Fish inventories for Devils Tower National Monument, Fort Laramie National Historic Site, Mount Rushmore National Memorial, Scotts Bluff National Monument and Wind Cave National Park

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Project Statement: During the scoping workshop held in April 2000, subject matter experts and park staff identified five parks where the fish species inventories were not complete. There were no records of any previous fish inventories at Mount Rushmore N.M., Devils Tower N.M., and Scotts Bluff N.M. There had been at least one previous fish inventory at Fort Laramie N.H.S. and Wind Cave N.P. (Armstrong and Adams 1988, South Dakota Game, Fish and Parks 1997), but experts indicated that these inventories were incomplete.

A list of fish species likely to occur at each park has been compiled since the workshop (Appendix 1). The list confirms that only 8 of 17 species have been documented at Ft. Laramie N.H.S. At Wind Cave N.P., all of the regularly occurring species were documented in an inventory in 1997, but the plains topminnow (*Fundulus sciadicus*), a species of concern for South Dakota and at the global level, has not been documented in the park, although records from the surrounding area suggest that it may occur there (Backlund *pers. comm.*).

This inventory project was chosen in part for FY2001 because the stream systems at each of these parks are relatively simple, making completion of this project feasible while the network completes planning for additional priorities during FY2001. If the data mining and planning during FY2001 reveals that other parks need fish inventories, those will be incorporated into the projects to be completed in FY2002-2004.

The streams to be inventoried at each of the parks are depicted in Figures 2a-2e:

- At Mount Rushmore NM there are two stream segments that total approximately 1.5 miles
- Approximately one mile of the Belle Fourche River runs through Devils Tower NM
- The North Platte River and Laramie River run through portions of Fort Laramie NHS, total stream length is approximately 3 miles
- At Wind Cave NP there are four stream segments totaling approximately 4 miles
- Approximately 1.5 miles of the North Platte River forms the northern border of Scotts Bluff NM

OBJECTIVES: This study will address each of the following objectives:

- Document 90% of the fish species at Fort Laramie N.H.S., Devils Tower N.M., Mount Rushmore N.M. and Scotts Bluff N.M. and record relative abundance.
- Determine if the plains topminnow, a state and global species of concern, occurs at Wind Cave N.P.

- Create voucher specimens for all species that are new or do not have voucher specimens
- Update the National Park Service databases: NRBib, NPSpecies and the Dataset Catalog with the results of the inventory
- Create GIS layers showing location of inventories and species found

METHODS: Objective 1: The first objective of this fish inventory is to document 90% of the fish species at Fort Laramie N.H.S., Devils Tower N.M., Mount Rushmore N.M. and Scotts Bluff N.M. In order to do this, the stream segments within each park first will be classified based on stream order (Strahler 1957). Within a stream segment, there also may be important differences in mesohabitats, such as pool-run, pool-riffle-run, etc. This determination will be made by the investigators during a visual survey of the streams prior to sampling. Streams within each of the parks then will be stratified either by stream order alone, or by stream order and mesohabitat. Any areas that cannot be accessed with the equipment necessary for sampling will be excluded and no inferences will be made to those sections.

Within each stratum in each park, three 100m sampling units will be chosen randomly (Patton *et al*. 2000). If the streams are stratified by mesohabitat, it may be necessary to reduce the sampling unit to 50-75m, but a total of 300m will be chosen randomly for each habitat. Sampling locations will be documented with a GPS unit as well as notes on any landmarks or a photograph if necessary. The length of the section sampled will be measured along the thalweg in meters, using a metric tape. Sampling will be conducted during periods of base flow by seine (1/4 inch mesh) where possible, with backpack electrofishing as an alternate technique. Sampling will cease in each stratum when 90% of the species have been captured or when 300m have been sampled (Patton *et al*. 2000).

In order to determine whether or not 90% of the species have been sampled, the species captured will be compared to a list of species likely to occur in the streams to be surveyed. A list of species likely to occur has been compiled and is being reviewed by the investigators and other experts (see Appendix 1). A recent study of Great Plains streams found that for a given stream segment, sampling 100m by sein may be sufficient to capture 90% of the species, but sampling 200m of stream always captured 90% of the species and 300m always captured 100% (Patton *et al*. 2000) of the species present. Therefore, in each stratum if it is unclear whether or not 90% of the species have been captured after sampling the first 100m, one or two additional sampling units should insure a complete species list.

All fish sampled will be identified to species and relative abundance of each species within the sample documented. All fish captured will be released at the sample site except those for retained as vouchers (see Objective 2).

Objective 2: In order to determine if the plains topminnow occurs at Wind Cave N.P., habitat likely to contain the fish will be targeted for sampling. The plains topminnow generally occurs in larger pool habitat with vegetated banks (Backlund, *pers. comm*.). The investigators will do a visual survey of the streams to determine where such habitat exists. If possible, all pool habitat that may contain the plains topminnow will be surveyed by sein using the methods described under Objective 1. If it is not possible to sample all pools due to budget, time or access

constraints, a subset of pool habitat will be randomly selected. The subset will contain the maximum number of sampling points possible.

Objective 2: Voucher specimens of fish species that are new or not represented in voucher collections of each park will be euthanized with an overdose of MS222 and preserved in 10% formalin. Each collection will be labeled with species, date, location, and collectors.

Objectives 3 and 4: The Park Service will use the data collected in this survey to update each of the databases central to inventory effort: NRBib, NPSpecies and the Dataset Catalog. In addition, the Park Service will process the GIS data collected in the field to create maps useful to park management. The investigators will assist in completing the metadata form associated with the GIS layer(s)

References:

Armstrong, DM and RA Adams. 1988. Vertebrates of Fort Laramie National Historic Site, Wyoming: an ecological and historical perspective. National Park Service Technical Report. Contract #MR7-36. 70pp.

Backlund, D. Biologist, South Dakota Natural Heritage Program, South Dakota Department of Grame, Fish and Parks, Pierre, S.D. Personal Communication, November, 2000.

Patton, TM, Hubert, WA and FJ Rahel. 1998. Ichthyofauna in streams of the Missouri River Drainage, Wyoming. Prairie Nat. 30(1):9-22.

Patton, TM, Hubert, WA, Rahel, FJ and KG Gerow. 2000. Effort needed to estimate species richness in small streams on the Great Plains in Wyoming. NA J of Fisheries Mgmt 20:394-98.

South Dakota Game, Fish and Parks. 1997. Electrofishing of Beaver, Cold Spring and Highland creeks, Wind Cave National Park. Unpublished report. 15pp.

Strahler, A.N. 1957. Quantitative analysis of watershed geomorphology. American Geophysical Union, Transactions 38:913-920

PRODUCTS:

To be completed by investigators:

1. Final report for inventories in standard scientific format including an introduction, detailed methodology, results, list of species and discussion.
2. Original field notebooks, notes and photographs along with accompanying documentation will be required to be inventoried and submitted to the principal investigator's records. These in turn will be accessioned into the records of the NGP network for copying and archiving.

3. GPS data from sampling locations including original rover files, base files and differentially corrected files (if applicable) included on diskette, zip drive or CD; FGDC compliant metadata.
4. Voucher specimens for fish species that have not been documented previously for all parks inventoried

To be completed by network coordinator and/or data management biotechnician:

1. Reviewed list of fish species known to and likely to occur in the five parks
2. All field data entered into Access relational database (to be developed)
3. All species and appropriate study information added to NRBib, NPSpecies, ANCS+ and Dataset Catalog databases
4. ArcView shape files and graphics derived from plot data; FGDC compliant metadata for all GIS data

PROJECT SCHEDULE:

The Park Service currently has sufficient funding to complete inventories at Devils Tower NM, Mount Rushmore NM, Fort Laramie NHS and Scotts Bluff NM. These projects will be completed during phase I of this project. If the Park Service receives the funding it expects to complete this project, Wind Cave NP will be incorporated into the fish inventories (Phase II).

October 2000-May 2001

- Complete list of fish species known to occur within the parks and species likely to occur that has been prepared by the Park Service and reviewed by the investigators
- Collection permit for fish species secured by Park Service

August-September 2001

- Field work for fish inventories conducted PHASE I: DETO, MORU, FOLA, SCBL
  PHASE II: WICA

December 2001

- Final report for fish inventories at all parks inventoried
- Submittal of original field notebooks, notes and photographs for inventorying and copying
- Submittal of GPS data and FGDC compliant metadata

January-June 2002

- Data entered by I&M staff into all databases: NRBib, NPSpecies, ANCS+, Dataset Catalog and N. Great Plains database (to be developed)
- Development of ArcView shape files from field data with metadata

BUDGET:

Phase I	
Personnel	
Two investigators	$ 3,840
(20 days @ $12.00/hr each)	
Benefits (10%)	384
Supplies	
Sein net, jars for collection, waders, etc.	$ 600
Travel	
Gas and maintenance for	
Federal vehicle	$ 550
Per diem	
(20 days @ $80/day for two people)	$ 3,200
Subtotal	$ 8,574
Overhead (15%)	$ 1,286
Phase I Project Total	**$ 9,860**
Phase II	
Personnel	
Two investigators	
(6 days, 2 people @ $12/hr)	$ 1,152
Benefits (10%)	115
Travel	
Gas and maintenance	$ 200
Per diem (6 days, 2 people @ $80/day)	$ 960
Supplies	
Collection jars, misc	$ 100
Subtotal	$2,527
Overhead (15%)	**$ 379**
Phase II Project Total	**$ 2,906**
Total project costs	**$12,766**

Appendix 1. Table of expected fish species in parks to be inventoried. A gray box indicates species documented in previous studies.

Fish species		DETO	FOLA	SCBL	MORU	WICA
Common name	**Scientific name**					
Creek chub	*Semotilus atromaculatus*	x	x	x		x
Fathead minnow	*Pimephales promelas*	x	x	x		x
Flathead chub	*Platygobio gracilis*	x				
Lake chub	*Coeusius plumbeus*	x				
Longnose dace	*Rhinichthys cataractae*	x	x	x	x	x
Sand shiner	*Notropis stramineus*	x	x			
Northern redhorse	*Moxostoma macroplepidotum*	x		x		
Quillback	*Carpiodes cyprinus*	x		x		
White sucker	*Catostomus commersoni*	x	x	x	x	
Stonecat	*Notourus flavus*	x	x	x		
Smallmouth bass	*Micropterus dolomieui*	x				
Bigmouth shiner	*Notropis dorsalis*		x			
Brassy minnow	*Hybognathus hankinsoni*		x			
Common shiner	*Luxilus comutus*		x			
Emerald shiner	*Notropis atherinoides*		x			
Stoneroller	*Campostoma anomalum*		x	x		
Longnose sucker	*Catostomus catostomus*		x	x		
Plains killifish	*Fundulus zebrinus*		x	x		
Johnny darter	*Etheostoma nigrum*		x			
Suckermouth minnow	*Phenacobius mirabilis*		x			
Horneyhead chub	*Nocomis biguttatus*		x			
Red shiner	*Cyprinella lutrensis*			x		
Northern pike	*Esox lucius*			x		
Orangethroat darter	*Etheostoma spectabile*			x		
Channel catfish	*Ictalurus punctatus*			x		
Bluegill	*Lepomis macrochirus*			x		
White bass	*Morone chrysops*			x		
Gizzard shad	*Nematalosa nasus*			x		
Sand shiner	*Notropis stramineus*			x		
River shiner	*Notropis blennius*			x		
Bigmouth shiner	*Notropis dorsalis*			x		
Madtom	*Noturus gyrinus*			x		
Walleye	*Stizostedion vietrum*			x		
Mountain sucker	*Catostomus platyrhynchus*				x	x
Plains topminnow	*Fundulus sciadicus*					x
Exotic species						
Common carp	*Cyprinus carpio*	x	x	x	x	
Green sunfish	*Lepomis cyanellus*	x	x			
Yellow perch	*Perca flavescens*		x			
Rainbow trout	*Oncorhyncus mykiss*		x			
Brown trout	*Salmo trutta*		x	x		
Brook trout	*Salvenlinus fontinalus*				x	x

Sources:

Armstrong, DM and RA Adams. 1988. Vertebrates of Fort Laramie National Historic Site, Wyoming: an ecological and historical perspective. National Park Service Technical Report. Contract #MR7-36. 70pp.

Chipps, S. 2000. Fisheries Biologist. South Dakota State University, Cooperative Fish and Wildlife Services Unit. Personal communication.

Erickson, J. 2000. Fisheries Biologist. South Dakota Game and Fish Department. Rapid City office. Personal communication.

Nebraska Department of Game, Fish and Parks. No date. List of species likely to occur in the North Platte River compiled for Scotts Bluff National Monument.

Patton, TM, Hubert, WA and FJ Rahel. 1998. Ichthyofauna in streams of the Missouri River drainage, Wyoming. Prairie Nat 30(1):9-22.

South Dakota Game, Fish and Parks Department. 1997. Electrofishing of Beaver, Cold Spring and Highland Creeks, Wind Cave National Park. Unpublished report.

Figure 2a. Mount Rushmore National Memorial
Fish Inventories

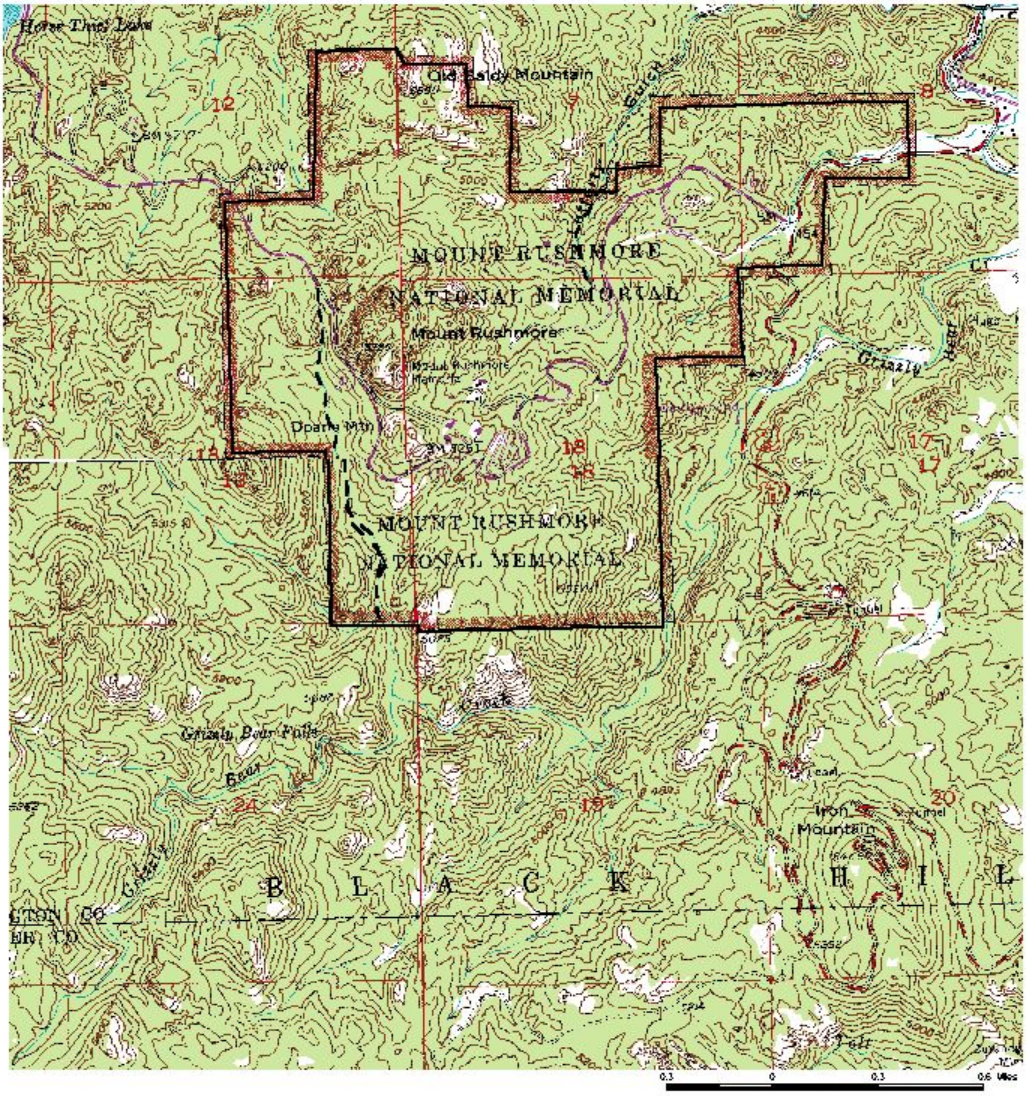
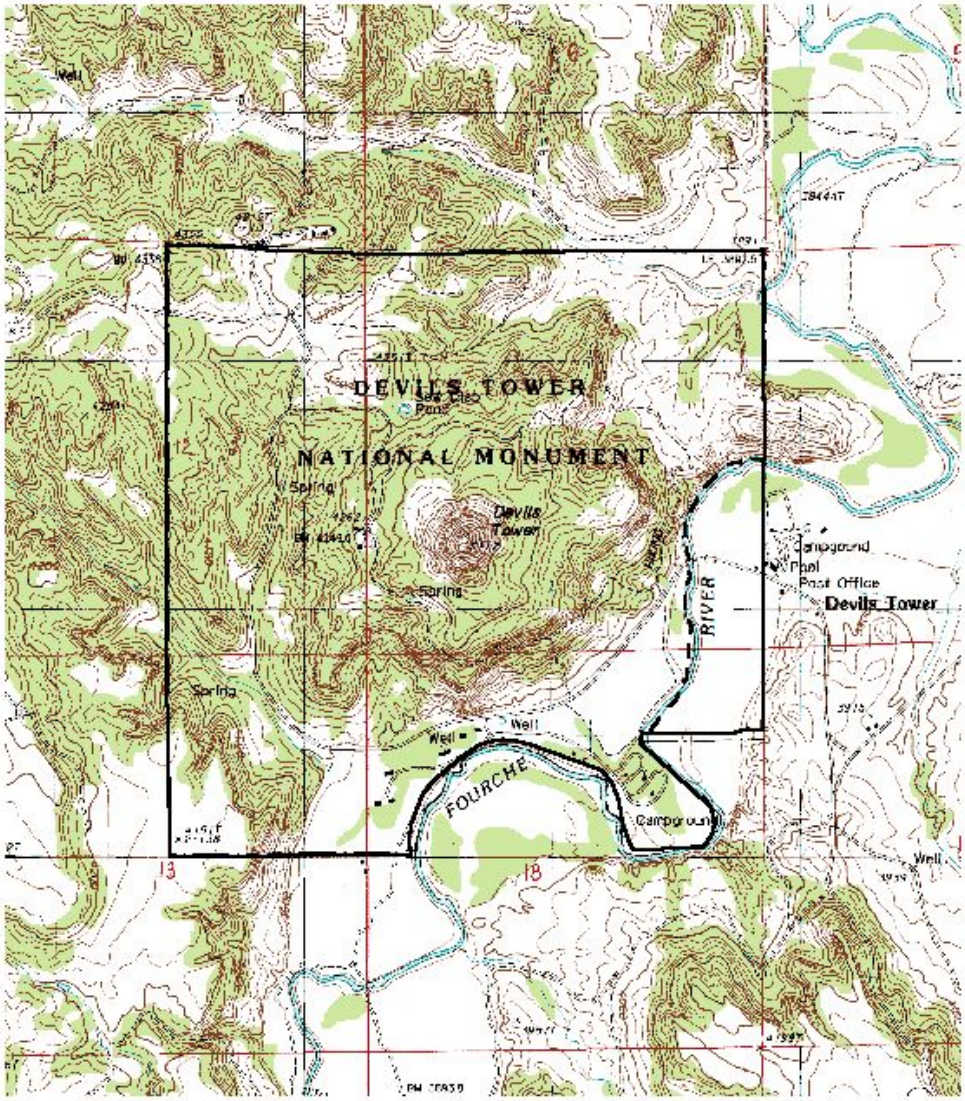


Figure 2b. Devils Tower National Monument
Fish Inventories



Section of Belle Fourche River to be inventoried
Devils Tower N.M. Boundary

0.5 0 0.5 Miles

Figure 2c. Fort Laramie National Historic Site
fish inventories

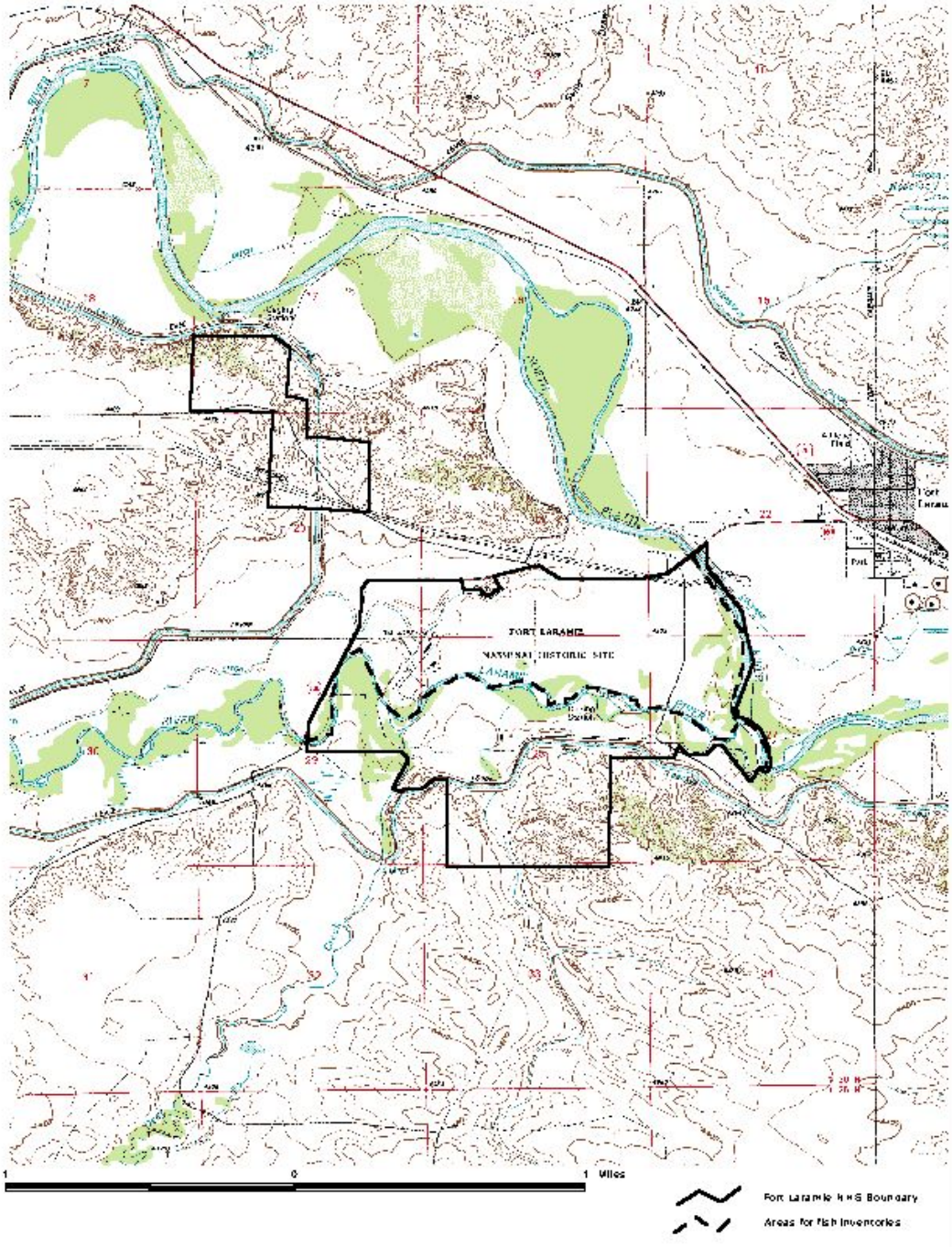


Figure 2d. Wind Cave National Park
Fish Inventories

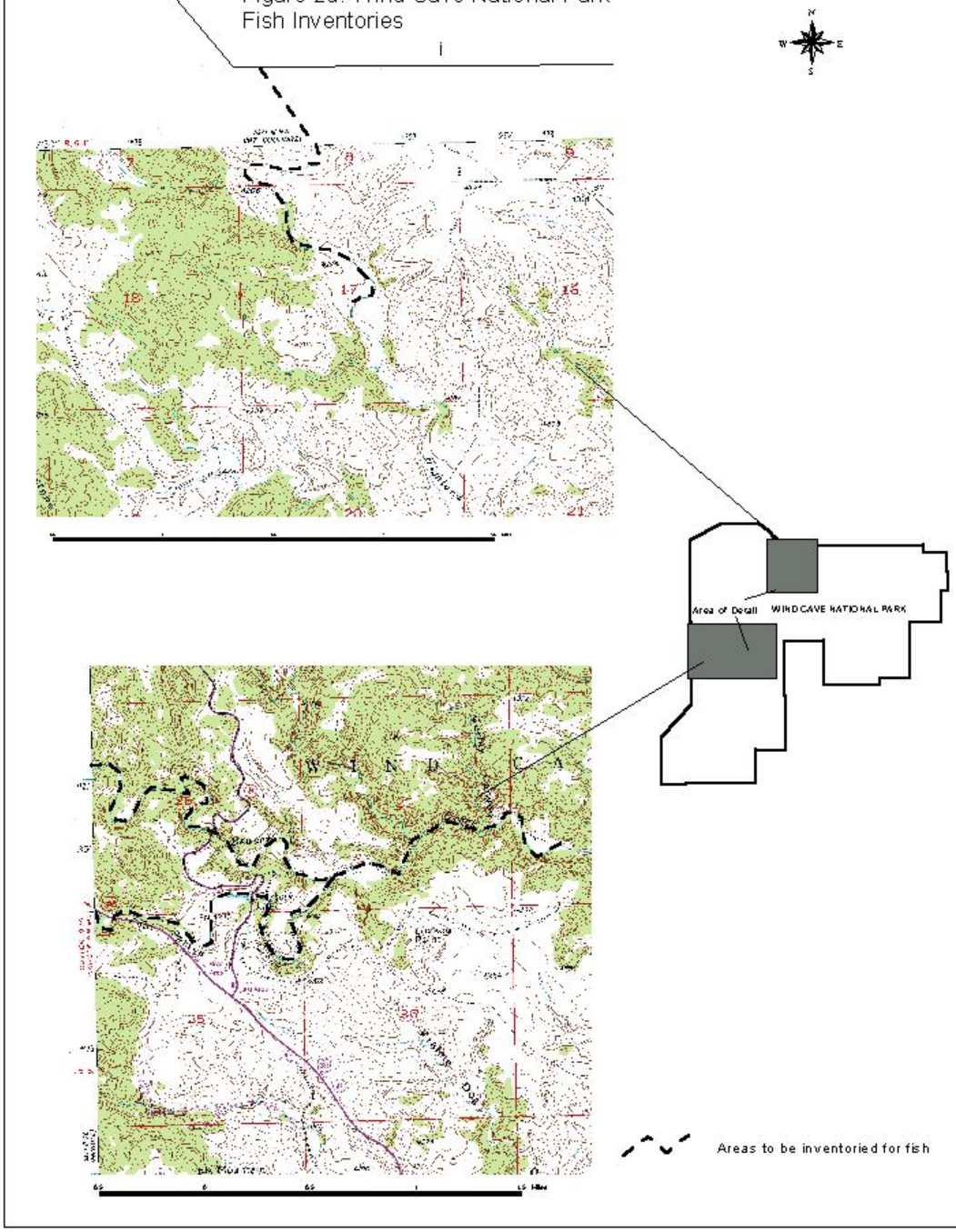


Figure 2e. Scotts Bluff National Monument
Fish Inventories