

YUKON FLOATER

TAXONOMY

Scientific name: *Anodonta beringiana* (Middendorf, 1851)

Common name: Yukon floater

Family: Unionidae

Taxonomic comments:

Synonym species is *Anodonta youconensis* (Lea, 1867), same as *A. youkanensis* (Lea, 1868); either name used occasionally in Canada and Russia (Frest et al. unpubl. data 2003, Smith pers. comm. 2004).



DESCRIPTION

Basic description: A freshwater mussel.

General description:

Shell is elliptical in shape, moderately thin and fragile. Periostracum (outer shell material) is dark brown to blackish in adults, olive green in juveniles. Nacre (inner shell material) is lead-colored to dull blue. Adult shell measurements up to 150 mm long, 55 mm wide, and 75 mm high, with shell wall about 3 mm thick at mid-anterior. Shell hinge contains no teeth and body mass consists mostly of two large adductor muscles. Distinguished from the similar species, *A. kennerlyi*, by its larger size, darker periostracum, inflated beaks (umbos) which project above the hinge line, and lead-colored/blue nacre (whitish-purple in *A. kennerlyi*) (Clarke 1981).

Length (cm): 15

Reproduction:

Adult males release sperm into the water, which are drawn up by the female through incurrent siphon to fertilize eggs. Process relies on slight water current to occur, and where currents are reduced, egg fertilization is less likely to occur (Hart and Fuller 1974). Fertilized eggs are incubated in portions of the female gills, then hatched larvae (glochidia) are released into the water and attach themselves parasitically to host fish (Stein 1971). It is unknown whether *A. beringiana* is a tachytictic (female releases glochidia as soon as they hatch into mature larvae) or bradytictic spawner (female retains glochidia after they mature and releases them sometime later, often holding them through the fall/winter season to release in the spring), but glochidia are often found attached to host fish from May-August (Cope 1959, Smith pers. comm. 2004).

Ecology:

Throughout its range, larvae are obligate parasites of three known species of fish: anadromous sockeye salmon (*Oncorhynchus nerka*), Chinook salmon (*O. tshawytscha*), and threespine stickleback (*Gasterosteus aculeatus*) (Cope 1959, Hart and Fuller 1974). Mature larvae (glochidia) are released from marsupial brooding compartments in female gills into water column when light-sensitive mantle-spots are stimulated or by changes in water temperature (Clarke 1981). Glochidia

are not free-swimming and depend on the host fish for dispersal once they have infected it. Glochidia sustain nourishment from the host using a “thread gland” and are protected from bacterial attack and predation while they metamorphose into juvenile mussels. As juveniles, use a byssal thread to anchor in suitable substrate, where they grow and mature (Hart and Fuller 1974).

Recent discoveries of several new species of host fish parasitized (ninespine stickleback, *Pungitius pungitius*, and nonanadromous Kokanee salmon, *Oncorhynchus nerka*), in Alaska, raise questions about host specificity in this mussel and encourage study of other fish inhabitants of its range (Miller pers. comm. 2004, Smith pers. comm. 2004). Since this species requires larval infection of host fish species for dispersal, its abundance and distribution are closely linked to population dynamics of its hosts. This species is a good indicator of environmental contaminants because it is long-lived (20-40+ year lifespan) (Stein 1971) and bio-concentrates filtered substances in its shell. Freshwater mussels were an important natural resource for native Alaskans, who used them for food, tools and jewelry (Williams and Neves 2003).

Food:

A filter feeder of decaying tissue and detritus including zooplankton, phytoplankton and bacteria (Hart and Fuller 1974). Requires water free of large amounts of sediment to feed (Stein 1971).

Phenology:

Unknown, but spawning likely corresponds to migrations of anadromous host fish to streams and lake outlets (Smith pers. comm. 2004).

Habitat:

Prefers lakes, ponds or slow-moving streams with sand and gravel substrate and a depth of around 1 m (Hart and Fuller 1974, Smith pers. comm. 2004). Requires abundant dissolved oxygen and water relatively free of silt (including glacial till), which can smother mussels (Hart and Fuller 1974).

STATUS

Global rank: G4 (1987-02-18)

Global rank reasons:

Global rank reasons currently unavailable.

State rank: S3S4 (2004-07-21)

State rank reasons:

Scant information available. Statewide distribution information incomplete. No data on abundance and trends. Degree of threat probably minimal, but closely linked to host fish ecology.

DISTRIBUTION AND ABUNDANCE

Range:**Global range:**

In Alaska, from the Aleutian Islands and southwestern Alaska to northern and central interior and into the upper Yukon River drainage (Clarke 1981, Baxter 1983) and Old Crow Basin, Yukon Territory. May also occur in Oregon, California and Washington (Henderson 1929, Ingram 1948),

but sites need verification (Frest et al. unpubl. data). Also reported from Kamchatka, Russia (Baxter 1983).

State range:

Occurs from the Aleutian Islands and southwestern Alaska to northern and central interior and into the upper Yukon River drainage (Clarke 1981, Baxter 1983). Larvae are obligate parasites of sockeye and Chinook salmon (*Oncorhynchus nerka* and *O. tshawytscha*) and threespine sticklebacks (*Gasterosteus aculeatus*), thus, species range never extends beyond the range of host fishes.

Abundance:**Global abundance:**

Unknown.

State abundance:

Unknown.

Trends:**Global trend:**

Unknown. However, notable declines in freshwater mussel populations in North America over the last 30 years are reason for concern (Williams et al. 1993, Williams and Neves 2003).

State trend:

Unknown.

EXISTING PROTECTION

Global protection:

No current federal regulations on the harvest of this species.

State protection:

No current state regulations on the harvest of this species in Alaska.

CHALLENGES

Global challenges:

Concerns include habitat loss/change, natural predation by birds and mammals (especially otter, mink and muskrat) and radical changes in host fish populations. Physical threats include smothering by fine sediments and exposure to air or extremes in temperature and levels of dissolved oxygen (Hart and Fuller 1974), all of which may be caused by natural events or human pollution and habitat disturbance. Damming changes current and substrate characteristics making conditions less favorable for mussel reproduction and anchoring, often removing or disturbing fishes, thereby eliminating glochidial hosts (Hart and Fuller 1974). Erosion caused by deforestation, poor agricultural processes or destruction of riparian zones has led to increased silt loads in many streams and has been linked to the decline of freshwater mussels (Williams et al. 1993). Introduced mollusks (e.g. the Asian clam, *Corbicula fluminea*, and the zebra mussel, *Dreissena polymorpha*, currently pose no immediate threat; however, these invasives continue to

spread rapidly and are predicted to occur in the entire contiguous United States and southern Canada within 10-20 years (Williams and Neves 2003).

State challenges:

See Global challenges.

RESEARCH AND INVENTORY NEEDS

Global research needs:

See State research needs below.

State research needs:

Baseline life history information needed. Research needed on the effects of human impacts and other threats to survival. Species' status is reliant on host fish populations; further research needed to determine all species of host fish utilized.

Global inventory needs:

Baseline surveys needed to determine species distribution range-wide. Determine estimate of total population size and develop methods to track population trends.

State inventory needs:

Baseline surveys needed to determine species distribution statewide. Determine estimate of total population size and develop methods to track population trends. Document the occurrence of invasive freshwater mussel species.

CONSERVATION AND MANAGEMENT NEEDS

Global conservation and management needs:

See State conservation and management needs below.

State conservation and management needs:

Management of this species is complicated because impacts to *A. beringiana* populations may not be immediately detectable due to its long lifespan. Management actions for this species should be included in management plans of host fish species. Impacts to stream and lake environments from development and resource extraction, and commercial and subsistence harvest will effect host fish populations and *A. beringiana*. Increase public awareness of freshwater mussels and their roles in ecosystems. Educate public to identify and report any suspected invasive mussel species.

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