GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Salvelinus namaycush***

Salvelinus namaycush 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Salmoniformes	Salmonidae

Common name

Synonym

Cristivomer namaycush , (Walbaum, 1792)
Cristovomer namayacush , (Walbaum, 1792)
Salmo amethystinus , (Mitchill, 1818
Salmo amethystus , (Mitchill, 1818
Salmo confinis , (DeKay, 1842)
Salmo ferox , (Perley, 1852)
Salmo namaycush , (Walbaum, 1792)
Salmo pallidus , (Rafinesque, 1817)
Salvelinus namaycush , (Walbaum, 1792)

Similar species

Salvelinus fontinalis

Summary

Salvelinus namaycush is a freshwater fish of the trout family, found primarily in lakes and large rivers worldwide. The distribution is broad due to the sport fishing industry and the demand for Salvelinus namaycush. In many of the introduced locations Salvelinus namaycush is an invasive species and reduces native biodiversity through competition and predation of endemic species. There have been some successful attempts to control Salvelinus namaycush using gillnetting and trapping.

view this species on IUCN Red List

Species Description

Cream coloured spots are found on the head and body, as well as the dorsal and caudal fins of *Salvelinus namaycush*. The average weight of *S. namaycush* is about 3 kg, but individuals will grow to up 27 kg if long lived. Average length of *S. namaycush* varies from 45 to 68 cm. The body is a slate grey to greenish with a lighter underside and a deeply forked caudal fin. Fins lower on the body are orange-red with a white edge. Breeding males will develop a dark stripe on their sides temporarily (Lenart, 2001).

Notes

Salvelinus namaycush are particularly susceptible to pollution, including but not limited to insecticides (FishBase, 2008). Hybrid crosses between female *S. namaycush* and male *Salvelinus fontinalis* called splakes, have been introduced into many areas of North America because of their ability to grow very quickly (Nova Scotia Fisheries and Aquaculture, Inland Fisheries Division. 2007).

Lifecycle Stages

Egg development for *Salvelinus namaycush*, depending on temperature, takes between 15 and 21 weeks to reach hatching which occurs between mid-February and late March (FishBase, 2008). The fry do not emerge from the crevices until a month after \"hatching\" in order to give time for the yolk sacs to absorb. The juveniles then fill their swim bladders near the surface and descend to deeper water where they remain for two or three years, which may be survival related since adults are found higher up in the water column and are known to be cannibalistic (Nova Scotia Fisheries and Aquaculture, Inland Fisheries Division, 2007).

Uses
Salvelinus namaycush was an important commercial fish stock in the US Great Lakes in the 1950's, but has since gone on the decline due to predation factors from sea lamprey. *S. Namaycush* remains a valuable sport fish for anglers worldwide (Lenart, 2001).

Habitat Description
Residing exclusively in freshwater, *Salvelinus namaycush* is found in lakes and rivers of varying sizes. The ability of *S. namaycush* to inhabit almost benthic-like environments gives it an upper hand in competition with other fish species. Within the water column, *S. namaycush* is found at both deep and shallow depths depending on the location and time of year as well as stage of development. *S. namaycush* prefers temperatures below 13°C and is rarely found in lakes with pH less than 5.2 (NatureServe, 2008)

Reproduction
Like many other aquatic species, *Salvelinus namaycush* fertilizes eggs externally, but unlike other species do not construct a 'redd' or nest. The act of spawning occurs predominately at night; where males will approach a female, press against her sides and quiver. During this act the females' eggs fall into rocky outcroppings beneath her after being fertilized by the male. This act of courting is repeated until all the eggs of the female are released. Occasionally, up to seven males and three females may interact together in a single spawning act. Spawning for *S. Namaycush* occurs annually in the southern range while only occurring every other year in more northern limits (FishBase, 2008).

Nutrition
Feeding on organisms from freshwater sponges to plankton, *Salvelinus namaycush* predates on a variety of underwater life. Organisms such as crustaceans, insects, fish and even small mammals are part of the diet of *S. namaycush*. When in the juvenile state, *S. namaycush* feeds almost exclusively on invertebrates. It was discovered that individuals which feed primarily on plankton grow slower, mature earlier at smaller sizes, die sooner and attain a smaller maximum size than those who predominately eat fish (FishBase, 2008). In larger lakes, *S. namaycush* is predominately piscivorous, where as in a smaller lake with less fish forage potential the predominate diet consists of crustaceans and plankton (Nova Scotia Fisheries and Aquaculture, Inland Fisheries Division. 2007).

General Impacts
The introduction of the invasive trout species *Salvelinus namaycush* has had detrimental effects on native biodiversity worldwide. Many various species of fish are affected not only by competition but by predation as well (Fuller, 2007). In the United States many endemic species are at risk due to the presence of *S. Namaycush* (Ruzycki *et al*. 2001) including the rare Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*) (Fuller, 2007).

Management Info
Preventative measures: The use of potentially invasive alien species for aquaculture and their accidental release/or escape can have negative impacts on native biodiversity and ecosystems. Hewitt *et al*, (2006) Alien Species in Aquaculture: Considerations for responsible use aims to first provide decision makers and managers with information on the existing international and regional regulations that address the use of alien species in aquaculture, either directly or indirectly; and three examples of national responses to this issue (Australia, New Zealand and Chile). The publication also provides recommendations for a 'simple' set of guidelines and principles for developing countries that can be applied at a regional or domestic level for the responsible management of Alien Species use in aquaculture development. These guidelines focus primarily on marine systems, however may equally be applied to freshwater.
Copp *et al*, (2005) Risk identification and assessment of non-native freshwater fishes presents a conceptual risk assessment approach for freshwater fish species that addresses the first two elements (hazard identification, hazard assessment) of the UK environmental risk strategy. The paper presents a few worked examples of assessments on species to facilitate discussion. The electronic Decision-support tools- Invasive-species identification tool kits that includes a freshwater and marine fish invasives scoring kit are made available on the Cefas (Centre for Environment, Fisheries & Aquaculture Science) page for free download (subject to Crown Copyright (2007-2008)).
Physical: Gillnetting and trapping were deemed the most suitable management techniques for the control of *Salvelinus namaycush* in Yellowstone Lake (Kaeding *et al*. 1996). Electrofishing has also been proven to be effective in managing populations of *S. namaycush*, and is done yearly in Yellowstone Lake (Greater Yellowstone Science Learning Center. 8 Jan 2008).

Pathway
Salvelinus namaycush is primarily bred and stocked for recreational fisheries worldwide (Fuller, 2007).

Principal source: FishBase, 2008. FishBase, 2001.*Salvelinus namaycush* Lake trout.
Fuller, 2007. *Salvelinus namaycush*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.
Nova, 2007. Nova Scotia Fisheries and Aquaculture, Inland Fisheries Division. 2007. Species fact sheets. *Salvelinus namaycush* Lake Trout.

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Pam Fuller USGS/BRD, Nonindigenous Aquatic Species Program. Florida Integrated Science Center. USA

Pubblication date: 2009-05-21

ALIEN RANGE

[1] ALTIPLANO
[1] ARGENTINA
[1] AUSTRIA
[1] BOLIVIA
[1] CZECH REPUBLIC
[1] DENMARK
[1] FINLAND
[1] FRANCE
[1] GERMANY
[1] ITALY
[1] JAPAN
[1] MOROCCO
[1] NEW ZEALAND
[1] NORWAY
[1] PERU
[1] SLOVAKIA
[1] SWEDEN
[1] SWITZERLAND
[1] UNITED KINGDOM
[32] UNITED STATES

Red List assessed species 1: VU = 1;

Cottus extensus **VU**

BIBLIOGRAPHY

19 references found for **Salvelinus namaycush**

Managment information

Centre for Environment, Fisheries & Aquaculture Science (CEFAS)., 2008. Decision support tools-Identifying potentially invasive non-native marine and freshwater species: fish, invertebrates, amphibians.

Summary: The electronic tool kits made available on the Cefas page for free download are Crown Copyright (2007-2008). As such, these are freeware and may be freely distributed provided this notice is retained. No warranty, expressed or implied, is made and users should satisfy themselves as to the applicability of the results in any given circumstance. Toolkits available include 1) FISK- Freshwater Fish Invasiveness Scoring Kit (English and Spanish language version); 2) MFISK- Marine Fish Invasiveness Scoring Kit; 3) MI-ISK- Marine invertebrate Invasiveness Scoring Kit; 4) FI-ISK- Freshwater Invertebrate Invasiveness Scoring Kit and AmphISK- Amphibian Invasiveness Scoring Kit. These tool kits were developed by Cefas, with new VisualBasic and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).
The decision support tools are available from:
http://cefas.defra.gov.uk/our-science/ecosystems-and-biodiversity/non-native-species/decision-support-tools.aspx [Accessed 13 October 2011]

The guidance document is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].

Greater Yellowstone Science Learning Center. 8 Jan 2008. Lake Trout Control.

Summary: Website that contains current information on the Yellowstone Lake trout control program and details the management strategies for the control of lake trout populations.
Available from: http://www.greateryellowstonescience.org/topics/biological/fish/yct/projects/laketrout [Accessed 25 March 2008]

Kaeding, L. R., G. D. Boltz, and D. G. Carty. 1996. Lake trout discovered in Yellowstone Lake threaten native cutthroat trout. Fisheries 21(3):16-20.

Summary: Article in journal which discusses the illegal introduction of lake trout into Yellowstone Lake, as well as management strategies.

Mendoza, R.E.; Cudmore, B.; Orr, R.; Balderas, S.C.; Courtenay, W.R.; Osorio, P.K.; Mandrak, N.; Torres, P.A.; Damian, M.A.; Gallardo, C.E.; Sanguines, A.G.; Greene, G.; Lee, D.; Orbe-Mendoza, A.; Martinez, C.R.; and Arana, O.S. 2009. Trinational Risk Assessment Guidelines for Aquatic Alien Invasive Species. Commission for Environmental Cooperation. 393, rue St-Jacques Ouest, Bureau 200, Montr�al (Qu�bec), Canada. ISBN 978-2-923358-48-1.

Summary: In 1993, Canada, Mexico and the United States signed the North American Agreement on Environmental Cooperation (NAAEC) as a side agreement to the North American Free Trade Agreement (NAFTA). The NAAEC established the Commission for Environmental Cooperation (CEC) to help the Parties ensure that improved economic efficiency occurred simultaneously with trinational environmental cooperation. The NAAEC highlighted biodiversity as a key area for trinational cooperation. In 2001, the CEC adopted a resolution (Council Resolution 01-03), which created the Biodiversity Conservation Working Group (BCWG), a working group of high-level policy makers from Canada, Mexico and the United States. In 2003, the BCWG produced the "Strategic Plan for North American Cooperation in the Conservation of Biodiversity." This strategy identified responding to threats, such as invasive species, as a priority action area. In 2004, the BCWG, recognizing the importance of prevention in addressing invasive species, agreed to work together to develop the draft CEC Risk Assessment Guidelines for Aquatic Alien Invasive Species (hereafter referred to as the Guidelines). These Guidelines will serve as a tool to North American resource managers who are evaluating whether or not to introduce a non-native species into a new ecosystem. Through this collaborative process, the BCWG has begun to implement its strategy as well as address an important trade and environment issue. With increased trade comes an increase in the potential for economic growth as well as biological invasion, by working to minimize the potential adverse impacts from trade, the CEC Parties are working to maximize the gains from trade while minimizing the environmental costs.
Available from: English version: http://www.cec.org/Storage/62/5516_07-64-CEC%20invasives%20risk%20guidelines-full-report_en.pdf [Accessed 15 June 2010]
French version: http://www.cec.org/Storage/62/5517_07-64-CEC%20invasives%20risk%20guidelines-full-report_fr.pdf [Accessed 15 June 2010]
Spanish version: http://www.cec.org/Storage/62/5518_07-64-CEC%20invasives%20risk%20guidelines-full-report_es.pdf [Accessed 15 June 2010].

General information

Dill, W.A. 1993. Sweden .Inland Fisheries of Europe. EIFAC Technical Paper No. 52. FAO 1993.

Summary: Report that includes many countries in Europe, specifically Sweden and the fishery population.
Available from: http://www.fao.org/docrep/009/t0798e/T0798E14.htm [Accessed 24 March 2007]

FishBase, 2001.*Salvelinus namaycush* Lake trout. www.fishbase.org

Summary: Comprehensive online database that includes multiple aspects of species information.
Available from: http://www.fishbase.org/Summary/SpeciesSummary.php?id=248 [Accessed 15 February 2008]

Freyhoff, J. 2003. Immigration and potential impacts of invasive freshwater fishers in Germany. IGB-Berlin: 52-58.

Summary: An article describing many fish introductions to Germany and their circumstances.
Available from: http://www.igb-berlin.de/institut/deutsch/2002/Freyhof.pdf [Accessed 13 November 2007]

Fuller, P. 2007. *Salvelinus�namaycush*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.

Summary: Online database with good information on nonindigenous aquatic species.
Available from: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=942 [Accessed 15 February 2008]

Fuller, P., 2008. *Salvelinus namaycush*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. Revision Date: 4/21/2006

Summary: Available from: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=942 [Accessed 24 October 2008]

Hesthagen, T. and Sandlund, O.T. 2007. Non-native freshwater fishes in Norway: history, consequences and perspectives. Journal of Fish Biology. 71D: 173-183.

Summary: This paper discusses the introduction of many different non-native fish species into Norway and their impacts as a whole.

ITIS (Integrated Taxonomic Information System), 2008. Online Database. *Salvelinus namaycush*
Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=162002 [Accessed 15 February 2008]
Lenart, S. 2001. *Salvelinus namaycush* (on-line), Animal Diversity Web. University of Michigan Museum of Zoology.
Summary: Website which contains information for many fauna including range, habitat, and other various facts pertaining to individual species.
Available from: http://animaldiversity.ummz.umich.edu/site/accounts/information/Salvelinus_namaycush.html [Accessed 24 March 2008]
NatureServe. 2008. *Salvelinus namaycush* NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, Virginia.
Summary: Online database which provides information on populations, management, ecology and distribution for various species fauna throughout the world.
Available from: http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Salvelinus+namaycush+ [Accessed 24 March 2007]
NOBANIS (North European and Baltic Network on Invasive Alien Species) 2009. *Salvelinus namaycush* (Salmonidae, Fish)
Summary: North European and Baltic Network on Invasive Alien Species (NOBANIS) provides information on invasive alien species in North and Central Europe.
Available from: http://www.nobanis.org/speciesInfo.asp?taxaID=701 [Accessed 15 February 2008]
Nova Scotia Fisheries and Aquaculture, Inland Fisheries Division. 2007. Species fact sheets. *Salvelinus namaycush* Lake Trout.
Summary: Website that provides information on the Nova Scotia fishing and aquaculture industry as well as current activities and species specific information.
Available from:http://www.gov.ns.ca/fish/sportfishing/species/lktrout.shtml [Accessed 18 February 2008]
Ruzycki, J.R., Wurtsbaugh, W.A. and Luecke, C. 2001. Salmonine Consumption and Competition for Endemic Prey Fishes in Bear Lake, Utah-Idaho. Transactions of the American Fisheries Society. 130:1175-1189
Summary: Paper discussing the effects of introduced fish species on the endemic prey populations in Bear Lake.
Available from: http://afs.allenpress.com/archive/1548-8659/130/6/pdf/i1548-8659-130-6-1175.pdf
Vigliano, P.H. and Darrigran, G. 2002. Argentina s freshwater systems, aliens in wonderland.
Summary: This is a listing of alien species and their locations in Argentina.
Available from: http://malacologia.com.ar/MALACOLOGIA/PDF/32ProceedingsPablo-Gustavo2002.pdf [Accessed 8 November 2007]
Vila, I; Pardo, R. & Scott, S. 2007. Freshwater fishes of the Altiplano. Aquatic Ecosystem Health & Management. 10(2) 2007. 201-211.
Summary: Paper discussing the freshwater fish species past and present of the Altiplano region of South America. Provides information on a variety of species.
Available from:http://www.informaworld.com/smpp/content?content=10.1080/14634980701351395
Zick, D.and Gassner, H., Filzmoser, P., Wanzenbock, J., Pamminger-Lahnsteiner and B., Tischler, G. 2006. Changes in the fish species composition of all Austrian lakes >50 ha during the last 150 years. Fisheries Management and Ecology 13(2), 103-11.