



The Koi hobby and industry in Australia is estimated at approximately \$150 million, according to the Koi Society of Australia (KSA).

There's something fishy going on in Australia's waterways and it's not only contributing to the destruction of the environment but also having a social and economic impact on communities across the country.

Good news is, the problem has been identified and experts have lined up a number of potential solutions supported by scientific research and fisheries experience. The challenge is to decide which is the most effective method – or combination of strategies - to rejuvenate Australia's once mighty and iconic waterbodies.

The issue is with the Common Carp (*Cyprinus carpio*), an important freshwater food fish that originated in China and spread throughout Asia and Europe as an ornamental and aquaculture species. Whilst native carp populations are currently listed as vulnerable by the International Union for Conservation of Nature (IUCN)¹, the species has also been domesticated and introduced into environments worldwide, causing havoc in large numbers.

Carp is considered a significant pest in Australia, North America and Canada, and is even listed in the Global Invasive Species Database (since 2014) as "one of 100 of the worst invasive species"²! The Australian Department of Agriculture and Water Resources lists carp as one of the worst introduced pest species in Australia, having significant social, environmental and economic impacts.

Minister for Agriculture and Water Resources, Barnaby Joyce said the economic impact of carp is currently estimated at up to \$500 million a year, mostly in regional Australia and especially along the Murray River, the world's third longest navigable river that stretches 2,520 kilometres spanning Victoria, New South Wales and South Australia.

Carp may not have directly caused the degradation of Australia's rivers, but their dominance certainly contributes to the problem, according to the Commonwealth Scientific and Industrial Research

Organisation (CSIRO), the federal government agency for scientific research in Australia.

Backed by U.S. research, CSIRO researchers think carp's bottom-feeding behaviour reduces water clarity, which limits sunlight penetrating down to aquatic vegetation on the river bed, which in turn reduces habitat and/or food for invertebrates, native fish and waterbirds³.

Industry groups agree carp is a big problem in Australia. But how bad is the problem, really, and how can we control the situation? Does the Australian government need to take drastic measures to reduce carp numbers – enough for international researchers to call for caution? Will one carp control method or a combination of strategies be most effective, or do authorities need to better manage the carp control methods already in place?

How did carp invade Australia in the first place? According to the CSIRO, carp was first introduced in Australia in 1859 and became a major pest in the 1960s after the accidental release of a strain that had been adapted for fish farming. Within a few years, carp established themselves throughout the entire Murray-Darling Basin, which is an immense region of south-eastern Australia through which thousands of interconnected creeks and rivers run, and can also be found in all states and territories except the Northern Territory.

Carp's widespread growth occurred largely because female carp produce up to 1 million eggs per year and the fish tolerate a wide range of habitats, including degraded water.

Carp makes up 60 per cent of the total fish biomass in the Murray-Darling Basin, according to the "Sustainable Rivers Audit 2 (SRA 2)" Report published by the Murray-Darling Basin Authority in 2012.

An MDBA spokesperson told *Pet Industry News* that other sources estimate the proportion of carp biomass in the Basin to be 70 to 90%.

"The number and biomass of carp in the Basin will vary from year to year. Typically, numbers are higher in years immediately following flooding. There are a number of estimates for carp biomass in the public domain from different surveys and different analyses by different organisations," said the MDBA spokesperson.

Since 2014, the MDBA with the partner governments, conducted an annual Basin-wide fish survey, designed to take consistent, representative samples of fish populations in the rivers of the Basin. The survey data is currently being analysed and results will be published as part of the 2017 Basin Plan Evaluation, said the MDBA spokesperson.

HOW TO CONTROL AUSTRALIA'S WORST FRESHWATER AQUATIC PEST?

Last year, the Australian Government launched a nationally coordinated approach to eradicating carp through a \$15 million National Carp Control Plan. The Fisheries Research and Development Corporation (FRDC) is leading the multi million-dollar planning process, on behalf of the Australian Government, over two years.

The NCCP Coordinator Matthew Barwick said carp are an ecological disaster in Australia and are in "plague proportions" in many rivers. The current control measures - including trapping, commercial fishing and exclusion - are expensive and largely ineffective at controlling carp over large areas or for any length of time, he said.

The primary solution being considered under the Australian Government's National Carp Control Plan is use of a virus called Cyprinid herpesvirus 3 (hereon referred to as the Carp virus or Koi herpesvirus (KHV)) as a biological control agent. The Carp virus is a natural virus now found in over 33 countries worldwide that is included in the World Organisation of Animal Health's (OIE) list of notifiable diseases.

Having first appeared in Israel in 1998, the virus quickly spread throughout the world, causing extensive fish kills of common and ornamental koi carp in natural

