

## *Alosa pseudoharengus* 正體中文

**System:** Freshwater

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Clupeiformes	Clupeidae

<b>Common name</b>	kyack (English), gaspareau (French), white herring (English), bigeye herring (English), grayback (English), alewife (English), branch herring (English), gray herring (English), mooneye (English, northwest New York state), freshwater herring (English), sawbelly (English)
<b>Synonym</b>	<i>Pomolobus pseudoharengus</i>
<b>Similar species</b>	<i>Alosa aestivalis</i>
<b>Summary</b>	<i>Alosa pseudoharengus</i> (alewife) is a small, fish species indigenous to the east coast of North America that causes several major effects in aquatic environments. Alewife migrate from the ocean to spawn in fresh water. It can occupy all strata of a land-locked body of water throughout the course of the year. <i>A. pseudoharengus</i> alters the zooplankton community as it is an extremely efficient feeder on zooplankton, competing with other fish species for food. Alewife feed on the eggs and larvae of other fish and thereby can cause other fish species to decline. It is often stocked as a forage fish.



[view this species on IUCN Red List](#)

### Species Description

Maine's Department of Marine Resources (1998) states that *A. pseudoharengus* is an iridescent gray green or violet shade on top that fades down their sides to a silver underbelly. It usually has a distinct dusky spot just behind the upper margin of the gill cover. Its strongly laterally compressed body is three and one-third times as long as it is deep and has a forked tail fin. The midline of their belly is sharp and saw edged. Serrations located on the midline of their belly are much stronger and sharper than the ones found on most other members of their family. Adult alewives normally grow to be 25cms to 28cms (10-11 inches) in length and 230grms- 255grms (8 to 9 ounces) in weight. Alewives in land-locked populations rarely exceed 20cms (8 inches) long and most are 13cms to 18cms (5 to 7 inches) long (O'Gorman *et al.* 1997).

### Notes

Describing the distribution of alewife is difficult as native and invaded ranges overlap. For example, alewife is native along Atlantic coast of New York, however it is invasive in western New York outside of the Atlantic drainage (Robert O'Gorman., pers. comm 2004)

### Lifecycle Stages

Maine's Department of Marine Resources (1998) report that "every spring, adults ascend rivers and streams to spawn in freshwater lake and pond areas. After the eggs hatch, the young-of-the-year spend two to six months in the freshwater environment, growing 4cm to 12.5cms (1½ to 5 inches) in size before they begin to migrate to sea."

## Uses

The Nova Scotia Department of Agriculture and Fisheries (2001) report that "*A. pseudoharengus* eggs, or roe, are canned and sold as a delicacy. The catch is used for fish meal lobster bait, pet food, or it is smoked, canned, salted, or pickled."

## Habitat Description

In lake habitats *Alosa pseudoharengus* are known to occupy all strata of a land-locked water body during the course of the year. Alewives have been found to prefer rocky habitats to sand sites along the Wisconsin shoreline. This may be related to their feeding on emerging insects associated with rocky areas (Janssen and Luebke, 2004). The majority of their time is spent in the limnetic zone (inhabiting fresh water). In late spring and summer they move into littoral areas (the region of the shore of a lake or sea or ocean) for spawning and move into deeper water during fall. Alewives have a preference for warmer waters. *A. pseudoharengus* move in large schools and are attracted to light. They move into shallow areas at night and return to deeper waters during the day. River populations of *A. pseudoharengus* are anadromous (meaning they migrate from the ocean to spawn in fresh water). They are found in river systems during spring migration, and are known to move further upstream than their close cousin, the American shad (*Alosa sapidissima*) (Chosid, Undated).

## Reproduction

The Department of Fisheries and Wildlife Science at Virginia Tech (VT-FIW, 2001) states that "in anadromous populations, females mature a year later than males. *A. pseudoharengus* matures between the ages of 3 and 5. The fecundity of oceanic female is 48,000 - 360,000 eggs. Landlocked fish mature between 1 and 3 years of age and their fecundity is between 13,200 and 49,200 eggs. Spawning occurs from March to May in tidal freshwater streams and ponds. After spawning, adults return to the sea. Inland populations spawn from April to August in the shallow areas of lakes and streams. Adults pair during spawning and swim in spirals to the surface. The eggs of *A. pseudoharengus* are non-adhesive and sink to the bottom of calm, still waters." Spawning occurs at night.

## Nutrition

VTDEC (2002) states that *A. pseudoharengus* "is planktivorous (their main food source is plankton), feeding predominantly on zooplankton as both juveniles and adults. However, large landlocked alewives also feed on the eggs and larvae of other fish species, as well as those of their own species".

## General Impacts

In the Laurentian Great Lakes, the alewife invasion has been associated with declines in abundance of emerald shiner (*Notropis atherinoides*), yellow perch (*Perca flavescens*), deepwater sculpin (*Myoxocephalus thompsoni*), and burbot (*Lota lota*). Alewives are suspected of interfering with reproduction of these fishes, most likely by preying upon the pelagic fry (Chuck Madenjian pers.comm., 2004).

Multiple impacts have been reported by the Vermont Department of Environmental Conservation (VTDEC, 2002). Alewives are extremely efficient feeders on zooplankton. They feed selectively on the larger species and the larger individuals within a species, causing drastic alterations in zooplankton size, abundance and community structure. *A. pseudoharengus* out-compete other fish species for food. Alewives compete directly for zooplankton with other planktivorous fish, including yellow perch (*Perca flavescens*) and rainbow smelt (*Osmerus mordax*), and with the young of many piscivorous species, such as bass, which are dependent on zooplankton during the early parts of their lives. *A. pseudoharengus* feed on the eggs and larvae of other fish. Predation on yellow perch and lake trout (*Salvelinus namaycush*) larvae appears to be a significant source of mortality in those species. *A. pseudoharengus* are the cause of major reproductive failures in landlocked Atlantic salmon (*Salmo salar*) and lake trout populations.

*A. pseudoharengus* undergoes periodic mass mortalities. The large numbers of alewives that die in these events wash up on beaches, causing foul odors and public health concerns. Any predator fish that utilises *A. pseudoharengus* populations as a main source of food will have difficulty finding enough to eat after an alewife mass mortality. This results in poor growth rates and declines in game fish. Land-locked alewives are high in thiaminase and Atlantic salmon and lake trout that eat mainly alewives produce thiamine deficient eggs which results in high mortality of fry from a syndrome linked to thiamine deficiency (O'Gorman and Stewart 1999).

## Management Info

**Biological:** Several options for alewife management and control have been listed by VTDEC (2002). Population reduction can be achieved by the stocking of alewife predator species such as the brown trout (*Salmo trutta*) which feed predominately on alewives.

**Physical:** An aggressive netting project can be undertaken when the alewives are vulnerable. Construction of barriers could prevent the spread of alewives downstream.

**Chemical:** An extreme measure of using a piscicide which would kill all fish species within a lake is also suggested.

## Pathway

Alewife were once purposely introduced into land-locked waterbodies to provide prey for piscivores although many such introductions were not sanctioned by management agencies. Lakes in the Adirondack Mountains and Otsego Lake, New York were illegally stocked with alewives for forage (Fuller et al. 2005) Fuller et al. (2005) brings up the possibility that alewife were introduced into Lake Ontario with American shad stockings in the 1880s, but he discounts this possibility in favour of the hypothesis that they reached the lake via the Erie Canal from the Hudson River.

**Principal source:** VTDEC, 2002 Alewife Species Account

\r\n [Maine's Department of Marine Resources, 1998](#) Alewife Fact Sheet

[Fuller et al. 2005](#). *Alosa pseudoharengus* Nonindigenous Aquatic Species Database, Gainesville, FL.

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

## Review:

**Publication date:** 2005-03-21

## ALIEN RANGE

[1] LAKE ERIE  
[1] LAKE ONTARIO  
[10] UNITED STATES

[1] LAKE MICHIGAN  
[1] LAKE SUPERIOR

## BIBLIOGRAPHY

32 references found for *Alosa pseudoharengus*

### Management information

Bean, T. 2002. Alewife (*Alosa pseudoharengus*). Introduced Species Summary Project [Online Database].

**Summary:** Species fact sheet reporting common name, scientific name, classification, identification, original distribution, current distribution, site and date of introduction, modes of introduction, reasons why it has become established, ecological role, benefits, threats, control level diagnosis, and control method.

Available from: [http://www.columbia.edu/itc/cerc/danoff-burg/invasion\\_bio/inv\\_spp\\_summ/alewife.html](http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/alewife.html) [Accessed 28 September 2003]

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](http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf) [Accessed 13 January 2009].

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]

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]

Krueger, C. C., D. L. Perkins, E. L. Mills, and J. E. Marsden. 1995. Predation by alewives on lake trout fry in Lake Ontario: role of an exotic species in preventing restoration of a native species. Journal of Great Lakes Research 21(Supplement 1):458-469.

Maine's Department of Marine Resources, 1998. Alewife Fact Sheet.

**Summary:** Species fact sheet reporting on background information, impacts, and general descriptions.

Available from: <http://www.state.me.us/dmr/rm/alewifefactsheet.htm> [Accessed 28 September 2003]

O Gorman R., and C. P. Schneider. 1986. Dynamics of alewives in Lake Ontario following a mass mortality. Transactions of the American Fisheries Society 115:1-14.

O Gorman, R., and T. J. Stewart. 1999. Ascent, dominance, and decline of the alewife in the Great Lakes: food web interactions and management strategies. Pages 489-514, in W. W. Taylor and P. Ferreri (eds.), Great Lakes Policy and Management: A Binational Perspective. Michigan State University Press.

O Gorman, R., B. F. Lantry, and C. P. Schneider. 2004. Effect of stock size, climate, predation, and trophic status on recruitment of alewives in Lake Ontario, 1978-2000. Transactions of the American Fisheries Society 133: 855-867.

Vermont Department of Environmental Conservation (VTDEC), 2002. Alewife Fact Sheet.

**Summary:** Species fact sheet reporting description, identification, impacts, problems, and management strategies.

Available from: <http://www.anr.state.vt.us/dec/waterq/ans/alewife.htm> [Accessed 28 September 2003]

Wells, L., and A. L. McLain. 1973. Lake Michigan--man's effects on native fish stocks and other biota. Great Lakes Fishery Commission, Technical Report 20, Ann Arbor, Michigan

### General information

Bushnoe, T.M., Warner, D.M., Rudstam, L.G., and Mills, E.L. 2003. *Cercopagis pengoi* as a new prey item for alewife (*Alosa pseudoharengus*) and rainbow smelt (*Osmerus mordax*) in Lake Ontario. Journal of Great Lakes Research. 29 (2): 205-212.

Chosid, D. UNDATED. Alewife *Alosa pseudoharengus*. New Jersey Division of Fish and Wildlife.

**Summary:** Alewife fact sheet available from the New Jersey Division of Fish and Wildlife.

Available from <http://www.state.nj.us/dep/fgw/pdf/fishfact/alewife.pdf> [Accessed 28 September 2003]

[FishBase, 2003 Species profile \*Alosa pseudoharengus\* Alewife](#)

**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?genusname=Alosa&speciesname=pseudoharengus> [Accessed 7 September, 2004]

Fitzsimons, J. D., S. B. Brown, D. C. Honeyfield, and J. G. Hnath. 1999. A review of early mortality syndrome (EMS) in Great Lakes salmonids: relationship with thiamine deficiency. *Ambio* 28:9-15.

Fitzsimons, John D.; Williston, Bill and Fodor, Georgina 2004. An assessment of the direct and indirect impacts of aquatic invasive species on lake trout restoration in the Great Lakes. In Abstracts: 13th International Conference on Aquatic Invasive Species, September 20-24, 2004.

Lynch West County Hotel, Ennis, County Clare, Ireland.

**Summary:** Impacts of some invasive species on native species within the Great Lakes.

[Fuller, P., Maynard, E., Raikow, D., 2005. \*Alosa pseudoharengus\* Nonindigenous Aquatic Species Database, Gainesville, FL.](#)

**Summary:** Available from: <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=490>

Graham, J.J. 1956. University of Toronto Studies Biological Series Publication 62, Publication of the Ontario Fisheries Research Laboratory 74, Toronto, Canada

Harman Willard N; Albright Matthew F; and Warner David M., 2002. Trophic changes in Otsego Lake, NY following the introduction of the alewife (*Alosa pseudoharengus*). *Lake & Reservoir Management*. 215-226.

[ITIS \(Integrated Taxonomic Information System\), 2004. Online Database \*Alosa pseudoharengus\*](#)

**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=161706](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=161706) [Accessed December 31 2004]

Janssen, J., and Luebke, M.A. 2004. Preference for rocky habitat by age-0 yellow perch and alewives. *Journal of Great Lakes Research*. 30 (1): 93-99.

Madenjian, C. P., G. L. Fahnenstiel, T. H. Johengen, T. F. Nalepa, H. A. Vanderploeg, G. W. Fleischer, P. J. Schneeberger, D. M. Benjamin, E. B. Smith, J. R. Bence, E. S. Rutherford, D. S. Lavis, D. M. Robertson, D. J. Jude, and M. P. Ebener. 2002. Dynamics of the Lake Michigan food web, 1970-2000. *Canadian Journal of Fisheries and Aquatic Sciences* 59:736-753.

Madenjian, C.P., Holuszko, J.D., and DeSorcie, T.J. 2003. Growth and condition of alewives in Lake Michigan, 1984-2001. *Transactions of the American Fisheries Society*. 132 (6): 1104-1116.

Madenjian, C.P., O'Connor, D.V., Chernyak, S.M., Rediske, R.R., and O'Keefe, J.P. 2004. Evaluation of a chinook salmon (*Oncorhynchus tshawytscha*) bioenergetics model. *Canadian Journal of Fisheries and Aquatic Sciences*. 61 (4): 627-635.

Mills, E. L., R. O Gorman, J. DeGisi, R. F. Heberger, and R. A. House. 1992. Food of the alewife (*Alosa pseudoharengus*) in Lake Ontario before and after the establishment of *Bythotrephes cederstroemi*. *Canadian Journal of Fisheries and Aquatic Sciences*. 49:2009-2019

[Nova Scotia Department of Agriculture and Fisheries. 2001. Alewife \(\*Alosa Pseudoharengus\*\). Inland Fisheries: Species Fact Sheets.](#)

**Summary:** Information on description, similar species, size, habitat, distribution, food habits, reproductive habits, and population status of species.

Available at: <http://www.gov.ns.ca/nsaf/sportfishing/species/ale.htm> [Accessed 28 September 2003]

O Gorman, R., D. H. Barwick, and C. A. Bowen. 1987. Discrepancies between ages determined from scales and otoliths for alewives from the Great Lakes. Pages 203-210 in R. C. Summerfelt and G. E. Hall editors. *Age and Growth of Fish*. Iowa State University Press, Ames, Iowa.

O Gorman, R., E. L. Mills, and J. S. DeGisi. 1991. Use of zooplankton to assess the movement and distribution of alewife (*Alosa pseudoharengus*) in south-central Lake Ontario in spring. *Canadian Journal of Fisheries and Aquatic Sciences* 48:2250-2257.

O Gorman, R., O. E. Johannsson, and C. P. Schneider. 1997. Age and growth of alewives in the changing pelagia of Lake Ontario, 1977-1992. *Transactions of the American Fisheries Society* 126:112-126.

Owens, R. W., R. O Gorman, E. L. Mills, L. G. Rudstam, J. J. Hasse, B. H. Kulik, and D. B. MacNeill. 1998. Blueback herring (*Alosa aestivalis*) in Lake Ontario: First record, entry route, and colonization potential. *Journal of Great Lakes Research* 24:723-730.

[Virginia Tech Department of Fisheries and Wildlife Sciences \(VT-FIW\). 2001. The Virtual Aquarium: Alewife, \*Alosa pseudoharengus\*.](#)

**Summary:** Information on description, similar species, size, habitat, distribution, food habits, reproductive habits, and population status of species.

Available from: <http://www.cnr.vt.edu/efish/families/alewife.html> [Accessed 28 September 2003]

Wells, L. 1977. Changes in yellow perch (*Perca flavescens*) populations of Lake Michigan, 1954-75. *Journal of the Fisheries Research Board of Canada* 29:889-898.