

# ENVIRONMENTAL DOCUMENTATION

## CHAPTER 4—STATE THREATENED AND ENDANGERED SPECIES ASSESSMENT (PROGRAMMATIC)

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## CHAPTER 4—STATE THREATENED AND ENDANGERED SPECIES ASSESSMENT (PROGRAMMATIC)

### 1. INTRODUCTION

This assessment identifies the systemic and regional effects of various alternative concept plans for flood damage reduction (FDR) upon state-listed threatened and endangered (T&E) species within the Upper Mississippi River System (UMRS). The assessment addresses state-listed species that actually occur or potentially occur within the study area. The assessment relies heavily upon information derived from prior studies and reports covering the UMRs. The environmental impacts are being addressed at both system-wide and regional levels.

### 2. METHODOLOGY

The sequence of steps used in the assessment of potential impacts to State listed T&E species were as follows: (1) compilation of state protected species potentially present within the UMRs floodplain, (2) to the extent feasible, assignment of state T&E species to habitat or species guilds, (3) identification of the potential impact vectors (natural and man-made) of relevance to the study area's state-protected species, and (4) assessment of the potential impacts to the species/species guilds.

### 3. RESULTS

#### *Step 1. Compilation of State Protected Species Potentially Present within the UMRs Floodplain.*

All 5 states have lists of species they consider to be scarce. The term “endangered” is typically applied to denote a species that is threatened with extinction throughout all, or a major portion of its range within a state, while a species that is “threatened” is one likely to become endangered within the foreseeable future throughout all, or a significant portion of its range within the state. **Table 1** displays the number of plant and animal species listed as threatened or endangered for each of the five UMRCP states. These numbers represent all species listed for each state, whether or not they occur or may potentially occur within the UMRCP study area.

<b>Listed Species</b>	<b>Wisconsin</b>	<b>Minnesota</b>	<b>Iowa</b>	<b>Illinois</b>	<b>Missouri</b>
<b>Fish</b>	21	21	15	31	52
<b>Mussels</b>	18	30	14	27	24
<b>Invertebrates</b>	24	49	15	25	62
<b>Mammals</b>	2	15	7	8	11
<b>Birds</b>	26	28	7	34	29
<b>Reptiles/Amphibians</b>	10	14	19	22	28
<b>Plants</b>	138	276	147	331	374

\* Source: State GIS Databases

Many state-listed species are common over a large area, but “rare” within a particular state because the state lies at the periphery of the species range (and thus a smaller population exists). The term “special concern” is applied to those species that are not rare, threatened, or endangered, but are very uncommon or have unique habitat requirements that make them worthy of periodic monitoring. Another term that may be encountered is “extirpated”. An extirpated species is one that was at one time a regular breeding species in the state, but no longer reproduces within the state.

The UMRCP obtained a county level endangered species listing (1994-1997) previously compiled by the UMR-IWWS Navigation Study for the five UMRS floodplain states (Illinois, Iowa, Minnesota, Missouri, and Wisconsin). The Navigation Study tailored the county listings to the floodplain by applying the 1989 land cover Geographic Information System (GIS) database from the Habitat Needs Assessment (HNA). That database defines various floodplain areas using 17 ecologically relevant land cover classes. The species listing for the UMRCP was based on the Navigation Study list and then revised and updated using the most current information available on state websites. The UMRCP listings do not include species listed as “rare” or “special concern” except when recent (1980 to present) records of occurrence were noted in the Navigation Study compilation, or where one or more states also listed the species in question as threatened or endangered.

**Table 2. Relationship between HNA Geomorphic River Reaches and the UMRCP Study Reaches**

HNA Reaches		UMRCP Reaches
1	Miss R. HN (St. Paul, MN) to L&D 3 (Red Wing, MN)	UMR, Head of Navigation to L&D 13 (1)
2	Miss R. L&D 3 (Red Wing, MN) to L&D 4 (Alma, WI)	
3	Miss R. L&D 4 (Alma, WI) to L&D 9 (Harper's Ferry, IA)	
4	Miss R. L&D 9 (Harper's Ferry, IA) to Pool 13 (Clinton, IA)	
5	Miss R. Pool 13 (Clinton, IA) to L&D 17 (New Boston, IL)	
6	Miss R. L&D 17 (New Boston, IL) to L&D 19 (Keokuk, IA)	UMR, L&D 13 to 19 (2)
7	Miss R. L&D 19 (Keokuk, IA) to L&D 22 (Saverton, MO)	UMR, L&D 19 to L 27 (3)
8	Miss R. L&D 22 (Saverton, MO) to L&D 27 (Granite City, IL)	
9&10	Miss R. L&D 27 (Granite City, MO) to Cairo, IL	UMR, Open River (L27 to Thebes) (4)
11	IL R HN (Chicago, IL) to Starved Rock L&D (Utica, IL)	Illinois River [IR] (5) Note: The upstream limit of the UMRCP reach is at the confluence of the Des Plaines and Kankakee Rivers southwest of Chicago
12	IL R Starved Rock L&D (Utica, IL) to River's mouth (Grafton, IL)	

A total of 16 freshwater mussel species, 18 fish species, 4 invertebrates, 5 mammals, 22 birds, 18 reptiles and amphibians, and 68 plants listed as threatened or endangered may potentially be found within the UMRCP study area. **Tables 3-9**, columns (a), (b), and (c) indicate the common name, scientific name, and current status (E, T, or SC) for each protected species. Based on the county level species data in the Navigation Study compilation, as they relate to the UMRCP study reaches, the actual or potential location of each of the listed species was establish within the UMRCP reaches. Column (d) indicates the UMRCP reach locations where each species may potentially be found.

***Step 2. Assignment of State Protected Species to Habitat or Species Guilds.***

General habitat descriptions (column e) and habitat/species guild designations (column f) for mussels (**Table 3**) and fish (**Table 4**) were taken from Appendixes C and D, respectively, of the HNA. For invertebrates (**Table 5**) and mammals (**Table 6**), general habitat descriptions were obtained from available information provided on State and university websites. Habitat/species guild designations were not included. General habitat descriptions and “species guild” designations for birds (**Table 7**) were developed using available information provided in database websites maintained by the Illinois Natural History Survey and the Wisconsin Department of Natural Resources. Habitat needs and guild designations for reptiles and amphibians (**Table 8**) were obtained from Appendix E of the HNA. General habitat descriptions for plants (**Table 9**) were developed based on species physiognomy and wetland indicator status applied to UMRCP land cover types.

**Table 3. State Listed Threatened and Endangered Mussels.**

Notes:

LOD = Lotic Depositional

LOE = Lotic Erosional

(a) Common Name	(b) Scientific Name	(c) Status						(d) UMRCP Reaches					(e) General Habitat Description	(f) Habitat Guild
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5		
		Rock pocketbook	<i>Arcidens confragosus</i>		E	T				X		X		
Spectaclecase	<i>Cumberlandia monodonta</i>		T	E	E	E		X	X	X			Aquatic	LOE
Purple wartyback	<i>Cyclonaias tuberculata</i>		T	E		T		X		X	X	X	Aquatic	LOE
Butterfly	<i>Ellipsaria lineolata</i>		T	E	T	T		X	X	X	X	X	Aquatic	LOE
Elephant-ear	<i>Elliptio crassidens</i>		E	E		T	E	X	X	X	X	X	Aquatic	LOD
Ebonysell	<i>Fusconaia ebena</i>		E	E		T	E	X		X			Aquatic	LOE
Higgins eye	<i>Lampsilis higginsii</i>	E	E	E	E	E	E	X	X	X			Aquatic	LOE
Yellow Sandshell	<i>Lampsilis teres</i>		E	E	E			X					Aquatic	LOE
Bullhead (Sheepnose)	<i>Plethobasus cyphus</i>		E	E	E	E	E		X	X			Aquatic	LOE
Round pigtoe	<i>Pleurobema coccineum</i>		T					X					Aquatic	LOD
Fat pocketbook pearly mussel	<i>Potamilus capax</i>	E				E	E			X			Aquatic	LOD
Winged mapleleaf	<i>Quadrula fragosa</i>	E	E	E			E	X					Aquatic	LOD
Monkeyface	<i>Quadrula metanevra</i>		T	T				X					Aquatic	LOD
Wartyback	<i>Quadrula nodulata</i>		E	T				X		X			Aquatic	LOD
Salamander mussel	<i>Simpsonaias ambigua</i>		T	T		E		X					Aquatic	LOD
Pistolgrip (Buckhorn)	<i>Tritogonia verrucosa</i>		T					X					Aquatic	LOD
Totals	16							14	5	10	3	3		

**Table 4. State Listed Threatened and Endangered Fish**

Notes:

R = Rheophilic RR = Rheo-Rheophilic RL = Rheo-Limnophilic

L = Limnophilic LR = Limno-Rheophilic

P = Pelagic PLR = Pelago-Limno-Rheophilic

(a) Common Name	(b) Scientific Name	(c) Status						(d) UMRCP Reaches					(e) General Habitat Description	(f) Species Guild	
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5			
Lake sturgeon	<i>Acipenser fulvescens</i>		SC		E	E	E	X	X	X				Aquatic	RR
Crystal darter	<i>Ammocrypta asprella</i>		SC	E			E	X						Aquatic	R
Western sand darter	<i>Ammocrypta clarum</i>				T	E		X	X	X				Aquatic	R
Blue sucker	<i>Cycleptus elongatus</i>		SC	E				X						Aquatic	R
Grass pickerel	<i>Esox americanus</i>				T				X					Aquatic	
Bluntnose darter	<i>Etheostoma chlorosoma</i>		SC	E	E			X						Aquatic	LR
Pallid shiner	<i>Hybopsis amnis</i>		SC	E		E		X				X		Aquatic	
Chestnut lamprey	<i>Ichthyomyzon castaneus</i>				T			X						Aquatic	RL
Black buffalo	<i>Ictiobus niger</i>			T				X						Aquatic	RL
River redhorse	<i>Moxostoma carinatum</i>			T		T						X		Aquatic	RL
Black redhorse	<i>Moxostoma duquesnei</i>			E	T			X						Aquatic	
Blacknose shiner	<i>Notropis heterolepis</i>				T	E			X					Aquatic	
Weed shiner	<i>Notropis texanus</i>				E	E		X	X					Aquatic	LR
Pugnose minnow	<i>Opsopoeodus emiliae</i>		SC					X	X					Aquatic	
Paddlefish	<i>Polydon spathula</i>		T	T				X						Aquatic	PLR
Pallid sturgeon	<i>Scaphirhynchus albus</i>	E					E				X			Aquatic	R
Shovelnose sturgeon	<i>Scaphirhynchus platyrhynchus</i>		SC					X						Aquatic	R
Central mudminnow	<i>Umbra limi</i>						E			X				Aquatic	L
Totals	18							13	6	3	1	2			

**Table 5. State Listed Threatened and Endangered Invertebrates**

Notes:  
 F = Forest  
 NF = Nonforest

Common Name (a)	Scientific Name (b)	Status (c)						UMRCP Reaches (d)					General Habitat Description (e)	
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5		
Iowa Pleistocene snail	<i>Discus macclintocki</i>	E			E	E		X						Upland F/NF (algific talus slopes)
Wing snaggletooth	<i>Gastrocopta procera</i>			T				X						Upland F/NF (hill prairies/glades)
Ottoe skipper	<i>Hesperia ottoe</i>		T			T		X			X	X		Upland NF
Byssus skipper	<i>Problema byssus</i>				T			X						Wetland NF
Totals	4							4				1	1	

**Table 6. State Listed Threatened and Endangered Mammals**

Common Name (a)	Scientific Name (b)	Status (c)						UMRCP Reaches (d)					General Habitat Description (e)
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5	
		River otter	<i>Lutra canadensis</i>					T		X	X	X	
Bobcat	<i>Lynx rufus</i>				T			X	X				Wetland/Upland F/NF
Gray bat	<i>Myotis grisescens</i>	E					E			X	X		Caves
Indiana bat	<i>Myotis sodalis</i>	E			E	E	E		X	X	X	X	Wetland/Upland F
Plains pocket mouse	<i>Perognathus flavescens</i>		SC		E				X	X			Upland NF
Totals	5							2	4	4	2	2	

**Table 7. State Listed Threatened and Endangered Birds**

Notes:

A = Agriculture

WB = Waterbird

R = Raptor

SB = Songbird

Common Name (a)	Scientific Name (b)	Status (c)						UMRCP Reaches (d)					General Habitat Description (e)	Species Guild (f)	
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5			
		Great egret	<i>Ardea alba</i>			T				X					
Upland sandpiper	<i>Bartramia longicauda</i>					E	X						X	Upland A/NF	Migratory WB
American bittern	<i>Botaurus lentiginosus</i>					E	E			X	X	X		Wetland NF	Migratory WB
Red-shouldered hawk	<i>Buteo lineatus</i>		SC	T	E	T		X	X				X	Wetland F/NF	Migratory R
Brown creeper	<i>Certhia americana</i>					T		X		X	X	X		Wetland F	Migratory SB
Cerulean warbler	<i>Dendroica cerulea</i>		SC	T				X						Wetland/Upland F	Migratory SB
Little blue heron	<i>Egretta caerulea</i>					E				X				Wetland A/F/NF	Migratory WB
Common moorhen	<i>Gallinula chloropus</i>		SC			T		X		X				Wetland A/NF	Migratory WB
Sandhill crane	<i>Grus canadensis</i>					T		X	X					Wetland A/F/NF	Migratory WB
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	SC		E	T	E	X	X	X	X	X		Wetland F	Migratory R
Loggerhead shrike	<i>Lanius ludovicianus</i>		T	E		T		X						Upland A/F	Migratory SB
Yellow-crowned night heron	<i>Nyctanassa violacea</i>			T		E		X						Wetland A/F	Migratory WB
Black-crowned night heron	<i>Nycticorax nycticorax</i>					E		X	X				X	Wetland F/NF	Migratory WB
Kentucky warbler	<i>Oporornis formosus</i>			T				X						Wetland F	Migratory SB
Osprey	<i>Pandion haliaetus</i>			T		E		X		X				Wetland F	Migratory R
Pied-billed grebe	<i>Podilymbus podiceps</i>					T				X	X	X		Wetland NF	Migratory WB
King rail	<i>Rallus elegans</i>		E		E	E	E	X		X	X	X		Wetland A/NF	Migratory WB
Forster's tern	<i>Sterna forsteri</i>		SC	E	SC	E		X						Wetland NF	Migratory WB
Common barn owl	<i>Tyto alba</i>			E	E	E	E			X	X			Wetland A/F/NF	Migratory R
Bell's vireo	<i>Vireo bellii</i>			T				X						Wetland F/NF	Migratory SB
Hooded warbler	<i>Wilsonia citrina</i>		SC	T				X						Wetland F	Migratory SB
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>					E		X						Wetland A/NF	Migratory SB
Totals 22								17	3	9	6	8			

**Table 8. State Listed Threatened and Endangered Reptiles/Amphibians**

Notes:  
 T = Terrestrial  
 W = Woodland  
 P = Prairie  
 A = Aquatic

Common Name (a)	Scientific Name (b)	Status						UMRCP Reaches					General Habitat Description (e)	Habitat Guild (f)
		(c)						(d)						
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5		
Wood turtle	<i>Clemmys insculpta</i>		T	T	E			X					Woodland/Prairie Marshes	T
Timber rattlesnake	<i>Crotalus horridus</i>		T			T		X		X			Rocky sites at fldpln edge/forest	W
Great Plains rat snake	<i>Elaphe guttata emoryi</i>					T				X			Dry prairies	P
Western fox snake	<i>Elaphe vulpine vulpina</i>						E	X		X			Mesic or xeric prairie	P
Blanding's turtle	<i>Emydoidea blandingii</i>		T	T	T	T	E	X		X			Prairie wetlands/ponds	A
Western hognose snake	<i>Heterodon nasicus</i>		SC		E	T		X	X			X	Sand prairies	P
Eastern hognose snake	<i>Heterodon platyrhinos</i>		SC					X					Floodplain forests/woodland openings	W
Illinois mud turtle	<i>Kinosternon flavescens spooneri</i>					E			X	X	X	X	Ephemeral ponds in/near sand prairies	A
Mudpuppy	<i>Necturus maculosus</i>				T			X					Wide range of aquatic habitats	A
Copperbelly water snake	<i>Nerodia erythrogaster neglecta</i>				E				X				Large rivers and backwaters	A
Diamondback water snake	<i>Nerodia rhombifera</i>				T				X				Large rivers and backwaters	A
Gopher snake	<i>Pituophis melanoleucus</i>		SC					X					Dry prairies	P
Illinois chorus frog	<i>Pseudacris streckeri illinoiensis</i>					T						X	Sand prairie	T
Crawfish frog	<i>Rana areolata</i>				E				X				Floodplain prairies	T
Bullfrog	<i>Rana catesbiana</i>		SC					X					Floodplain open water areas	A
Pickereel frog	<i>Rana palustris</i>		SC					X					Rocky areas at floodplain edge	A
Eastern massasauga	<i>Sistrurus catenatus catenatus</i>	C	E	E	E	E	E	X		X			Mesic prairies	P
Ornate box turtle	<i>Terrapene ornata</i>			E	T				X				Prairies and large meadows	T
Totals	18							11	6	6	1	3		

**Table 9. State Listed Threatened and Endangered Plants**

Wetland Indicator Status

5 = UPL (Upland)                    -1 = FAC+  
 4 = FACU-                            -2 = FACW-  
 3 = FACU                             -3 = FACW  
 2 = FACU+                          -4 = FACW+  
 1 = FAC-                              -5 = OBL (Obligate wetland)  
 0 = FAC (Facultative)

(a) Common Name	(b) Scientific Name	(c) Status						(d) UMRCP Reaches					(e) General Habitat Description	(f) Wetland Indicator	
		Fed	MN	WI	IA	IL	MO	1	2	3	4	5			
Yellow giant hyssop	<i>Agastache nepetoides</i>			T				X						Upland NF	3
Shadbush	<i>Amelanchier interior</i>					E		X						Upland F	5
False tarragon	<i>Artemisia dracunculus</i>					E		X						Upland NF	5
Purple milkweed	<i>Asclepias purpurascens</i>			E				X						Upland NF	3
Forked aster	<i>Aster furcatus</i>			T	T	T						X		Upland NF	5
Flax-leaved aster	<i>Aster linarifolius</i>				T				X					Upland NF	5
Tennessee milk-vetch	<i>Astragalus tennesseensis</i>					E						X		Upland NF	?
Kitten tails	<i>Besseyia bullii</i>		T	T	T	T		X	X			X		Upland NF	5
Decurrent false aster	<i>Boltonia decurrens</i>	T				T	E			X	X	X		Wetland NF	-3
Sweet-smelling Indian plantain	<i>Cacalia suaveolens</i>		E		T			X						Wetland NF	-5
Poppy mallow	<i>Callirhoe triangulata</i>				E			X						Upland NF	5
Large water-starwort	<i>Callitriche heterophylla</i>			T	SC			X	X					Wetland NF	-5
Fibrous-rooted sedge	<i>Carex communis</i>					T						X		Upland NF	5
Davis' sedge	<i>Carex davisii</i>		T					X						Wetland NF	-1
Redroot	<i>Ceanothus herbaceus</i>					E		X						Upland F	?
Rose turtlehead	<i>Chelone oblique var speciosa</i>						E								
Hill's thistle	<i>Cirsium hillii</i>		SC	T	SC	T						X		Upland NF	?
Mountain clematis	<i>Clematis occidentalis</i>				SC	E		X						Upland NF	5
Dayflower	<i>Commelina erecta</i>				T				X					Wetland NF	-3
Golden corydalis	<i>Corydalis aurea</i>				T	E						X		Upland NF	5
Large-bracted corydalis	<i>Corydalis curvisiliqua</i>				E				X					Upland NF	5
Beaked hazelnut	<i>Corylus rostrata</i>					E		X						Upland F	?
Gray's umbrella sedge	<i>Cyperus grayioides</i>					T		X				X		NF	?
Showy lady's-slipper orchid	<i>Cypripedium reginae</i>				T	E	L	X				X		Wetland NF	-4

Silky prairie-clover	<i>Dalea villosa</i>				E			X						NF	?
Jeweled shooting star	<i>Dodecatheon amethystinum</i>				T		L	X						Upland NF	5
Marginal shield-fern	<i>Dryopteris marginalis</i>		T		T			X						Upland F	3
Upland boneset	<i>Eupatorium sessilifolium</i>		T		SC			X						Upland NF	?
Queen-of-the-prairie	<i>Filipendula rubra</i>				T	E	L						X	Wetland NF	- 5
Vahl's fimbriatylis	<i>Fimbristylis vahlii</i>					E							X	?	?
False heather	<i>Hudsonia tomentosa</i>		SC		E	E		X						Upland F	5
Winterberry	<i>Ilex verticillata</i>				E			X						Wetland F	- 4
Common juniper	<i>Juniperus communis</i>					T		X						Upland F	5
Dwarf dandelion	<i>Krigia virginica</i>				E				X					Upland NF	5
Blazing star	<i>Liatris scariosa var nieuwlandii</i>					T	L						X	Upland NF	?
Common clubmoss	<i>Lycopodium clavatum</i>				E	E		X						Upland F	0
Rock clubmoss	<i>Lycopodium porophyllum</i>				T			X						Upland F	4
Yellow monkeyflower	<i>Mimulus glabratus</i>				T	E	L						X	Wetland NF	- 5
Hairy umbrella-wort	<i>Mirabilis hirsute</i>					E		X						Upland NF	5
Fragile prickly pear	<i>Opuntia fragilis</i>			T	T	E		X	X					Upland NF	5
Broomrape	<i>Orobranche ludoviciana</i>		SC	E	SC	T	L	X						Upland NF	5
Panic grass	<i>Panicum columbianum</i>					E							X	NF	?
Purple cliffbrake	<i>Pellaea atropurpurea</i>				E			X						Upland F	5
Arrow arum	<i>Peltandra virginica</i>				E		L		X					Wetland NF	- 5
Large-flowered beardstongue	<i>Penstemon grandiflorus</i>					E	L	X	X					Upland NF	5
Tuberclad orchid	<i>Platanthera flava var flava</i>					E	L	X						Wetland NF	- 3
Tuberclad orchid	<i>Platanthera flava var herbiola</i>			T		E	L	X					X	Wetland NF	- 3
James clammyweed	<i>Polanisia jamesii</i>		E		E	E		X						Upland NF	5
Rose	<i>Rosa acicularis</i>				E	E		X						Upland F	3
Hairy wild-petunia	<i>Ruellia humilis</i>			E				X						Upland NF	4
Blue sage	<i>Salvia azurea ssp pitcheri</i>					T		X						Upland NF	?
Red-berried elder	<i>Sambucus pubens</i>					E				X	X	X		Upland F	5
Hall's bulrush	<i>Scirpus hallii</i>			E	SC	T							X	Wetland NF	- 5
Alkali bulrush	<i>Scirpus paludosus</i>					E							X	Wetland NF	- 5
Leafy bulrush	<i>Scirpus polyphyllus</i>					T				X				Wetland NF	- 5
Ovate-leaved skullcap	<i>Scutellaria ovata</i>		T					X						Upland NF	3
Snowy campion	<i>Silene nivea</i>		T	T				X						Wetland NF	- 3
Cliff goldenrod	<i>Solidago sciaphila</i>		SC			T		X						Upland NF	5
Patterson bindweed	<i>Stylisma pickeringii</i>				E	E	L		X	X	X	X		Upland NF	5
Rough-seeded fameflower	<i>Talinum rugospermum</i>		E		E			X						Upland NF	5
Hairy-jointed meadow-parsnit	<i>Thaspium barbinode</i>			E				X						Upland NF	5
Arbor vitae	<i>Thuja occidentalis</i>					T							X	Wetland NF	- 5

Prairie spiderwort	<i>Tradescantia bracteata</i>					T				X			Upland NF	4
Buffalo clover	<i>Trifolium reflexum</i>					E				X		X	Upland NF	5
Corn salad	<i>Valerianella chenopoliifolia</i>					E						X	Wetland F	?
Canada violet	<i>Viola canadensis</i>					E		X					Upland F	?
Lance-leaved violet	<i>Viola lanceolata</i>		T		SC			X					Wetland NF	- 5
Plains violet	<i>Viola viarum</i>					E				X			Upland NF	3
Totals	68							41	10	7	3	22		

**Step 3. Identification of Potential Impact Vectors.**

Various ecological disturbances and habitat forming processes on the UMRS that were identified as part of the HNA Technical Report are listed in **Table 10**. Disturbance factors can be both natural and man-made. Ultimately, these disturbances impact upon the river's biota, including state protected species. For a detailed discussion of these potential disturbance factors, the reader is referred to Chapter 4 of the HNA Technical Report (pages 38-56). Disturbance mechanisms resulting from implementation of systemic FDR measures that have the potential to adversely affect floodplain biota (including any threatened or endangered species within the project footprint) are highlighted in the table.

<b>Table 10. Selected Disturbances Influencing UMRS Habitat Formation and Maintenance*</b>	
<b>Disturbance Mechanism</b>	
<b>Natural</b>	<b>Anthropogenic</b>
Annual flood	River regulation
Major flood	Impoundment
Drought	Dredging, material placement
Sedimentation	Channel training structures
Channel avulsion	Commercial navigation traffic
Waves, sediment resuspension, and erosion	Recreational boat traffic
Fire	Levees
Ice	Agriculture
Tree wind-throw	Logging
Log jams and debris piles	Urban development
Beavers, floodplain impoundments	Mining
Herbivores	Parasites and disease
	Exotic Species

\*Source: Chapter 4 of HNA Technical Report, October 2000 (pages 38-56)

**Step 4. Programmatic Assessment of Potential Impacts to Threatened or Endangered Species.**

**Appendix E** provides a general assessment of the cumulative effects of FDR activities and concept plans on the river’s biological resources. **Appendix E** also reflects in summary form the implications of the **CD Chapter 5** Habitat Output Quantification. **Table 11** provides a very brief summary of the analysis, as it pertains to state protected species both from a species guild perspective and from a habitat type perspective.

**Table 11. Summary of Appendix E Assessment as it Pertains to State Protected Species**

Guild/Group	Impacts Description
Mussels (LOE or LOD)	Construction impacts: direct burial, sediment resuspension Long-term impacts: alteration of current and flow patterns
Fish (all species guilds)	Construction impacts: dredging entrainment, sediment resuspension Long-term impacts: reduction of lateral connectivity, alteration of current and flow patterns
Invertebrates (aquatic or wetland)	Construction impacts: direct burial, short-term clearing of vegetation Long-term impacts: Permanent changes in land cover (vegetation)
Mammals (all groups)	Construction impacts: Displacement or disruption of normal feeding, resting or reproductive activities Long-term impacts: Permanent changes in land cover, separation or fragmentation of habitats
Birds (all groups)	Construction impacts: Displacement or disruption of normal feeding, resting or reproductive activities Long-term impacts: Permanent changes in land cover, separation or fragmentation of habitats
Amphibians and Reptiles (all groups)	Construction impacts: Displacement or disruption of normal feeding, resting or reproductive activities Long-term impacts: Permanent changes in land cover, separation or fragmentation of habitats
Plants (wetland habitats)	Construction impacts: Short-term clearing of vegetation Long-term impacts: Permanent changes in land cover (vegetation), alteration of microclimatic conditions (e.g. shade, moisture, elevation)
Aquatic	Quantitative: Encroachment losses resulting from levee raise Qualitative: Alteration of current/flow patterns, structural alterations (e.g. loss of depth or reduction in substrate diversity)
Terrestrial (Wetland)	Quantitative: Direct conversion of native vegetative cover to cultivation and/or urban development Qualitative: Alteration of natural drainage or other microclimatic conditions (e.g. shade, moisture, elevation)
Terrestrial (Upland)	Quantitative: Direct conversion of native plant cover (levee setbacks) Qualitative: Alteration of natural drainage or other climatic conditions (e.g. shade, moisture, elevation)

A more detailed evaluation of potential impacts of systemic FDR on threatened and endangered species that may be present in the study area would need to be undertaken as part of future site-specific feasibility studies (should any be recommended as a result of this study effort), to ensure compliance with Section 7 of the Endangered Species Act and any applicable State statues concerning the protection of listed species.

#### **4. REFERENCES**

USACE, 2000. Internal Review Draft—Upper Mississippi River—Illinois Waterway System Navigation Study. 45 p.

USACE, 1988. Final Environmental Impact Statement. Second Lock at Locks and Dam No. 26 (Replacement) Mississippi River, Alton, Illinois and Missouri. Volume 1 – Main Report. 289 pp.

USACE, 1999. Upper Mississippi River and Illinois Waterway Cumulative Effects Study. Prepared by WEST Consultants, Inc.

USACE, Undated. Application of Conceptual and Predictive Models in Integrated River Management. Prepared for UMRS-IWW Navigation Feasibility Study.

Minnesota DNR, 2003. State Natural Heritage Database Program. Endangered Threatened and Special Concern Species by Scientific Name.

Missouri DNR, 2003. State Natural Heritage Database Program. Threatened and Endangered Species in Missouri.

Wisconsin DNR, 2003. State Natural Heritage Database Program. Wisconsin Natural Heritage Inventory Working List—Threatened and Endangered Species Only.

Illinois DNR, 2003. State Natural Heritage Database Program. Illinois Endangere Species Protection Board—1999 Endangered and Threatened Species List.