Salvelinus fontinalis - (Mitchill, 1814)

Brook Trout

Unique Identifier: ELEMENT_GLOBAL.2.103972

Element Code: AFCHA05030

Informal Taxonomy: Animals, Vertebrates - Fishes - Bony Fishes - Salmon and Trouts

Kingdom	Phylum	Class	Order	Family	Genus
Animalia	Craniata	Actinopterygii	Salmoniformes	Salmonidae	Salvelinus

Genus Size: C - Small genus (6-20 species)

Check this box to expand all report sections: ☑

Concept Reference

Concept Reference:

Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.A. Lachner, R.N. Lea, and W.B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. American Fisheries Society, Special Publishing 20. 183 pp.

Concept Reference Code: B91ROB01NAUS

Name Used in Concept Reference: *Salvelinus fontinalis*

Taxonomic Comments:

Analyses of mtDNA variation indicate that diversity is highest in the southern part of the range and lowest in the north; mid-Atlantic populations are transitional between these regions of high and low haplotypic diversity (Perkins et al. 1993, Hayes et al. 1996, Hall et al. 2002).

Genetic data from 30 populations representing six major river drainages in Maine "provided evidence for the role of contemporary landscape features in shaping the observed pattern of genetic diversity at smaller geographic scales (within and among populations within river drainage). On a broader geographic scale, contemporary landscape structure appeared to be only a minor factor determining the observed pattern of genetic structuring among drainages" (Castric et al. 2001).

Hybrids between this species and *Salmo trutta* and *Salvelinus namaycush* are known. Extinct subspecies *agassizi* (silver

trout) sometimes has been regarded as a distinct species. The aurora trout, maintained only as hatchery stocks in lakes in the Temiskaming District of Ontario, may be a distinct subspecies, *S. f. timagamiensis* (Page and Burr 1991).

Conservation Status

NatureServe Status

Global Status: G5
Global Status Last Reviewed: 12Sep1996
Global Status Last Changed: 12Sep1996
Rounded Global Status: G5 - Secure
Nation: United States
National Status: N5
Nation: Canada
National Status:N5

U.S. & Canada State/Province Status	
United States	Alaska (SNA), Arizona (SNA), Arkansas (SNA), California (SNA), Colorado (SNA), Connecticut (S5), Delaware (SNA), Georgia (S5), Idaho (SNA), Illinois (SNA), Indiana (S4), Iowa (S3), Kentucky (SNA), Maine (S5), Maryland (S3S4), Massachusetts (S4), Michigan (S4), Minnesota (SNR), Montana (SNA), Navajo Nation (SNA), Nebraska (SNA), Nevada (SNA), New Hampshire (S5), New Jersey (S3), New Mexico (SNA), New York (S5), North Carolina (S5), North Dakota (SNA), Ohio (S1), Oregon (SNA), Pennsylvania (S5), Rhode Island (S5), South Carolina (S2), South Dakota (SNA), Tennessee (S3), Utah (SNA), Vermont (S5), Virginia (S4), Washington (SNA), West Virginia (S5), Wisconsin (S4), Wyoming (SNA)
Canada	Alberta (SNA), British Columbia (SNA), Labrador (S5), Manitoba (S4), New Brunswick (S4), Newfoundland Island (S5), Nova Scotia (S4), Nunavut (SNR), Ontario (S5), Prince Edward Island (S5), Quebec (S4), Saskatchewan (SNA)

Other Statuses

Implied Status under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC):PS

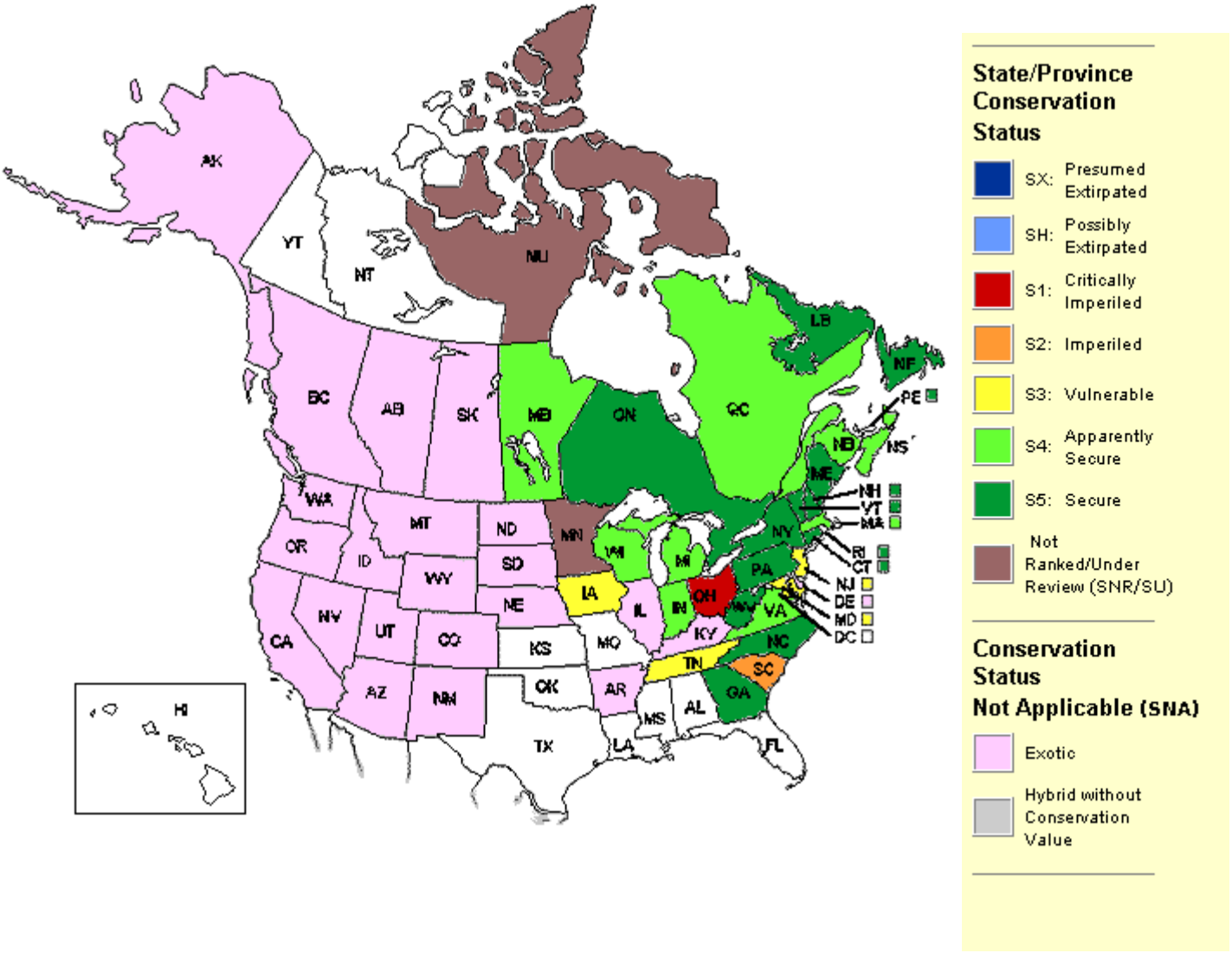
NatureServe Conservation Status Factors

Threats:
Range has contracted in southern Appalachian region due to impacts of logging, fires, river impoundment, road and railroad construction, land clearance for agriculture and human habitation, and encroachment of introduced rainbow trout and brown trout (Larson and Moore 1985, Galbreath et al. 2001). Introduction of hatchery-reared brook trout from the northeastern United States has also affected native populations, but genetic sampling of populations in the Pigeon river system in North Carolina indicates that a high proportion of sampled populations consist of unaltered native fish (Galbreath et al. 2001).

In general, a brook trout population will respond most negatively to factors that decrease survival of large juveniles and small adults and that decrease growth rates of small juveniles (Marschall and Crowder 1996).

Distribution

U.S. States and Canadian Provinces



Endemism: occurs (regularly, as a native taxon) in multiple nations

U.S. & Canada State/Province Distribution	
United States	AK, AR, AZ, CA, CO, CT, DE, GA, IA, ID, IL, IN, KY, MA, MD, ME, MI, MN, MT, NC, ND, NE, NH, NJ, NM, NN, NV, NY, OH, OR, PA, RI, SC, SD, TN, UT, VA, VT, WA, WI, WV, WY
Canada	AB, BC, LB, MB, NB, NF, NS, NU, ON, PE, QC, SK

Range Map

No map available.

Global Range Comments:

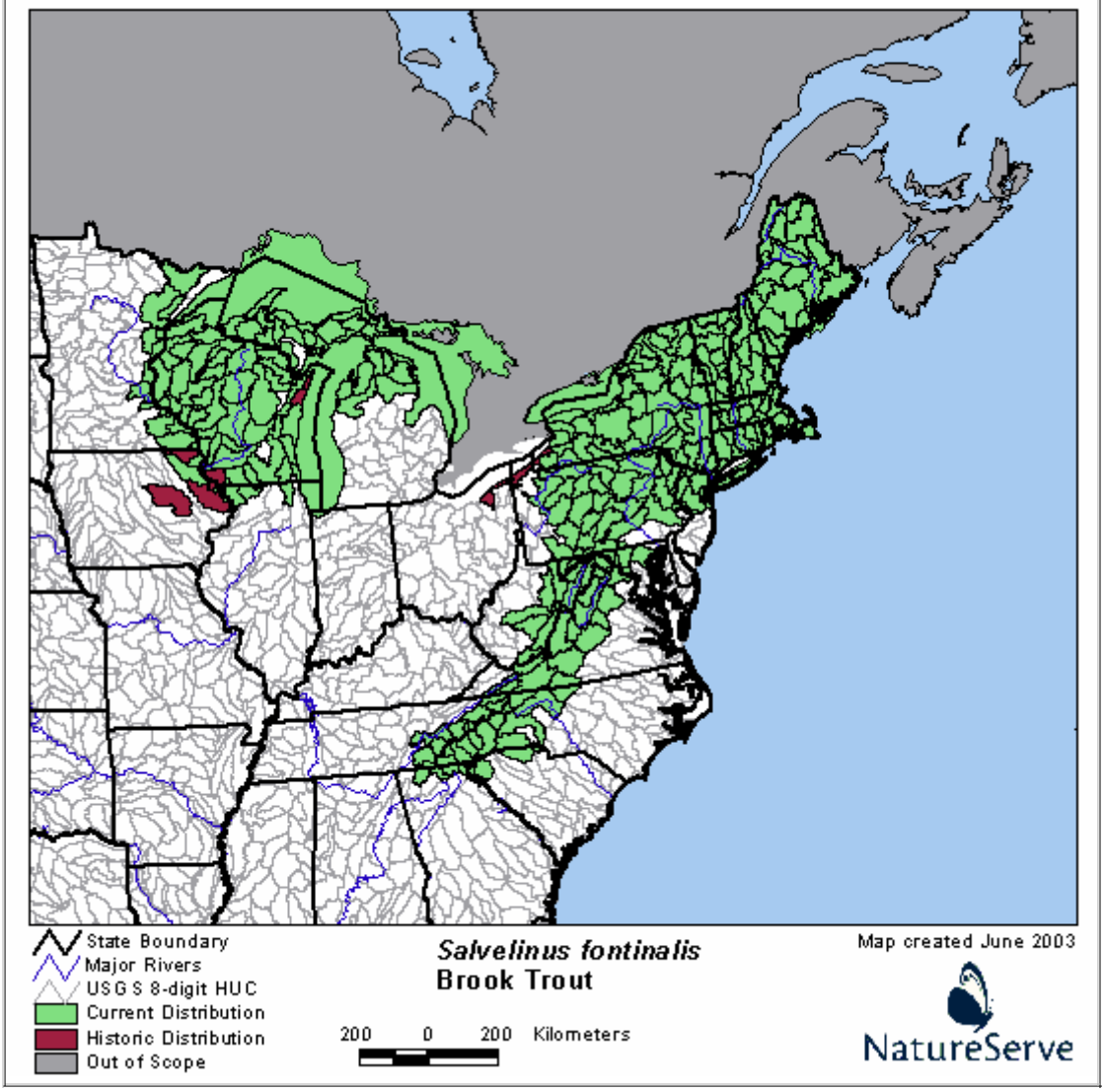
Native to most of eastern Canada from Newfoundland to western side of Hudson Bay, south in Atlantic, Great Lakes, and Mississippi River basins to Minnesota and (in the Appalachians) northern Georgia; introduced in western North America and temperate regions in many other parts of the world; common.

U.S. Distribution by County (based on available natural heritage records)	
State	**County Name (FIPS Code)**
OH	Geauga (39055)
TN	Monroe (47123), Sevier (47155)

U.S. Distribution by Watershed (based on available natural heritage records)	
Watershed Region	**Watershed Name (Watershed Code)**

04	Ashtabula-Chagrin (04110003)
06	Lower French Broad (06010107), Lower Little Tennessee (06010204)

U.S. Distribution by Watershed (based on multiple information sources)



Ecology & Life History

Reproduction Comments:

Spawns during day in late summer (in north) or fall. Eggs hatch in 47 days at 10 C, in 165 days at 2.8 C. In Ontario, alevin emergence occurred over a 71-day period, coinciding with the spring thaw and an episodic pH depression (Snucins et al. 1992). Sexually mature in 2-3 years (also reported as first year for males, 2nd year for females). Only small percentages of returning migrants actually spawn; post-spawning mortality generally is low (Stearley 1992).

Ecology Comments

Adults in streams may defend small feeding territories that extend several body lengths in diameter (Grant et al. 1989). In experimental stream communities, Resetarits 1991 found that brook trout negatively affected both growth and survival of the salamander GYRINOPHILUS PORPHYRITICUS; the presence of GYRINOPHILUS had no affect on relative condition or fecundity of SALVELINUS. SALVELINUS and GYRINOPHILUS affected the growth of the two-lined salamander EURYCEA and the crayfish CAMBARUS BARTONII. SALVELINUS caused CAMBARUS and EURYCEA to alter their activity levels and habitat; EURYCEA and CAMBARUS were able to avoid predation by SALVELINUS and GYRINOPHILUS but at a significant cost to growth.

Habitat Type: Freshwater

Non-Migrant: Y

Locally Migrant: Y

Long Distance Migrant: N

Mobility and Migration Comments:
Migrations can be extensive. For example, in the Kennebecasis River, New Brunswick, brook trout moved upstream 65-100 km in spring after ice loss; summer movements were minimal; movements to spawning areas in fall were less than 10 km, then the fish moved back downstream to wintering areas in the lower to middle reaches of the river (Curry et al. 2002).

Riverine Habitat(s): CREEK, High gradient, MEDIUM RIVER, Moderate gradient, Pool, Riffle, SPRING/SPRING BROOK

Lacustrine Habitat(s): Deep water

Special Habitat Factors: Benthic

Habitat Comments:
Clear cool well-oxygenated creeks, small to medium rivers, and lakes. May move from streams into lakes or sea to avoid high temperatures in summer. Preferred temperature 14-16 C; does poorly where water temperature exceeds 20 C for extended periods (see Sublette et al. 1990). Spawns usually over gravel beds in shallow headwaters but also may spawn successfully in gravelly shallows of lakes if spring (groundwater) upwelling and moderate current, or nearby surficial inflow (Quinn 1995), are present. Eggs buried in nest in gravel. In Ontario, eggs were buried at 7-20 cm in bottom substrate (Snucins et al. 1992).

Adult Food Habits: Carnivore, Invertivore, Piscivore

Immature Food Habits: Carnivore, Invertivore, Piscivore

Food Comments:
Feeds opportunistically on various invertebrate and vertebrate animals, including primarily terrestrial and aquatic insects and planktonic crustaceans.

Phenology Comments: Most feeding in early morning and evening (Sublette et al. 1990).

Length: 40 centimeters

Economic Attributes

Economic Comments: Has been used in carcinogen testing (Metcalfe 1989).

Management Summary

Species Impacts:
Introduced populations of brook trout have contributed to the decline of native fishes, amphibians, and invertebrates in cold streams and lakes in western North America (see Adams et al. 2002). Prevention of further invasion has become a major concern (Adams et al. 2002).

Management Requirements:
See Thompson and Rahel (1996) for information on a depletion-removal electrofishing protocol that significantly reduced populations and recruitment but did not totally eradicate brook trout in streams managed for Colorado River cutthroat trout.

Population/Occurrence Delineation

Group Name: NONANADROMOUS SALMONIDS

Use Class: Not applicable
Subtype(s): Spawning Area
Minimum Criteria for an Occurrence:
Occurrences are based on evidence of historical presence, or current and likely recurring presence, at a given location. Such evidence minimally includes collection or reliable observation and documentation of one or more individuals (including eggs and larvae) in appropriate habitat.
Mapping Guidance:
Conceptually, the occurrence includes the entire area used by the population, including spawning, rearing, migration, and wintering areas. Occupied locations that are separated by a gap of 10 km or more of any aquatic habitat that is not known to be occupied represent different occurrences. However, it is important to evaluate migrations and seasonal changes in habitat (see separation justification) to ensure that spawning areas and nonspawning areas for a single population are not artificially segregated as different occurrences simply because there have been no collections/observations in an intervening area that may exceed the separation distance.
Separation Barriers: Dam lacking a suitable fishway; high waterfall; upland habitat.
Alternate Separation Procedure:
Separation distance is 10 stream-km for both suitable and unsuitable habitat. However, if it is known that the same population occupies sites separated by more than 10 km (e.g., this may be common for migratory populations), those sites should be included within the same occurrence. In lakes, occurrences include all suitable habitat that is presumed to be occupied (based on expert judgment), even if documented collection/observation points are more than 10 km apart. Separate sub-occurrences or source features may usefully document locations of critical spawning areas within a lake.

Separation Justification:
Separation distance is arbitrary; little is known about juvenile dispersal (e.g., how far fishes may move between between their embryonic developmental habitat and eventual spawning site). "Restricted movement is the norm in populations of stream salmonids during nonmigratory periods," but there is considerable variation in movements within and among species (Rodriguez 2002).

Migrations can be extensive. For example, in the Kennebecasis River, New Brunswick, brook trout moved upstream 65-100 km in spring after ice loss; summer movements were minimal; movements to spawning areas in fall were less than 10 km, then the fish moved back downstream to wintering areas in the lower to middle reaches of the river (Curry et al. 2002).

Because of the difficulty in defining suitable versus unsuitable habitat, especially with respect to dispersal, and to simplify the delineation of occurrences, a single separation distance is used regardless of habitat quality.
Date: 11Mar2003
Author: Hammerson, G.

Population/Occurrence Viability

U.S. Invasive Species Impact Rank (I-Rank)

Authors/Contributors

NatureServe Conservation Status Factors Edition Date: 05Nov2003
Element Ecology & Life History Edition Date: 11Mar2003
Element Ecology & Life History Author(s): Hammerson, G.

Zoological data developed by NatureServe and its network of natural heritage programs (see **Local Programs**) and other contributors and cooperators (see **Sources**).

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Note: This report was printed on **August 18, 2008**

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Citation for Bird Range Maps of North America:
Ridgely, R.S., T.F. Allnutt, T. Brooks, D.K. McNicol, D.W. Mehlman, B.E. Young, and J.R. Zook. 2003. Digital Distribution Maps of the Birds of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA.

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Patterson, B.D., G. Ceballos, W. Sechrest, M.F. Tognelli, T. Brooks, L. Luna, P. Ortega, I. Salazar, and B.E. Young. 2003. Digital Distribution Maps of the Mammals of the Western Hemisphere, version 1.0. NatureServe, Arlington, Virginia, USA.

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