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# **Viability Assessment Report For Lake and Pond Margins Habitat Association**

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## **I. Description of the Habitat Association**

The margins of standing bodies of water include the littoral zone that consists of the area of shallow water where light penetrates to the bottom and is typically occupied by rooted plants (Odum, 1971). The margin habitat would also include areas of the shore that are kept wet through wave action. These communities include photosynthetic primary producers and the groups that depend on them (Cole, 1994).

The physiographic position, geology, soils, hydrology, and dominant vegetation all vary with the actual location of each body of water. All of these factors plus the size, depth, age, and permanence of the body of water play an important role in the physical, chemical and biological makeup of these aquatic environments.

### **Location**

Large and small lakes, ponds, temporary and permanent shallow water pools, occur throughout most of the Daniel Boone National Forest (DBNF). Their size and distribution are widely variable. For this report a lake is any permanent body of water with a surface area greater than or equal to five acres and a pond is any permanent body of water with a surface area less than five acres. There are 12 lakes and approximately 300 mapped ponds on the DBNF with approximately 445 and 30 miles of shoreline respectively (USDA Forest Service, 1996). In addition to the lakes and ponds, numerous (possibly more than 1500) ridge-top, seasonal and forested pools have been established on the DBNF primarily on the Morehead and Stanton Districts (Biebighauser, 2001).

### **Geology, Hydrology and Dominant Vegetation**

The DBNF contains parts of several physiographic regions or ecological subsections and portions of three major river systems, the Cumberland, Kentucky and Licking rivers. The Forest also lies within or is bordered by several sections and subsections within the Eastern Broadleaf Forest provinces and the Central Appalachian Broadleaf-Coniferous Forest Province. The western part of the DBNF lies primarily within the Northern Escarpment, Southwestern Escarpment and Low Hills Belt subsections of the Northern Cumberland Plateau Section and is bordered to the west by the Highland Rim and Bluegrass sections. The eastern part of the DBNF lies primarily within the Rugged Eastern Hills subsection. The southern and southeastern boundaries of the Forest also encompass the Jellico Mountains subsection of the Cumberland Mountains Section (USDA Forest Service 2001). Vegetation

will vary with the size and type of water body. Seasonal ponds of all types may have rushes, bulrushes, caric sedges, Nepal browntop and lowland buttonweed. Shallow permanent ponds will frequently have ceric sedges, rushes, bulrushes, redtop panic grass, Swamp Beggar's-tick and Carolina willow. Larger deep ponds and smaller lakes may have cattail, Woolly Bulrush and black and Carolina willow. Margins of larger lakes with heavy wave action and fluctuating water levels may have vegetation restricted to woody plants such as sycamore and willow. Some annual plants may also occur here, smartweed, Nepal browntop, hierba de yago, lowland buttonweed, cattail and at least one site with phragmites. Precipitation in the area occurs throughout the year with seasonal variation.

## **II. Current Status of the Habitat Association on the Daniel Boone National Forest**

The landscape of the area that is now the DBNF has changed dramatically since the 1800's when the dominant use was small-scale subsistence farming. Logging and land clearing for agriculture accelerated in the early 1900's, and by 1930 most of eastern Kentucky had been cleared. Faced with economic necessity, many people either abandoned or sold their land to the Federal Government in the 1920's and 1930's under the Weeks Act. The law allowed the Federal Government to begin buying land, in 1937, for what was eventually to become the DBNF. From the 1920's to the 1970's mining companies stripped and deep mined coal on adjacent private lands (USDA Forest Service, 2001).

Historically, natural bodies of standing water may have been more common than they are today in what is now the DBNF. Beginning in the 1940's many small ponds were established for watering livestock on private land through programs administered by the Soil Conservation Service (Biebighauser, 2001). When this land was acquired for the DBNF some tracts had these existing standing water bodies on them. Ponds were established on the DBNF to provide water for forest fire suppression in the 1960's. A number of small lakes were established in the early 1970's by the Soil Conservation Service for flood control as directed by Public Law 566 (Biebighauser, 2001). Past and current DBNF practices have established and maintained numerous water sources for a variety of purposes. This has increased the total number of individual bodies of water on the Forest.

## **III. Management Needs: Recommendations for the Conservation of Habitat to Ensure Species Viability**

The majority of the lakes, ponds, and other standing water found on the DBNF are man-made. The margins of these bodies of water form unique habitats and are used by numerous species for which continued expectation of existence on the forest is at risk (see Attachment A). Habitat management includes protection and improvement and in some cases creating more bodies of standing water, to ensure species viability. Protection involves preventing actions or alterations, to the habitat, that adversely affect species viability.

The desired goal would be to maintain or exceed State water quality standards for aquatic biodiversity. Maintain and restore water quality necessary to support healthy aquatic ecosystems and to ensure survival, growth, reproduction, and migration of aquatic dependent species. Maintain and/or restore the biological, physical, and chemical integrity of aquatic ecosystems (USDA Forest Service, 2001).

The desired future condition of this habitat association is to maintain, improve, and/or establish more standing water within the Forest. Manage land surrounding these areas in a way that enhances or does not negatively impact the species viability of organisms living there. Ensure a high likelihood that species within this association will persist or increase on the forest over the planning period.

### **Forest-Wide Standards**

- Follow direction in FSM 2630 (Management of Wildlife and Fish Habitat) and FSM 2670 (Threatened, Endangered, and Sensitive Plants and Animals).
  - *Rationale: These provide guidance for management decisions specific to wildlife, fish, and PETS species.*
- Follow guidelines in FSH 2609.13 (Wildlife and Fisheries Program Management Handbook).
  - *Rationale: These provide guidance for management decisions specific to wildlife and fisheries.*
- Meet or exceed all Federal, State, and local water quality standards for aquatic biodiversity.
  - *Rationale: The National Forest Management Act of 1976 requires the Forest Service to maintain or enhance water quality, which turn helps maintain healthy aquatic ecosystems.*
- Create more ponds and temporary and permanent shallow water pools throughout the DBNF.
  - *Rationale: The majority of these bodies of water are concentrated on the Morehead and Stanton Ranger Districts. It has been shown that the margins of these pools are used by species at risk of losing population viability on the DBNF. Creating more pools and thus more margins may increase these species viability.*
- National Forest vegetation management will not be proposed in the areas adjacent to these small lakes, ponds, or areas of standing water unless the objective of the management is habitat improvement or will have beneficial or no adverse effect on species that use this association.
  - *Rationale: Management activities are sometimes necessary to maintain or enhance individual species habitats.*
- Manage special dispersed recreation activities. Schedule and regulate use of facilities, time of year, number of users, and designate use areas.
  - *Rationale: Limit adverse impact on species that use these aquatic areas as habitat.*

- Supplement habitat with naturally and artificially created nesting, roosting, and perching structures if these are limiting factors. Provide wood duck nest boxes and create snags in appropriate habitat.
  - *Rationale: Species viability may be increased if these are limiting factors in the area.*
- Provide fish attractors in areas with limited cover in ponds and lakes of appropriate size.
  - *Rationale: Increase lake and pond productivity for species dependent of on fish as a food source, such as the bald eagle, wood duck, and hooded merganser.*
- Comply with water goals as specified in the Clean Water Act and other Congressional mandates.
  - *Rationale: The Clean Water Act mandates the maintenance of biological integrity; this will help to enhance and maintain habitat viability.*
- Determine if the applicable water quality standards are being met.
  - *Rationale: This will help insure maintenance or improvement of the habitat association and the viability of the species that inhabit it.*

#### **IV. Management Needs: Monitoring and Inventory to Ensure Species Viability**

There are several species that use the margins of these scattered bodies of water that are at risk of losing their population viability (see Attachment A). Inventories should be conducted to collect baseline data on the presence, population size, and timing and frequency of use by these species.

- Habitat persistence and health should be regularly monitored while periodic monitoring should be conducted to insure individual species viability. This could be accomplished in cooperation with KDFWR and other state and federal agencies. (Moderate priority)
- If the current status of a species in this habitat association is not known, then inventory of species that are potentially at risk of losing population viability should be carried out. The general strategy is to document existing habitat and/or species condition and status, and then assess for degradation or potential improvement. (High priority)

Information on the location, dimensions, and type of water bodies on the DBNF should be collected and entered into a GIS database. This information would be used in the management of species at risk of losing population viability that use these habitats and would help determine whether there is a need to establish more of this habitat type. It would also be used in management decisions on the DBNF to prevent potentially adverse impacts to these species. (High priority)

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## Attachment A.

### Species List: Lake and Pond Margin Habitat Association

CLASS	Common Name/ <i>Species</i>
AMPHIBIAN	Four-toed Salamander/ <i>Hemidactylum scutatum</i> Mudpuppy/ <i>Necturus maculosus</i>
BIRD	Wood Duck/ <i>Aix sponsa</i> Least bittern/ <i>Ixobrychus exilis</i> Hooded Merganser/ <i>Lophodytes cucullatus</i> Pied-billed Grebe/ <i>Podilymbus podiceps</i> Prothonotary warbler/ <i>Protonotaria citrea</i>
FISH	Rock Bass/ <i>Ambloplites rupestris</i> Muskellunge (Native Pop. only)/ <i>Esox masquinongy</i> (Cave Run Lake) Northern Hogsucker/ <i>Hypentelium nigricans</i> Bluegill/ <i>Lepomis macrochirus</i> Smallmouth Bass/ <i>Micropterus dolomieu</i> Largemouth Bass/ <i>Micropterus salmoides</i> Yellow Perch/ <i>Perca flavescens</i> White Crappie/ <i>Pomoxis annularis</i> Walleye (Native pop. only)/ <i>Stizostedion vitreum</i>
INSECTS	Pygmy Snaketail/ <i>Ophiogomphus howei</i>
MAMMAL	Beaver/ <i>Castor canadensis</i>
PLANTS	Shaggy Hedge-Hyssop/ <i>Gratiola pilosa</i> Engelmann's Quillwort/ <i>Isoetes engelmannii</i> Vetchling Peavine/ <i>Lathyrus palustris</i> Loesel's Twayblade/ <i>Liparis loeselii</i> Spotted Pondweed/ <i>Potamogeton pulcher</i> Sweet Waterlily/ <i>Nymphaea odorata</i> Sphagnum Moss/ <i>Sphagnum macrophyllum</i> Shining Ladies'-Tresses/ <i>Spiranthes lucida</i> Eelgrass/ <i>Vallisneria americana</i>
REPTILES	Eastern Ribbon Snake/ <i>Thamnophis sauritus sauritus</i>

## **Attachment B.**

### **Pond and Lake Margins Species/Habitat Relationships with References**

#### **AMPHIBIANS**

Four-toed salamander – *Hemidactylum scutatum* – The four-toed salamander is usually associated with sphagnum bogs or slow-moving streams with abundant moss or sedges adjacent to woodland areas. Adults live under rocks, logs, leaves or moss in maple-beech and other hardwood forests. They can also be observed in coniferous woods such as loblolly, short-leaf pine, and Virginia pines. The larvae live in pools, bogs or slow-moving streams with moss or sedges (Neill, 1963). The four-toed salamander is terrestrial as an adult, requiring woodlands near sphagnum ponds, streams or bogs. The larvae are aquatic and require a permanent water source. The four-toed salamander is an opportunistic feeder with a diet consisting of small arthropods and worms. (Wilson, 1995).

Mudpuppy – *Necturus maculosus* – The mudpuppy is entirely aquatic, inhabiting lakes, pond, rivers, streams, and other permanent bodies of water. They prefer either weedchoked waters or those with abundant shelter in the form of debris, rocks, mud, and/or leaf beds. They require unpolluted, clean water (Wilson, 1995)

#### **BIRDS**

Wood Duck – *Aix sponsa* – These birds live around a variety of aquatic habitats that have cavities available for nesting. Swamps, wooded streams, lakes, ponds, reservoirs, and marshes provide suitable habitat. Nesting is in live or dead trees, within cavities, hollow limbs, and even abandoned pileated woodpecker holes. Trees utilized are usually near or above water—often in sycamore and maples (Mengel, 1965). Artificial nest boxes are widely used. Birds forage in shallow water for aquatic plants, insects, and small fish. In the winter, wood ducks often eat acorns.

Least Bittern – *Ixobrychus exilis* – This bittern species is found around aquatic habitats that have tall vegetation, such as cattails and rushes, in which to conceal themselves and their nests. Swamps, marshes, ponds and shallow lake edges are commonly used. In Kentucky, least bitterns have also been found nesting in artificial situations, including reservoirs, waterfowl management impoundments, and fish hatchery brood ponds (Palmer-Ball, 1996). Foraging is in shallow water, mud, and aquatic vegetation (Hamel, 1992).

Hooded Merganser – *Lophodytes cucullatus* – This species of waterfowl requires wooded areas with clear water streams, rivers, swamps, ponds, and lakes with cavity trees present (DeGraaf, 1991). Usually forages in freshwater situations such as swamps, ponds or lakes (Hamel, 1992). This species is seldom found far from floodplain situations and usually requires a good stand of fairly mature forest nearby for nest sites (Palmer-Ball, 1996). They require cavities for nesting and may utilize artificial cavities originally constructed for wood ducks (Bellrose, 1980).

Pied-billed Grebe – *Podilymbus podiceps* – The destruction of wetland habitat has led to a decrease in numbers of this species. Marshes, water impoundments, and shallow edges of lakes

and ponds provide habitat for these birds. Marshy, shallow water with abundant emergent vegetation in which to nest is required during the breeding season. During winter, the birds use similar habitat, but with an increased use of open water. On 13 June 2000, an MSU grad student observed a pied-billed grebe and four young on an USFS-built wetland near Beaver Creek, on the Morehead R.D. (Biebighauser 2001).

Prothonotary Warbler – *Protonotaria citrea* – This species is found in standing water habitats within areas of extensive forest (Hamel, 1992). When birds are seen, they are almost always near the water, where they commonly forage over slow moving streams and rivers. Swamps, riparian corridors, bottomland/floodplains, willow thickets around lakes and ponds, and reservoir margins that contain snags at least 6” dbh in size provide potential habitat for these cavity-nesters. Somewhat open swamps with scattered dead stumps or dead trees with cavities are favored nesting sites.

Bald Eagle – *Haliaeetus leucocephalus* – This federally listed species is dependent on aquatic habitat, primarily river floodplains, lakes, and natural and human-built reservoirs. It utilizes both standing and flowing fresh water sources (and salt water, in coastal areas) that have large trees suitable for nesting, perching and roosting. Suitable trees are at least 20” dbh in size and usually growing near the water (Hamel, 1992). In Kentucky, the birds have nested and wintered around wetland/floodplain habitats and reservoirs resulting from the impoundment of rivers (e.g., Laurel River Lake on the DBNF). Wintering birds are known to occur on major impoundments on the DBNF. Records of attempted nesting exist for Laurel River Lake although no active nests are currently known to exist.

American Woodcock – *Scolopax minor* – This species typically requires moist woodlands in early stages of succession. It may use open fields, cultivated land, pastures and clearings at least ¼ acre in size (DeGraaf et. al., 1991). It generally requires poorly drained soils with an abundance of earthworms for feeding, nearby fields or small forest openings for courtship and roost site (DeGraaf et. al., 1991) and is largely absent from extensive areas of mature forest (Palmer-Ball, 1996). The presences of edge habitat and a high shrub stem density may be important for nest site selection in some areas (NatureServe, 2001). Appears to be partial to sheltered wet thickets along meandering streams (Barbour et. al., 1973). This species may be found feeding around the edges of ponds and lakes where the soil remains damp and a brushy edge is present.

## INSECT AND SNAILS

Pygmy Snaketail – *Ophiogomphus howei* – In Kentucky, pygmy snaketail is only known from its aquatic larval stage from the Middle Fork of the Kentucky, Rockcastle, and South Fork of the Rockcastle Rivers. It may only persist in the latter two streams. Apparently more widespread at one time, the Pygmy Snaketail has declined in Kentucky due to impoundments and degraded water quality. This species is common in clean rivers and streams in other parts of the United States. There are rare records of the Pygmy Snaketail from wave-swept shores of lakes, however these conditions are not present on the Daniel Boone.



## MAMMALS

Beaver – *Castor canadensis* – Beavers are year-round residents of the river floodplain forest habitat association on the DBNF. They are closely associated with water, normally ranging within about 500 feet of 2<sup>nd</sup> to 4<sup>th</sup> order streams. Another important element in beaver habitat is the availability of food, usually fairly young, tender tree species associated with the riparian zones. Young seral stage tree vegetation within 500 feet of creeks and rivers provides an abundant food source. Activities that favor young deciduous growth, such as timber harvest or to some extent prescribed fire, will usually benefit beavers. The diet of the beaver changes throughout the year. From fall to spring beavers rely mainly on woody vegetation although they will use this food throughout the year. During the summer beavers eat a variety of foods including; pondweeds, duckweeds, pond lilies, algae and fleshy rootstocks of many other species, as well as a wide variety of upland or riparian herbaceous plants. Beavers alter stream habitats by their dam construction and create other unique habitats for both terrestrial and aquatic species. Lotic streams are altered to become more lentic systems. Beaver dams provide a shifting mosaic of environmental conditions within stream corridors. Additionally, beavers add much needed large woody debris to stream systems thereby aiding many aquatic organisms which require this habitat component.

## PLANTS

Shaggy Hedge-hyssop – *Gratiola pilosa* – is a coastal plain species which extends interior to the Appalachian Mountains and Arkansas. In Kentucky is known only from the southern portion of the DBNF area. Here it occurs on pond margins, wet meadows and seeps along rivers.

Engelmann's quillwort – *Isoetes engelmannii* – is a semi-aquatic species. The plants can survive entirely submerged, or for several months out of water if the soil remains moist. At the time spores are released, the leaf bases must be submerged for sexual reproduction to be successful. The plants are generally in shallow water (under 2 feet deep) and are found in both permanent and seasonal water including ruts, roadside ditches, ponds, lake margins, and occasionally in streamhead wetlands and streams.

Vetchling Peavine – *Lathyrus palustris* – is found on the coastal plain and in the mountains of eastern North America. It is typically found in or at the edge of floodplain forest, swamps, wet meadows or streamside fields, and riverbanks. It may be found along lake or pond margins. On the DBNF, this species occurs on terrace forest of larger streams.

Loesel's Twayblade – *Liparis loeselii* – is a northern and midwestern North American species. It is found in wet to damp forest. On the DBNF, it is known from wet seeps on roadsides, a seep at the base of an abandoned limestone quarry, and at the edge of a strip mine pond.

Shining Ladies'-tresses – *Spiranthes lucida* – is a northeastern to central US species. It is commonly found in damp forest and marshes, and on wet shores. On the DBNF, the species at all sites is found on open limestone streambanks, often in thin mud.

## REPTILES

Eastern Ribbon Snake – *Thamnophis sauritus sauritus* – This is a semiaquatic species almost always found close to the shallow water of bogs, marshes, swamps, ponds, streams, and weedy lake shorelines. Other low, wet places in which it is encountered include meadows and grassy roadside ditches. Occupied areas tend to be open, but with an abundance of ground cover, such as grasses and sedges, and bushes in which the snakes can sun themselves. These snakes often climb into low vegetation, although rarely more than 4 feet off the ground (Barbour 1971). When startled, they swim on the surface of the water. Deep water is normally avoided, and fleeing Ribbon Snakes skirt the shore, threading their way through vegetation and getting lost from sight with amazing rapidity (Conant and Collins 1991). Their diet consists of small fish and amphibians.

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**Attachment C.**

**Pond and Lake Margins Habitat Association Matrix**

<b>Association</b>	<b>Habitats</b>	<b>Modifier</b>	<b>Class</b>	<b>Common/Species</b>	
15-Lake/Pond Margins	Lake Margins	(blank)	BIRD	Hooded Merganser/ Lophodytes cucullatus	
			P-DIC	Vetchling Peavine/ Lathyrus palustris	
		Acidic Substrate	P-FER	Quillwort/ Isoetes englemannii	
		Forb/Grass Condition	BIRD	American Woodcock/ Scolopax minor	
		Forest Interior (Minimal Edge)		Prothonotary Warbler/ Protonotaria citrea	
		Moist		American Woodcock/ Scolopax minor	
		Rich Soil		American Woodcock/ Scolopax minor	
		Rocky/Rocks	INSEC	Pygmy Snaketail/ Ophiogomphus howei	
		Sandy Soil		Pygmy Snaketail/ Ophiogomphus howei	
		Shrub/Sapling Condition	BIRD	American Woodcock/ Scolopax minor	
		Snags > 6" dbh		Wood Duck/ Aix sponsa	
				Prothonotary Warbler/ Protonotaria citrea	
			Tract Size (Area Sensitive)		Prothonotary Warbler/ Protonotaria citrea
			Tree and Snags (Cavity Nesters)		Wood Duck/ Aix sponsa
					Hooded Merganser/ Lophodytes cucullatus
				Prothonotary Warbler/ Protonotaria citrea	
		Trees > 20" dbh		Bald Eagle/ Haliaeetus leucocephalus	
		Water (Distance Sensitive)		Wood Duck/ Aix sponsa	
				Bald Eagle/ Haliaeetus leucocephalus	
				Hooded Merganser/ Lophodytes cucullatus	
				Pied-billed Grebe/ Podilymbus podiceps	
				Prothonotary Warbler/ Protonotaria citrea	
	Pond Margins	(blank)	AMPHI	Four-toed Salamander/ Hemidactylum scutatum	
			BIRD	Least Bittern/ Ixobrychus exilis	
				Hooded Merganser/ Lophodytes cucullatus	
			REPT	Eastern Ribbon Snake/ Thamnophis sauritus sauritus	
		Forb/Grass Condition	BIRD	American Woodcock/ Scolopax minor	
Moist			American Woodcock/ Scolopax minor		
		P-MON	Loesel's Twayblade/ Liparis loeselii		
Open (Little or No Shade)		P-DIC	Shaggy Hedge-hyssop/ Gratiola pilosa		
Rich Soil		BIRD	American Woodcock/ Scolopax minor		
Seasonal (water)		P-FER	Quillwort/ Isoetes englemannii		
Seep/Constant Water			Quillwort/ Isoetes englemannii		
Shrub/Sapling Condition		BIRD	American Woodcock/ Scolopax minor		
	Tree and Snags (Cavity Nesters)		Hooded Merganser/ Lophodytes cucullatus		
	Trees > 20" dbh		Bald Eagle/ Haliaeetus leucocephalus		
	Water (Distance Sensitive)		Wood Duck/ Aix sponsa		
			Bald Eagle/ Haliaeetus leucocephalus		

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<u>Association</u>	<u>Habitats</u>	<u>Modifier</u>	<u>Class</u>	<u>Common/Species</u>
				Least Bittern/ <i>Ixobrychus exilis</i>
				Hooded Merganser/ <i>Lophodytes cucullatus</i>
				Pied-billed Grebe/ <i>Podilymbus podiceps</i>