


	<p align="center"><b>Carp</b></p> <p align="center"><i>Cyprinus Carpio</i></p>	<p align="center"><b>Mosquito Fish (Plague Minnow)</b></p> <p align="center"><i>Gambusia Holbrooki</i></p>	<p align="center"><b>Salvinia</b></p> <p align="center"><i>Salvinia molesta</i></p>
<p><b>How, When &amp; Why introduced</b></p>	<ul style="list-style-type: none"> <li>Introduced into dams as an ornamental fish and for sport fishing in the 1850's. They had little environmental impact until the 1960's when the Boolarra strain was released from a fish farm into the Murray river.</li> </ul>	<ul style="list-style-type: none"> <li>First introduced into Australia as a mosquito agent in 1905.</li> <li>Use was further extended as a mosquito agent in the 1920's and 1940's by military and civilian authorities worldwide.</li> </ul>	<ul style="list-style-type: none"> <li>Native to Brazil. The plant has been used to decorate home aquariums and ponds. First recorded in Queensland in 1953.</li> <li>Salvinia mainly spreads by people who carelessly empty aquariums or their contents into waterways or ponds which overflow into catchments</li> </ul>
<p><b>Features of the species &amp; factors encouraging success</b></p>	<ul style="list-style-type: none"> <li>Female carp can lay over a million eggs a year. (great fecundity)</li> <li>Ecological flexibility - They can live anywhere in NSW except freely flowing coastal rivers and high mountain streams. They tolerate high salinity levels and low oxygen levels which native freshwater fish cannot survive.</li> <li>They can grow up to 60+Kg</li> </ul>	<ul style="list-style-type: none"> <li>Tolerates a large range of salinities from freshwater to full sea water.</li> <li>Tolerates a range of temperatures from 0.5°C to 38°C.</li> <li>Tolerates water acidity and pollution levels which would kill native fish. Upward facing mouth for utilising surface oxygen.</li> <li>Reproduces live young (20-200) every 8 weeks</li> </ul>	<ul style="list-style-type: none"> <li>In warmer temperatures the volume can double every 2-3 days. 1 plant can turn into 8,000 in a month. 67,000,000 after 2 months...</li> <li>The plant reproduces as portions break off.</li> <li>It grows in thick mats on the surface. One mat has been recorded at over 100km<sup>2</sup> in area and 1m deep.</li> </ul>
<p><b>Effects on the local environment (biotic &amp; abiotic)</b></p>	<ul style="list-style-type: none"> <li>They increase turbidity due to their manner of feeding.</li> <li>Reduce submerged vegetation by uprooting aquatic plants.</li> <li>Influence the frequency of algal blooms by increasing nutrient loads.</li> <li>They can excavate and collapse river banks.</li> <li>Feed at low levels of the food chain, preventing flow of energy to native fish.</li> </ul>	<ul style="list-style-type: none"> <li>Stop the recruitment of native fishes by occupying habitats and consuming resources.</li> <li>They also consume young fish (competitive exclusion)</li> <li>Adult native fish may be excluded as aggressive gambusia nip or eat their fins.</li> </ul>	<ul style="list-style-type: none"> <li>Mats block out sunlight which will eliminate native submerged plants.</li> <li>Less plants = less oxygen.</li> <li>Reduced submerged plant life and low oxygen can severely reduce habitat for fish.</li> <li>Loss of water through transpiration.</li> </ul>
<p><b>Management or control methods</b></p>	<ul style="list-style-type: none"> <li>Daughterless carp technology.</li> <li>Electrofishing.</li> <li>At Penrith Lakes: used netting and sonar trapping in the past.</li> </ul> <p>Main method used at Penrith Lakes is biological control via stocking lakes with Australian Bass to eat Carp eggs and fry.</p>	<ul style="list-style-type: none"> <li>Some native fish eg: Flathead, Gudgeon and Bass eat young gambusia.</li> <li>Very small in size (only up to 2cm) very difficult to fish without damage to the ecosystem.</li> <li>Bass have been introduced as fingerlings in their thousands to Penrith Lakes.</li> </ul>	<ul style="list-style-type: none"> <li><u>Biological</u>: Salvinia weevil (<i>Cyrtobagous salviniae</i>) only in high temperatures and nitrogen levels.</li> <li><u>Mechanical</u>: vacuuming water body (small areas are practical, larger areas are not so practical)</li> <li><u>Herbicide</u>: cannot be used for potable (drinking) water. Frequent use of spray needed.</li> </ul>
<p><b>Images</b></p>			
<p><b>More information:</b></p>	<p><a href="https://www.dpi.nsw.gov.au/fishing/pests-diseases/freshwater-pests/species/carp">https://www.dpi.nsw.gov.au/fishing/pests-diseases/freshwater-pests/species/carp</a></p>	<p><a href="https://www.dpi.nsw.gov.au/fishing/pests-diseases/freshwater-pests/species/gambusia">https://www.dpi.nsw.gov.au/fishing/pests-diseases/freshwater-pests/species/gambusia</a></p>	<p><a href="https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control/management-guides/bcfa">https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control/management-guides/bcfa</a></p>

• This resource can be found: <https://www.penrithlakeseec.com> → Resources tab → Student Resources → Introduced Species table