



Channeled Applesnail

Pomacea canaliculata (Lamarck, 1828)

syn. *Ampullaria canaliculata*, *A. varians*, *Pila canaliculata*, *Pomacea canaliculata*, *P. varians*

ALBERTA REGULATION:
FISHERIES ACT

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Overview:

The channeled applesnail is a freshwater snail native to Argentina and Uruguay.¹ It was originally introduced to Asia as a food source but the market never developed.³ Distribution via the aquarium trade began around 1980.¹ The first North American populations of *P. canaliculata* were discovered in California in 1997.³ Its rapid spread throughout Asia and other areas of introduction prompted the IUCN to list it among their '100 of the World's Worst Invasive Species.'¹

The original genus for this species was *Ampullaria* and is a common synonym, however *Ampullaria* is an African and Asian genus. The channeled applesnail is now in the New World genus *Pomacea*.¹ There are five species of non-native applesnails in the U.S. and the term "channeled applesnail" refers to a specific morphology exhibited by

many applesnail species, rather than one specific species.³ Taxonomy in its native habitat is not well understood² and variability in shell morphology (size, shape, colour) complicates accurate identification.³

P. canaliculata feed primarily on aquatic plants as well as aquatic and semi-aquatic crops like rice, and so is a major agricultural pest. *P. canaliculata* also have separate sexes with high reproductive capacity – clutches average 200-300 eggs and are laid every few weeks on solid surfaces.² Their presence is often noted by their bright pink to red egg masses on emergent vegetation and other substrates. Competition with native species and habitat modification are the environmental impacts of channeled applesnail invasions.¹

As of January 1, 2016, the possession,

sale, or transport of this species in Alberta is illegal under the Fisheries Act.

Habitat:

P. canaliculata inhabit freshwater wetlands which are flooded for at least part of the year. They prefer relatively still waters with vegetation and muddy bottoms. They can breathe air therefore are tolerant of waters with low dissolved oxygen content.¹

Identification:

Somewhat globular in shape, shells are large and average 62.5 mm height and 56 mm width⁴ but can reach up to 10 cm.² The shell is thin and smooth, the whorls are rounded and the suture between the whorls is deeply indented or channeled, as the name suggests.¹ Shell color is variable – yellow-brown to greenish-brown or dark chestnut.¹



Channeled Applesnail (continued)

Albino and gold colour variations also exist.⁴ Shells sometimes bear dark brown spiral bands which vary in number and thickness. The shell spire (tip of the whorls) is low. The shell opening is oval to kidney-shaped and the inside edge is uncoloured.¹

Fully grown females are larger than males. The door attached to the snail's foot (which closes the opening when the snail withdraws into the shell) is brown, horny, and flexible. This door, or operculum, is uniformly concave in females and in males concave at the center but convex at the margins.¹

The snail's foot is oval and the back edge is square-ish. Tentacles are long and tapered with large but short eye stalks at their outer bases. The snout is short, squared, and each side has long, tapering palps.¹ The left side of the neck is modified into an extensible siphon. The mantle cavity, which houses all of the internal organs, is deep and broad, occupying a third to half of a shell body whorl. In males, the penis sheath is located just behind the mantle edge and above the right tentacle.¹

Ecology:

P. canaliculata have separate sexes and fertilization is internal. Bright pink to red (unique to *P. canaliculata*) clutches of eggs are laid above water on exposed rocks, vegetation, and other substrates. The eggs are enclosed in a calcium carbonate shell. The average clutch size is 260 eggs, but this is highly variable, and the estimated average annual production of eggs is 4400.¹ About

one day after copulation, eggs are laid, predominantly at night but also early morning or evening. Copulation takes place about three times per week and a single clutch is laid after each mating. The eggs hatch about 2 weeks later; however, this is highly dependent on temperature. Newly hatched snails immediately enter the water.¹

Temperature determines the life history of *P. canaliculata* – time to maturity, breeding and life span.¹ Under seasonally fluctuating temperatures (7 to 28°C), sexual maturity is reached in 2 years, two breeding seasons occur and mortality ensues in 4 years. However, a minimum age determines sexual maturity in males, whereas females must reach a minimum size.¹

In Japan the snails bury into the mud and become dormant for the winter, but are reported to only be able to survive buried up to 3 months. Their non-native northern limit in Japan is 36°N.¹

Economic Impacts:

P. canaliculata would cause significant losses to the agricultural production of aquatic and semi-aquatic crops.¹ Environmental impacts of *P. canaliculata* could have impacts on recreation and tourism.

Environmental Impacts:

P. canaliculata aggressively impact aquatic vegetation and high densities of snails can cause almost complete loss of plants. The snail's grazing causes increased phosphorus levels in the water, leading to increased phytoplankton biomass, and ultimately

turbid water. Major changes in ecosystem state and function are the result. Channeled applesnail also prey on and compete directly with native snails.¹

Sociological Impacts:

P. canaliculata carry a number of parasites, which threaten human health: one that causes dermatitis, a fluke that causes intestinal problems, as well, the snails are a host for the rat lungworm which can cause a potentially fatal meningitis if ingested. The crushed shells of dead snails can be a hazard for skin cuts.¹ The transformation of native aquatic communities results in the intrinsic loss of natural capital and enjoyment of natural areas. Channeled applesnail infested waterbodies could have negative impacts on shoreline property values.

Prevention:

Primary management of *P. canaliculata* is prevention. Introductions are primarily deliberate and subsequent spread occurs by floating downstream, limited crawling, and even attached to birds. Eggs can be transported on boats.¹ Aquatic and semi-aquatic crop plants should be examined for snails and egg clutches. Screens on water inlets can prevent spread.² Boats, trailers and aquatic recreational equipment should be thoroughly inspected and cleaned, drained and dried of all plant, animal and mud before moving to another water body. The motor, live well, and bilge should be drained on dry land. Rinse equipment with very hot water (50°C) or let it dry in the sun for 5 days.⁵



Channeled Applesnail *(continued)*

Control:

Eradication of infestations will only be possible in the very early, localized stages by handpicking adults and removing any egg masses. In established infestations reducing snail numbers can reduce impacts.¹ Handpicking is easiest when the snails are most active; morning or late afternoon. Providing substrate for egg laying facilitates easier location and removal of egg masses. Baits can ease handpicking but the bait must be more attractive than the existing vegetation or crop.¹ Several cultural methods can minimize snail damage in rice and taro crops. Water draw-down is ineffective as the snails can survive long periods without water. Pesticides have significant environmental impacts and biological control by another introduced species has inherent risks.¹



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