplain	21	0.0	20	0.1	26	0.1	25	0.1	25	0.1	8	0.0	32	0.1	6	0.0	26	0.1	8	0.0	35	0.1	45	0.1	32	0.1	308.2
Wooded river	4760	8.6	1771	5.7	1455	4.4	1272	5.1	2331	5.6	1489	5.3	1529	5.7	2061	6.7	3002	7.5	2147	7.8	3230	8.2	1961	6.5	2309	9.2	29315.4
Woody outside floodplain	1152	2.1	446	1.4	537	1.6	251	1.0	311	0.7	263	0.9	243	0.9	241	0.8	552	1.4	334	1.2	522	1.3	295	1.0	502	2.0	5648.1
Mown lowland grasses	673	1.2	558	1.8	1060	3.2	296	1.2	211	0.5	177	0.6	438	1.6	23	0.1	249	0.6	271	1.0	84	0.2	46	0.2	35	0.1	4120.7
Herbaceous riparian	274	0.5	95	0.3	148	0.5	71	0.3	370	0.9	123	0.4	186	0.7	546	1.8	306	0.8	228	0.8	718	1.8	859	2.8	276	1.1	4201.9
<b>Hydrology Map Units</b>																											
Wetted channel	1827	3.3	818	2.6	938	2.9	699	2.8	886	2.1	680	2.4	704	2.6	715	2.3	772	1.9	589	2.1	651	1.7	436	1.4	254	1.0	9968.1
Open water, canal	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	48	0.1	46	0.2	33	0.1	77	0.3	39	0.2	242.5
Open water, slough	0	0.0	2	0.0	30	0.1	3	0.0	21	0.1	8	0.0	3	0.0	4	0.0	20	0.0	12	0.0	13	0.0	37	0.1	25	0.1	179.1
Open water pit, pond, or lake	589	1.1	346	1.1	508	1.6	119	0.5	217	0.5	140	0.5	152	0.6	401	1.3	339	0.9	310	1.1	198	0.5	132	0.4	310	1.2	3762.1
Open water	0	0.0	4	0.0	32	0.1	19	0.1	35	0.1	31	0.1	15	0.1	32	0.1	28	0.1	35	0.1	41	0.1	36	0.1	35	0.1	340.4
<b>Barren or very Sparsely Vegetated Map Units</b>																											
Barren beach/bar	36	0.1	30	0.1	17	0.1	19	0.1	54	0.1	25	0.1	20	0.1	69	0.2	149	0.4	72	0.3	213	0.5	542	1.8	163	0.7	1408.2
Sand/gravel areas	179	0.3	86	0.3	124	0.4	75	0.3	81	0.2	9	0.0	72	0.3	179	0.6	224	0.6	136	0.5	79	0.2	77	0.3	205	0.8	1526.1
Barren surface	11	0.0	65	0.2	52	0.2	5	0.0	9	0.0	6	0.0	1	0.0	5	0.0	71	0.2	0	0.0	4	0.0	5	0.0	4	0.0	238.1
<b>Agriculture Map Units</b>																											
Agriculture alfalfa	1007	1.8	344	1.1	510	1.6	591	2.4	514	1.2	884	3.1	1554	5.8	978	3.2	3289	8.2	2820	10.2	4132	10.5	2746	9.0	2801	11.2	22171.4
Agriculture corn	25567	46.4	15485	49.4	15264	46.7	12488	49.9	24105	57.5	16811	59.6	14399	53.6	16336	53.1	13492	33.8	11004	39.8	16702	42.5	13075	43.0	10008	39.9	204735.4
Agriculture other crops	1391	2.5	643	2.1	655	2.0	647	2.6	349	0.8	387	1.4	163	0.6	668	2.2	328	0.8	405	1.5	1037	2.6	415	1.4	1326	5.3	8413.3
Agriculture bare ground	729	1.3	166	0.5	383	1.2	169	0.7	573	1.4	274	1.0	71	0.3	399	1.3	469	1.2	329	1.2	413	1.0	191	0.6	240	1.0	4406.0
Agriculture soy beans	3002	5.5	1830	5.8	931	2.8	1073	4.3	2396	5.7	1478	5.2	706	2.6	807	2.6	844	2.1	1829	6.6	2292	5.8	1594	5.2	849	3.4	19630.9
Agriculture mown field	353	0.6	306	1.0	297	0.9	219	0.9	259	0.6	107	0.4	70	0.3	140	0.5	1200	3.0	582	2.1	1310	3.3	202	0.7	213	0.8	5259.1
Agriculture winter wheat	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	0.1	0	0.0	27	0.1	0	0.0	42.3
<b>Built upland, Gravel Extractions and Utility Map Units</b>																											
Development commercial	358	0.6	335	1.1	120	0.4	36	0.1	36	0.1	88	0.3	82	0.3	782	2.5	519	1.3	18	0.1	71	0.2	9	0.0	791	3.2	3246.2
Development residential	1002	1.8	657	2.1	130	0.4	8	0.0	11	0.0	93	0.3	150	0.6	1106	3.6	1393	3.5	52	0.2	209	0.5	1	0.0	468	1.9	5280.4
Developed single dwelling	492	0.9	382	1.2	301	0.9	174	0.7	197	0.5	272	1.0	256	1.0	241	0.8	292	0.7	120	0.4	261	0.7	191	0.6	141	0.6	3320.0
Powerline	20	0.0	5	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	0.0	35.7
Sand/gravel operations	5	0.0	7	0.0	24	0.1	0	0.0	5	0.0	23	0.1	2	0.0	12	0.0	2	0.0	2	0.0	49	0.1	0	0.0	15	0.1	145.7
<b>Transportation Map Units</b>																											
Bridge	2	0.0	6	0.0	3	0.0	1	0.0	1	0.0	0	0.0	1	0.0	2	0.0	1	0.0	0	0.0	2	0.0	0	0.0	1	0.0	19.5
Road gravel	1097	2.0	571	1.8	440	1.3	381	1.5	826	2.0	527	1.9	332	1.2	417	1.4	310	0.8	403	1.5	801	2.0	695	2.3	352	1.4	7152.3
Road interstate	0	0.0	271	0.9	273	0.8	234	0.9	347	0.8	223	0.8	246	0.9	287	0.9	361	0.9	267	1.0	338	0.9	288	0.9	305	1.2	3439.7
Road paved	319	0.6	395	1.3	296	0.9	127	0.5	137	0.3	77	0.3	91	0.3	317	1.0	379	0.9	160	0.6	184	0.5	36	0.1	408	1.6	2925.6
Railroad	238	0.4	50	0.2	0	0.0	0	0.0	124	0.3	78	0.3	4	0.0	125	0.4	157	0.4	137	0.5	128	0.3	1	0.0	132	0.5	1172.7
Other road	13	0.0	18	0.1	20	0.1	11	0.0	10	0.0	8	0.0	15	0.1	15	0.0	28	0.1	24	0.1	16	0.0	1	0.0	13	0.1	192.2
<b>TOTAL</b>	<b>55072</b>	<b>100</b>	<b>31337</b>	<b>100</b>	<b>32719</b>	<b>100</b>	<b>25032</b>	<b>100</b>	<b>41899</b>	<b>100</b>	<b>28212</b>	<b>100</b>	<b>26885</b>	<b>100</b>	<b>30757</b>	<b>100</b>	<b>39877</b>	<b>100</b>	<b>27655</b>	<b>100</b>	<b>39289</b>	<b>100</b>	<b>30389</b>	<b>100</b>	<b>25083</b>	<b>100</b>	<b>434205.9</b>

Additional and more detailed information can be found in a final report, created for this project, by Friesen et al. called "Central Platte River 1998 Land Cover/Use Mapping Project, Nebraska", and can be obtained from the Platte River EIS office, PO Box 25007, Mail Code PL-100, Denver, CO 80225-0007.

### **GIS Land Plan Modeling for the FEIS Alternatives**

A modeling project jointly developed by Reclamation and the Service was used to determine potential benefits of habitat protection and restorations during the first increment (13 years). The modeling project used the 1998 land cover/use maps and color infrared aerial photography for modeling purposes. Following guidelines set forth in the Governance Committee Program Documents, the objective for land acquisition within the first increment is 10,000 acres. The land plan identifies goals for habitat restoration and protection for the target species (whooping crane, least tern, & piping plover) to include both complex and non-complex habitats. The land plan identifies a minimum of 9,200 acres to be acquired in complex habitats and up to 800 acres could be allocated to non-complex habitats. The Programs area of interest for the land plans is the same area mapped for the 1998 land cover/use database. Land Plan results provided insight to the overall benefits of Program lands to the target species as well as provided supplementary data for the SEDVEG Model.

### **Objectives and Formulation of Land Plans for Program Alternatives**

Each action alternative includes acquisition of interest in lands of varying amounts, and management of those lands to approximate the habitat characteristics described in the Governance Committee Program Document (tables 2 & 3). Acquisition of interests in lands for the Program is based entirely upon willing sellers. Therefore, it is not possible to determine, prior to Program implementation, exactly which lands will become part of the Program.<sup>26</sup> However, based upon meeting the objectives described above, an illustrative scenario for land acquisition and management has been analyzed. While the ultimate plan implemented for the Program will differ in specific location and management of each land parcel, the overall scale of actions, the types of actions, and hence their overall effect on key habitat characteristics should be similar to those produced by this scenario.

The GIS land plans presented in this FEIS differ from the land plans developed early for the DEIS. First The DEIS analyzed two approaches to implementing the Governance Committee Alternative and thus two illustrative land plans were created. Since release of the DEIS, the Governance Committee has made significant revisions to their proposal, adding additional detail. Therefore, for the FEIS one EIS alternative was developed to represent the likely environmental consequences for the Governance Committee's proposal. Also, for the FEIS the DEIS Water Leasing Alternative was replaced with a new alternative referred to as the Full Water Leasing Alternative. The action alternatives and the land plan elements for the FEIS are:

#### **Governance Committee Alternative**

The land objective for the First increment of the Governance Committee Alternative is protecting, restoring where appropriate, and maintaining at least 10,000 acres of habitat for the target species in the Central Platte River Habitat Area, located between Lexington and Chapman, Nebraska.

#### **Full Water Leasing Alternative**

The Land Plan for this alternative is the same as for the Governance Committee Alternative.

#### **Wet Meadow Alternative**

This alternative includes the same land management plan as contained in the Governance Committee Alternative, but adds roughly 7,000 acres of additional wet meadow acquisition and/or restoration.

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<sup>26</sup> Except for the Cottonwood Ranch and the Wyoming property, which have already been committed to the Program by their managing entities.

## Water Emphasis Alternative

Under the Water Emphasis Alternative, relatively more water and less land is managed under the Program. The land habitat component for this alternative is a reduced form of the land plan used for the Governance Committee and Full Water Leasing Alternatives. The plan involves 7,475 acres of land. Management of the parcels would be similar to that for the Governance Committee Alternative, but on a smaller scale.

Table 2 – Target species habitat complex guidelines.

Riverine Habitat	Characteristics
Location	Platte River, between Lexington, and Chapman, Nebraska
Channel area	Approximately 2 miles long, 1,150 feet wide, and includes both sides of the river.
Water depth	A range of depths with approximately 40 percent of the channel area less than 0.7-foot deep during whooping crane migration periods.
Wetted width	90 to 100 percent of channel area inundated during migration periods.
Water velocity	During migration seasons, velocity should be less than 4 miles per hour in shallow areas.
Sandbars/channel morphology	Nonpermanent sandbars and low, nonpermanent islands, high enough to provide dry sand during the tern/plover nesting season and free of vegetation that inhibits use by tern, plover, or crane.
Proximity to wet meadow	Within 2 miles, but contiguous is preferred.
Distance from disturbance	<i>For whooping cranes:</i> In general, not less than 0.5-mile distant or appropriately screened from potential disturbances. <i>For interior least tern/piping plover:</i> In general, not less than 0.25-mile distant or appropriately protected from human disturbances.
Unobstructed view	Adequate visibility upstream, downstream, and across the channel.
Flight hazards	Overhead lines should be avoided, if possible.
Security	Sufficient control while target species are present to avoid human disturbance.
Wet Meadow Habitat	Characteristics
Location	Within 2 miles of the above-described channel area.
Size	Approximately 640 contiguous acres or more.
Distance from disturbance	In general, not less than 0.5-mile distant or appropriately screened from potential disturbance.
Vegetation composition	Native prairie grasses and herbaceous vegetation, lacking or mostly lacking sizable trees and shrubs, occurring in a mosaic of wetland (hydrophytic) and upland (nonhydrophytic) plants.
Hydrology	Swales subirrigated by groundwater seasonally near the soil surface and by precipitation and surface water, with the root zone saturated for at least 5 to 12.5 percent of the growing season.
Topography and soils	The topography is generally level or low undulating surface, dissected by swales and depressions. Mosaic of wetland soils with low salinity in swales and nonwetland soils occurring in uplands.
Food sources	Capable of supporting aquatic, semiaquatic, and terrestrial fauna and flora characteristic of wet meadows; especially aquatic invertebrates, beetles, insect larvae, and amphibians.
Buffer	Characteristics
	That portion of a complex used to isolate channel areas and wet meadows from potential disturbances. In general, it is up to 0.5 mile wide.

Table 3 –Non-complex habitat guidelines.

Sandpit Habitat for Interior Least Terns and Piping Plovers	Characteristics
Location	Within 2 miles of a river channel, between Lexington and Chapman.
Size	Approximately 3 acres or greater of nesting substrate that may be extended to include a management zone surrounding the nesting area.
Topography and soils	Open expanse of bare or sparsely vegetated (<25 percent) dry, sandy, or sand and gravel substrate.
Security	Sufficient control to avoid human disturbance to terns and plovers.
Nonriparian Habitat	Characteristics



<b>for Whooping Cranes</b>	
Location	Off-channel but within 3.5 miles of the centerline of the channel area, between Lexington and Chapman.
Type of habitat	Wetland or wet meadow areas.
Wetlands	Depressional wetlands with semipermanent, permanent, or seasonal shallow body(ies) of water.
Wet meadows	A generally level or low and undulating surface, dissected by swales and depressions. The area consists of a mosaic of wetland and upland soils and plants.
Distance from disturbance	In general, not less than 0.25-mile distant or appropriately screened from potential disturbance.
Unobstructed view	Good visibility in all directions.
Security	Sufficient control to avoid human disturbance to target species.

## Methods

First boundary shapefiles were created. Each boundary was created based on amount of acres needed for each action alternative. Each boundary shapefile was used to clip the corresponding area from the 1998 Land Cover/Use database. From the clipped coverage an attribute called mgt\_code and mgt\_desc were added to the feature attribute table and populated with values from Table 4. These values were assigned to a parcel of land based on the type of management activity that would best produce suitable habitat as set in the guidelines from table 1 & 2. The mgt\_code was used for all analysis created from this dataset by the Platte River EIS office. Management can consist of the following actions: conversion to wetted channel, conversion to bare sand, or conversion to lowland grasses.

Table 4 – Land plan management codes

MGT_CODE	MGT_DESC
-99	No management
1	Wooded to Lowland Grasses
2	Wooded to Wetted Channel
3	Wooded to Bare Sand
4	Shrubs to Lowland Grasses
5	Shrubs to Wetted Channel
6	Shrubs to Bare Sand
7	Herbaceous to Lowland Grasses
8	Herbaceous to Wetted Channel
9	Herbaceous to Bare Sand
10	Bare Sand To Wetted Channel
12	Lowland Grasses to Wetted Channel
13	Misc to Lowland Grasses*
14	Upland Grasses to Lowland Grasses
15	Emergents to Lowland Grasses

\* Miscellaneous equals Agriculture, development, road, and barren surface

Figure 3 is an example of Cottonwood Ranch property prior to management activities. Figure 4 illustrates what potential land management activities might look like for the Governance Committee Alternative.

Figure 3—Cottonwood Ranch property

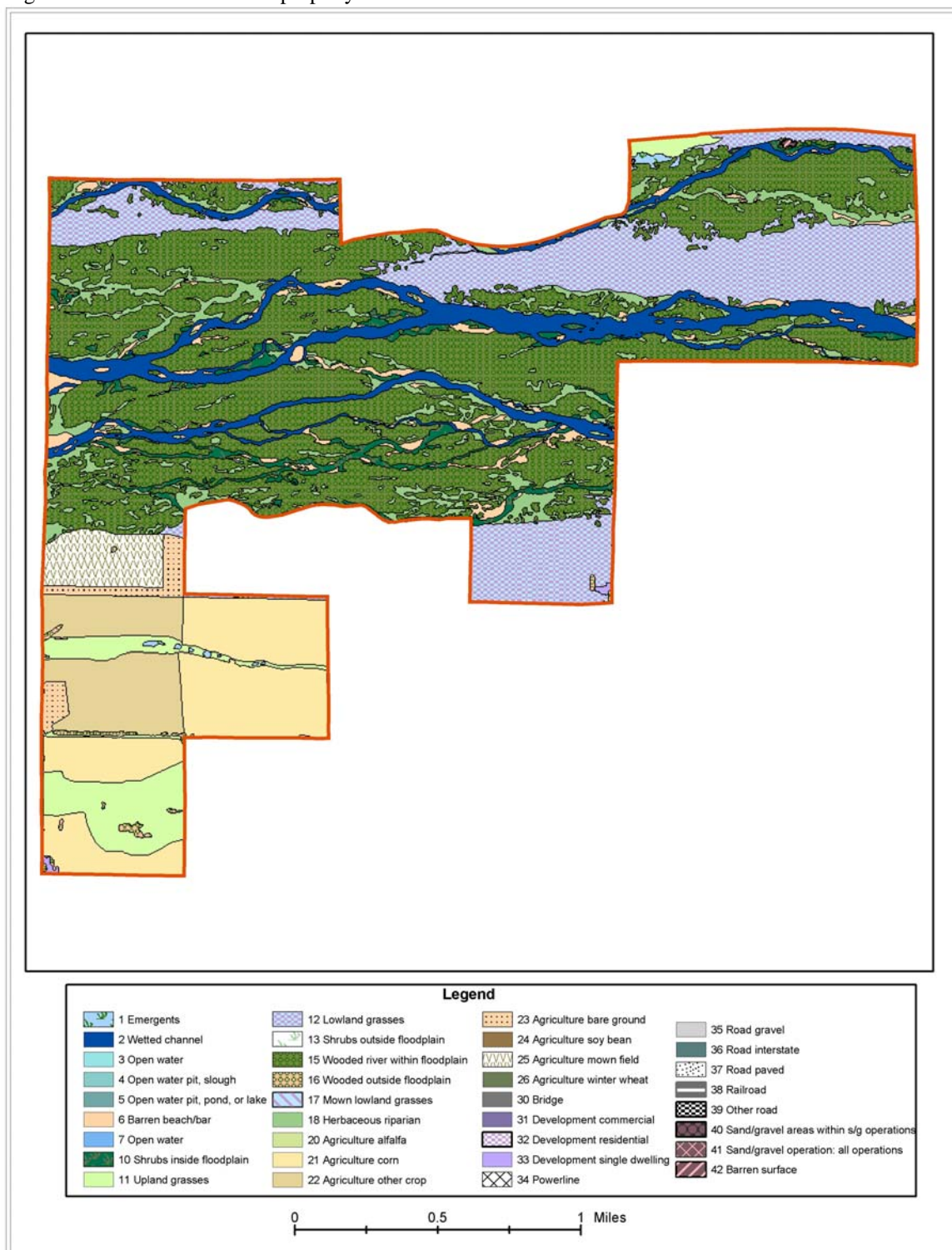
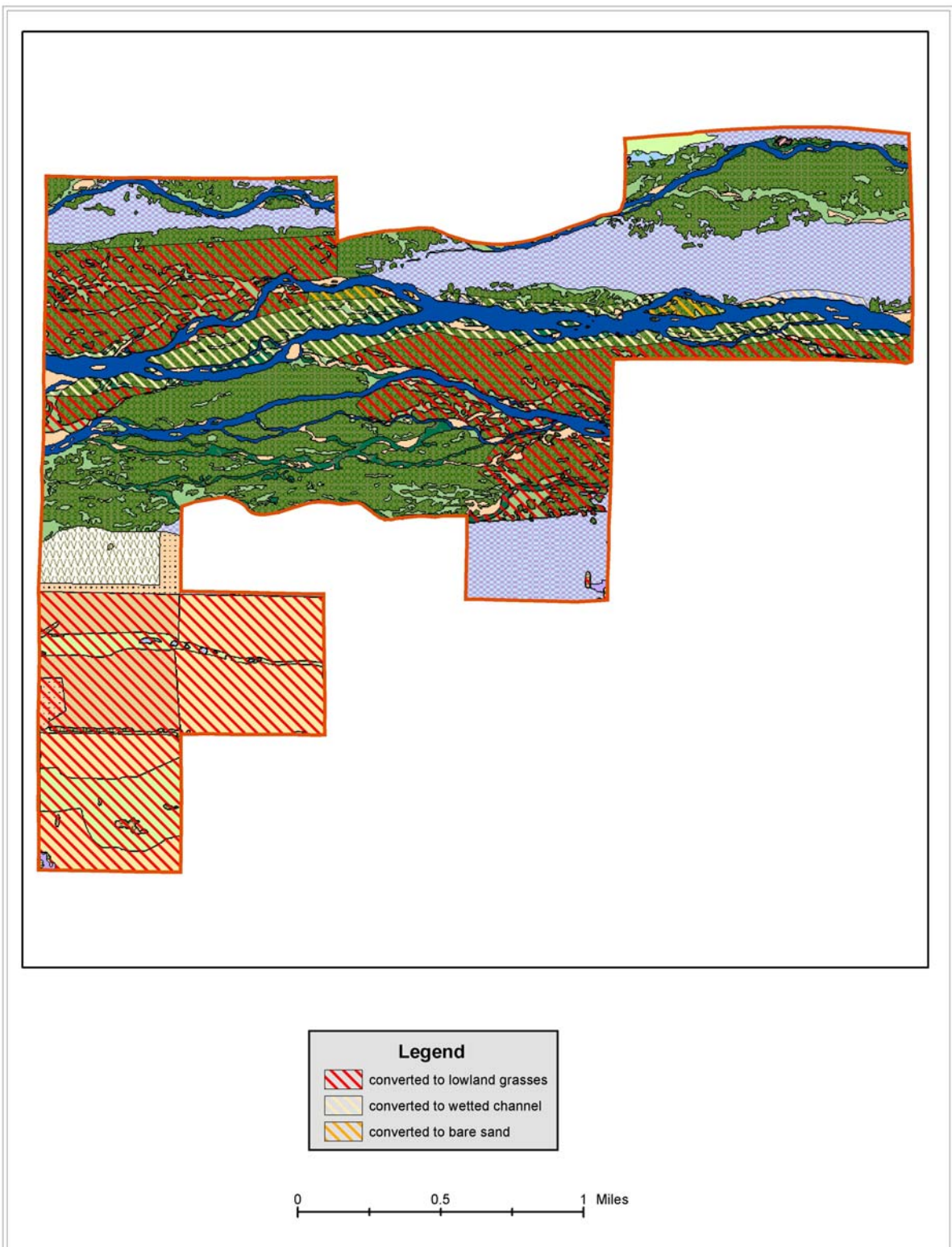


Figure 4 –Cottonwood Ranch Governance Committee Alternative



## Analysis

The modeled land plans were analyzed based on habitat and restoration objectives of each alternative. Using a combination of the 1998 land cover/use maps, and aerial photography potential land protection and restoration locations and management activities were examined. The land plan areas were examined for their effectiveness in improving habitat condition for the target bird species. Analysis included determination of the potential effectiveness of protection and restoration of wet meadows, channel widening and increase of unobstructed view on local habitat areas in each bridge segment.

The extent of management/restoration conversion of land cover/use types in each bridge segment were also compared to present condition. The modeled locations and distributions of complex and non-complex habitats were examined and compared to the description of suitable habitat in tables 1 and 2 and the objectives of each alternative to assure that maximum benefit for the bird species could be accomplished through habitat protection and management and/or restoration.

## Results

Several tables summarizing the amount of acres affected or modified by the proposed management actions were created for use in different analyses, in the FEIS. Following is each table by action alternative.

### **Governance Committee & Full Water Leasing Alternative**

Table 5—Illustrative Distribution of Land Plan Acreage by River Segment,  
Governance Committee Alternative & Full Water Leasing.

<b>River Reach</b>	<b>Acreage</b>
Lexington to Johnson-2	24
Johnson-2 to Overton	195
Overton to Elm Creek	3110
Elm Creek to Odessa	57
Odessa to Kearney	1760
Kearney to Minden	1551
Minden to Gibbon	75
Gibbon to Shelton	1094
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	42
Phillips to Chapman	1685
<b>Total</b>	<b>10,000</b>

Table 6—Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Governance Committee Alternative & Full Water Leasing

Restoration Activities	Change in Cover Type	Acres	Subtotal
To lowland grasses	Wooded to lowland grasses	2235	
	Herbaceous to lowland grasses	271	
	Agriculture to lowland grasses	1161	
	Shrubs to lowland grasses	513	
	Upland grasses to lowland grasses	94	
	Emergents to lowland grasses	3	4277
To wetted channel	Wooded to wetted channel	152	
	Shrubs to wetted channel	163	
	Herbaceous to wetted channel	19	
	Bare sand to wetted channel	19	
	Lowland grasses to wetted channel	2	
	Emergents to wetted channel	0	355
To bare sand	Wooded to bare sand	0	
	Shrubs to bare sand	0	
	Herbaceous to bare sand	0	0
Restored lands		4632	4632
Unmodified lands		4568	4568
Total non-complex habitat		800	800
<b>Totals</b>		<b>10,000</b>	<b>10,000</b>

Table 7: Governance Committee &amp; Full Water Leasing Alternative – Land Cover/Use Calculations

Bridge Segments and Restoration Units	Emerg (1)	Wetted Channel (2)	Open Water (4,5,7)	Bare Sand (6)	Shrubs (10,13)	Upland Grass (11)	Lowland Grasses (12, 17)	Wooded (15, 16)	Herb. Rip. (18)	Ag - Alfalfa (20)	Ag - Corn (21)	Ag - Soyb (24)	Ag - Other (22)	S&G Op (40, 41)	Sub-Total	Other Classes	Total
<b>Bridge Segment 1</b>																	
1998 Total Acres	62.1	1826.5	589.1	36.4	648.7	5108.7	4829.0	5911.9	274.2	1007.4	25565.9	3002.2	1390.5	184.0	50436.6	4633.9	55070.5
<b>Pre-Restoration</b>	<b>1.0</b>	<b>219.2</b>	<b>1.0</b>	<b>2.2</b>	<b>169.8</b>	<b>9.4</b>	<b>842.2</b>	<b>292.4</b>	<b>14.2</b>	<b>0.0</b>	<b>77.8</b>	<b>35.6</b>	<b>0.0</b>	<b>0.0</b>	<b>1664.7</b>	<b>7.1</b>	<b>1671.8</b>
Restoration Actions	0.0	81.3	0.0	0.0	-134.2	0.0	212.4	-103.2	-1.5	0.0	-38.6	-16.3	0.0	0.0		0.0	
<b>Post-Restoration</b>	<b>1.0</b>	<b>300.5</b>	<b>1.0</b>	<b>2.2</b>	<b>35.6</b>	<b>9.4</b>	<b>1054.6</b>	<b>189.2</b>	<b>12.7</b>	<b>0.0</b>	<b>39.2</b>	<b>19.3</b>	<b>0.0</b>	<b>0.0</b>	<b>1664.7</b>	<b>7.1</b>	<b>1671.8</b>
% Increase/Decrease	0%	37%	0%	0%	-79%	0%	25%	-35%	-10%	0%	-50%	-46%	0%	0%	0%	0%	
<b>Bridge Segment 2</b>																	
1998 Total Acres	61.0	817.6	352.1	29.6	298.5	2104.0	3742.2	2216.6	95.4	343.7	15484.6	1829.5	642.5	93.0	28110.2	3225.6	31335.7
<b>Bridge Segment 3</b>																	
1998 Total Acres	161.1	938.2	570.0	16.6	363.2	1193.4	7512.9	1992.3	148.4	510.4	15262.9	930.8	655.0	148.1	30403.3	2315.5	32718.8
<b>Bridge Segment 4</b>																	
1998 Total Acres	63.6	699.6	140.7	19.2	294.7	2010.4	3969.1	1523.0	71.1	591.1	12488.1	1072.7	646.6	75.3	23665.2	1366.4	25031.6
<b>Bridge Segment 5</b>																	
1998 Total Acres	63.2	885.7	273.0	53.9	574.3	2684.1	4370.8	2641.8	370.3	514.0	24104.5	2396.3	349.1	86.2	39367.1	2531.0	41898.0
<b>Bridge Segment 6</b>																	
1998 Total Acres	179.3	680.1	179.3	24.7	323.9	864.5	2741.7	1751.2	123.1	883.6	16810.1	1478.4	386.8	31.5	26458.1	1753.6	28211.7

<b>Pre-Restoration</b>	<b>0.9</b>	<b>266.6</b>	<b>0.1</b>	<b>5.6</b>	<b>92.3</b>	<b>6.9</b>	<b>0.4</b>	<b>309.7</b>	<b>17.1</b>	<b>0.6</b>	<b>337.9</b>	<b>25.1</b>	<b>0.0</b>	<b>0.0</b>	<b>1063.2</b>	<b>6.1</b>	<b>1069.3</b>
Restoration Actions	-0.9	54.3	0.0	0.0	-53.9	-1.1	609.9	-234.8	-11.0	0.0	-337.9	-24.5	0.0	0.0	0.0	0.0	
<b>Post-Restoration</b>	<b>0.0</b>	<b>320.9</b>	<b>0.1</b>	<b>5.6</b>	<b>38.4</b>	<b>5.8</b>	<b>610.3</b>	<b>74.9</b>	<b>6.1</b>	<b>0.6</b>	<b>0.0</b>	<b>0.5</b>	<b>0.0</b>	<b>0.0</b>	<b>1063.2</b>	<b>6.1</b>	<b>1069.3</b>
% Increase/Decrease	-100%	20%	0%	0%	-58%	-16%	155577%	-76%	-64%	0%	-100%	-98%	0%	0%	0%	0%	
<b>Bridge Segment 7</b>																	
1998 Total Acres	149.1	704.0	170.6	19.8	533.2	1670.5	3461.0	1771.8	185.7	1554.0	14398.7	706.1	162.7	74.2	25561.4	1323.1	26884.4
<b>Bridge Segment 8</b>																	
1998 Total Acres	28.9	715.1	437.3	69.2	537.2	2238.9	1065.9	2301.7	546.0	978.4	16335.3	807.5	668.0	190.6	26919.9	3836.6	30756.5
<b>Pre-Restoration</b>	<b>7.2</b>	<b>183.8</b>	<b>2.5</b>	<b>21.2</b>	<b>230.8</b>	<b>1.6</b>	<b>210.3</b>	<b>313.1</b>	<b>120.3</b>	<b>6.1</b>	<b>349.1</b>	<b>0.0</b>	<b>0.0</b>	<b>1.3</b>	<b>1447.2</b>	<b>8.8</b>	<b>1456.0</b>
Restoration Actions	-1.7	40.6	0.0	0.0	-154.2	0.0	679.4	-181.0	-36.0	0.0	-347.1	0.0	0.0	0.0	0.0	0.0	
<b>Post-Restoration</b>	<b>5.4</b>	<b>224.4</b>	<b>2.5</b>	<b>21.2</b>	<b>76.6</b>	<b>1.6</b>	<b>889.8</b>	<b>132.1</b>	<b>84.3</b>	<b>6.1</b>	<b>1.9</b>	<b>0.0</b>	<b>0.0</b>	<b>1.3</b>	<b>1447.2</b>	<b>8.8</b>	<b>1456.0</b>
% Increase/Decrease	-24%	22%	0%	0%	-67%	0%	323%	-58%	-30%	0%	-99%	0%	0%	0%	0%	0%	
<b>Bridge Segment 9</b>																	
1998 Total Acres	101.3	772.2	386.8	148.6	766.7	7321.8	3111.7	3553.4	306.0	3289.3	13491.9	844.1	328.5	225.9	34648.3	5228.6	39876.9
<b>Pre-Restoration</b>	<b>5.0</b>	<b>276.5</b>	<b>14.0</b>	<b>74.7</b>	<b>311.7</b>	<b>10.7</b>	<b>11.9</b>	<b>954.1</b>	<b>90.0</b>	<b>0.0</b>	<b>2.3</b>	<b>2.5</b>	<b>0.0</b>	<b>17.6</b>	<b>1771.0</b>	<b>4.2</b>	<b>1775.2</b>
Restoration Actions	0.0	95.1	0.0	-16.4	-238.8	0.0	981.2	-776.4	-44.7	0.0	0.0	0.0	0.0	0.0	0.0		
<b>Post-Restoration</b>	<b>5.0</b>	<b>371.6</b>	<b>14.0</b>	<b>58.3</b>	<b>72.9</b>	<b>10.7</b>	<b>993.0</b>	<b>177.7</b>	<b>45.3</b>	<b>0.0</b>	<b>2.3</b>	<b>2.5</b>	<b>0.0</b>	<b>17.6</b>	<b>1771.0</b>	<b>4.2</b>	<b>1775.2</b>
% Increase/Decrease	0%	34%	0%	-22%	-77%	0%	0%	-81%	-50%	0%	0%	0%	0%	0%	0%	0%	
<b>Bridge Segment 10</b>																	
1998 Total Acres	113.6	588.9	356.3	71.8	277.6	3044.7	2143.0	2480.6	228.2	2820.4	11004.0	1828.6	405.5	138.8	25502.1	2153.1	27655.2
<b>Bridge Segment 11</b>																	

1998 Total Acres	183.7	650.5	252.9	212.6	513.7	2889.8	2057.0	3752.0	718.0	4131.6	16701.5	2291.5	1037.3	127.6	35519.6	3768.3	39287.9
<b>Cottonwood Ranch</b>																	
<b>Pre-Restoration</b>	<b>6.5</b>	<b>245.1</b>	<b>1.6</b>	<b>67.6</b>	<b>104.5</b>	<b>101.9</b>	<b>654.5</b>	<b>1265.9</b>	<b>226.2</b>	<b>0.0</b>	<b>235.2</b>	<b>0.0</b>	<b>118.0</b>	<b>0.0</b>	<b>3027.1</b>	<b>83.8</b>	<b>3110.8</b>
Restoration Actions	0.0	82.1	0.0	-2.4	-93.2	-92.5	1695.7	-1059.4	-168.6	0.0	-235.2	0.0	-118.0	0.0	8.4	-8.4	
<b>Post-Restoration</b>	<b>6.5</b>	<b>327.2</b>	<b>1.6</b>	<b>65.2</b>	<b>11.3</b>	<b>9.4</b>	<b>2350.2</b>	<b>206.5</b>	<b>57.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>3035.5</b>	<b>75.3</b>	<b>3110.8</b>
% Increase/Decrease	0%	33%	0%	-4%	-89%	-91%	259%	-84%	-75%	0%	-100%	0%	-100%	0%	0%	-10%	
<b>Bridge Segment 12</b>																	
1998 Total Acres	126.2	436.2	204.4	542.4	311.2	2923.8	3096.0	2256.4	859.4	2746.5	13074.2	1594.3	414.6	77.4	28663.1	1725.5	30388.6
<b>Pre-Restoration</b>	<b>0.9</b>	<b>19.8</b>	<b>28.4</b>	<b>4.7</b>	<b>2.7</b>	<b>0.0</b>	<b>0.1</b>	<b>72.6</b>	<b>26.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>35.0</b>	<b>191.0</b>	<b>0.1</b>	<b>191.1</b>
Restoration Actions	0.0	0.0	0.0	0.0	-2.7	0.0	135.6	-71.1	-26.8	0.0	0.0	0.0	0.0	-35.0	0.0		
<b>Post-Restoration</b>	<b>0.9</b>	<b>19.8</b>	<b>28.4</b>	<b>4.7</b>	<b>0.1</b>	<b>0.0</b>	<b>135.7</b>	<b>1.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>191.0</b>	<b>0.1</b>	<b>191.1</b>
% Increase/Decrease	0%	0%	0%	0%	-98%	0%	113960%	-98%	-100%	0%	0%	0%	0%	-100%	0%	0%	
<b>Bridge Segment 13</b>																	
1998 Total Acres	113.0	253.9	369.8	163.4	267.1	1581.7	934.0	2810.5	276.1	2800.8	10007.1	848.9	1326.2	219.3	21971.8	3110.7	25082.5
<b>Alternative Habitats</b>																	800.0
<b>Total All Bridge Segments 1998</b>	<b>1406.1</b>	<b>9968.5</b>	<b>4282.2</b>	<b>1408.2</b>	<b>5709.9</b>	<b>35636.4</b>	<b>43034.6</b>	<b>34963.0</b>	<b>4201.9</b>	<b>22171.2</b>	<b>204728.8</b>	<b>19630.8</b>	<b>8413.2</b>	<b>1671.9</b>	<b>397226.7</b>	<b>36971.8</b>	<b>434198.5</b>
<b>TOTAL PRE-RESTORATION UNIT</b>	<b>21.5</b>	<b>1211.0</b>	<b>47.6</b>	<b>176.1</b>	<b>911.7</b>	<b>130.5</b>	<b>1719.5</b>	<b>3207.7</b>	<b>494.6</b>	<b>6.7</b>	<b>1002.3</b>	<b>63.2</b>	<b>118.0</b>	<b>53.9</b>	<b>9164.2</b>	<b>110.1</b>	<b>9274.3</b>
<b>TOTAL RESTORATION ACTIONS</b>	<b>-2.7</b>	<b>353.5</b>	<b>0.0</b>	<b>-18.8</b>	<b>-676.9</b>	<b>-93.6</b>	<b>4314.1</b>	<b>-2425.9</b>	<b>-288.6</b>	<b>0.0</b>	<b>-958.8</b>	<b>-40.8</b>	<b>-118.0</b>	<b>-35.0</b>	<b>8.5</b>	<b>-8.4</b>	
<b>TOTAL POST-RESTORATION UNIT</b>	<b>18.8</b>	<b>1564.5</b>	<b>47.6</b>	<b>157.2</b>	<b>234.9</b>	<b>36.9</b>	<b>6033.6</b>	<b>781.8</b>	<b>206.1</b>	<b>6.7</b>	<b>43.5</b>	<b>22.4</b>	<b>0.0</b>	<b>18.9</b>	<b>9172.7</b>	<b>101.7</b>	<b>9274.3</b>
<b>% Increase/Decrease</b>	<b>-12%</b>	<b>29%</b>	<b>0%</b>	<b>-11%</b>	<b>-74%</b>	<b>-72%</b>	<b>251%</b>	<b>-76%</b>	<b>-58%</b>	<b>0%</b>	<b>-96%</b>	<b>-65%</b>	<b>-100%</b>	<b>-65%</b>	<b>0%</b>	<b>-8%</b>	



<b>Total Bridge Segments with Restoration</b>	<b>1403.4</b>	<b>10321.9</b>	<b>4282.2</b>	<b>1389.3</b>	<b>5033.0</b>	<b>35542.8</b>	<b>47348.7</b>	<b>32537.1</b>	<b>3913.4</b>	<b>22171.2</b>	<b>203770.0</b>	<b>19590.0</b>	<b>8295.2</b>	<b>1636.9</b>	<b>397235.1</b>	<b>36963.4</b>	<b>831433.6</b>
<b>% Increase/Decrease</b>	<b>-0.2%</b>	<b>3.5%</b>	<b>0.0%</b>	<b>-1.3%</b>	<b>11.9%</b>	<b>-0.3%</b>	<b>10.0%</b>	<b>-6.9%</b>	<b>-6.9%</b>	<b>0.0%</b>	<b>-0.5%</b>	<b>-0.2%</b>	<b>-1.4%</b>	<b>-2.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0</b>

### Wet Meadow Alternative

Table 8—Illustrative Distribution of Program Lands, Managed by River Reach, for the Wet Meadow Alternative

<b>River Reach</b>	<b>Acreage</b>
Lexington to Johnson-2	24
Johnson-2 to Overton	195
Overton to Elm Creek	3110
Elm Creek to Odessa	2596
Odessa to Kearney	2578
Kearney to Minden	2766
Minden to Gibbon	75
Gibbon to Shelton	2014
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	1603
Phillips to Chapman	1685
<b>Total</b>	<b>17,053</b>

Table 9—Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Wet Meadow Alternative

<b>Restoration Activities</b>	<b>Change in Cover Type</b>	<b>Acres</b>	<b>Subtotal</b>
To lowland grasses	Wooded to lowland grasses	3864	
	Herbaceous to lowland grasses	414	
	Agriculture to lowland grasses	3188	
	Shrubs to lowland grasses	636	
	Upland grasses to lowland grasses	107	
	Emergents to lowland grasses	3	8212
To wetted channel	Wooded to wetted channel	152	
	Shrubs to wetted channel	163	
	Herbaceous to wetted channel	19	
	Bare sand to wetted channel	19	
	Lowland grasses to wetted channel	2	
	Emergents to wetted channel	0	355
To bare sand	Wooded to bare sand	7	
	Shrubs to bare sand	0	
	Herbaceous to bare sand	0	7
Restored lands		8574	8574
Unmodified lands		7679	7679
Total non-complex habitat		800	800
<b>Totals</b>		<b>17,053</b>	<b>17,053</b>

Table 10—Wet Meadow Alternative – Changes to Land Cover/Use Calculations

Bridge Segments and Restoration Units	Emerg (1)	Wetted Channel (2)	Open Water (4,5,7)	Bare Sand (6)	Shrubs (10,13)	Upland Grass (11)	Lowland Grasses (12, 17)	Wooded (15, 16)	Herb. Rip. (18)	Ag - Alfalfa (20)	Ag - Corn (21)	Ag - Soyb (24)	Ag - Other (22)	S&G Op (40, 41)	Sub-Total	Other Classes	Total
<b>Bridge Segment 1</b>																	
1998 Total Acres	62.1	1826.5	589.1	36.4	648.7	5108.7	4829.0	5911.9	274.2	1007.4	25565.9	3002.2	1390.5	184.0	50436.6	4633.9	55070.5
<b>Pre-Restoration</b>	<b>1.0</b>	<b>219.2</b>	<b>1.0</b>	<b>2.2</b>	<b>169.8</b>	<b>9.4</b>	<b>842.2</b>	<b>292.4</b>	<b>14.2</b>	<b>0.0</b>	<b>77.8</b>	<b>35.6</b>	<b>0.0</b>	<b>0.0</b>	<b>1664.7</b>	<b>7.1</b>	<b>1671.8</b>
Restoration Actions	0.0	81.3	0.0	0.0	-134.2	0.0	212.4	-103.2	-1.5	0.0	-38.6	-16.3	0.0	0.0		0.0	
<b>Post-Restoration</b>	<b>1.0</b>	<b>300.5</b>	<b>1.0</b>	<b>2.2</b>	<b>35.6</b>	<b>9.4</b>	<b>1054.6</b>	<b>189.2</b>	<b>12.7</b>	<b>0.0</b>	<b>39.2</b>	<b>19.3</b>	<b>0.0</b>	<b>0.0</b>	<b>1664.7</b>	<b>7.1</b>	<b>1671.8</b>
% Increase/Decrease	0%	37%	0%	0%	-79%	0%	25%	-35%	-10%	0%	-50%	-46%	0%	0%	0%	0%	
<b>Bridge Segment 2</b>																	
1998 Total Acres	61.0	817.6	352.1	29.6	298.5	2104.0	3742.2	2216.6	95.4	343.7	15484.6	1829.5	642.5	93.0	28110.2	3225.6	31335.7
<b>Pre-Restoration</b>	<b>0.0</b>	<b>255.1</b>	<b>1.7</b>	<b>16.1</b>	<b>93.3</b>	<b>42.0</b>	<b>649.4</b>	<b>387.8</b>	<b>31.6</b>	<b>10.4</b>	<b>53.4</b>	<b>0.0</b>	<b>12.9</b>	<b>1.6</b>	<b>1555.4</b>	<b>5.4</b>	<b>1560.8</b>
Restoration Actions	0.0	0.0	0.0	7.2	-34.6	0.0	463.3	-347.2	-30.1	0.0	-51.3	0.0	0.0	0.0		0.0	
<b>Post-Restoration</b>	<b>0.0</b>	<b>255.1</b>	<b>1.7</b>	<b>23.3</b>	<b>58.7</b>	<b>42.0</b>	<b>1112.6</b>	<b>40.6</b>	<b>1.5</b>	<b>10.4</b>	<b>2.1</b>	<b>0.0</b>	<b>12.9</b>	<b>1.6</b>	<b>1562.5</b>	<b>5.4</b>	<b>1568.0</b>
% Increase/Decrease	0%	0%	0%	44%	-37%	0%	71%	-90%	-95%	0%	-96%	0%	0%	0%	0%	0%	
<b>Bridge Segment 3</b>																	
1998 Total Acres	161.1	938.2	570.0	16.6	363.2	1193.4	7512.9	1992.3	148.4	510.4	15262.9	930.8	655.0	148.1	30403.3	2315.5	32718.8
<b>Bridge Segment 4</b>																	
1998 Total Acres	63.6	699.6	140.7	19.2	294.7	2010.4	3969.1	1523.0	71.1	591.1	12488.1	1072.7	646.6	75.3	23665.2	1366.4	25031.6
<b>Bridge Segment 5</b>																	

1998 Total Acres	63.2	885.7	273.0	53.9	574.3	2684.1	4370.8	2641.8	370.3	514.0	24104.5	2396.3	349.1	86.2	39367.1	2531.0	41898.0
<b>Bridge Segment 6</b>																	
1998 Total Acres	179.3	680.1	179.3	24.7	323.9	864.5	2741.7	1751.2	123.1	883.6	16810.1	1478.4	386.8	31.5	26458.1	1753.6	28211.7
<b>Pre-Restoration</b>	<b>0.9</b>	<b>308.2</b>	<b>0.2</b>	<b>6.5</b>	<b>93.7</b>	<b>15.3</b>	<b>125.7</b>	<b>352.4</b>	<b>18.1</b>	<b>34.0</b>	<b>928.8</b>	<b>74.0</b>	<b>4.8</b>	<b>0.0</b>	<b>1962.8</b>	<b>25.6</b>	<b>1988.5</b>
Restoration Actions	-0.9	54.3	0.0	0.0	-54.4	-2.1	1343.6	-269.3	-11.1	-33.4	-928.8	-73.5	-4.8	0.0	19.5	-19.5	
<b>Post-Restoration</b>	<b>0.0</b>	<b>362.5</b>	<b>0.2</b>	<b>6.5</b>	<b>39.3</b>	<b>13.2</b>	<b>1469.4</b>	<b>83.1</b>	<b>7.1</b>	<b>0.6</b>	<b>0.0</b>	<b>0.5</b>	<b>0.0</b>	<b>0.0</b>	<b>1982.4</b>	<b>6.1</b>	<b>1988.5</b>
% Increase/Decrease	-100%	18%	0%	0%	-58%	-14%	1069%	-76%	-61%	0%	-100%	-99%	-100%	0%	1%	-76%	
<b>Bridge Segment 7</b>																	
1998 Total Acres	149.1	704.0	170.6	19.8	533.2	1670.5	3461.0	1771.8	185.7	1554.0	14398.7	706.1	162.7	74.2	25561.4	1323.1	26884.4
<b>Bridge Segment 8</b>																	
1998 Total Acres	28.9	715.1	437.3	69.2	537.2	2238.9	1065.9	2301.7	546.0	978.4	16335.3	807.5	668.0	190.6	26919.9	3836.6	30756.5
<b>Pre-Restoration</b>	<b>7.2</b>	<b>214.2</b>	<b>5.4</b>	<b>21.3</b>	<b>264.4</b>	<b>7.7</b>	<b>611.6</b>	<b>501.9</b>	<b>135.7</b>	<b>80.9</b>	<b>792.2</b>	<b>0.0</b>	<b>0.0</b>	<b>1.3</b>	<b>2643.8</b>	<b>27.3</b>	<b>2671.1</b>
Restoration Actions	-1.7	40.6	0.0	0.0	-166.1	-5.0	1378.0	-346.4	-48.8	-57.2	-790.2	0.0	0.0	0.0	3.1	-3.1	
<b>Post-Restoration</b>	<b>5.4</b>	<b>254.9</b>	<b>5.4</b>	<b>21.3</b>	<b>98.2</b>	<b>2.7</b>	<b>1989.6</b>	<b>155.5</b>	<b>86.9</b>	<b>23.8</b>	<b>2.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.3</b>	<b>2646.9</b>	<b>24.2</b>	<b>2671.1</b>
% Increase/Decrease	-24%	19%	0%	0%	-63%	-65%	225%	-69%	-36%	-71%	-100%	0%	0%	0%	0%	-11%	
<b>Bridge Segment 9</b>																	
1998 Total Acres	101.3	772.2	386.8	148.6	766.7	7321.8	3111.7	3553.4	306.0	3289.3	13491.9	844.1	328.5	225.9	34648.3	5228.6	39876.9
<b>Pre-Restoration</b>	<b>5.0</b>	<b>282.3</b>	<b>15.8</b>	<b>71.2</b>	<b>313.0</b>	<b>32.8</b>	<b>12.7</b>	<b>1012.7</b>	<b>96.5</b>	<b>2.5</b>	<b>502.7</b>	<b>85.6</b>	<b>30.9</b>	<b>18.9</b>	<b>2482.6</b>	<b>36.4</b>	<b>2519.0</b>
Restoration Actions	0.0	95.3	0.0	-16.4	-246.8	-1.5	1298.0	-825.9	-52.6	-2.5	-157.8	-50.5	-13.5	0.0	25.6	-25.6	

<b>Post-Restoration</b>	<b>5.0</b>	<b>377.6</b>	<b>15.8</b>	<b>54.8</b>	<b>66.2</b>	<b>31.2</b>	<b>1310.7</b>	<b>186.8</b>	<b>43.9</b>	<b>0.0</b>	<b>344.9</b>	<b>35.1</b>	<b>17.4</b>	<b>18.9</b>	<b>2508.2</b>	<b>10.7</b>	<b>2519.0</b>
% Increase/Decrease	0%	34%	0%	-23%	-79%	-5%	10259%	-82%	-55%	-100%	-31%	-59%	-44%	0%	1%	-71%	
<b>Bridge Segment 10</b>																	
1998 Total Acres	113.6	588.9	356.3	71.8	277.6	3044.7	2143.0	2480.6	228.2	2820.4	11004.0	1828.6	405.5	138.8	25502.1	2153.1	27655.2
<b>Pre-Restoration</b>	<b>2.6</b>	<b>187.5</b>	<b>43.5</b>	<b>41.6</b>	<b>105.2</b>	<b>12.6</b>	<b>387.3</b>	<b>1117.1</b>	<b>99.8</b>	<b>262.9</b>	<b>208.4</b>	<b>0.0</b>	<b>0.7</b>	<b>13.1</b>	<b>2482.1</b>	<b>56.7</b>	<b>2538.8</b>
Restoration Actions	0.0	0.0	0.0	0.0	-66.6	-5.3	1683.4	-992.9	-94.2	-262.9	-208.4	0.0	0.0	0.0	53.1	-53.1	
<b>Post-Restoration</b>	<b>2.6</b>	<b>187.5</b>	<b>43.5</b>	<b>41.6</b>	<b>38.6</b>	<b>7.3</b>	<b>2070.6</b>	<b>124.2</b>	<b>5.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.7</b>	<b>13.1</b>	<b>2535.2</b>	<b>3.6</b>	<b>2538.8</b>
% Increase/Decrease	0%	0%	0%	0%	-63%	-42%	435%	-89%	-94%	-100%	-100%	0%	0%	0%	2%	-94%	
<b>Bridge Segment 11</b>																	
1998 Total Acres	183.7	650.5	252.9	212.6	513.7	2889.8	2057.0	3752.0	718.0	4131.6	16701.5	2291.5	1037.3	127.6	35519.6	3768.3	39287.9
<b>Cottonwood Ranch</b>																	
<b>Pre-Restoration</b>	<b>6.5</b>	<b>245.1</b>	<b>1.6</b>	<b>67.6</b>	<b>104.5</b>	<b>101.9</b>	<b>654.5</b>	<b>1265.9</b>	<b>226.2</b>	<b>0.0</b>	<b>235.2</b>	<b>0.0</b>	<b>118.0</b>	<b>0.0</b>	<b>3027.1</b>	<b>83.8</b>	<b>3110.8</b>
Restoration Actions	0.0	82.1	0.0	-2.4	-93.2	-92.5	1695.7	-1059.4	-168.6	0.0	-235.2	0.0	-118.0	0.0	8.4	-8.4	
<b>Post-Restoration</b>	<b>6.5</b>	<b>327.2</b>	<b>1.6</b>	<b>65.2</b>	<b>11.3</b>	<b>9.4</b>	<b>2350.2</b>	<b>206.5</b>	<b>57.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>3035.5</b>	<b>75.3</b>	<b>3110.8</b>
% Increase/Decrease	0%	33%	0%	-4%	-89%	-91%	259%	-84%	-75%	0%	-100%	0%	-100%	0%	0%	-10%	
<b>Bridge Segment 12</b>																	
1998 Total Acres	126.2	436.2	204.4	542.4	311.2	2923.8	3096.0	2256.4	859.4	2746.5	13074.2	1594.3	414.6	77.4	28663.1	1725.5	30388.6
<b>Pre-Restoration</b>	<b>0.9</b>	<b>19.8</b>	<b>28.4</b>	<b>4.7</b>	<b>2.7</b>	<b>0.0</b>	<b>0.1</b>	<b>72.6</b>	<b>26.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>35.0</b>	<b>191.0</b>	<b>0.1</b>	<b>191.1</b>
Restoration Actions	0.0	0.0	0.0	0.0	-2.7	0.0	135.6	-71.1	-26.8	0.0	0.0	0.0	0.0	-35.0	0.0		
<b>Post-Restoration</b>	<b>0.9</b>	<b>19.8</b>	<b>28.4</b>	<b>4.7</b>	<b>0.1</b>	<b>0.0</b>	<b>135.7</b>	<b>1.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>191.0</b>	<b>0.1</b>	<b>191.1</b>
% Increase/Decrease	0%	0%	0%	0%	-98%	0%	113960%	-98%	-100%	0%	0%	0%	0%	-100%	0%	0%	

<b>Bridge Segment 13</b>																	
1998 Total Acres	113.0	253.9	369.8	163.4	267.1	1581.7	934.0	2810.5	276.1	2800.8	10007.1	848.9	1326.2	219.3	21971.8	3110.7	25082.5
<b>Alternative Habitats</b>																	800.0
<b>Total All Bridge Segments 1998</b>	1406.1	9968.5	4282.2	1408.2	5709.9	35636.4	43034.6	34963.0	4201.9	22171.2	204728.8	19630.8	8413.2	1671.9	397226.7	36971.8	434198.5
<b>TOTAL PRE-RESTORATION UNIT</b>	<b>24.1</b>	<b>1731.3</b>	<b>97.5</b>	<b>231.2</b>	<b>1146.5</b>	<b>221.7</b>	<b>3283.5</b>	<b>5002.8</b>	<b>648.9</b>	<b>390.8</b>	<b>2798.5</b>	<b>195.2</b>	<b>167.4</b>	<b>69.9</b>	<b>16009.4</b>	<b>242.5</b>	<b>16251.9</b>
<b>TOTAL RESTORATION ACTIONS</b>	-2.7	353.6	0.0	-11.7	-798.6	-106.5	8209.9	-4015.4	-433.8	-356.0	-2410.3	-140.2	-136.3	-35.0	117.0	-109.8	
<b>TOTAL POST-RESTORATION UNIT</b>	<b>21.4</b>	<b>2085.0</b>	<b>97.5</b>	<b>219.5</b>	<b>348.0</b>	<b>115.2</b>	<b>11493.4</b>	<b>987.4</b>	<b>215.2</b>	<b>34.8</b>	<b>388.2</b>	<b>55.0</b>	<b>31.0</b>	<b>35.0</b>	<b>16126.4</b>	<b>132.7</b>	<b>16259.1</b>
<b>% Increase/Decrease</b>	<b>-11%</b>	<b>20%</b>	<b>0%</b>	<b>-5%</b>	<b>-70%</b>	<b>-48%</b>	<b>250%</b>	<b>-80%</b>	<b>-67%</b>	<b>-91%</b>	<b>-86%</b>	<b>-72%</b>	<b>-81%</b>	<b>-50%</b>	<b>1%</b>	<b>-45%</b>	
<b>Total Bridge Segments with Restoration</b>	<b>1403.4</b>	<b>10322.1</b>	<b>4282.2</b>	<b>1396.5</b>	<b>4911.3</b>	<b>35529.9</b>	<b>51244.5</b>	<b>30947.6</b>	<b>3768.1</b>	<b>21815.2</b>	<b>202318.4</b>	<b>19490.6</b>	<b>8276.9</b>	<b>1636.9</b>	<b>397343.7</b>	<b>36861.9</b>	<b>434198.5</b>
<b>% Increase/Decrease</b>	<b>-0.2%</b>	<b>3.5%</b>	<b>0.0%</b>	<b>-0.8%</b>	<b>14.0%</b>	<b>-0.3%</b>	<b>19.1%</b>	<b>-11.5%</b>	<b>10.3%</b>	<b>-1.6%</b>	<b>-1.2%</b>	<b>-0.7%</b>	<b>-1.6%</b>	<b>-2.1%</b>	<b>0.0%</b>	<b>-0.3%</b>	<b>0.0</b>

### **Water Emphasis Alternative**

Table 11— Illustrative Distribution of Program Lands, By River Reach, for the Water Emphasis Alternative

<b>River Reach</b>	<b>Acreage</b>
Lexington to Johnson-2	24
Johnson-2 to Overton	195
Overton to Elm Creek	3110
Elm Creek to Odessa	57
Odessa to Kearney	1760
Kearney to Minden	95
Minden to Gibbon	75
Gibbon to Shelton	25
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	42
Phillips to Chapman	1685
<b>Total</b>	<b>7475</b>

Table 12—Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Water Emphasis Alternative

<b>Restoration Activities</b>		<b>Acres</b>	<b>Subtotal</b>
To lowland grasses	Wooded to lowland grasses	1863	
	Herbaceous to lowland grasses	225	
	Agriculture to lowland grasses	451	
	Shrubs to lowland grasses	354	
	Upland grasses to lowland grasses	93	2986
To wetted channel	Wooded to wetted channel	108	
	Shrubs to wetted channel	113	
	Herbaceous to wetted channel	18	
	Bare sand to wetted channel	19	
	Lowland grasses to wetted channel	2	260
To bare sand	Wooded to bare sand	0	
	Shrubs to bare sand	0	
	Herbaceous to bare sand	0	
Restored lands		3246	3246
Unmodified lands		3428	3428
Total non-complex habitat		800	800
<b>Totals</b>		<b>7474</b>	<b>7474</b>

Table 13—Water Emphasis Alternative – Changes to Land Cover/Use Calculations

Bridge Segments and Restoration Units	Emerg (1)	Wetted Channel (2)	Open Water (4,5,7)	Bare Sand (6)	Shrubs (10,13)	Upland Grass (11)	Lowland Grasses (12, 17)	Wooded (15, 16)	Herb. Rip. (18)	Ag - Alfalfa (20)	Ag - Corn (21)	Ag - Soyb (24)	Ag - Other (22)	S&G Op (40, 41)	Sub-Total	Other Classes	Total
<b>Bridge Segment 1</b>																	
1998 Total Acres	62.1	1826.5	589.1	36.4	648.7	5108.7	4829.0	5911.9	274.2	1007.4	25565.9	3002.2	1390.5	184.0	50436.6	4633.9	55070.5
<b>Pre-Restoration</b>	<b>1.0</b>	<b>219.2</b>	<b>1.0</b>	<b>2.2</b>	<b>169.8</b>	<b>9.4</b>	<b>842.2</b>	<b>292.4</b>	<b>14.2</b>	<b>0.0</b>	<b>77.8</b>	<b>35.6</b>	<b>0.0</b>	<b>0.0</b>	<b>1664.7</b>	<b>7.1</b>	<b>1671.8</b>
Restoration Actions	0.0	81.3	0.0	0.0	-134.2	0.0	212.4	-103.2	-1.5	0.0	-38.6	-16.3	0.0	0.0		0.0	
<b>Post-Restoration</b>	<b>1.0</b>	<b>300.5</b>	<b>1.0</b>	<b>2.2</b>	<b>35.6</b>	<b>9.4</b>	<b>1054.6</b>	<b>189.2</b>	<b>12.7</b>	<b>0.0</b>	<b>39.2</b>	<b>19.3</b>	<b>0.0</b>	<b>0.0</b>	<b>1664.7</b>	<b>7.1</b>	<b>1671.8</b>
% Increase/Decrease	0%	37%	0%	0%	-79%	0%	25%	-35%	-10%	0%	-50%	-46%	0%	0%	0%	0%	
<b>Bridge Segment 2</b>																	
1998 Total Acres	61.0	817.6	352.1	29.6	298.5	2104.0	3742.2	2216.6	95.4	343.7	15484.6	1829.5	642.5	93.0	28110.2	3225.6	31335.7
<b>Bridge Segment 3</b>																	
1998 Total Acres	161.1	938.2	570.0	16.6	363.2	1193.4	7512.9	1992.3	148.4	510.4	15262.9	930.8	655.0	148.1	30403.3	2315.5	32718.8
<b>Bridge Segment 4</b>																	
1998 Total Acres	63.6	699.6	140.7	19.2	294.7	2010.4	3969.1	1523.0	71.1	591.1	12488.1	1072.7	646.6	75.3	23665.2	1366.4	25031.6
<b>Bridge Segment 5</b>																	
1998 Total Acres	63.2	885.7	273.0	53.9	574.3	2684.1	4370.8	2641.8	370.3	514.0	24104.5	2396.3	349.1	86.2	39367.1	2531.0	41898.0
<b>Bridge Segment 6</b>																	



1998 Total Acres	179.3	680.1	179.3	24.7	323.9	864.5	2741.7	1751.2	123.1	883.6	16810.1	1478.4	386.8	31.5	26458.1	1753.6	28211.7
<b>Bridge Segment 7</b>																	
1998 Total Acres	149.1	704.0	170.6	19.8	533.2	1670.5	3461.0	1771.8	185.7	1554.0	14398.7	706.1	162.7	74.2	25561.4	1323.1	26884.4
<b>Bridge Segment 8</b>																	
1998 Total Acres	28.9	715.1	437.3	69.2	537.2	2238.9	1065.9	2301.7	546.0	978.4	16335.3	807.5	668.0	190.6	26919.9	3836.6	30756.5
<b>Bridge Segment 9</b>																	
1998 Total Acres	101.3	772.2	386.8	148.6	766.7	7321.8	3111.7	3553.4	306.0	3289.3	13491.9	844.1	328.5	225.9	34648.3	5228.6	39876.9
<b>Pre-Restoration</b>	<b>5.0</b>	<b>276.5</b>	<b>14.0</b>	<b>74.7</b>	<b>311.7</b>	<b>10.7</b>	<b>11.9</b>	<b>954.1</b>	<b>90.0</b>	<b>0.0</b>	<b>2.3</b>	<b>2.5</b>	<b>0.0</b>	<b>17.6</b>	<b>1771.0</b>	<b>4.2</b>	<b>1775.2</b>
Restoration Actions	0.0	95.1	0.0	-16.4	-238.8	0.0	981.2	-776.4	-44.7	0.0	0.0	0.0	0.0	0.0	0.0		
<b>Post-Restoration</b>	<b>5.0</b>	<b>371.6</b>	<b>14.0</b>	<b>58.3</b>	<b>72.9</b>	<b>10.7</b>	<b>993.0</b>	<b>177.7</b>	<b>45.3</b>	<b>0.0</b>	<b>2.3</b>	<b>2.5</b>	<b>0.0</b>	<b>17.6</b>	<b>1771.0</b>	<b>4.2</b>	<b>1775.2</b>
% Increase/Decrease	0%	34%	0%	-22%	-77%	0%	0%	-81%	-50%	0%	0%	0%	0%	0%	0%	0%	
<b>Bridge Segment 10</b>																	
1998 Total Acres	113.6	588.9	356.3	71.8	277.6	3044.7	2143.0	2480.6	228.2	2820.4	11004.0	1828.6	405.5	138.8	25502.1	2153.1	27655.2
<b>Bridge Segment 11</b>																	
1998 Total Acres	183.7	650.5	252.9	212.6	513.7	2889.8	2057.0	3752.0	718.0	4131.6	16701.5	2291.5	1037.3	127.6	35519.6	3768.3	39287.9
<b>Cottonwood Ranch</b>																	
<b>Pre-Restoration</b>	<b>6.5</b>	<b>245.1</b>	<b>1.6</b>	<b>67.6</b>	<b>104.5</b>	<b>101.9</b>	<b>654.5</b>	<b>1265.9</b>	<b>226.2</b>	<b>0.0</b>	<b>235.2</b>	<b>0.0</b>	<b>118.0</b>	<b>0.0</b>	<b>3027.1</b>	<b>83.8</b>	<b>3110.8</b>
Restoration Actions	0.0	82.1	0.0	-2.4	-93.2	-92.5	1695.7	-1059.4	-168.6	0.0	-235.2	0.0	-118.0	0.0	8.4	-8.4	
<b>Post-Restoration</b>	<b>6.5</b>	<b>327.2</b>	<b>1.6</b>	<b>65.2</b>	<b>11.3</b>	<b>9.4</b>	<b>2350.2</b>	<b>206.5</b>	<b>57.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>3035.5</b>	<b>75.3</b>	<b>3110.8</b>
% Increase/Decrease	0%	33%	0%	-4%	-89%	-91%	259%	-84%	-75%	0%	-100%	0%	-100%	0%	0%	-10%	

<b>Bridge Segment 12</b>																	
1998 Total Acres	126.2	436.2	204.4	542.4	311.2	2923.8	3096.0	2256.4	859.4	2746.5	13074.2	1594.3	414.6	77.4	28663.1	1725.5	30388.6
<b>Pre-Restoration</b>	<b>0.9</b>	<b>19.8</b>	<b>28.4</b>	<b>4.7</b>	<b>2.7</b>	<b>0.0</b>	<b>0.1</b>	<b>72.6</b>	<b>26.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>35.0</b>	<b>191.0</b>	<b>0.1</b>	<b>191.1</b>
Restoration Actions	0.0	0.0	0.0	0.0	-2.7	0.0	135.6	-71.1	-26.8	0.0	0.0	0.0	0.0	-35.0	0.0		
<b>Post-Restoration</b>	<b>0.9</b>	<b>19.8</b>	<b>28.4</b>	<b>4.7</b>	<b>0.1</b>	<b>0.0</b>	<b>135.7</b>	<b>1.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>191.0</b>	<b>0.1</b>	<b>191.1</b>
% Increase/Decrease	0%	0%	0%	0%	-98%	0%	113960%	-98%	-100%	0%	0%	0%	0%	-100%	0%	0%	
<b>Bridge Segment 13</b>																	
1998 Total Acres	113.0	253.9	369.8	163.4	267.1	1581.7	934.0	2810.5	276.1	2800.8	10007.1	848.9	1326.2	219.3	21971.8	3110.7	25082.5
<b>Alternative Habitats</b>																	800.0
<b>Total All Bridge Segments 1998</b>	<b>1406.1</b>	<b>9968.5</b>	<b>4282.2</b>	<b>1408.2</b>	<b>5709.9</b>	<b>35636.4</b>	<b>43034.6</b>	<b>34963.0</b>	<b>4201.9</b>	<b>22171.2</b>	<b>204728.8</b>	<b>19630.8</b>	<b>8413.2</b>	<b>1671.9</b>	<b>397226.7</b>	<b>36971.8</b>	<b>434198.5</b>
<b>TOTAL PRE-RESTORATION UNIT</b>	<b>13.4</b>	<b>760.6</b>	<b>45.0</b>	<b>149.2</b>	<b>588.7</b>	<b>122.0</b>	<b>1508.7</b>	<b>2584.9</b>	<b>357.2</b>	<b>0.0</b>	<b>315.3</b>	<b>38.1</b>	<b>118.0</b>	<b>52.6</b>	<b>6653.8</b>	<b>95.2</b>	<b>6749.0</b>
<b>TOTAL RESTORATION ACTIONS</b>	<b>0.0</b>	<b>258.5</b>	<b>0.0</b>	<b>-18.8</b>	<b>-468.8</b>	<b>-92.5</b>	<b>3024.8</b>	<b>-2010.1</b>	<b>-241.6</b>	<b>0.0</b>	<b>-273.8</b>	<b>-16.3</b>	<b>-118.0</b>	<b>-35.0</b>	<b>8.4</b>	<b>-8.4</b>	
<b>TOTAL POST-RESTORATION UNIT</b>	<b>13.4</b>	<b>1019.1</b>	<b>45.0</b>	<b>130.4</b>	<b>119.9</b>	<b>29.5</b>	<b>4533.6</b>	<b>574.8</b>	<b>115.6</b>	<b>0.0</b>	<b>41.5</b>	<b>21.8</b>	<b>0.0</b>	<b>17.6</b>	<b>6662.2</b>	<b>86.8</b>	<b>6749.0</b>
% Increase/Decrease	0%	34%	0%	-13%	-80%	-76%	200%	-78%	-68%	0%	-87%	-43%	-100%	-67%	0%	-9%	
<b>Total Bridge Segments with Restoration</b>	<b>1406.1</b>	<b>10227.0</b>	<b>4282.2</b>	<b>1389.3</b>	<b>5241.1</b>	<b>35543.9</b>	<b>46059.4</b>	<b>32952.9</b>	<b>3960.3</b>	<b>22171.2</b>	<b>204455.0</b>	<b>19614.5</b>	<b>8295.2</b>	<b>1636.9</b>	<b>397235.1</b>	<b>36963.4</b>	<b>831433.6</b>
% Increase/Decrease	0.0%	2.6%	0.0%	-1.3%	-8.2%	-0.3%	7.0%	-5.7%	-5.7%	0.0%	-0.1%	-0.1%	-1.4%	-2.1%	0.0%	0.0%	0.0

## Channel Width Model

The GIS channel width model, was developed by a Biologist and a GIS Analyst with Reclamation, and was designed to determine the area of active channel that fall within predetermined channel width classes. The predetermined channel width classes were set by a biologist with the U.S. Fish and Wildlife Service and are areas where the channel width is >170, >250, >500, >750, or >1000 feet. The model, a program written Arc Macro Language (AML), produces five Arc/Info coverages, one for each channel width class. The method was initially developed to determine locations and amount of open channels with unobstructed views that existed in the 1998 Land Cover/Use GIS database (Friesen et al), or commonly referred to present condition in the Final Environmental Impact Statement (FEIS). Additional uses of the original method are to calculate the effect that management alternatives outlined in the FEIS will have on channel width.

Metadata prepared for this model, describes in detail the program written in Arc Macro Language (AML) called chwidth.aml. For purposes of this model the active channels are defined as any area in the 1998 Land Cover/Use (LCLU) GIS database defined as 'Wetted Channel' (veg\_code = 2). The area is contained by the north and south banks of the Platte River and includes all river channels. The area extends west to east for approximately 90-miles from Lexington, Nebraska downstream to Chapman, Nebraska. For this model all vegetated islands were considered an obstruction and all un-vegetated islands coded as barren beach/bar in the 1998 LCLU were not considered an obstruction.

The model was used to first determine the present conditions of the Platte River using the 1998 Land Cover/Use GIS database (table 14).

Table14 – Channel width values Present Condition.

Segment	Segment Length (ft)	Total Channel Area	Avg. Total Channel Width	Area >170'	Area <170'	Area 171' - 250'	Area 251' - 500'	Area 501' - 750'	Area 751' - 1000'	Area >1000'
1	52800.0	1864.6	1538.3	1457.8	406.8	209.8	383.6	238.7	326.5	299.2
2	38544.0	846.5	956.6	536.0	310.5	158.2	235.2	86.0	56.7	0.0
3	35904.0	968.8	1175.4	739.2	229.6	163.7	221.1	223.9	80.7	49.8
4	27456.0	718.4	1139.7	580.2	138.2	104.2	168.6	198.6	108.8	0.0
5	46464.0	946.1	886.9	742.0	204.1	177.6	326.5	135.2	102.7	0.0
6	31680.0	703.4	967.2	521.4	182.0	108.1	241.7	119.0	52.6	0.0
7	31152.0	722.8	1010.7	576.9	145.8	123.4	164.8	203.2	85.4	0.0
8	37488.0	779.9	906.2	520.2	259.7	179.0	248.8	92.4	0.0	0.0
9	47520.0	888.5	814.5	574.6	313.9	171.0	312.2	80.5	10.9	0.0
10	36432.0	643.5	769.4	536.2	107.3	43.3	142.9	239.5	110.4	0.0
11	44880.0	837.6	812.9	517.2	320.4	173.6	274.4	24.0	45.2	0.0
12	41712.0	644.3	672.8	369.6	274.6	160.6	161.6	47.4	0.0	0.0
13	40128.0	344.7	374.1	232.4	112.3	95.6	136.8	0.0	0.0	0.0
<b>Totals</b>	<b>512160.0</b>	<b>10908.9</b>	<b>12024.8</b>	<b>7903.6</b>	<b>3005.3</b>	<b>1868.0</b>	<b>3018.3</b>	<b>1688.5</b>	<b>979.9</b>	<b>349.0</b>

## Methods for Action Alternatives

The channel width analysis is used to measure the affect the action alternatives outlined in the FEIS have on creating wide, open channels. To accomplish this, we first selected the polygons, from the GIS land plans developed for the FEIS, that are converted to wetted channel or bare sand which. These polygons have mgt\_code values of 2, 3, 5, 6, 8, 9, 12, and/or 16 (table 4). Then the selected land plan polygons were removed from the river as they were no longer considered an obstruction. This task was completed on all the action alternatives and the resulting coverages were used into the channel width program. Each alternative is listed below with a table that represents the output for this analysis. For more detailed information please see metadata specifically produced for this analysis, by contacting the Platte River EIS office, PO Box 25007, Mail Code PL-100, Denver, CO 80225-0007.

## Governance Committee and Full Water Leasing Alternative

The GC & Full Water Leasing Alternatives consisted of restoring habitat and converting islands to bare sand or wetted channel. Table 15 illustrates the results from the channel width analysis for these two alternatives.

Table 15 – Channel width values for Governance Committee Alternative & Full Water Leasing

Segment	Segment Length (ft)	Total Channel Area	Avg. Total Channel Width	Area >170'	Area <170'	Area 171' - 250'	Area 251' - 500'	Area 501'-- 750'	Area 751' - 1000'	Area >1000'
1	52800.0	1945.9	1605.4	1566.8	379.1	195.5	351.9	256.1	432.8	330.6
2	38544.0	846.2	956.3	536.0	310.2	158.2	235.2	86.0	56.7	0.0
3	35904.0	968.8	1175.4	739.4	229.4	163.8	221.2	223.9	82.4	48.1
4	27456.0	717.9	1139.0	580.3	137.7	104.1	168.8	198.6	108.8	0.0
5	46464.0	945.9	886.7	742.0	203.9	177.6	326.5	135.2	102.7	0.0
6	31680.0	757.7	1041.8	596.7	161.0	94.5	195.5	145.9	117.7	43.1
7	31152.0	722.8	1010.7	577.0	145.8	123.4	164.9	203.2	85.4	0.0
8	37488.0	820.5	953.4	573.3	247.2	171.4	259.3	127.0	15.7	0.0
9	47520.0	967.5	886.9	672.3	295.1	135.3	290.5	185.5	61.1	0.0
10	36432.0	643.5	769.4	536.3	107.1	43.1	143.3	239.5	110.4	0.0
11	44880.0	917.0	890.0	618.7	298.3	146.2	262.1	130.8	79.6	0.0
12	41712.0	644.3	672.8	369.9	274.3	160.9	161.7	47.4	0.0	0.0
13	40128.0	344.5	373.9	232.5	112.0	95.7	136.8	0.0	0.0	0.0
<b>Totals</b>	<b>512160.0</b>	<b>11242.4</b>	<b>12361.8</b>	<b>8341.2</b>	<b>2901.2</b>	<b>1769.6</b>	<b>2917.6</b>	<b>1979.1</b>	<b>1253.2</b>	<b>421.8</b>

## Water Emphasis Alternative

The Water Emphasis Alternative consists of the same land plan elements in bridge segments 1, 9, 11 & 12 of the GC alternative. Table 16 illustrates the results from the channel width analysis for the this alternative.

Table 16 – Channel width values for Water Emphasis Alternative

Segment	Segment Length (ft)	Total Channel Area	Avg. Total Channel Width	Area >170'	Area <170'	Area 171' - 250'	Area 251' - 500'	Area 501'-- 750'	Area 751' - 1000'	Area >1000'
1	52800.0	1945.9	1605.4	1566.8	379.1	195.5	351.9	256.1	432.8	330.6
2	38544.0	846.5	956.6	536.0	310.5	158.2	235.2	86.0	56.7	0.0
3	35904.0	968.8	1175.4	739.4	229.4	163.7	221.1	223.9	80.7	49.8
4	27456.0	718.4	1139.7	580.3	138.1	104.2	168.6	198.6	108.8	0.0
5	46464.0	946.1	886.9	742.0	204.1	177.6	326.5	135.2	102.7	0.0
6	31680.0	703.4	967.2	596.7	106.7	108.1	241.7	119.0	52.6	0.0
7	31152.0	722.8	1010.7	577.0	145.8	123.4	164.8	203.2	85.4	0.0
8	37488.0	779.9	906.2	573.3	206.6	179.0	248.8	92.4	0.0	0.0
9	47520.0	967.5	886.9	672.3	295.1	135.3	290.5	185.5	61.1	0.0
10	36432.0	643.5	769.4	536.3	107.1	43.3	142.9	239.5	110.4	0.0
11	44880.0	917.0	890.0	618.7	298.3	146.2	262.1	130.8	79.6	0.0
12	41712.0	644.3	672.8	369.9	274.3	160.9	161.7	47.4	0.0	0.0
13	40128.0	344.7	374.1	232.5	112.2	95.6	136.8	0.0	0.0	0.0
<b>Totals</b>	<b>512160.0</b>	<b>11148.6</b>	<b>12241.4</b>	<b>8341.2</b>	<b>2807.4</b>	<b>1790.9</b>	<b>2952.5</b>	<b>1917.6</b>	<b>1170.7</b>	<b>380.4</b>

## Wet Meadow Alternative

The Wet Meadow Alternative consists of management similar to Governance Committee Alternative except for an increase in wet meadow restoration. Table 17 illustrates the changes in channel width from present condition for the wet meadow alternative.

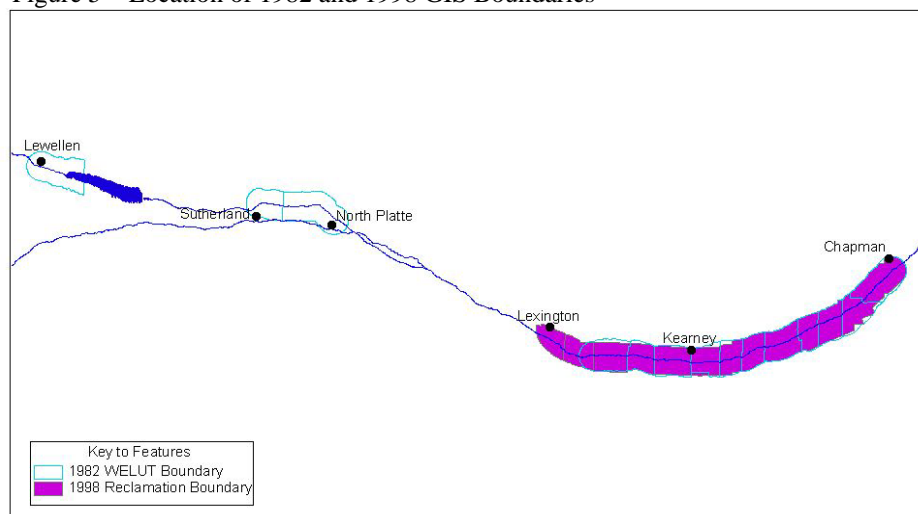
Table 17 – Channel width values for Wet Meadow Alternative

Segment	Segment Length (ft)	Total Channel Area	Avg. Total Channel Width	Area >170'	Area <170'	Area 171' - 250'	Area 251' - 500'	Area 501'-- 750'	Area 751' - 1000'	Area >1000'
1	52800.0	1945.9	1605.4	1566.8	379.1	195.5	351.9	256.1	432.8	330.6
2	38544.0	916.8	1036.2	631.4	285.4	142.4	191.6	34.2	154.0	109.2
3	35904.0	968.5	1175.1	739.4	229.1	163.8	221.2	223.9	82.4	48.1
4	27456.0	717.9	1139.0	580.3	137.6	104.1	168.8	198.6	108.8	0.0
5	46464.0	945.9	886.7	742.0	203.9	177.6	326.5	135.2	102.7	0.0
6	31680.0	757.7	1041.8	596.7	161.0	94.5	195.5	145.9	117.7	43.1
7	31152.0	722.8	1010.7	577.0	145.8	123.4	164.9	203.2	85.4	0.0
8	37488.0	820.5	953.4	573.3	247.2	171.3	259.4	127.0	15.7	0.0
9	47520.0	982.1	900.3	690.0	292.1	133.0	282.1	194.7	80.2	0.0
10	36432.0	699.5	836.3	610.7	88.7	29.2	93.0	248.7	175.2	64.6
11	44880.0	917.0	890.0	618.7	298.3	146.2	262.1	130.8	79.6	0.0
12	41712.0	644.3	672.8	369.9	274.3	160.9	161.7	47.4	0.0	0.0
13	40128.0	344.5	373.9	232.5	112.0	95.7	136.8	0.0	0.0	0.0
<b>Totals</b>	<b>512160.0</b>	<b>11383.4</b>	<b>12521.6</b>	<b>8528.8</b>	<b>2854.6</b>	<b>1737.5</b>	<b>2815.5</b>	<b>1945.7</b>	<b>1434.4</b>	<b>595.6</b>

## 1982 & 1998 Trend Analysis

A land cover/use database was created in 1982 by Western Energy and Land Use Team (WELUT) for the Platte River Whooping Crane Maintenance Trust. The 1982 database extends from just upstream of Overton, Nebraska downstream to Chapman, Nebraska and contains three other bridge segments upstream of Overton near North Platte, Sutherland, and Lewellen. For purposes of comparing the 1982 and 1998 database we ignored the 3 sites upstream and clipped the 1998 database to the 1982 boundary. Figure 5 shows the boundaries for the two datasets.

Figure 5—Location of 1982 and 1998 GIS Boundaries



Limitation of the trend analysis is that the 1982 database was completed under different mapping standards. The 1982 LCLU database had fewer vegetation and land use values, and delineation of vegetation types during photo interpretation is at a different level of detail. However, both minimum mapping units (MMUs) are the same ½ an acre. In addition flow levels of the Platte River during the two years of photography vary some. On September 2 & 3, 1982 (date of aerial photography) recorded flow levels ranged from 172 cfs to 349 cfs. On August 19, 21 & 24, 1998 (date of aerial photography) recorded flow levels ranged from 325cfs to 1030cfs.

To identify the change in habitat, vegetation and land use we first measured the change in channel width using the channel width model. Table 18 and table 19 depict the channel width analysis for trends between the 1982 and 1998 databases.

Table 18 – Channel width values for the 1982 WELUT database

Segment	Total Channel Area	>170'	<170'	171' -- 250'	251' -- 500'	501'-- 750'	751' -- 1000'	>1000'
1	1707.1	1191.3	515.8	232.0	530.8	250.7	150.1	27.7
2	769.2	476.0	293.3	126.3	250.7	99.0	0.0	0.0
3	933.7	722.2	211.5	136.7	223.1	225.3	137.1	0.0
4	608.8	412.2	196.6	110.8	211.3	66.7	23.4	0.0
5	877.0	609.7	267.3	176.3	355.8	55.4	22.3	0.0
6	683.7	437.1	246.7	156.6	211.2	69.2	0.0	0.0
7	669.5	380.4	289.1	158.7	129.5	24.8	16.8	50.6
8	616.0	275.4	340.6	139.1	114.9	21.4	0.0	0.0
9	788.8	417.2	371.6	191.1	209.8	16.4	0.0	0.0
10	604.7	436.7	168.0	69.9	197.7	124.3	44.8	0.0
11	1000.9	538.7	462.2	259.5	241.8	37.4	0.0	0.0
12	301.3	193.9	107.4	66.3	63.3	64.4	0.0	0.0
<b>Totals</b>	<b>9560.8</b>	<b>6090.8</b>	<b>3470.0</b>	<b>1823.3</b>	<b>2739.9</b>	<b>1054.8</b>	<b>394.4</b>	<b>78.3</b>

Table 19—Channel width values for 1998 clipped to 1982 boundary

Segment	Total Channel Area	>170'	<170'	171' -- 250'	251' -- 500'	501'-- 750'	751' -- 1000'	>1000'
1	1865.0	1458.0	407.0	210.0	384.0	239.0	327.0	299.0
2	846.0	536.0	311.0	158.0	235.0	86.0	57.0	0.0
3	969.0	739.0	230.0	164.0	221.0	224.0	81.0	50.0
4	718.0	580.0	138.0	104.0	169.0	199.0	109.0	0.0
5	946.0	742.0	204.0	178.0	326.0	135.0	103.0	0.0
6	703.0	521.0	182.0	108.0	242.0	119.0	53.0	0.0
7	723.0	577.0	146.0	123.0	165.0	203.0	85.0	0.0
8	780.0	520.0	260.0	178.0	250.0	92.0	0.0	0.0
9	888.0	575.0	314.0	172.0	312.0	81.0	11.0	0.0
10	643.0	536.0	107.0	43.0	143.0	239.0	110.0	0.0
11	838.0	517.0	320.0	174.0	274.0	24.0	45.0	0.0
12	348.2	234.1	114.1	76.5	110.2	47.4	0.0	0.0
<b>Totals</b>	<b>10267.2</b>	<b>7535.1</b>	<b>2733.1</b>	<b>1688.5</b>	<b>2831.2</b>	<b>1688.4</b>	<b>981.0</b>	<b>349.0</b>

Second we compared the changes in vegetation and land cover use from 1982 to 1998. Some difficulties did surface in comparing these two databases as the land cover/use attributes were not exactly alike.

Therefore a cross walk between the two databases was developed and an attribute called ‘Tcode’ was added to the 1998 LCLU GIS database. Table 20 shows the attribute values and the cross walk between the two.

Table 20 —1982 to 1998 Vegetation Code Crosswalk

1982 Veg_Code (1998 Tcode)	1982 Veg_Desc	1998 Veg_Code	1998 Veg_Desc
1	Emergents: Any emergent "wet grassland"	1	Emergents
2	Channel	2	Wetted Channel
		4	Open Water Slough
5	Open Water	3	Open Water Canal (large only)
		5	Open Water Pit, Pond, or Lake
		7	Open Water (e.g., creek, small canals)
6	Beach/Bar	6	Barren Beach/Bar
		43	(Unvegetated Island--separate coverage)
8	Herbaceous on Island		
9	Shrubs on Island	10	Shrubs inside Floodplain
10	Shrubs inside Floodplain		
11	Grassland	11	Upland Grasses
		18	Herbaceous Riparian
12	Herbaceous; also known as "wet meadows"	12	Lowland Grasses
		17	Mown Lowland Grasses
		18	Herbaceous Riparian
14	Woody on Island	15	Wooded River within Floodplain
15	Woody		
16	Woods/Shrubs	13	Shrubs outside Floodplain
		16	Woody outside Floodplain
20	Alfalfa	20	Agriculture Alfalfa
21	Corn	21	Agriculture Corn
22	Other Crops	22	Agriculture Other Crops
		23	Agriculture Bare Ground/Fallow
		24	Agriculture Soy Bean
		25	Agriculture Mown Field
		26	Agriculture Winter Wheat
30	Bridge	30	Bridge
31	Commercial Development	31	Development Commercial
		42	Barren Surface (will recode non- urban polys)
32	Urban Development	32	Development Residential
33	Single Dwelling	33	Development Single Dwelling
34	Powerline	34	Powerline

35	Gravel Road	35	Road Gravel
37	Paved Road	36	Road Interstate
		37	Road Paved
38	Railroad	38	Railroad
39	Private Road	39	Other Road
40	Sand/Gravel Operation	40	Sand/Gravel Areas
		41	Sand/Gravel Operation
50	Floodplain	50	Floodplain

As in the channel width analysis when comparing these two datasets the 1998 land cover/use coverage was clipped to the 1982 boundary (figure 5). Table 21 shows the acres and percent land cover that were calculated by bridge segment for this analysis.

Table 21– Trend analysis between 1982 and 1998 Land Cover/Use Databases by GIS bridge Segment

<b>Segment 1</b>		<b>Trends 1982</b>		<b>Trends 1998</b>	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	789	1.4%	62.1	0.1%
2	Wetted Channel	1431.7	2.6%	1826.6	3.3%
5	Open Water	639.6	1.2%	589.1	1.1%
6	Barren Beach/Bar	282	0.5%	36.4	0.1%
10	Shrubs inside floodplain	792.3	1.4%	616.4	1.1%
11	Upland Grasses	6476.4	11.8%	4861.0	8.8%
12	Lowland Grasses	3287.6	6.0%	5351.3	9.7%
15	Wooded River within floodplain	2908.9	5.3%	4760.1	8.6%
16	Woody outside floodplain	1432.5	2.6%	1184.4	2.2%
20	Agriculture Alfalfa	2771.6	5.0%	1007.4	1.8%
21	Agriculture Corn	23384.2	42.5%	25566.8	46.4%
22	Agriculture Other Crops	6532.2	11.9%	5475.2	9.9%
30	Bridge	0.0	0.0%	1.8	0.0%
31	Development Commercial	255.2	0.5%	368.9	0.7%
32	Development Residential	1065.4	1.9%	1001.7	1.8%
33	Development Single Dwelling	899.9	1.6%	491.9	0.9%
34	Powerline	139.9	0.3%	20.3	0.0%
35	Road Gravel	1163.9	2.1%	1096.7	2.0%
37	Road Paved	317.3	0.6%	319.2	0.6%
38	Railroad	103.9	0.2%	237.9	0.4%
39	Other Road	41.3	0.1%	13.3	0.0%
40	Sand/Gravel Operation	357.7	0.6%	184.0	0.3%
	Totals	55072.5	100.0%	55072.5	100.0%

<b>Segment 2</b>		<b>Trends 1982</b>		<b>Trends 1998</b>	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	72	0.2%	61.0	0.2%
2	Wetted Channel	686.4	2.2%	819.2	2.6%
5	Open Water	322.3	1.0%	350.4	1.1%
6	Barren Beach/Bar	88	0.3%	29.6	0.1%
10	Shrubs inside floodplain	386.6	1.2%	273.0	0.9%
11	Upland Grasses	1714.3	5.5%	1872.1	6.0%



12	Lowland Grasses	3226.0	10.3%	4062.8	13.0%
15	Wooded River within floodplain	1187.7	3.8%	1770.8	5.7%
16	Woody outside floodplain	346.5	1.1%	471.4	1.5%
20	Agriculture Alfalfa	1726.3	5.5%	343.7	1.1%
21	Agriculture Corn	15255.2	48.8%	15425.8	49.3%
22	Agriculture Other Crops	2577.3	8.2%	2944.0	9.4%
30	Bridge	11.3	0.0%	6.4	0.0%
31	Development Commercial	455.1	1.5%	399.5	1.3%
32	Development Residential	1420.0	4.5%	656.7	2.1%
33	Development Single Dwelling	491.8	1.6%	381.8	1.2%
34	Powerline	16.0	0.1%	4.5	0.0%
35	Road Gravel	476.0	1.5%	570.8	1.8%
37	Road Paved	630.9	2.0%	666.4	2.1%
38	Railroad	95.2	0.3%	49.6	0.2%
39	Other Road	4.6	0.0%	17.7	0.1%
40	Sand/Gravel Operation	80.7	0.3%	93.0	0.3%
	Totals	31270.3	100.0%	31270.3	100.0%

Segment 3		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	56	0.2%	160.2	0.5%
2	Wetted Channel	636.5	1.9%	968.5	3.0%
5	Open Water	410.1	1.3%	539.8	1.6%
6	Barren Beach/Bar	298	0.9%	16.6	0.1%
10	Shrubs inside floodplain	299.6	0.9%	285.4	0.9%
11	Upland Grasses	3186.4	9.7%	2914.7	8.9%
12	Lowland Grasses	4472.7	13.7%	5940.3	18.2%
15	Wooded River within floodplain	1092.2	3.3%	1455.2	4.4%
16	Woody outside floodplain	778.6	2.4%	614.9	1.9%
20	Agriculture Alfalfa	2107.9	6.4%	510.4	1.6%
21	Agriculture Corn	14167.3	43.3%	15263.2	46.6%
22	Agriculture Other Crops	3306.8	10.1%	2266.4	6.9%
30	Bridge	4.7	0.0%	2.6	0.0%
31	Development Commercial	94.9	0.3%	172.1	0.5%
32	Development Residential	96.5	0.3%	130.4	0.4%
33	Development Single Dwelling	462.3	1.4%	300.7	0.9%
34	Powerline	0.0	0.0%	0.0	0.0%
35	Road Gravel	507.2	1.6%	440.4	1.3%
37	Road Paved	417.8	1.3%	569.6	1.7%
38	Railroad	0.0	0.0%	0.0	0.0%
39	Other Road	5.2	0.0%	19.7	0.1%
40	Sand/Gravel Operation	318.4	1.0%	148.1	0.5%
	Totals	32719.3	100.0%	32719.3	100.0%

Segment 4		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	114	0.5%	63.6	0.3%
2	Wetted Channel	465.1	1.9%	702.5	2.8%
5	Open Water	98.7	0.4%	137.4	0.5%
6	Barren Beach/Bar	143	0.6%	19.2	0.1%

10	Shrubs inside floodplain	164.6	0.7%	253.8	1.0%
11	Upland Grasses	3558.0	14.2%	3250.0	13.0%
12	Lowland Grasses	2332.9	9.3%	2800.9	11.2%
15	Wooded River within floodplain	965.8	3.9%	1271.9	5.1%
16	Woody outside floodplain	587.1	2.3%	292.0	1.2%
20	Agriculture Alfalfa	1054.5	4.2%	591.2	2.4%
21	Agriculture Corn	10731.7	42.9%	12488.5	49.9%
22	Agriculture Other Crops	3626.3	14.5%	2107.5	8.4%
30	Bridge	1.3	0.0%	0.7	0.0%
31	Development Commercial	139.2	0.6%	40.9	0.2%
32	Development Residential	0.0	0.0%	8.3	0.0%
33	Development Single Dwelling	288.5	1.2%	174.1	0.7%
34	Powerline	0.0	0.0%	0.4	0.0%
35	Road Gravel	281.8	1.1%	381.0	1.5%
37	Road Paved	368.9	1.5%	361.7	1.4%
38	Railroad	0.0	0.0%	0.0	0.0%
39	Other Road	0.0	0.0%	11.3	0.0%
40	Sand/Gravel Operation	111.2	0.4%	75.3	0.3%
Totals		25032.5	100.0%	25032.5	100.0%

Segment 5		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	162	0.4%	63.2	0.2%
2	Wetted Channel	686.6	1.6%	907.2	2.2%
5	Open Water	192.1	0.5%	251.5	0.6%
6	Barren Beach/Bar	191	0.5%	53.9	0.1%
10	Shrubs inside floodplain	288.2	0.7%	482.8	1.2%
11	Upland Grasses	6316.0	15.1%	6713.3	16.0%
12	Lowland Grasses	735.3	1.8%	712.2	1.7%
15	Wooded River within floodplain	1929.9	4.6%	2330.8	5.6%
16	Woody outside floodplain	1066.9	2.5%	402.5	1.0%
20	Agriculture Alfalfa	792.0	1.9%	514.0	1.2%
21	Agriculture Corn	24276.1	57.9%	24105.2	57.5%
22	Agriculture Other Crops	3335.8	8.0%	3577.8	8.5%
30	Bridge	1.2	0.0%	1.3	0.0%
31	Development Commercial	9.2	0.0%	45.4	0.1%
32	Development Residential	0.0	0.0%	10.8	0.0%
33	Development Single Dwelling	403.6	1.0%	197.0	0.5%
34	Powerline	0.0	0.0%	0.0	0.0%
35	Road Gravel	767.8	1.8%	826.5	2.0%
37	Road Paved	496.2	1.2%	483.8	1.2%
38	Railroad	122.0	0.3%	124.0	0.3%
39	Other Road	6.7	0.0%	10.0	0.0%
40	Sand/Gravel Operation	120.2	0.3%	86.2	0.2%
Totals		41899.5	100.0%	41899.5	100.0%

Segment 6		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	342	1.2%	179.3	0.6%
2	Wetted Channel	587.5	2.1%	688.2	2.4%

5	Open Water	126.8	0.4%	171.2	0.6%
6	Barren Beach/Bar	98	0.3%	24.7	0.1%
10	Shrubs inside floodplain	238.0	0.8%	255.1	0.9%
11	Upland Grasses	2549.7	9.0%	2839.5	10.1%
12	Lowland Grasses	593.6	2.1%	889.9	3.2%
15	Wooded River within floodplain	1313.2	4.7%	1488.6	5.3%
16	Woody outside floodplain	790.9	2.8%	331.4	1.2%
20	Agriculture Alfalfa	1722.8	6.1%	883.6	3.1%
21	Agriculture Corn	15864.3	56.2%	16810.7	59.6%
22	Agriculture Other Crops	2547.4	9.0%	2246.8	8.0%
30	Bridge	0.7	0.0%	0.2	0.0%
31	Development Commercial	106.8	0.4%	93.8	0.3%
32	Development Residential	52.8	0.2%	93.4	0.3%
33	Development Single Dwelling	401.4	1.4%	272.0	1.0%
34	Powerline	0.0	0.0%	0.0	0.0%
35	Road Gravel	484.1	1.7%	527.1	1.9%
37	Road Paved	302.1	1.1%	300.0	1.1%
38	Railroad	70.5	0.2%	77.6	0.3%
39	Other Road	5.3	0.0%	8.0	0.0%
40	Sand/Gravel Operation	14.1	0.0%	31.5	0.1%
	Totals	28212.7	100.0%	28212.7	100.0%

Segment 7		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	356	1.3%	149.1	0.6%
2	Wetted Channel	545.3	2.0%	706.8	2.6%
5	Open Water	120.8	0.4%	167.8	0.6%
6	Barren Beach/Bar	124	0.5%	19.8	0.1%
10	Shrubs inside floodplain	146.3	0.5%	410.1	1.5%
11	Upland Grasses	3393.8	12.6%	3232.1	12.0%
12	Lowland Grasses	2103.0	7.8%	2085.4	7.8%
15	Wooded River within floodplain	1725.8	6.4%	1528.9	5.7%
16	Woody outside floodplain	522.6	1.9%	366.1	1.4%
20	Agriculture Alfalfa	2108.2	7.8%	1554.1	5.8%
21	Agriculture Corn	12469.7	46.4%	14399.4	53.6%
22	Agriculture Other Crops	2075.9	7.7%	1009.8	3.8%
30	Bridge	3.3	0.0%	0.8	0.0%
31	Development Commercial	59.6	0.2%	83.0	0.3%
32	Development Residential	79.8	0.3%	149.5	0.6%
33	Development Single Dwelling	269.4	1.0%	255.9	1.0%
34	Powerline	0.0	0.0%	4.4	0.0%
35	Road Gravel	330.2	1.2%	332.0	1.2%
37	Road Paved	385.8	1.4%	337.0	1.3%
38	Railroad	0.0	0.0%	4.3	0.0%
39	Other Road	8.2	0.0%	15.3	0.1%
40	Sand/Gravel Operation	57.7	0.2%	74.2	0.3%
	Totals	26885.6	100.0%	26885.6	100.0%

Segment 8		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%

1	Emergents	161	0.5%	28.9	0.1%
2	Wetted Channel	432.5	1.4%	719.5	2.3%
5	Open Water	388.3	1.3%	432.9	1.4%
6	Barren Beach/Bar	200	0.7%	69.2	0.2%
10	Shrubs inside floodplain	387.6	1.3%	490.4	1.6%
11	Upland Grasses	2458.4	8.0%	2367.8	7.7%
12	Lowland Grasses	1382.0	4.5%	1483.1	4.8%
15	Wooded River within floodplain	1853.0	6.0%	2060.9	6.7%
16	Woody outside floodplain	351.6	1.1%	287.7	0.9%
20	Agriculture Alfalfa	2181.0	7.1%	978.4	3.2%
21	Agriculture Corn	15903.8	51.7%	16335.9	53.1%
22	Agriculture Other Crops	1443.3	4.7%	2014.8	6.6%
30	Bridge	0.7	0.0%	2.0	0.0%
31	Development Commercial	796.4	2.6%	787.9	2.6%
32	Development Residential	1170.3	3.8%	1106.4	3.6%
33	Development Single Dwelling	457.7	1.5%	241.1	0.8%
34	Powerline	2.8	0.0%	0.0	0.0%
35	Road Gravel	446.7	1.5%	416.7	1.4%
37	Road Paved	414.4	1.3%	605.1	2.0%
38	Railroad	31.8	0.1%	124.6	0.4%
39	Other Road	0.0	0.0%	15.0	0.0%
40	Sand/Gravel Operation	295.6	1.0%	190.6	0.6%
	Totals	30759.0	100.0%	30759.0	100.0%

Segment 9		Trends 1982		Trends 1998	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	257	0.6%	101.3	0.3%
2	Wetted Channel	352.2	0.9%	792.1	2.0%
5	Open Water	427.2	1.1%	414.8	1.0%
6	Barren Beach/Bar	451	1.1%	148.6	0.4%
10	Shrubs inside floodplain	291.5	0.7%	718.8	1.8%
11	Upland Grasses	10790.5	27.1%	10280.4	25.8%
12	Lowland Grasses	580.4	1.5%	459.6	1.2%
15	Wooded River within floodplain	2960.3	7.4%	3001.9	7.5%
16	Woody outside floodplain	925.0	2.3%	599.5	1.5%
20	Agriculture Alfalfa	3493.9	8.8%	3289.4	8.2%
21	Agriculture Corn	12522.4	31.4%	13492.4	33.8%
22	Agriculture Other Crops	3226.9	8.1%	2841.4	7.1%
30	Bridge	1.2	0.0%	0.6	0.0%
31	Development Commercial	600.5	1.5%	590.5	1.5%
32	Development Residential	1319.7	3.3%	1393.4	3.5%
33	Development Single Dwelling	344.3	0.9%	292.5	0.7%
34	Powerline	16.9	0.0%	0.0	0.0%
35	Road Gravel	424.4	1.1%	310.4	0.8%
37	Road Paved	578.5	1.5%	738.0	1.9%
38	Railroad	126.0	0.3%	157.4	0.4%
39	Other Road	6.6	0.0%	28.2	0.1%
40	Sand/Gravel Operation	181.3	0.5%	226.0	0.6%
	Totals	39877.1	100.0%	39877.1	100.0%

<b>Segment 10</b>		<b>Trends 1982</b>		<b>Trends 1998</b>	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	65	0.2%	113.6	0.4%
2	Wetted Channel	245.7	0.9%	600.6	2.2%
5	Open Water	338.1	1.2%	390.1	1.4%
6	Barren Beach/Bar	362	1.3%	71.8	0.3%
10	Shrubs inside floodplain	205.7	0.7%	262.4	0.9%
11	Upland Grasses	3848.9	13.9%	3861.9	14.0%
12	Lowland Grasses	480.8	1.7%	1554.2	5.6%
15	Wooded River within floodplain	2766.2	10.0%	2147.0	7.8%
16	Woody outside floodplain	533.2	1.9%	348.9	1.3%
20	Agriculture Alfalfa	4853.3	17.5%	2820.6	10.2%
21	Agriculture Corn	11229.6	40.6%	11004.4	39.8%
22	Agriculture Other Crops	1388.7	5.0%	3160.3	11.4%
30	Bridge	1.4	0.0%	0.4	0.0%
31	Development Commercial	8.6	0.0%	18.1	0.1%
32	Development Residential	46.9	0.2%	52.4	0.2%
33	Development Single Dwelling	161.6	0.6%	119.8	0.4%
34	Powerline	66.8	0.2%	0.0	0.0%
35	Road Gravel	256.2	0.9%	403.1	1.5%
37	Road Paved	441.6	1.6%	426.9	1.5%
38	Railroad	80.6	0.3%	137.2	0.5%
39	Other Road	9.9	0.0%	23.6	0.1%
40	Sand/Gravel Operation	265.9	1.0%	138.8	0.5%
	Totals	27656.2	100.0%	27656.2	100.0%

<b>Segment 11</b>		<b>Trends 1982</b>		<b>Trends 1998</b>	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	150	0.4%	177.6	0.5%
2	Wetted Channel	434.7	1.1%	664.0	1.7%
5	Open Water	256.4	0.7%	269.4	0.7%
6	Barren Beach/Bar	569	1.5%	212.6	0.6%
10	Shrubs inside floodplain	217.1	0.6%	462.0	1.2%
11	Upland Grasses	3415.0	9.0%	3260.4	8.6%
12	Lowland Grasses	1568.5	4.1%	2372.4	6.2%
15	Wooded River within floodplain	3580.6	9.4%	3230.0	8.5%
16	Woody outside floodplain	783.5	2.1%	570.9	1.5%
20	Agriculture Alfalfa	5513.4	14.5%	4118.0	10.8%
21	Agriculture Corn	15872.5	41.7%	15906.8	41.8%
22	Agriculture Other Crops	3700.6	9.7%	4746.1	12.5%
30	Bridge	1.1	0.0%	1.7	0.0%
31	Development Commercial	122.3	0.3%	74.6	0.2%
32	Development Residential	187.3	0.5%	208.6	0.5%
33	Development Single Dwelling	395.5	1.0%	256.0	0.7%
34	Powerline	0.0	0.0%	0.0	0.0%
35	Road Gravel	498.8	1.3%	744.0	2.0%
37	Road Paved	601.3	1.6%	521.3	1.4%
38	Railroad	103.0	0.3%	128.1	0.3%
39	Other Road	14.1	0.0%	16.1	0.0%
40	Sand/Gravel Operation	84.3	0.2%	127.6	0.3%

Totals		38068.3	100.0%	38068.3	100.0%
<b>Segment 12</b>		<b>Trends 1982</b>		<b>Trends 1998</b>	
Veg Code	Veg Type	Acres	%	Acres	%
1	Emergents	111	0.9%	67.8	0.5%
2	Wetted Channel	147.7	1.2%	242.3	1.9%
5	Open Water	153.3	1.2%	133.0	1.1%
6	Barren Beach/Bar	259	2.1%	177.6	1.4%
10	Shrubs inside floodplain	132.1	1.1%	170.5	1.4%
11	Upland Grasses	1349.4	10.8%	1677.5	13.5%
12	Lowland Grasses	754.5	6.1%	639.0	5.1%
15	Wooded River within floodplain	1106.0	8.9%	988.3	7.9%
16	Woody outside floodplain	156.4	1.3%	132.2	1.1%
20	Agriculture Alfalfa	1523.9	12.2%	1337.6	10.7%
21	Agriculture Corn	5387.0	43.2%	5322.7	42.7%
22	Agriculture Other Crops	565.9	4.5%	865.8	6.9%
30	Bridge	1.5	0.0%	0.1	0.0%
31	Development Commercial	107.8	0.9%	13.7	0.1%
32	Development Residential	0.0	0.0%	0.0	0.0%
33	Development Single Dwelling	139.7	1.1%	114.7	0.9%
34	Powerline	0.0	0.0%	0.0	0.0%
35	Road Gravel	197.0	1.6%	332.9	2.7%
37	Road Paved	224.6	1.8%	173.6	1.4%
38	Railroad	0.0	0.0%	0.0	0.0%
39	Other Road	13.0	0.1%	0.0	0.0%
40	Sand/Gravel Operation	133.6	1.1%	73.3	0.6%
Totals		12462.4	100.0%	12462.4	100.0%

Table 22—Trend analysis without division into bridge segments.

<b>Trend Code (Tcode)</b>	<b>1982 Acres</b>	<b>1998 Acres</b>	<b>% Change</b>
Emergents	2633.8	1227.7	-53.4%
Wetted Channel	6652.0	9637.7	44.9%
Open Water	3473.6	3847.5	10.8%
Barren Beach/Bar	3065.3	880.0	-71.3%
Shrubs inside floodplain	3549.4	4680.7	31.9%
Upland Grasses	49057.0	47130.9	-3.9%
Lowland Grasses	21517.4	28351.2	31.8%
Wooded River within floodplain	23389.7	26034.4	11.3%
Woody outside floodplain	8274.6	5602.0	-32.3%
Agriculture Alfalfa	29848.8	17948.4	-39.9%
Agriculture Corn	177063.8	186121.9	5.1%
Agriculture Other Crops	34327.2	33255.9	-3.1%
Bridge	28.3	18.5	-34.6%
Development Commercial	2755.5	2688.6	-2.4%
Development Residential	5438.7	4811.6	-11.5%
Development Single Dwelling	4715.8	3097.4	-34.3%
Powerline	242.4	29.6	-87.8%
Road Gravel	5834.1	6381.5	9.4%

Road Paved	5179.4	5502.6	6.2%
Railroad	733.1	1040.5	41.9%
Other Road	114.9	178.2	55.1%
Sand/Gravel Operation	2020.7	1448.5	-28.3%

### **Tern & Plover Trend Analysis: 1938 to 1998**

This analysis consisted of comparing the current GIS land cover/use database (LCLU) from 1998 color-infrared aerial photography (CIR) with a GIS layer created, especially for this project, from 1938 B&W aerial photography. From the 1998 LCLU database we created a separate GIS coverage of wetted channel, barren beach bar, and vegetated island. The wetted channel and barren beach bar classes were dissolved into one class of wetted channel. For the 1938 database a GIS technician with the Bureau of Reclamation's Remote Sensing and Geographic Information Group (RSGIG) digitized the wetted channel and any vegetation islands from black and white aerial photography taken in 1938. Figure 6 shows an example of the 1998 and 1938 GIS coverages. The results show that there was a 65% decrease in wetted channel from 1938 to 1998 (table 23).

Figure 6 – Example of 1938 and 1998 coverage with associated aerial photography

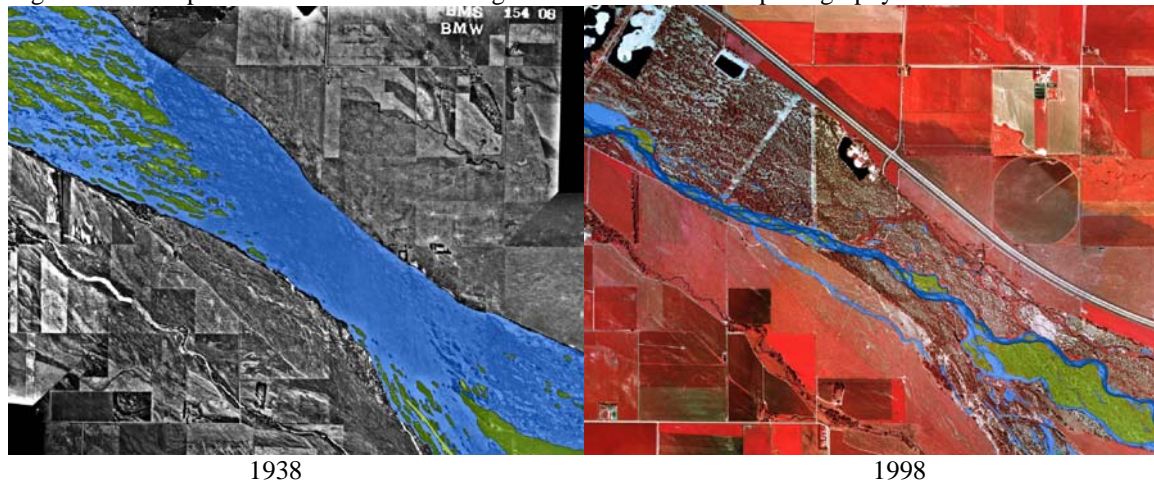


Table 23—Comparison of 1938 and 1998 Mapping Units

	<b>1938 River</b>	<b>1998 River</b>	<b>%Change</b>
<b>Mapping Unit</b>	<b>Acres</b>	<b>Acres</b>	
Vegetated Island	27,658	8,555	-69%
Wetted Channel	27,059	9,514	-65%

Tables 24 and 25 show channel width values for 1938 and 1998. Bridge segment 1, Chapman, Nebraska to Grand Island, Nebraska was not included in the analysis because of the limited coverage of the 1938 photographs in that bridge segment.

Table 24—Channel width values for 1938

<b>Segment</b>	<b>Segment Length (ft)</b>	<b>Total Channel Area</b>	<b>Avg. Total Channel Width</b>	<b>&gt;170'</b>	<b>&lt;170'</b>	<b>171' -- 250'</b>	<b>251' -- 500'</b>	<b>501' -- 750'</b>	<b>751' -- 1000'</b>	<b>&gt;1000'</b>
2	38544.0	1664.1	1880.7	1495.6	168.5	126.8	298.9	182.8	303.1	584.0

3	35904.0	1672.9	2029.6	1391.9	281.0	173.7	416.2	205.2	362.3	234.5
4	27456.0	1277.8	2027.3	1089.8	188.0	83.1	217.4	187.7	96.5	505.2
5	46464.0	2427.9	2276.2	2241.8	186.1	83.2	244.7	214.9	266.6	1432.4
6	31680.0	1791.1	2462.7	1744.5	46.6	16.3	82.4	47.9	61.5	1536.5
7	31152.0	1456.1	2036.0	1302.0	154.0	79.2	196.6	78.4	60.5	887.3
8	37488.0	2035.6	2365.3	1815.5	220.0	119.8	206.3	149.8	190.4	1149.2
9	47520.0	3871.0	3548.4	3507.4	363.5	199.3	423.4	186.7	136.1	2561.9
10	36432.0	2536.3	3032.5	2340.1	196.2	105.9	249.2	173.0	174.4	1637.6
11	44880.0	2996.9	2908.7	2496.5	500.4	327.2	863.0	368.8	150.6	786.8
12	41712.0	2709.5	2829.5	2358.7	350.8	160.9	343.4	376.8	416.4	1061.2
13	40128.0	2620.1	2844.2	2357.2	262.9	142.8	255.7	204.0	116.3	1638.3
Totals	512160.0	27611.4	30696.7	24658.2	2953.1	1632.2	3825.3	2421.0	2363.7	14415.9

Table 25—Channel width values for 1998 GIS Land Cover/Use

Segment	Segment Length (ft)	Total Channel Area	Avg. Total Channel Width	>170'	<170'	a 171' - 250'	251' - 500'	501' - 750'	751' - 1000'	>1000'
1	52800.0	1864.6	1538.3	1457.8	406.8	209.8	383.6	238.7	326.5	299.2
2	38544.0	846.5	956.6	536.0	310.5	158.2	235.2	86.0	56.7	0.0
3	35904.0	968.8	1175.4	739.2	229.6	163.7	221.1	223.9	80.7	49.8
4	27456.0	718.4	1139.7	580.2	138.2	104.2	168.6	198.6	108.8	0.0
5	46464.0	946.1	886.9	742.0	204.1	177.6	326.5	135.2	102.7	0.0
6	31680.0	703.4	967.2	521.4	182.0	108.1	241.7	119.0	52.6	0.0
7	31152.0	722.8	1010.7	576.9	145.8	123.4	164.8	203.2	85.4	0.0
8	37488.0	779.9	906.2	520.2	259.7	179.0	248.8	92.4	0.0	0.0
9	47520.0	888.5	814.5	574.6	313.9	171.0	312.2	80.5	10.9	0.0
10	36432.0	643.5	769.4	536.2	107.3	43.3	142.9	239.5	110.4	0.0
11	44880.0	837.6	812.9	517.2	320.4	173.6	274.4	24.0	45.2	0.0
12	41712.0	644.3	672.8	369.6	274.6	160.6	161.6	47.4	0.0	0.0
13	40128.0	344.7	374.1	232.4	112.3	95.6	136.8	0.0	0.0	0.0
Totals	512160.0	10908.9	12024.8	7903.6	3005.3	1868.0	3018.3	1688.5	979.9	349.0



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