Appendix A

DATA SURVEY FOR THE OAK RIDGE RESERVATION ECOLOGICAL MONITORING AND ASSESSMENT PROGRAM TERRESTRIAL WILDLIFE RISK ASSESSMENT

DATA SURVEY FOR THE OAK RIDGE RESERVATION ECOLOGICAL MONITORING AND ASSESSMENT PROGRAM TERRESTRIAL WILDLIFE RISK ASSESSMENT

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INTRODUCTION

Staff of the Environmental Assessment and Compliance Group were asked to perform a data information survey for the Oak Ridge Reservation Ecological Monitoring and Assessment Program (ORR-EMAP). The survey's purpose was to identify datasets potentially relevant to an upcoming terrestrial wildlife ecological risk assessment.

SURVEY APPROACH

Primary datasets of interest were soil, sediment, biota, and surface water contaminant concentrations. Radiological studies and air sampling were not of interest to this project. The following Operable Units (OUs) were given priority based on their total non-urban or barren area:

K-25:	K-901 (Area 10), K-770, K-33, K-1007
ORNL:	WAG 2, WAG 3, WAG 4, WAG 5, WAG 6, WAG 7, WAG 8, WAG 11
Y-12:	Bear Creek, LEFPC, Bear Creek OU1, Chestnut Ridge OU2
Other OUs:	Freels Bend, South Campus

The survey took a "top-down" approach, starting with ER Program Managers and OU Facility and Project Managers. Most of these people referred to other individuals and programs they thought might have relevant information. (See Fig. 1: Referrals.) It was hoped that this strategy would provide good general coverage of available datasets and allow those with access to datasets the opportunity to contribute.

The survey was conducted by telephone and electronic mail from March 22 through April 6, 1995. After a brief introduction of the survey's purpose, respondents were asked if they were aware of any potentially relevant studies, reports, or research. General information requested from survey participants included the following:

- What OUs are you affiliated with?
- Are you aware of any potentially relevant studies, reports, or research?
- Do you know of any individuals or programs that may have information of interest?

For each person contacted, a survey form was filled out to the extent information was known. (See Fig. A.2: Survey Participant Form.)

If potentially relevant datasets were identified, further questions were asked regarding the nature of the data including the following:

- Have these datasets been entered into a data management system such as the Oak Ridge Environmental Information System (OREIS) or the Bechtel Environmental Information Data Management System (BEIDMS)?
- What types of samples were taken?
- Who has the data in electronic form?

If most of a dataset was thought to be in a data management system such as OREIS, no further questions regarding that dataset were asked since the findings could be obtained from the system. If a dataset was not thought to be in a data management system, a blank data survey form was faxed to those who might have relevant information. (See Fig. A.3: Dataset Information Form.) Unfortunately, many of these forms were not returned.

PERSONS CONTACTED

Persons contacted are listed in Table A.1. All are Lockheed Martin Energy Systems, Inc., employees or on-site subcontractors except where indicated.

SURVEY FINDINGS

Interviews and returned survey forms uncovered the following information regarding OUs of interest.

K-25
OREIS holds surface water, sediment, toxicity, and biota data for the K-901A holding pond. The K-25 Site Environmental Monitoring program takes monthly surface water and sediment samples from the K-901A pond. SAIC is currently collecting data for K-901. The ORNL Environmental Sciences Division (ESD) sampled Canadian geese near the K-1007 pond for PCBs. SAIC holds surface water, soil, and possibly sediment data for K-770. Additional soil and sediment data for K-25 can be found in OREIS.

ORNL
Surface water data from seeps, springs, and tributaries, and sediment and soil data including soil characterizations and core samples have been collected for WAG 2. Results from these studies are intended for inclusion in OREIS. Some Ni sampling has been conducted for WAG 4. Water and soil from Pit 1 of WAG 7 have been sampled. Bechtel holds data regarding WAG 5.

Y-12
Surface water, soil, sediment, and biological information for LEFPC are in OREIS. This data includes summaries of Hg distribution and results of tests for organics. A surface water compliance testing point is located at EFPC. OREIS holds data collected in 1992 and 1993 for the EFPC Remedial Investigation (RI). EFPC data not in OREIS includes pollutant data; old surface water data; and PCB, Hg, and pesticide data for fish and algae. SAIC is currently conducting EFPC studies. CDM obtained Chestnut Ridge soil, sediment, and surface water data. Small mammal and vegetation bioaccumulation studies have been conducted for Chestnut Ridge OU2. Two surface water sampling points for Y-12 surface water compliance are located at Bear Creek. The Bechtel Environmental Information Data Management System (BEIDMS) contains 1994 and 1995 Bear Creek Valley surface water data. A Bear Creek OU1 soils data project being conducted

by SAIC is almost complete. Future studies for Y-12 include soil and sediment sampling near Bear Creek Road.

A historical data capture being conducted by SAIC has found the following surface water datasets for Bear Creek Valley:

- USGS water quality (inorganics, nitrate), 1984;
- NPDES data (inorganics and organic), 1990-94;
- organics, inorganics, and PCBs, 1990;
- organics, PCBs, inorganics, pesticides, 1993;
- inorganics, organic, 1987; and
- GWQAR data, organics, inorganics. 1986-1994 (in BEIDMS).

The Bear Creek Valley historical data capture contains the following soil and sediment information:

- organics, inorganics, PCBs, 1990 ;
- Upper Bear Creek Valley, inorganics, organics, pesticides, PCBs, 1983-84; and
- well borings, organics, inorganics, pesticides, PCBs, 1983-(unknown).

Other OUs

Jacobs Engineering holds Freels Bend data for soil, water, organics, inorganics, pesticides, PCBs, semi-volatiles, volatiles, and metals. This information is intended for inclusion in OREIS. Vegetation, soil, sediment, volatiles, and surface water data for South Campus are in OREIS.

Table A.1. Contacts for data survey for ORR-EMAP terrestrial wildlife risk assessment

Name	Employer	Phone	UserID	Notes/project affiliation
Jane Aiken		241-3439	XQ9	In charge of K-901
Terri Ball			TLS	WAG 6
Lisa Baron		574-7393	ISA	
Clay Bednarz		241-3926	NRZ	WAG 4 & 11 Project Manager
Donna Bennett		574-5839	DFH	UEFPC
Bud Brickeen		576-1579	WBR	WAG 3 & 8 Project Manager
Jeff Cange	Bechtel	220-2255		WAG 5 Task Manager
Jane Carr		241-3542	J5C	ORNL Document Management Center
Jennifer Chason	SAIC	481-8796		EFPC, Bear Creek
Roger Clapp		576-6619	UVA	WAG 2 Technical Lead
Mike Coffey		576-5477	C3Y	K-1007, K-901
Dennis Cope		241-3841	DGX	Y-12
Barnaby Cornaby	SAIC	481-8721		LEFPC
Chris Dearstone		576-5946, 574-7449	KTV	Y-12 Database Administrator
John Forstrom		576-5640	KAF	K-25
Don Garrett		241-3501	GA4	WAG 6, WAG 11
Patty Goddard		576-3692	PG2	K-25 ER Technical Coordinator
Steven Haase		241-5258	6SH	Y-12 Technical Support
Chuck Hadden	SAIC	481-8733		Bear Creek, LEFPC
Kim Hanzelka		574-4599	UKH	Y-12 surface water compliance
Al Hardesty		576-0311	AFQ	WAG 5
Larry Hawk		241-4874	HKV	Facility Manager (WAG 2, 3, 8, . . .)
Kelly Henry	Jacobs	482-5045		Freels Bend, South Campus
Steve Herbes		574-7336	SEH	WAG 2 Project Manager
Walter Hill		574-2828		LEFPC
Judy Hodgins		576-2368	H9S	Project Manager for soil sampling at Bear Creek Road

Table A.1 (continued)

Name	Employer	Phone	UserID	Notes/project affiliation
Jenny Holt		574-7336, 873-4821 (beeper)	VH2	
Rick Howard		241-2812	HR5	Facility Manager (WAG 4, 7, 11)
Dale Huff		574-7859	DDH	WAG 4
Dan Jones		241-5247		Y-12 Risk Assessment Group
Dick Ketelle		574-5762	KET	X-10
Jim Loar		574-7323	LOA	
John Lyons		574-3166	L9Y	K-25 ER Program Manager
Misty Mayes	SAIC	481-4617		K-901 pond
Wayne McMahon		574-7525	EIH	Y-12 EM Manager
Jerome Miller				LEFPC
Jill Mortimore		574-1462	JAO	Freels Bend, South Campus
Allen Motley		576-5782	A4Z	K-25
John Murphy		576-7929	JMU	X-10 EM Manager
Terri Nelson		574-7033	TRX	WAG 7 Facility and Project Manager, WAG 5 Facility Manager
Rona Painter		576-5477	RR9	K-25 Groundwater Program
Robert Poling		576-5493	P8O	K-25 Groundwater Program
Tony Poole		241-3591	D6P	K-25 ambient monitoring
Rob Rich		574-0678	RA3	ambient monitoring of K-901A and K-1007A ponds; stormwater sampling for Mitchell, Poplar, Clinch
Jim Rodgers		574-8982	JGR	Environmental Compliance for all sites
Jean Shaakir-Ali		574-5359	IJL	WAG 2
Lisa Shipe		241-2590	OLG	K-25 Monitoring Group
Valerie Smith		241-3518	VD5	K-901 and other K-25 OUs
Brian Spalding		574-7265	BPS	Pit 1 of WAG 7
Pam Stevens		576-5488	NPT	K-25 outfalls
Jane Tate	Jacobs	220-4872		South Campus

Table A.1 (continued)

Name	Employer	Phone	UserID	Notes/project affiliation
Chris Taylor		576-6813	YLO	WAG 1, WAG 7
Fred Taylor		435-3418	FGT	Former WAG 7 Project Manager
Ralph Turner		574-7856	RRT	Bear Creek
Frank Van Ryn		574-1907	XS2	K-770
Ed Vazquez		576-1930	EAV	Y-12 Data Management Program
Steve Walker				Technical Lead for future soil sampling at Bear Creek Road
Ben Watts		576-4710	BW3	K-25 Data Management Program
Don Watkins		576-9931	W5T	WAG 2
Darrell West		574-7367	DAR	
Lori Wiley	CDM			UEFPC soil sampling
Jackie Williams		241-5119	XLW	K-25 Data Management Program
Kirk Wilson		576-5290	QRG	WAG 6 Facility Manager
Pam Wood		576-9925	PW7	ORNL editor, Document control
Steve Wood	CDM	482-1065		Chestnut Ridge OU2: soil, sediment, and surface water

FIG. A.1. REFERRALS

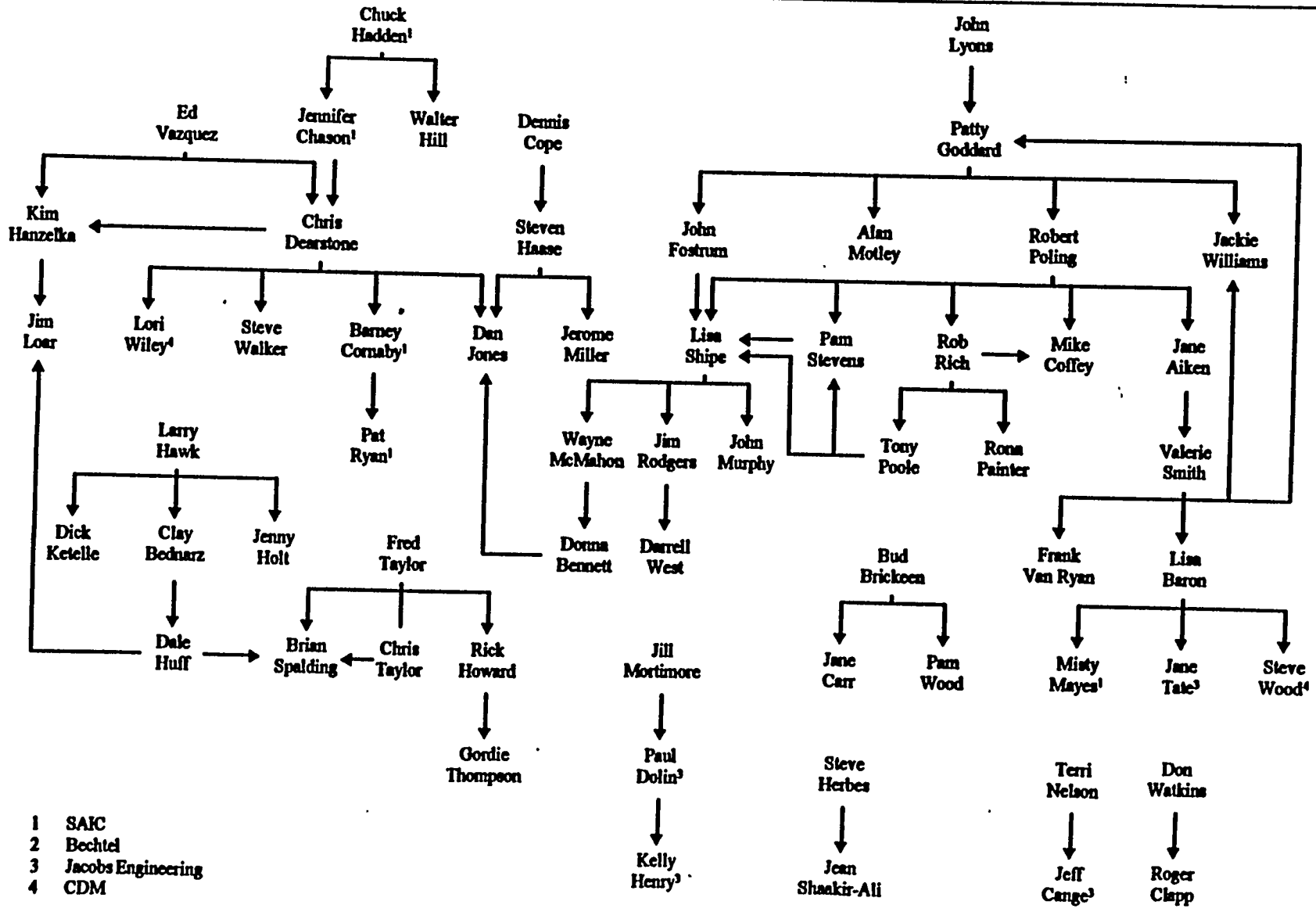

FIG. A.2. SURVEY PARTICIPANT FORM

PROJECT TO LOCATE DATA FOR THE OAK RIDGE RESERVATION
WHICH COULD SUPPORT ECOLOGICAL RISK ASSESSMENTS

INFORMATION ABOUT PERSONS CONTACTED (DRAFT)
(Complete information is requested only for authorities and custodians of surface water or soil data)

Name of person contacted
(last, first, middle initial)

Job title

Three-character User ID (or E-mail name if person has no User ID)

Phone number

Fax number

How was this person identified to be contacted? (e.g., referred to by program manager; name selected from organizational chart...)

Location

Employer (MMES, SAIC, Bechtel, ...)

Programmatic affiliation (ER, Compliance, BMAP, general research, ...)

Job responsibilities (Free form and flexible)

Operable Unit affiliations (which OU's does this person work with?)

Main role in identifying or providing data (check all that apply):

1. ____ Broad knowledge about multiple data sets
2. ____ Broad knowledge about a major program
3. ____ Detailed knowledge about one or more subprograms or tasks
4. ____ Data system expert
5. ____ Data custodian (of what data?) _____
   (Add names of the data authorities)
6. ____ Data authority (of what data?) _____
   (Add the name of the person who collected the data for which this person is an authority, or who was in charge of the field teams)

FIG. A.2. SURVEY PARTICIPANT FORM (CONTINUED)

What programs, subprograms, or data systems is this person knowledgeable about?

What subject areas (and, if relevant, specialties) (e.g., chemistry-mercury, biology-benthic macroinvertebrates, radionuclide concentrations, data management, project management...) is this person knowledgeable about?

Expected usefulness of this contact in similar future data searches

High Intermediate Low

Comments on expected usefulness:

Other comments

Contact made by:

Date(s):

Method (e.g., in person, by phone, E-mail, correspondence):

FIG. A.3. DATASET INFORMATION FORM

DRAFT ORR-EMAP-ORNL Environmental Restoration Data Inventory

Interview Form for Relevant Data in the 3/95 search for data to support the ORR-EMAP (Terrestrial) Ecological Risk Assessment for the Reservation (As determined by Media/Sample Matrix meeting the filter specifications)

1. Organization (Program/Project/Division):_____
2. SubProgram or Task:_____
3. Data File or Model Name:_____
4. Data Path or Location:_____
5. Data Purpose:_____
6. Site Area Description:_____
7. Location Description:_____
8. Approximate Date Range: [__/__/__ - __/__/__]
9. Media/Sample Matrix:_____
10. Primary Custodian of Dataset:_____
11. Phone Numbers:_____ User ID:_____
12. Secondary Custodian of Dataset:_____
13. Phone Numbers:_____ User ID:_____
14. Primary Data Authority: _____
15. Phone Numbers:_____ User ID:_____
16. Secondary Data Authority:_____
17. Phone Numbers:_____ User ID:_____
18. Data Generator:_____
(Subcontractor, if applicable)
19. Phone Numbers:_____ User ID:_____
20. Approximate Time of Last Data Base Update: [__/__/__]
21. Intended Frequency of Data Base Update:_____
(Monthly, Quarterly, Annually, etc.)

FIG. A.3. DATASET INFORMATION FORM (CONTINUED)

22. Abstract: _____

23. Archive Software: _____ (Current Database)

24. Hardware Used: _____ (Original Platform)

25. Presentation Format: _____
Tabular (Spreadsheet)
Textual (Word Processing)
Graphical (non-spatial raster image)
Spatial (True Earth GIS file)

26. Grid System: _____ (X-10, Admin, TN SP, Lat/Long)

27. Distribution Point: _____
(ORNL Domain Name, IP Address)

28. Comments/Other Information: _____

29. Keywords: _____

30. Identifiers: _____

31. Estimated Size: _____

32. Validation/Evaluation (Yes/No): _____ 33. If "Yes," Describe Type:

34. Data Dictionary (Yes/No): _____

35. Reports: (attach additional page, if needed)

1) DMC Number: _____ Date Published: _____
Title: _____

2) DMC Number: _____ Date Published: _____
Title: _____

3) DMC Number: _____ Date Published: _____
Title: _____

FIG. A.3. DATASET INFORMATION FORM (CONTINUED)

This information SUPPLEMENTS that obtained for the Draft ORR-EMAP-ORNL Environmental Restoration Data Inventory Interview Form (from Gordie Thompson) as supported by its "Classification Scheme"

Number (hand-assigned) of the Interview Form which this sheet supplements_____

Name by which data are known, or a descriptive name for the data. (Example: "BMAP Fish Community sampling data")

Types of samples

Contaminant levels Toxicity General water quality Biota status

Other_____

Types of contaminants, biota, or other measurements represented by the data (e.g., toxicity of noncharacterized water to Ceriodaphnia dubia; levels of n congeners of PCB's; metals; bioaccumulation study of x in blue herons; ...) (also attach a list of variables or a summary of data if available)

How many stations or locations were sampled? (approximate is OK)?

If soil samples are included, were these ____Surface? ____Shallow (<12")? ____Deep (>12")?

What is/was the frequency of sampling?

Is sampling ongoing?

If ongoing, provide the scheduled end date if there is one

Sampling method(s)

FIG. A.3. DATASET INFORMATION FORM (CONTINUED)

Analysis method(s)

Are qualifiers included in the data set (Y/N)? ____ If yes, indicate type(s) included
_____ Lab?
_____ Validation?
_____ Other? _____

Are nondetects included in the data set? _____

Please characterize the level of data assessment (QA/QC):

_____ Validation/evaluation performed?
(If yes, what type of validation/evaluation was performed?)

_____ Are validation/Evaluation results included in the electronic data?

_____ Collected under ER standards prevailing at the time of collection?

What approximate percentage of relevant data are in the Oak Ridge Environmental Information System (OREIS)?

Recommended media for transfer (obtain from OREIS; electronically via ftp; diskette(s),...)

Cutoff date for fully validated data

Cutoff date for unvalidated but available data

Any special considerations relating to use of the data?

FIG. A.3. DATASET INFORMATION FORM (CONTINUED)

Person who compiled this information

Date information was compiled

1. All persons are thought to be employees of Lockheed Martin Energy Systems, Inc. (LMES) except where indicated.

2. E-mail address is UserID@ORNL.GOV

Appendix B

TABLES FOR CHAPTER 3: EVALUATION OF THE POTENTIAL USE OF OPERABLE UNITS ON THE OAK RIDGE RESERVATION BY WILDLIFE

Table B.1. Habitat requirements for assessment and measurement endpoints on the ORR

Species	General habitat requirements	Citation
Mallard duck	Ponds, lakes, slow-moving streams or rivers. shallow water (<41 cm) for feeding	DeGraaf and Rudis 1986
Cumberland slider	Found in shallow freshwaters with lots of aquatic vegetation. They will inhabit mainly larger bodies of water with deep water avilable (3 feet or more).	Meyers-Schone and Walton 1994
Mink	Streambanks, lakeshores, and marshes. Favors forested wetlands with abundant cover such as thickets, rocks, or windfalls.	DeGraaf and Rudis 1986
River otter	Borders of streams, lakes or other wetlands in forested areas.	DeGraaf and Rudis 1986
Great blue heron	All sizes and types of bodies of water that contain fish	DeGraaf and Rudis 1986
Belted kingfisher	Earthen bank for nesting; pond, lake, stream, or river for feeding.	DeGraaf and Rudis 1986
Bald eagle	Large bodies of water that contain fish, large living trees for nesting. Low human disturbance.	DeGraaf and Rudis 1986
Osprey	Near large bodies of water that support abundant fish. Along rivers and lakes	DeGraaf and Rudis 1986
Double-crested cormorant	Found on rocky coasts, beaches, inland lakes and rivers.	National Geographic Society 1987
Black-crowned night heron	Ponds, lakes, marshes, slow streams with pools, or rivers	DeGraaf and Rudis 1986
Northern water snake	Aquatic and semi aquatic habitats	DeGraaf and Rudis 1986
Pied-billed grebe	Lakes, rivers, or ponds with emergent vegetation and open water	DeGraaf and Rudis 1986
Leopard frog	all types of shallow freshwater habitats; includes streams, rivers, ponds, or lakes	Conant 1986
Hellbender	Almost always found in rivers and larger streams where water is running and ample shelter is available in the form of large rocks, snags, or debris.	Conant 1986
Rough-winged swallows	Nearly any open area with adequate nest sites and a water supply (usually a stream). Often river valleys and lake shores.	DeGraaf and Rudis 1986

Table B.1 (continued)

Species	General habitat requirements	Citation
Gray bat	Cave residents year-round, although different caves are occupied in summer and winter. Forage over lakes and rivers.	Harvey 1992
Indiana bat	Favors limestone caves with pools of water. Solitary females or small maternity colonies bear young in hollow trees or under loose bark. Forages over riparian forest and associated fields	DeGraaf and Rudis 1986 Mumford and Whitaker 1982
Eastern small footed bat	In or near woodland in caves, mine tunnels, buildings, crevices in rocks. Maternity colonies have been observed in buildings. Forages low over trees and brush	DeGraaf and Rudis 1986 Burt and Grossenheider 1976
Rafinesque's big-eared bat	Hibernate in caves, mines or similar habitats. Maternity colonies are usually found in abandoned buildings. Siuspected to be a forest-inhabiting bat.	Harvey 1992 Mumford and Whitaker 1982
American toad	Almost any habitat: gardens, woods, yards with cover, damp soil, and a food supply Usually in moist upland woods	DeGraaf and Rudis 1986
American woodcock	Moist woodlands in early stages of succession, swamps, stream banks, bogs, rich bottomlands, brushy edges of woods, dry open woods and fields.	DeGraaf and Rudis 1986
European starling	Farm, city, orchard, gardens, parks; Prefers rural areas w/pastures or hayfields; If forests, prefers stands with low percent canopy cover. More common in vicinity of human habitations.	DeGraaf and Rudis 1986
American robin	Open woods and fields. Forages primarily in lawns, gardens, grassy fields, etc.	DeGraaf and Rudis 1986
Short-tailed shrew	Both timbered fairly open habitats: deciduous, mixed, and less often coniferous forests with moist loose humus; especially common along banks of streams and in meadows with tall rank grasses or sedges, brush piles, and stone walls. Avoids dry, warm sites.	DeGraaf and Rudis 1986
Long-tailed shrew	found in deciduous and mixed forest.	DeGraaf and Rudis 1986
Masked shrew	Damp deciduous and confiferous woodlands with grasses, rocks, logs, or stumps for cover; bogs and other moist areas.	DeGraaf and Rudis 1986

Table B.1 (continued)

Species	General habitat requirements	Citation
Smokey shrew	Damp, boulder-strewn, upland woods with thick leafmold. Typically near streams with moss-covered banks.	DeGraaf and Rudis 1986
Southeastern shrew	Open fields and woodlots	Burt and Grossenheider 1976
Six-line racerunner	Dry regions in sparse woods with loose/sandy soil and short grasses.	Smith 1967
Slender glass snake	dry grasslands or dry open woods	Conant 1986
Tennessee cave salamander	caves with water (species has external gills)	Conant 1986
Green salamander	humid rocky areas where rock faces remain moist and well protected from sun and direct rain.	Conant 1986
Raccoon	Wooded areas interrupted by fields and water courses. Not usually found in dense forests, commonly found in wetlands near human habitation.	DeGraaf and Rudis 1986
Wood duck	Shallow waters of ponds, lakes, or marshes having abundant floating and emergent vegetation. Wooded swamps or open flooded lowland forests where food is available.	DeGraaf and Rudis 1986
Muskrat	Marshes, shallow portions of lakes, ponds, swamps, sluggish streams, drainage ditches. Most abundant in areas with cattails.	DeGraaf and Rudis 1986
White-tailed deer	Mosaic of forests and open areas	DeGraaf and Rudis 1986
Wild turkey	Mast-producing woodlands. Ideal habitat is a network of open, mixed forests and fields.	DeGraaf and Rudis 1986
Canada goose	marshes, shores of ponds and lakes, grassy fields or agricultural lands that provide additional grazing areas.	DeGraaf and Rudis 1986
Eastern cottontail	Farmlands, pastures, fallow fields, open woodlands, thickets along fence rows and stone walls, edges of forests. swamps and marshes, suburban areas with adequate food and cover. Avoids dense woods.	DeGraaf and Rudis 1986
Groundhog	Open land. Edges of woodlands (seldom in interior), open cultivated land, pastures, meadows, open brushy hillsides.	DeGraaf and Rudis 1986

Table B.1 (continued)

Species	General habitat requirements	Citation
Grasshopper sparrow	Hayfields, weedy fallow fields, prairies. Avoids shrubby fields. Birds favor uplands with ground vegetation of various densities.	DeGraaf and Rudis 1986
Henslow's sparrow	Neglected weedy fields-commonly of broomsedge-wet meadows, saltmarsh edges. Occaisionally in dry and cultivated uplands. May fovor moist lowland habitat and may use areas with widely scattered shrubs.	DeGraaf and Rudis 1986
Lark sparrow	generally prefers sites with grasslands or open woodlands	National Geographc Society 1987
Vesper sparrow	Breed in short-grass meadows, pastures, hayfields, cultivated grain fields, dry open uplands, burned and cut-over areas in forests, country roadsides. Birds favor sparsely vegetated uplands and may use areas with widely scattered shrubs.	DeGraaf and Rudis 1986
Red-tailed hawk	Deciduous and mixed woodlands interspersed with meadows, brushy pastures, open bogs, and swampy areas. Large openings for foraging.	DeGraaf and Rudis 1986
Golden eagle	Elevated nest sites, especially cliffs. Broad expanses of open land for hunting. 50 to 100 square mile home range.	DeGraaf and Rudis 1986
Northern harrier	Open country with herbaceous or low woody vegetation for nest concealment.	DeGraaf and Rudis 1986
Cooper's hawk	Extensive deciduous or mixed woodlands that are dense or open, scattered woodlots interspersed with open fields. Occupies similar forest niche as Sharp-shinned Hawk but has broadened its habitat by moving into more open agricultural areas. Flood plain forests and wooded swamps.	DeGraaf and Rudis 1986
Red-shouldered hawk	Moist hardwood or mixed woodlands, wooded swamps, bottomlands and wooded margins of marshes often close to cultivated fields.	DeGraaf and Rudis 1986
Sharp-shinned hawk	Open mixed or coniferous woodlands, clearing, edges. Extensive open mixed woodlands that are free from human disturbance.	DeGraaf and Rudis 1986
Barn owl	Almost anywhere in open country but prefers vicinity of farms and villages. Avoids woodlands and higher elevations.	DeGraaf and Rudis 1986
Black vulture	Common in open country and around human settlements, avoids heavily forested areas	Ehrlich et al. 1988

Table B.1 (continued)

Species	General habitat requirements	Citation
Cougar	Found throughout all habitat types and successional stages. Requires isolation away from human disturbance. Home ranges may vary in size from 5 to 96 square miles.	DeGraaf and Rudis 1986
Red fox	A mixture of forest and open areas is preferred. Unbroken fields and dense forests avoided. Edges used heavily.	DeGraaf and Rudis 1986
Snapping turtle	Any permanent body of freshwater, large or small.	DeGraaf and Rudis 1986
Black rat snake	Variety of habitats including woodlands, thickets, field edges, farmlands, rocky hillsides, river bottoms, old barns.	DeGraaf and Rudis 1986
Northern pine snake	Flat, sandy pine barrens, sandhills, and dry mountain ridges, most often in or near pine woods.	Conant 1986

Table B.2. Summary of landcover types identified on the ORR and expected use by assessment and measurement endpoints

Species	Landcover types[a] on the ORR									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Other
Mallard duck		X								
Cumberland slider		X								
Mink		X			X	X				water primary; forest secondary
River otter		X			X	X				water primary; forest secondary
Great blue heron		X								
Belted kingfisher		X								
Bald eagle		X								large bodies of water
Osprey		X								large bodies of water
Double-crested cormorant		X								large bodies of water
Black-crowned night heron		X								
Northern water snake		X								
Pied-billed grebe		X								
Leopard frog		X								
Hellbender		X								

Table B.2 (continued)

Species	Landcover types[a] on the ORR									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Other
Rough-winged swallows		X					X	X		Earthen Banks
Gray bat		X								large bodies of water, caves
Indiana bat		X			X	X	X	X		
Eastern small footed bat					X		X	X		
Rafinesque's big-eared bat	X (buiildings)		X	X	X	X				Caves
American toad		X	X	X	X	X				forest primary; water secondary
American woodcock					X	X	X	X		
European starling	X		X	X	X	X	X	X		
American robin	X		X	X	X	X	X	X		
Short-tailed shrew			X	X	X	X		X		
Long-tailed shrew					X	X				
Masked shrew					X	X				
Smokey shrew					X	X				
Southeastern shrew			X	X	X	X	X	X		
Six-line racerunner			X	X	X	X	X	X		
Slender glass snake			X	X	X	X	X	X		

Table B.2 (continued)

Species	Landcover types[A] on the ORR									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Other
Tennessee cave salamander										Caves
Green salamander										moist, rocky sites
Raccoon	X	X	X	X	X	X	X	X		
Wood duck		X			X	X				
Muskrat		X								
White-tailed deer			X	X	X	X	X	X		
Wild turkey			X	X	X	X	X	X		
Canada goose	X	X					X			
Eastern cottontail	X						X	X		
Groundhog	X						X	X		
Grasshopper sparrow							X	X		
Henslow's sparrow							X	X		
Lark sparrow					X	X	X	X		
Vesper sparrow							X	X		
Red-tailed hawk			X	X	X	X	X	X		
Golden eagle										use of ORR unlikely[B]
Northern harrier							X	X		

Table B.2 (continued)

Species	Landcover types[a] on the ORR									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Other
Cooper's hawk					X	X	X	X		
Red-shouldered hawk					X	X				
Sharp-shinned hawk					X	X				
Barn owl	X						X	X		
Black vulture							X	X		
Cougar			X	X	X	X	X	X		use of ORR unlikely[c]
Red fox			X	X	X	X	X	X		
Snapping turtle		X								
Black rat snake	X		X	X	X	X	X	X		
Northern pine snake			X	X		X				

[a] Definitions of habitat types are presnted in Table 1. X in cell indicates use of habitat by listed endpoint species.
[B] While golden eagles may migrate through the ORR, because the ORR does not contain large expanses of open habitat, significant use of any area on the ORR is highly unlikely.
[c] Because the ORR does not contain large expanses of habitat away from human disturbance, significant use of any area on the ORR is highly unlikely.

Table B.3. Summary of landcover types identified on OUs on the ORR

OU	Area (ha) by landcover type									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Total
Area 10 (K-901)	15.94	3.56	1.75	0.31	6.87	7.62	3.19	38.31		77.5
K-33	65	0.12			2.94	0.87	5.06	13.94	0.37	88.3
K-1064	110.6						0.19	3.56	0.06	14.87
K-1410	3.19							0.31		3.5
K-29	25.62						0.62	0.88		27.12
K-1007	13.75	7.62					0.19	0.75		22.31
K-1413	1.31									1.31
K-1004	2.94									2.94
K-1070-C/D	6.56				1.69	0.19	0.25	4.37		13.06
K-1401	8.06									8.06
K-1420	2.31									2.31
K-1407	12.31	0[a]						4.19		16.5
K-770	43.81	2	2.37	1.06	4.37	3.12	4.19	28	0.06	88.98
WAG 1	48.18	0[a]	0.81		1.25	0.81	0.94			51.99
WAG 2	13	9	1		15.75	29	0.06	14.81		82.62
WAG 3	0.56		0.19		1.06	2.19	0.06	8.12		12.18
WAG 4	6.37	0[a]			2.19	1.19	4.5	1.06		15.31

Table B.3 (continued)

OU	Area (ha) by landcover type									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Total
WAG 5	10.19	0[a]	0.25		3.56	6.44	7.69	9.06		37.19
WAG 6	25.5	0.75			5.06	2.06	0.5	2.94		36.81
WAG 7	5.37	0[a]	1.44		17.25	25.31	0.12	8.31		57.8
WAG 8	17.81		3.44		1.44	3.785		5.12		31.56
WAG 9	1.37				0.25	0.06		0.31		1.99
WAG 10	0.5		0.12		0.06	0.19		0.25		1.12
WAG 11	0.31		4.56		0.81	3.81	0.37	5.12		14.98
WAG 13	0.56		0.12		0.18	0.44	0.37	1.81		3.48
Bear Creek	85.37	0[a]	37.37	20.94	192.81	140.56	14.62	246.06	0.44	738.17
BC OU1	9.5				8.19	0.25	9.19	24	0.25	51.38
BC OU2	4.12							0.62	0.06	4.8
CR OU1	1.5					0.19	2.5	2.06		6.25
CR OU2	0.94	0.06			3.81	0.38		2.62		7.81
CR OU3	0.31						0.19			0.5
CR OU4	1.44	3.94			0.06	0.06	0.19	0.56	0.31	6.56
Lower East Fork Poplar Creek	99.81	0.19	7.37	2.62	41.06	50.87	8.5	133.87	2	344.29
UEFPC OU2	3.56									3.56
UEFPC OU3	5.19									5.19

Table B.3 (continued)

OU	Area (ha) by landcover type									
	Urban	Water	Pine forest	Pine plant.	Decid. forest	Mixed forest	Pasture	Trans.	Barren	Total
Freels Bend	0.75	1.12		0.06	2.06	3.88	0.81	4.56		13.49
South Campus Facility	9.81	0.44	0.06	0.06			13.25	4.5	0.44	28.56

[a] While no surface water was observed in the satellite image, surface water is known to be present at this site.

Table B.4. Summary of habitat availability for assessment and measurment endpoints at K-25 OUs.[a]

	K-901	K-33	K-1064	K-1410	K-29	K-1007	K-1413	K-1004	K-1070-C/D	K-1401	K-1420	K-1407	K-770
Mallard duck	x	x				x						x	x
Cumberland slider	x	x				x						x	x
Mink	x	x				x						x	x
River otter	x	x				x						x	x
Great blue heron	x	x				x						x	x
Belted kingfisher	x	x				x						x	x
Bald eagle	x					x							
Osprey	x					x							
Double-crested cormorant	x					x							
Black-crowned night heron	x	x				x						x	x
Northern Water snake	x	x				x						x	x
Pied-billed grebe	x	x				x						x	x
Leopard frog	x	x				x						x	x
Hellbender													
Rough-winged swallows	x	x				x			x			x	x
Gray bat	x					x							
Indiana bat	x	x	x	x	x	x			x			x	x
Eastern small footed bat	x	x	x	x	x	x			x			x	x

Table B.4 (continued)

	K-901	K-33	K-1064	K-1410	K-29	K-1007	K-1413	K-1004	K-1070-C/D	K-1401	K-1420	K-1407	K-770
Rafinesque's big-eared bat	x	x	x	x	x	x	x	x	x	x	x	x	x
American toad	x	x							x				x
American woodcock	x	x	x	x	x	x			x			x	x
European starling	x	x	x	x	x	x	x	x	x	x	x	x	x
American robin	x	x	x	x	x	x	x	x	x	x	x	x	x
Short-tailed shrew	x	x							x				x
Long-tailed shrew	x	x							x				x
Masked shrew	x	x							x				x
Smokey shrew	x	x							x				x
Southeastern shrew	x	x	x	x	x	x			x			x	x
Six-line racerunner	x	x	x	x	x	x			x			x	x
Slender glass snake	x	x	x	x	x	x			x			x	x
Tennessee cave salamander													
Green salamander													
Raccoon	x	x	x	x	x	x	x	x	x	x	x	x	x
Wood duck	x	x				x						x	x
Muskrat	x	x				x						x	x
White-tailed deer	x	x	x	x	x	x			x			x	x
Wild turkey	x	x	x	x	x	x			x			x	x
Canada goose	x	x	x	x	x	x	x	x	x	x	x	x	x

Table B.4 (continued)

	K-901	K-33	K-1064	K-1410	K-29	K-1007	K-1413	K-1004	K-1070-C/D	K-1401	K-1420	K-1407	K-770
Eastern cottontail	x	x	x	x	x	x	x	x	x	x	x	x	x
Groundhog	x	x	x	x	x	x	x	x	x	x	x	x	x
Grasshopper sparrow	x	x	x	x	x	x			x			x	x
Henslow's sparrow	x	x	x	x	x	x			x			x	x
Lark sparrow	x	x	x	x	x	x			x			x	x
Vesper sparrow	x	x	x	x	x	x			x			x	x
Red-tailed hawk	x	x	x	x	x	x			x			x	x
Golden eagle													
Northern harrier	x	x	x	x	x	x			x			x	x
Cooper's hawk	x	x	x	x	x	x			x			x	x
Red-shouldered hawk	x	x							x				x
Sharp-shinned hawk	x	x							x				x
Barn owl	x	x	x	x	x	x	x	x	x	x	x	x	x
Black vulture	x	x	x	x	x	x			x			x	x
Cougar													
Red fox	x	x	x	x	x	x			x			x	x
Snapping turtle	x	x				x						x	x
Black rat snake	x	x	x	x	x	x	x	x	x	x	x	x	x
Northern pine snake	x	x							x				x
Total number of endpoints/OU	52	48	26	26	26	44	9	9	35	9	9	40	48

[a] X=presence of at least one habitat category prefered by the endpoint. Amount of suitable habitat not considered; only presence/absence of habitat.

Table B.5. Summary of habitat availability for assessment and measurment endpoints at X-10 OUs[a]

	WAG 1	WAG 2	WAG 3	WAG 4	WAG 5	WAG 6	WAG 7	WAG 8	WAG 9	WAG 10	WAG 11	WAG 13
Mallard duck	x	x		x	x	x	x					
Cumberland slider	x	x		x	x	x	x					
Mink	x	x		x	x	x	x					
River otter		x		x	x	x	x					
Great blue heron	x	x		x	x	x	x					
Belted kingfisher	x	x		x	x	x	x					
Bald eagle		x (WOL)[b]										
Osprey		x (WOL)[b]										
Double-crested cormorant		x (WOL)[b]										
Black-crowned night heron	x	x		x	x	x	x					
Northern water snake	x	x		x	x	x	x					
Pied-billed grebe	x	x		x	x	x	x					
Leopard frog	x	x		x	x	x	x					
Hellbender		x		x	x	x	x					
Rough-winged swallows	x	x	x	x	x	x	x	x	x	x	x	x
Gray bat		x (WOL)[b]										
Indiana bat	x	x	x	x	x	x	x	x	x	x	x	x

Table B.5 (continued)

	WAG 1	WAG 2	WAG 3	WAG 4	WAG 5	WAG 6	WAG 7	WAG 8	WAG 9	WAG 10	WAG 11	WAG 13
Eastern small footed bat	x	x	x	x	x	x	x	x	x	x	x	x
Rafinesque's big-eared bat	x	x	x	x	x	x	x	x	x	x	x	x
American toad	x	x	x	x	x	x	x	x	x	x	x	x
American woodcock	x	x	x	x	x	x	x	x	x	x	x	x
European starling	x	x	x	x	x	x	x	x	x	x	x	x
American robin	x	x	x	x	x	x	x	x	x	x	x	x
Short-tailed shrew	x	x	x	x	x	x	x	x	x	x	x	x
Long-tailed shrew	x	x	x	x	x	x	x	x	x	x	x	x
Masked shrew	x	x	x	x	x	x	x	x	x	x	x	x
Smokey shrew	x	x	x	x	x	x	x	x	x	x	x	x
Southeastern shrew	x	x	x	x	x	x	x	x	x	x	x	x
Six-line racerunner	x	x	x	x	x	x	x	x	x	x	x	x
Slender glass snake	x	x	x	x	x	x	x	x	x	x	x	x
Tennessee cave salamander												
Green salamander												
Raccoon	x	x	x	x	x	x	x	x	x	x	x	x
Wood duck	x	x		x	x	x	x					
Muskrat	x	x		x	x	x	x					
White-tailed deer	x	x	x	x	x	x	x	x	x	x	x	x
Wild turkey	x	x	x	x	x	x	x	x	x	x	x	x
Canada goose	x	x	x	x	x	x	x	x	x	x	x	x

Table B.5 (continued)

	WAG 1	WAG 2	WAG 3	WAG 4	WAG 5	WAG 6	WAG 7	WAG 8	WAG 9	WAG 10	WAG 11	WAG 13
Eastern cottontail	x	x	x	x	x	x	x	x	x	x	x	x
Groundhog	x	x	x	x	x	x	x	x	x	x	x	x
Grasshopper sparrow	x	x	x	x	x	x	x	x	x	x	x	x
Henslow's sparrow	x	x	x	x	x	x	x	x	x	x	x	x
Lark sparrow	x	x	x	x	x	x	x	x	x	x	x	x
Vesper sparrow	x	x	x	x	x	x	x	x	x	x	x	x
Red-tailed hawk	x	x	x	x	x	x	x	x	x	x	x	x
Golden eagle												
Northern harrier	x	x	x	x	x	x	x	x	x	x	x	x
Cooper's hawk	x	x	x	x	x	x	x	x	x	x	x	x
Red-shouldered hawk	x	x	x	x	x	x	x	x	x	x	x	x
Sharp-shinned hawk	x	x	x	x	x	x	x	x	x	x	x	x
Barn owl	x	x	x	x	x	x	x	x	x	x	x	x
Black vulture	x	x	x	x	x	x	x	x	x	x	x	x
Cougar												
Red fox	x	x	x	x	x	x	x	x	x	x	x	x
Snapping turtle	x	x		x	x	x	x					
Black rat snake	x	x	x	x	x	x	x	x	x	x	x	x
Northern pine snake	x	x	x	x	x	x	x	x	x	x	x	x
Total number of endpoints/OU	47	53	35	49	49	49	49	35	35	35	35	35

[a] X=presence of at least one habitat category prefered by the endpoint. Amount of suitable habitat not considered; only presence/absence of habitat.
[b] WOL = suitable habitat only at White Oak Lake.

Table B.6. Summary of habitat availability for assessment and measurment endpoints at Y-12 OUs, Freel's Bend, and the South Campus Facility[a]

	Bear Creek	BC OU1	BC OU2	CR OU1	CR OU2	CR OU3	CR OU4	LEFPC	UEFPC OU2	UEFPC OU3	Freels Bend	SCF
Mallard duck	x						x	x			x	x
Cumberland slider	x						x	x			x	x
Mink	x						x	x			x	x
River otter	x						x	x			x	x
Great blue heron	x						x	x			x	x
Belted kingfisher	x						x	x			x	x
Bald eagle												
Osprey												
Double-crested cormorant												
Black-crowned night heron	x						x	x			x	x
Northern water snake	x						x	x			x	x
Pied-billed grebe	x						x	x			x	x
Leopard frog	x						x	x			x	x
Hellbender	x							x				
Rough-winged swallows	x	x	x	x	x		x	x			x	x
Gray bat												
Indiana bat	x	x	x	x	x	x	x	x			x	x
Eastern small footed bat	x	x	x	x	x	x	x	x			x	x
Rafinesque's big-eared bat	x	x	x	x	x	x	x	x	x	x	x	x

Table B.6 (continued)

	Bear Creek	BC OU1	BC OU2	CR OU1	CR OU2	CR OU3	CR OU4	LEFPC	UEFPC OU2	UEFPC OU3	Freels Bend	SCF
American toad	x	x		x	x		x	x			x	x
American woodcock	x	x	x	x	x	x	x	x			x	x
European starling	x	x	x	x	x	x	x	x	x	x	x	x
American robin	x	x	x	x	x	x	x	x	x	x	x	x
Short-tailed shrew	x	x		x	x		x	x			x	x
Long-tailed shrew	x	x		x	x		x	x			x	
Masked shrew	x	x		x	x		x	x			x	
Smokey shrew	x	x		x	x		x	x			x	
Southeastern shrew	x	x	x	x	x	x	x	x			x	x
Six-line racerunner	x	x	x	x	x	x	x	x			x	x
Slender glass snake	x	x	x	x	x	x	x	x			x	x
Tennessee cave salamander												
Green salamander												
Raccoon	x	x	x	x	x	x	x	x	x	x	x	x
Wood duck	x						x	x			x	x
Muskrat	x						x	x			x	x
White-tailed deer	x	x	x	x	x	x	x	x			x	x
Wild turkey	x	x	x	x	x	x	x	x			x	x
Canada goose	x	x	x	x	x	x	x	x	x	x	x	x
Eastern cottontail	x	x	x	x	x	x	x	x	x	x	x	x

Table B.6 (continued)

	Bear Creek	BC OU1	BC OU2	CR OU1	CR OU2	CR OU3	CR OU4	LEFPC	UEFPC OU2	UEFPC OU3	Freels Bend	SCF
Groundhog	x	x	x	x	x	x	x	x	x	x	x	x
Grasshopper sparrow	x	x	x	x	x	x	x	x			x	x
Henslow's sparrow	x	x	x	x	x	x	x	x			x	x
Lark sparrow	x	x	x	x	x	x	x	x			x	x
Vesper sparrow	x	x	x	x	x	x	x	x			x	x
Red-tailed hawk	x	x	x	x	x	x	x	x			x	x
Golden eagle												
Northern harrier	x	x	x	x	x	x	x	x			x	x
Cooper's hawk	x	x	x	x	x	x	x	x			x	x
Red-shouldered hawk	x	x		x	x		x	x			x	
Sharp-shinned hawk	x	x		x	x		x	x			x	
Barn owl	x	x	x	x	x	x	x	x	x	x	x	x
Black vulture	x	x	x	x	x	x	x	x			x	x
Cougar												
Red fox	x	x	x	x	x	x	x	x			x	x
Snapping turtle	x						x	x			x	x
Black rat snake	x	x	x	x	x	x	x	x	x	x	x	x
Northern pine snake	x	x		x	x		x	x			x	x
Total number of endpoints/OU	49	35	27	35	35	26	48	49	9	9	48	43

[a] X=presence of at least one habitat category prefered by the endpoint. Amount of suitable habitat not considered; only presence/absence of habitat.

Table B.7. Ranking of endpoint species by the number of OUs that provide at least one favored habitat type

Endpoint Species	Total OUs W/habitat	Endpoint Species	Total OUs W/habitat
Barn owl	37	American Toad	24
Groundhog	37	Long-tailed shrew	23
European starling	37	Red-shouldered hawk	23
American robin	37	Sharp-shinned hawk	23
Rafinesque's big-eared bat	37	Masked shrew	23
Raccoon	37	Smokey shrew	23
Eastern cottontail	37	Snapping turtle	16
Black rat snake	37	Mallard duck	16
Canada goose	37	Muskrat	16
American woodcock	31	Pied-billed grebe	16
Henslow's sparrow	31	Mink	16
Southeastern shrew	31	Great blue heron	16
Wild turkey	31	Belted kingfisher	16
Slender glass snake	31	Black-crowned night heron	16
Grasshopper sparrow	31	Wood duck	16
Six-line racerunner	31	Northern Water snake	16
Eastern small footed bat	31	Leopard frog	16
Indiana bat	31	Cumberland slider	16
Lark sparrow	31	River otter	15
Red fox	31	Hellbender	7
Black vulture	31	Bald eagle	3
Cooper's hawk	31	Gray bat	3
Northern harrier	31	Double-crested cormorant	3
White-tailed deer	31	Osprey	3
Red-tailed hawk	31	Green salamander	0
Vesper sparrow	31	Golden eagle	0
Rough-winged swallows	27	Tennessee cave salamander	0
Short-tailed shrew	24	Cougar	0
Northern pine snake	24		

Table B.8. Ranking of OUs on the ORR by the number of species for which they provide habitat

OUs	Total species per OU	Ous	Total species per OU
WAG 2	53	WAG 9	35
K-901	52	WAG 10	35
Lower East Fork Poplar Creek	49	WAG 11	35
Bear Creek	49	WAG 13	35
WAG 4	49	BC OU1	35
WAG 5	49	CR OU1	35
WAG 6	49	CR OU2	35
WAG 7	49	BC OU2	27
K-33	48	K-1064	26
K-770	48	K-1410	26
CR OU4	48	K-29	26
Freel's Bend	48	CR OU3	26
WAG 1	47	K-1413	9
K-1007	44	K-1004	9
South Campus Facility	43	K-1401	9
K-1407	40	K-1420	9
K-1070-C/D	35	UEFPC OU2	9
WAG 3	35	UEFPC OU3	9
WAG 8	35		