GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Oncorhynchus mykiss***

Oncorhynchus mykiss 简体中文 正體中文

System: Freshwater

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Salmoniformes	Salmonidae

Common name

Regenbogenforelle (German), Kamchatka steelhead (English, Russian Federation), trucha arco iris (English, Dominican Republic), Truta (Portuguese), steelhead trout (English), Hardhead (English, United States), Coast range trout (English, United States), redband trout (English), Forelle (German), truite arc-en-ciel (French), Regnbogasilungur (Icelandic), Forel rajduzhna (Ukrainian), Dagova pastarva (Bulgarian), K'wsech (Salish, British Columbia, Canada), Kamchatka trout (English, Russian Federation), Kirjolohi (Finnish, Finland), Kamloops trout (English, Canada), Kamloops (English, United States), Nijimasu (Japanese), Masu (Japanese, Japan), Rainbow trout (English), Lord-fish (English, Newfoundland, Canada), Pastrva (Serbian, Yugoslavia), Pestropha (Greek), Orret (Norwegian), Rainbow trout (English, Alaska, United States), Summer salmon (English, United Kingdom), Regenboogforel (Dutch), Regenbogenforelle (German, Germany), Redband (English, United States), Steelhead (English, United States), Pstruh duhový (Czech), Regnbåge (Swedish), Regnbågslax (Swedish), Stahlkopfforelle (German), Alabalik (Turkish), Silver trout (English), Salmon trout (English, United States), Coast rainbow trout (English, Canada), Trucha arco iris (Spanish), Coast angel trout (English), Steelhead trout (English), Brown trout (English, Nepal), Aure (Norwegian), Regnbueørret (Norwegian), Stålhovedørred (Danish), Salmones del Pacífico (Spanish), Baiser (English, Newfoundland, Canada), Baja California rainbow trout (English, Mexico), Trofte ylberi (Albanian), Amerikaniki Pestrofa (Greek), Sxew'k'em (Salish, British Columbia, Canada), Trofta ylberi (Albanian), Truta-arco-iris (Portuguese), Trucha (Spanish), Trota (Italian), Trota iridea (Italian), Trucha arcoiris (Spanish, Mexico), Urriöi (Icelandic), Alabalik türü (Turkish), Pstrag teczowy (Polish, Poland), Pstruh dúhový (Slovak), Regnbueørred (Danish)

Synonym

Salmo mykiss , (Walbaum, 1792)
Fario gairdneri , (Richardson, 1836)
Onchorrhychus mykiss , (Walbaum, 1792)
Oncorhynchus kamloops , (Jordan, 1892)
Oncorhynchus mykiss nelsoni , (Evermann, 1908)
Parasalmo mykiss , (Walbaum, 1792)
Salmo gairdneri irideus , (Gibbons, 1855)
Salmo gairdneri shasta , (Jordan, 1894)
Salmo gairdneri , (Richardson, 1836)
Salmo gairdnerii gairdnerii , (Richardson, 1836)
Salmo gairdnerii irideus , (Gibbons, 1855)
Salmo gairdnerii , (Richardson, 1836)
Salmo gilberti , (Jordan, 1894)
Salmo iridea , (Gibbons, 1855)
Salmo irideus argentatus , (Bajkov, 1927)
Salmo irideus , (Gibbons, 1855)
Salmo kamloops whitehousei , (Dymond, 1931)
Salmo kamloops , (Jordan, 1892)
Salmo masoni , (Suckley, 1860)
Salmo nelsoni , (Evermann, 1908)
Salmo purpuratus , (Pallas, 1814)
Salmo rivularis kamloops , (Jordan, 1892)
Salmo rivularis , (Ayres, 1855)
Salmo stellatus , (Girard, 1856)
Salmo truncatus , (Suckley, 1859)
Salmo mykiss , (Walbaum, 1792)

Similar species *Salmo trutta*

Summary Oncorhynchus mykiss (rainbow trout) are one of the most widely introduced fish species in the world. Native to western North America, from Alaska to the Baja Peninsula, Oncorhynchus mykiss have been introduced to numerous countries for sport and commercial aquaculture. Oncorhynchus mykiss is highly valued as a sportfish, with regular stocking occurring in many locations where wild populations cannot support the pressure from anglers. Concerns have been raised about the effects of introduced trout in some areas, as they may affect native fish and invertebrates through predation and competition.

view this species on IUCN Red List

Species Description
Rainbow trout are a deep-bodied, compressed species of fish, with extremely large sea-run individuals growing to 1220mm and 16.3kg. The general body shape is typical for a trout, with a moderately large head and a mouth that extends back behind the eyes. Rainbow trout have highly variable colouration. Rainbow trout that live in lakes have a very silvery appearance, usually with a dark olive-green colour on the back. Occasionally the back is a deep steely blue, mostly in Rainbow trout that live well offshore in deep lakes or in small fish that have not yet spawned. Numerous spots are present on the back and extend about two-thirds of the way to the lateral line down the sides. The sides are silvery and largely free of spots, while the belly and ventral surface of the head are whitish. Eyes are an olive to bronze colour. Sometimes a soft, metallic-pink colour is present along the sides of the body and the head.

When rainbow trout leave lakes to spawn, their colours become more intense. The pinkish stripe that is present on the sides of lake fish becomes a rich crimson colour, the fins become a stronger red colour, and there is sometimes a red slash in the folds below the lower jaw. The belly and the lower sides turn a smoky grey and spots on the sides and upper fins become bolder and more clearly delineated. Rainbow trout parr (juveniles) have an olive-green colour on the back and silvery olive high on the sides. There are 8-13 oval-shaped marks along the sides, which may also have smaller dark spots along them. Rosy-yellow markings occur along the lateral lines between the oval marks. As the parr grows, adult colouration is attained (McDowall, 1990)

Lifecycle Stages
Lake fish usually spawn in lake tributaries, where the young trout feed and grow before migrating downstream after about a year. Growing to maturity in the lake takes around 2 to 4 years, at which time they migrate back to the tributaries to spawn. Most fish will return to the tributary in which they hatched (McDowall, 1990). Some lake populations may spawn in lake-shore gravels rather than travel into tributaries (*ibid*)

Uses
Rainbow trout are highly valued as both a sport and table fish. They are the basis of many sport fisheries and are highly sought-after by anglers. In many locations rainbow trout are raised in hatcheries, then liberated into rivers and streams for recreational anglers to catch. They have also been introduced to many countries as an aquaculture species for commercial purposes (FishBase, 2003).

Habitat Description
Rainbow trout are primarily a freshwater fish, although sea-run populations, often known as steelhead, exist in some areas. It is unclear whether this migration to sea water is genetic or simply opportunistic, but it appears that any population of rainbow trout is capable of migrating to or surviving in the sea if the need arises (FishBase, 2003)
Well-oxygenated, clean fresh water, with a temperature of around 12°C is preferred, although a range from 10°C to 24°C is tolerated (FishBase, 2003). Rainbow trout tend to thrive better in lakes than in streams or rivers, although large fish are often present in remote headwaters (McDowall, 1990).

Reproduction
Sexual. Fertilisation is external, with the female trout excavating a hollow in streambed gravel for the eggs to be laid in. Between 700 and 4000 oarnge-red eggs are laid per spawning event. The male then fertilises the eggs and they are covered with a layer of gravel. This 'nest' is known as a redd (McDowall, 1990; FishBase, 2003).

Nutrition
Adult rainbow trout eat insects (both aquatic and terrestrial), crustaceans, molluscs, fish eggs, and small fish. Young trout feed predominantly on zooplankton (Cadwallader & Backhouse, 1983 in Fishbase, 2003).

General Impacts
Impacts include hybridisation, disease transmission, predation and competition with native species.
In the United States, the introduction of rainbow trout into areas outside of their native range has caused problems due to their ability to hybridise with native salmonid species, affecting their genetic integrity. Some species, such as the Alvord cutthroat (*Oncorhynchus clarki* subsp1.) have become virtually extinct because of this. Other species known to be affected by hybridisation include the Lahontan cutthroat trout (*O. clarki henshawi*); golden trout (*O. aquabonita*); redband trout (*O. mykiss* subsp.); Gila trout (see *O. gilae* in IUCN Red List of threatened Species) and Arizona trout (see *O. apache* in IUCN Red List of Threatened Species) (Fuller, 2000).
Whirling disease is a condition caused by a protozoan (*Myxobolus cerebralis*) that causes dysfunction in the nervous system of salmonids, and may result in curvature of the vertebral column. This results in fish losing the ability to maintain a proper orientation, causing them to swim in a spiral motion (McDowall, 1990). The stocking of hatchery-reared trout into the wild has caused outbreaks of this disease in the United States, threatening wild fish populations (Fuller, 2000).
In many countries introduced rainbow trout have been reported to have negative effects on native fish, amphibians and invertebrates. In New Zealand it is suspected that rainbow trout affect native fish species through direct predation and competition for feeding areas (McDowall, 1990), while in the United States there is evidence that the same is happening to fish such as the humpback chub (see *Gila cypha* in IUCN Red List of Threatened Species), suckers, and squawfish (Fuller, 2000).

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)).
Chemical: Antimycin, an antibiotic, is used to kill rainbow trout in the Great Smoky Mountains National Park in the US, in an effort to protect native brook trout (ESPN, 2003).

Pathway
Introduced to many locations as an aquaculture species.Introduced to many locations to 'improve' the native fish fauna for anglers.

Principal source:

Compiler: IUCN SSC Invasive Species Specialist Group
Updates with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

Review:

Pubblication date: 2010-10-04

ALIEN RANGE

[1] AFGHANISTAN
[1] ARGENTINA
[1] AUSTRIA
[1] BOLIVIA
[1] BRAZIL
[1] CAMEROON
[1] CHINA
[1] CONGO
[1] CYPRUS
[1] DENMARK
[1] ECUADOR
[1] ETHIOPIA
[1] FRANCE
[1] FRENCH SOUTHERN TERRITORIES
[1] GREECE
[1] GUYANA
[1] ALBANIA
[1] AUSTRALIA
[2] BELGIUM
[1] BOSNIA AND HERZEGOVINA
[1] BULGARIA
[1] CHILE
[1] COLOMBIA
[1] COSTA RICA
[1] CZECH REPUBLIC
[1] DOMINICAN REPUBLIC
[1] ESTONIA
[1] FINLAND
[3] FRENCH POLYNESIA
[1] GERMANY
[1] GUATEMALA
[1] HONDURAS

[1] HUNGARY
[1] INDIA
[1] IRAN, ISLAMIC REPUBLIC OF
[1] IRELAND
[1] ITALY
[1] JORDAN
[1] KOREA, REPUBLIC OF
[1] LESOTHO
[1] MADAGASCAR
[1] MALAYSIA
[1] MOROCCO
[1] NETHERLANDS
[1] NEW GUINEA
[1] NORWAY
[1] PANAMA
[1] PERU
[1] PORTUGAL
[1] REUNION
[1] SOUTH AFRICA
[1] SRI LANKA
[1] SWAZILAND
[1] SWITZERLAND
[1] TAIWAN
[1] THAILAND
[1] UGANDA
[45] UNITED STATES
[1] VENEZUELA
[1] ZIMBABWE
[1] ICELAND
[1] INDONESIA
[1] IRAQ
[1] ISRAEL
[1] JAPAN
[1] KENYA
[1] LEBANON
[1] LIECHTENSTEIN
[1] MALAWI
[1] MAURITIUS
[1] NEPAL
[1] NEW CALEDONIA
[1] NEW ZEALAND
[1] PAKISTAN
[1] PAPUA NEW GUINEA
[1] POLAND
[1] PUERTO RICO
[1] ROMANIA
[1] SPAIN
[1] SUDAN
[1] SWEDEN
[1] SYRIAN ARAB REPUBLIC
[1] TANZANIA, UNITED REPUBLIC OF
[1] TURKEY
[1] UNITED KINGDOM
[1] URUGUAY
[1] ZAMBIA

Red List assessed species 33: EX = 1; CR = 8; EN = 8; VU = 9; NT = 2; DD = 1; LC = 4;

Amphilius natalensis **LC**
Anaxyrus canorus **EN**
Barbus erubescens **CR**
Chlorolestes apricans **EN**
Ecchlorolestes peringueyi **VU**
Lepidomeda vittata **VU**
Metacnemis angusta **VU**
Orestias ctenolepis **VU**
Orestias pentlandii **VU**
Parapsilorhynchus prateri **CR**
Podiceps andinus **EX**
Pseudobarbus burgi **EN**
Pseudobarbus tenuis **NT**
Rollandia microptera **EN**
Salmo platycephalus **CR**
Somuncuria somuncurensis **CR**
Telmatobius atacamensis **CR**
Amphilius uranoscopus **LC**
Barbus calidus **VU**
Chiloglanis bifurcus **EN**
Diplomystes chilensis **DD**
Kneria auriculata **LC**
Litoria spenceri **CR**
Metacnemis valida **EN**
Orestias olivaceus **VU**
Orestias silustani **VU**
Pelasgus marathonicus **NT**
Pseudacris regilla **LC**
Pseudobarbus quathlambae **EN**
Rana muscosa **EN**
Salmo akairos **VU**
Sinocyclocheilus grahami **CR**
Sympetrum evanescens **CR**

BIBLIOGRAPHY
24 references found for **Oncorhynchus mykiss**

Managment information
Alien Species in Poland 2006 *Oncorhynchus mykiss*
Summary: Available from: http://www.iop.krakow.pl/ias/Gatunek.aspx?spID=197 [Accessed 18 March 2010]

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].
Champion, P. Clayton, J. and Rowe, D. 2002. Alien Invaders Lake Managers Handbook. Ministry for the Environment.
Summary: Available from: http://www.mfe.govt.nz/publications/water/lm-alien-invaders-jun02.pdf [Accessed 3 February 2005]
Clearwater, Susan J.; Chris W. Hickey and Michael L. Martin. 2008. Overview of potential piscicides and molluscicides for controlling aquatic pest species in New Zealand. Science for conservation 283. March 2008, New Zealand Department of Conservation
Summary: Available from: http://www.doc.govt.nz/upload/documents/science-and-technical/sfc283entire.pdf [Accessed 20 March 2008]
Copp, G.H., Garthwaite, R. and Gozlan, R.E., 2005. Risk identification and assessment of non-native freshwater fishes: concepts and perspectives on protocols for the UK. Sci. Ser. Tech Rep., Cefas Lowestoft, 129: 32pp.
Summary: The discussion paper 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.
Available from: http://www.cefas.co.uk/publications/techrep/tech129.pdf [Accessed 1 September 2005]
Cossios E. Daniel, 2010. Vertebrados naturalizados en el Per: historia y estado del conocimiento (Naturalised vertebrates in Peru: history and state of knowledge) Rev. peru. biol. 17(2): 179 - 189 (Agosto 2010)
Summary: Available from: http://sisbib.unmsm.edu.pe/BVrevistas/biologia/v17n2/pdf/a07v17n2.pdf [Accessed 23 February 2011]
ESPN, 2003. ESPN Outdoors.
Summary: A news article on the planned extermination of rainbow trout from a stream in Great Smoky Mountains National Park in the US.
Available from: http://espn.go.com/outdoors/flyfishing/news/2001/1209/1292668.html [Accessed 26 March 2003]
Hewitt, C.L, Campbell, M.L. and Gollasch, S. 2006. Alien Species in Aquaculture. Considerations for responsible use. IUCN, Gland, Switzerland and Cambridge, UK. viii + 32 pp.
Summary: This publication 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 (New Zealand, Australia and Chile).
Available from: http://data.iucn.org/dbtw-wpd/edocs/2006-036.pdf [Accessed 22 September 2008]
IUCN/SSC Invasive Species Specialist Group (ISSG)., 2010. A Compilation of Information Sources for Conservation Managers.
Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.
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].

Rowe, D.K and Graynoth, E, 2002. Lake Managers Handbook- Fish in New Zealand Lakes. Ministry for the Environment, Wellington.
Summary: Available from: http://www.mfe.govt.nz/publications/water/lm-fish-in-nz-lakes-jun02.pdf

General information
CONABIO. 2008. Sistema de informaci□n sobre especies invasoras en M□xico. Especies invasoras - Peces. Comisi□n Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.
Summary: English:
The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.
Invasive species - fish is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Peces [Accessed 30 July 2008]
Spanish:
La lista de especies del Sistema de informaci□n sobre especies invasoras de m□xico cuenta actualmente con informaci□n aceca de nombre cient□fico, familia, grupo y nombre com□n, as□ como h□bitat, estado de la invasi□n en M□xico, rutas de introducci□n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p□gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci□n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci□n novedades, para conocer los cambios.
Especies invasoras - Peces is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Peces [Accessed 30 July 2008]
Couteyen, S. 2006. Effets de l introduction de la truite arc-en-ciel (*Oncorhynchus mykiss* Walbaum, 1792) sur les populations larvaires de deux esp□ces de Zygopt□res de l □les de la R□union. Martinia, 22 (2), 55-63
FishBase, 2005. Species profile *Oncorhynchus mykiss* Rainbow trout
Summary: FishBase is a global information system with all you ever wanted to know about fishes . FishBase on the web contains practically all fish species known to science. FishBase was developed at the WorldFish Center in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and many other partners, and with support from the European Commission (EC). Since 2001 FishBase is supported by a consortium of seven research institutions. You can search on Search FishBase
This species profile is available from:
http://www.fishbase.org/Summary/SpeciesSummary.cfm?ID=239&genusname=Oncorhynchus&speciesname=mykiss [Accessed 21 March, 2005]
Freshwater Biodata Information System New Zealand (FBIS), 2005
Summary: The Freshwater Biodata Information System (FBIS) contains fish, algae, aquatic plant and invertebrate data and metadata gathered from New Zealand s freshwater streams, rivers and lakes. FBIS provides different ways to search for biodata: choose a predefined search from a list of common searches; use the map view to draw a box on a map and search for biodata; or create your own search for maximum search flexibility. FBIS is offered as a nationally available resource for the New Zealand public, institutions and companies who need access to a well-maintained long-term data repository.
Available from: https://secure.niwa.co.nz/fbis/validate.do?search=common [Accessed 5 August 2005]
Fuller, P. 2000. Nonindigenous fishes - *Oncorhynchus mykiss*. Nonindigenous Exotic Species website, US Geological Survey.
Summary: Contains useful information on the distribution and effects of rainbow trout within the United States.
Available from: http://nas.er.usgs.gov/fishes/accounts/salmonid/on_mykis.html [Accessed 25 March 2003]
Hasegawa, K. and Maekawa, K. 2006. The Effects of Introduced Salmonids on Two Native Stream-dwelling Salmonids Through Interspecific Competition, *Journal of Fish Biology 68*: 1123 - 1132.
ITIS (Integrated Taxonomic Information System), 2005. Online Database *Oncorhynchus mykiss*
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.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Oncorhynchus+mykiss&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
Keith, P. 2002. Freshwater fish and decapod crustacean populations on Reunion island, with an assessment of species introductions. Bull. Fr. P□che Piscic., 364, 97-107.
Summary: Cet article propose un bilan de la connaissance des esp□ces de poissons et des crustac□s d□capodes pr□sents dans les eaux douces de La R□union avec une synth□se des esp□ces introduites.
Keith, P. 2002. Revue des introductions de poissons et de crustac□s d□capodes d eau douce en Polyn□sie fran□aise. Bull. Fr. P□che Piscic, 364, 147-160.
Summary: Cet article fait le bilan des introductions d esp□ces dul□aquicoles en Polyn□sie fran□aise.
Keith, P. 2005. Revue des introductions de poissons et de crustac□s d□capodes d eau douce en Nouvelle-Cal□donie. Revue d Ecologie (La Terre et la vie), 60, 45-55.
Summary: Cet article propose un bilan complet et actualis□ des introductions d esp□ces de poissons et de crustac□s d□capodes dans les eaux douces de Nouvelle-Cal□donie.
Marquet, G., Keith, P., Vigneux, E. 2003. Atlas des poissons et des crustac□s d eau douce de Nouvelle-Cal□donie. Paris, Mus□um national d□histoire naturelle, Collection Patrimoines Naturels 58, 282 p

Mus&#65533;um national d Histoire naturelle [Ed]. 2003-2006 . *Oncorhynchus mykiss* Inventaire national du Patrimoine naturel
Summary: Available from: http://inpn.mnhn.fr/isb/servlet/ISBServlet?action=Espece&typeAction=10&pageReturn=ficheEspeceDescription.jsp&numero_taxon=67804 [Accessed 10 April 2008]

Pascal, M., Barr&#65533;, N., De Garine-Wichatitsky, Lorvelec, O., Fr&#65533;tey, T., Brescia, F., Jourdan, H. 2006. Les peuplements n&#65533;o-cal&#65533;doniens de vert&#65533;b&#65533;br&#65533;s : invasions, disparitions. Pp 111-162, in M.-L. Beauvais *et al*., : Les esp&#65533;ces envahissantes dans l&#65533;archipel n&#65533;o-cal&#65533;donien, Paris, IRD &#65533;ditions, 260 p.+ c&#65533;d&#65533;rom
Summary: Synth&#65533;se des introductions d esp&#65533;ces de vert&#65533;br&#65533;s en Nouvelle-Cal&#65533;donie et &#65533;valuation de leurs impacts.