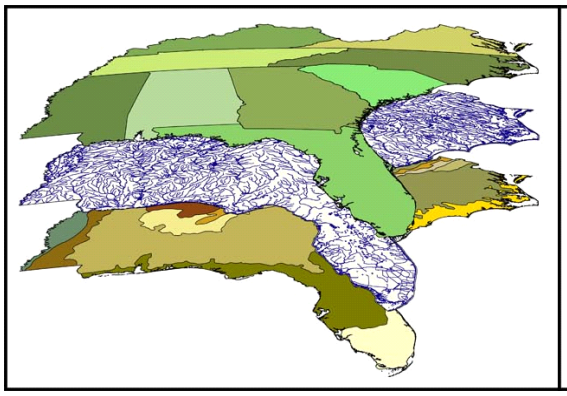


SOUTHEAST GAP ANALYSIS PROJECT

Species Modeling Report

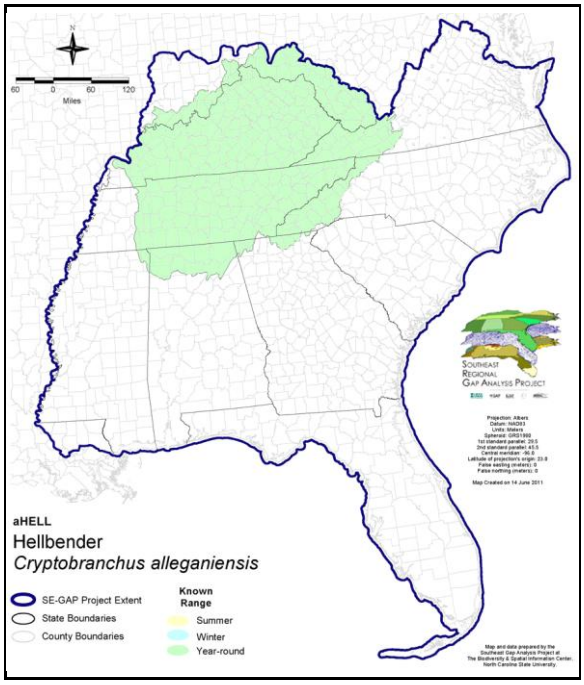
Hellbender

Cryptobranchus alleganiensis

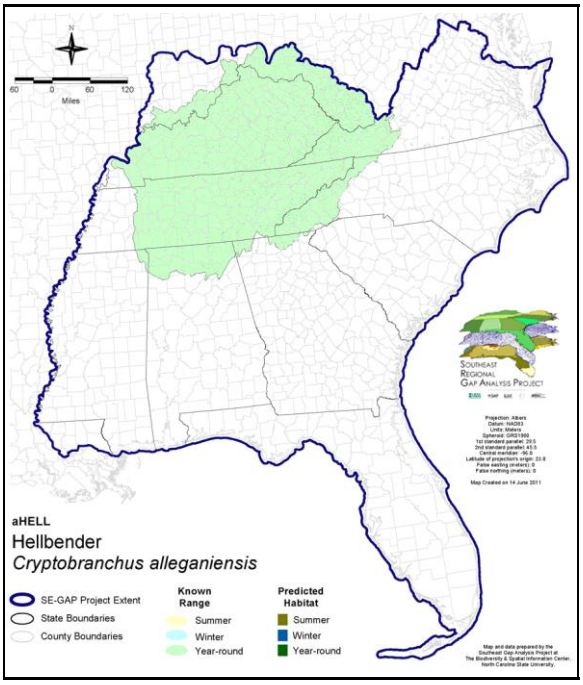
Taxa: Amphibian
Order: Caudata
Family: Cryptobranchidae

SE-GAP Spp Code: **aHELL**
ITIS Species Code: 173587
NatureServe Element Code: AAAAC01010

KNOWN RANGE:



PREDICTED HABITAT:



Range Map Link: http://www.basic.ncsu.edu/segap/datazip/maps/SE_Range_aHELL.pdf
Predicted Habitat Map Link: http://www.basic.ncsu.edu/segap/datazip/maps/SE_Dist_aHELL.pdf
GAP Online Tool Link: http://www.gapserve.ncsu.edu/segap/segap/index2.php?species=aHELL
Data Download: http://www.basic.ncsu.edu/segap/datazip/region/vert/aHELL_se00.zip

PROTECTION STATUS:

Reported on March 14, 2011

Federal Status: ---

State Status: AL (SP), GA (R), IL (LE), KY (N), MD (E), NC (SC), NY (SC), OH (E), TN (D), VA (SC)

NS Global Rank: G3G4

NS State Rank: AL (S2), AR (S2), GA (S2), IL (S1), IN (SNR), KY (S3), MD (S1), MO (SNR), MS (S1), NC (S3), NY (S2), OH (S1), PA (S3), SC (SNR), TN (S3), VA (S2S3), WV (S2)

SUMMARY OF PREDICTED HABITAT BY MANAGMENT AND GAP PROTECTION STATUS:

	US FWS		US Forest Service		Tenn. Valley Author.		US DOD/ACOE	
	ha	%	ha	%	ha	%	ha	%
Status 1	2.3	< 1	492.3	< 1	0.0	0	0.0	0
Status 2	14.0	< 1	1,427.8	< 1	0.0	0	0.0	0
Status 3	4.3	< 1	11,524.1	7	358.2	< 1	450.8	< 1
Status 4	0.6	< 1	0.0	0	0.0	0	0.0	0
Total	21.2	< 1	13,444.2	8	358.2	< 1	450.8	< 1

	US Dept. of Energy		US Nat. Park Service		NOAA		Other Federal Lands	
	ha	%	ha	%	ha	%	ha	%
Status 1	0.0	0	2,558.7	1	0.0	0	0.0	0
Status 2	0.0	0	337.1	< 1	0.0	0	0.0	0
Status 3	52.4	< 1	919.6	< 1	0.0	0	0.0	0
Status 4	0.0	0	0.0	0	0.0	0	0.0	0
Total	52.4	< 1	3,815.5	2	0.0	0	0.0	0

	Native Am. Reserv.		State Park/Hist. Park		State WMA/Gameland		State Forest	
	ha	%	ha	%	ha	%	ha	%
Status 1	0.0	0	2.7	< 1	0.4	< 1	0.0	0
Status 2	0.0	0	0.5	< 1	3,131.0	2	23.7	< 1
Status 3	137.7	< 1	348.4	< 1	1,097.5	< 1	268.8	< 1
Status 4	0.0	0	0.0	0	198.5	< 1	0.0	0
Total	137.7	< 1	351.5	< 1	4,427.3	3	292.5	< 1

	State Coastal Reserve		ST Nat.Area/Preserve		Other State Lands		Private Cons. Easemt.	
	ha	%	ha	%	ha	%	ha	%
Status 1	0.0	0	255.7	< 1	0.0	0	0.0	0
Status 2	0.0	0	587.0	< 1	0.5	< 1	26.0	< 1
Status 3	0.0	0	23.2	< 1	5.0	< 1	0.0	0
Status 4	0.0	0	0.0	0	1.7	< 1	0.0	0
Total	0.0	0	865.9	< 1	7.2	< 1	26.0	< 1

	Private Land - No Res.		Water		Overall Total	
	ha	%	ha	%	ha	%
Status 1	0.0	0	0.0	0	3,312.0	2
Status 2	0.0	0	0.0	0	5,547.5	3
Status 3	0.0	0	0.0	0	15,190.0	15
Status 4	136,606.7	79	1,084.7	< 1	138,090.0	80
Total	136,606.7	79	1,084.7	< 1	162,139.5	100

GAP Status 1: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, and intensity) are allowed to proceed without interference or are mimicked through management.

GAP Status 2: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive use or management practices that degrade the quality of existing natural communities.

GAP Status 3: An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type or localized intense type. It also confers protection to federally listed endangered and threatened species throughout the area.

GAP Status 4: Lack of irrevocable easement or mandate to prevent conversion of natural habitat types to anthropogenic habitat types. Allows for intensive use throughout the tract. Also includes those tracts for which the existence of such restrictions or sufficient information to establish a higher status is unknown.

PREDICTED HABITAT MODEL(S):

Year-round Model:

Habitat Description: Entirely aquatic amphibians, hellbenders inhabit large, fast-moving streams at elevations below 762 m (Petranka). They are frequently captured in shallow, rocky rapids. Hellbenders are most abundant in water that is clear and has many large, flat rocks for shelter, nesting, and breeding. Other large submerged objects, such as logs, and bank holes in or at water's edge may also be used for shelter. Stream siltation and chemical or thermal pollution pose possible threats for this species. Typically, only streams in predominantly forested watersheds provide the cool, well-oxygenated stream conditions required by hellbenders. Usually avoids water warmer than 20 C. Males prepare nests beneath large flat rocks or submerged logs. Under rocks in medium to large streams with cool, well oxygenated water. They have become harder to find in northern mountains recently, but are still common in several larger, clean streams. Hellbenders lay eggs in late summer or fall. Winter breeding has been observed in Spring River, Arkansas (Peterson et al. 1989). Clutch size averages about 350-500; increases with female body length. Several females may oviposit in same site. Males guard developing eggs. Larvae hatch in 1.5-3 months and lose gills about 18 months after hatching. Sexually mature in 5-8 years (Minton 1972, Peterson et al. 1988). Lifespan of 25+ years. S. Smith 18Feb05

Elevation Mask: < 762m

Avoidance Mask: Medium - moderately intolerant of human disturbance.

Hydrography Mask:

Freshwater Only

Fast Current Only

Utilizes flowing water features with buffer of 30m into selected water features.

Selected Map Units:

Functional Group	Map Unit Name
Anthropogenic	Deciduous Plantations
Anthropogenic	Evergreen Plantations
Anthropogenic	Low Intensity Developed
Anthropogenic	Pasture/Hay
Anthropogenic	Quarry/Strip Mine/Gravel Pit
Anthropogenic	Row Crop
Anthropogenic	Successional Grassland/Herbaceous
Anthropogenic	Successional Grassland/Herbaceous (Other)
Anthropogenic	Successional Grassland/Herbaceous (Utility Swath)
Anthropogenic	Successional Shrub/Scrub (Clear Cut)
Anthropogenic	Successional Shrub/Scrub (Other)
Anthropogenic	Successional Shrub/Scrub (Utility Swath)
Forest/Woodland	Allegheny-Cumberland Dry Oak Forest and Woodland
Forest/Woodland	Allegheny-Cumberland Dry Oak Forest and Woodland - Hardwood Modifier
Forest/Woodland	Allegheny-Cumberland Dry Oak Forest and Woodland - Pine Modifier
Forest/Woodland	Appalachian Hemlock-Hardwood Forest
Forest/Woodland	Appalachian Serpentine Woodland
Forest/Woodland	Central Appalachian Oak and Pine Forest
Forest/Woodland	Central Appalachian Pine-Oak Rocky Woodland
Forest/Woodland	East Gulf Coastal Plain Northern Dry Upland Hardwood Forest - Offsite Pine Modifier
Forest/Woodland	East Gulf Coastal Plain Northern Mesic Hardwood Forest
Forest/Woodland	Northeastern Interior Dry Oak Forest - Mixed Modifier
Forest/Woodland	Northeastern Interior Dry Oak Forest - Virginia/Pitch Pine Modifier
Forest/Woodland	Northeastern Interior Dry Oak Forest-Hardwood Modifier
Forest/Woodland	South-Central Interior Mesophytic Forest
Forest/Woodland	Southern and Central Appalachian Cove Forest
Forest/Woodland	Southern and Central Appalachian Oak Forest
Forest/Woodland	Southern and Central Appalachian Oak Forest - Xeric
Forest/Woodland	Southern Appalachian Low Mountain Pine Forest
Forest/Woodland	Southern Interior Low Plateau Dry-Mesic Oak Forest

Forest/Woodland	Southern Interior Low Plateau Dry-Mesic Oak Forest - Evergreen Modifier
Forest/Woodland	Southern Piedmont Dry Oak-Heath Forest - Virginia/Pitch Pine Modifier
Forest/Woodland	Southern Ridge and Valley Dry Calcareous Forest
Forest/Woodland	Southern Ridge and Valley Dry Calcareous Forest - Hardwood Modifier
Forest/Woodland	Southern Ridge and Valley Dry Calcareous Forest - Pine Modifier
Water	Open Water (Fresh)
Wetlands	Central Appalachian Floodplain - Forest Modifier
Wetlands	Central Appalachian Floodplain - Herbaceous Modifier
Wetlands	Central Appalachian Riparian - Forest Modifier
Wetlands	Central Appalachian Riparian - Herbaceous Modifier
Wetlands	South-Central Interior Large Floodplain - Forest Modifier
Wetlands	South-Central Interior Large Floodplain - Herbaceous Modifier
Wetlands	South-Central Interior Small Stream and Riparian

CITATIONS:

Barbour, R. W. 1971. Amphibians and reptiles of Kentucky. Univ. Press of Kentucky, Lexington. x + 334 pp.

Bury, R. B., C. K. Dodd, Jr., and G. M. Fellers. 1980. Conservation of the Amphibia of the United States:a review. U.S. Fish and Wildlife Service, Washington, D.C., Resource Publication 134. 34 pp.

Collins, J. T. 1991. Viewpoint:a new taxonomic arrangement for some North American amphibians and reptiles. SSAR Herpetol. Review 22:42-43.

Dundee, H. A. 1971. Cryptobranchus, and C. alleganiensis. Cat. Am. Amph. Rep. 101.1-101.4.

Figg, D. E. 1993. Missouri Department of Conservation wildlife diversity report, July 1992-June 1993. 75 pp.

Gates, J. E., R. H. Stouffer, Jr., J. R. Stauffer, Jr., and C. H. Hocutt. 1985. Dispersal patterns of translocated CRYPTOBRANCHUS ALLEGANIENSIS in a Maryland stream. J. Herpetol. 19:436-438.

Green, N. B., and T. K. Pauley. 1987. Amphibians and reptiles in West Virginia. University of Pittsburg Press, Pittsburg, Pennsylvania. xi + 241 pp.

Hillis, R. E., and E. D. Bellis. 1971. Some aspects of the ecology of the hellbender, CRYPTOBRANCHUS ALLEGANIENSIS ALLEGANIENSIS, in a Pennsylvania stream. J. Herpetol. 5:121-126.

Johnson, T. R. 1977. The amphibians of Missouri. Univ. Kansas Mus. Nat. Hist., Pub. Ed. Ser. 6. ix + 134 pp.

Minton, S. A., Jr. 1972. Amphibians and reptiles of Indiana. Indiana Academy Science Monographs 3. v + 346 pp.

Mitchell, J. C. 1991. Amphibians and reptiles. Pages 411-76 in K. Terwilliger (coordinator). Virginia's Endangered Species:Proceedings of a Symposium. McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Mount, R. H. 1975. The Reptiles and Amphibians of Alabama. Auburn University Agricultural Experiment Station, Auburn, Alabama. vii + 347 pp.

Nickerson, M.A. and C.E. Mays. 1973. THE HELLBENDERS:NORTH AMERICAN "GIANT SALMANDERS." MILWAUKEE PUBLIC MUS., PUBL. INBIOL. AND GEOL. NO. 1, 106 P.

Peterson, C. L., and R. F. Wilkinson. 1996. Home range size of the hellbender (CRYPTOBRANCHUS ALLEGANIENSIS) in Missouri. Herpetological Review 27:126-127.

Peterson, C. L., C. A. Ingersol, and R. F. Wilkinson. 1989. Winter breeding of CRYPTOBRANCHUS ALLEGANIENSIS BISHOPI in Arkansas. Copeia 1989:1031-1035.

Peterson, C. L., D. E. Metter, and B. T. Miller. 1988. Demography of the hellbender Cryptobranchus alleganiensis in the Ozarks. Am. Midl. Nat. 119:291-303.

Peterson, C. L., et al. 1983. Age and growth of the Ozark hellbender (CRYPTOBRANCHUS ALLEGANIENSIS BISHOPI). Copeia 1983:225-231.

Peterson, C. L., J. W. Reed, and R. F. Wilkinson. 1989. Seasonal food habits of CRYPTOBRANCHUS ALLEGANIENSIS (Caudata:Cryptobranchidae). Southwest. Nat. 34:438-441.

Petranka, J. W. 1998. Salamanders of the United States and Canada. Washington DC: Smithsonian Inst. Press.

Pfingsten, R. A. 1990. The status and distribution of the hellbender, CRYPTOBRANCHUS ALLEGANIENSIS in Ohio. Herpetol. Rev. 21:48-50.

Routman, E. 1993. Mitochondrial DNA variation in CRYPTOBRANCHUS ALLEGANIENSIS, a salamander with extremely low allozyme diversity. Copeia 1993:407-416.

Routman, E., R. Wu, and A. R. Templeton. 1994. Parsimony, molecular evolution, and biogeography:the case of the North American giant salamander. Evolution 48:1799-1809.

Wilson, L. A. 1995. The Land Manager's Guide to the amphibians and reptiles of the South. Chapel Hill, NC: The Nature Conservancy.

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Compiled: 15 September 2011

This data was compiled and/or developed by the Southeast GAP Analysis Project at The Biodiversity and Spatial Information Center, North Carolina State University.