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Key threatening processes in NSW

Instream structures and other mechanisms that alter natural flows

INTRODUCTION

In May 2002 the installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams were listed as a key threatening process (KTP) under the *Fisheries Management Act 1994*.

A threatening process is defined under the Act as 'a process that threatens, or that may threaten, the survival or evolutionary development of a species, population or ecological community of fish or marine vegetation'.

Threatening processes that adversely affect threatened species, populations or ecological communities, or possibly cause others that are not currently threatened to become threatened, may be eligible for listing as a KTP.

Anyone can nominate the listing of a KTP. The Fisheries Scientific Committee (FSC), an independent body of scientists, assesses nominations and is responsible for determining whether any threatening processes should be listed as a KTP.

The complete list of key threatening processes is contained in Schedule 6 of the *Fisheries Management Act 1994*.

WHAT ARE 'INSTREAM STRUCTURES OR OTHER MECHANISMS THAT ALTER NATURAL FLOWS'?

Instream structures that modify natural flow include dams, weirs, canals, navigation locks, floodgates, culverts, flow regulators, levee banks, erosion control structures and causeways.

Bridges and other similar structures that have minimal impact on flow are excluded. Structures in off-stream waterways (such as artificial canals, farm dams and reservoirs) are also excluded.

Mechanisms that alter natural flow regimes include the operation of the above structures as well as water extraction, pumping and diversion, and sand and gravel extraction.

A fixed crest weir. *Photo: NSW DPI.*

Alteration to natural flow regimes can occur by reducing or increasing flows; altering the seasonality of flows; changing the frequency, duration, magnitude, timing, predicability and variability of flow events; altering surface and subsurface water levels; and changing the rate of rise or fall of water levels.

WHY ARE INSTREAM STRUCTURES INSTALLED AND OPERATED?

Instream structures have been installed and operated for a number of reasons:

- **Locks** allow navigation on large rivers to facilitate commercial freight and other boating traffic;
- **Weirs** create pool environments for diversions into irrigation channels, for pump intakes, recreational boating and swimming, and other aesthetic reasons;
- **Dams** store water for stock, domestic and irrigation supply, and for flood mitigation;
- **Floodgates** and **levee banks** control floodwaters on

urban and agricultural land, and prevent upstream saltwater intrusions;

- **Culverts** and **causeways** allow traffic to pass over waterways.

WHAT ARE THE IMPACTS OF ALTERING NATURAL FLOW REGIMES?

The rivers of NSW have naturally irregular flow regimes with long periods of drought punctuated with substantial floods. Native flora and fauna have adapted to natural flows over thousands of years. Periods of low and high flow support a rich diversity of organisms and habitats and have an important ecological function.

Impacts resulting from the installation and operation of instream structures include:

- Disruption to natural environmental cues necessary for reproductive cycles;
- Impaired spawning, growth, recruitment, feeding and other life cycle processes of native fish resulting from the release of cold water from low level dam outlets;
- Creation of physical barriers to native fish movement and migration;
- Reduction of available habitat due to changes in the area, frequency and duration of floodplain and wetland inundation;
- Reduction of the total water available for riverine ecosystems resulting from consumptive extraction;
- Destruction of bottom habitats, changes in natural flows and decreased water clarity from extraction and dredging activities;
- Alteration to the natural processes of sediment erosion, transport and deposition, leading to loss of fish habitat;
- Changes to biota as a result of altering instream physical, chemical and biological conditions;
- Creation of environments more suited to exotic species such as carp and redfin perch. Weir pool environments also provide ideal conditions for harmful algal blooms.

WHAT THREATENED FISH ARE AFFECTED BY THIS KTP?

The installation and operation of instream structures that alter natural flows has negative impacts on many threatened species, populations and ecological communities including:

- The endangered ecological community of the lower Murray River catchment;
- The endangered ecological community of the lowland catchment of the Darling River;
- Murray hardyhead (endangered);
- Southern pygmy perch (endangered);
- River snail (endangered);
- Eastern freshwater cod (endangered);
- Trout cod (endangered);
- Macquarie perch (vulnerable);
- Silver perch (vulnerable);
- Purple spotted gudgeon (endangered western population); and
- Olive perchlet (endangered western population).

Many other protected and unlisted species of invertebrates and fishes are also adversely impacted by changes to natural flows.

Flow regulator with adjustable gates. *Photo: NSW DPI.*

WHAT HAPPENS AFTER A KEY THREATENING PROCESS IS LISTED?

The listing of this KTP does not automatically change current laws regulating the management of instream structures or water resources in NSW.

However, once a KTP is listed, the NSW Department of Primary Industries may prepare a 'threat abatement plan' to identify actions required to manage the KTP so as to abate, ameliorate or eliminate its adverse effects on threatened biodiversity. Threat abatement plans identify responsible persons or public authorities for each action, and set out a timetable for implementation. Public authorities are required to report their progress in implementing relevant actions in their annual reports to Parliament. This may result in some changes to the management of instream structures or water flows in the future.

When preparing threat abatement plans, the Department of Primary Industries must consider ways to minimise any social and economic consequences that may result from the listing, as well as options for community involvement. Draft threat abatement plans are publicly exhibited for a minimum of 4 weeks, during which time any interested party may comment.

Listing as a KTP establishes formal assessment requirements in development control processes established by the *Environmental Planning and Assessment Act 1979*.

HOW ARE THREAT ABATEMENT PLANS IMPLEMENTED?

The successful implementation of threat abatement plans is dependent on the assistance and cooperation of public authorities, local councils and the community.

When preparing threat abatement plans the Department of Primary Industries consults with relevant authorities and seeks their cooperation in implementing the measures included in the plan.

Threat abatement plans inform and influence other planning processes and must be considered by public authorities when making decisions. For example, local councils and other public authorities must consider threat abatement plans when assessing proposed developments or activities.

Public authorities should take any action available to them to implement measures in the plan for which they are responsible, and should not make decisions that are inconsistent with the provisions of the plan. However, there are no penalties for individuals or organisations who do not comply with the plan.

A weir with drop-boards taken out. *Photo: NSW DPI.*

REDUCING THE IMPACTS OF THIS KTP

The following are some of the possible actions that may be undertaken to reduce or eliminate the impacts of instream structures on natural flow regimes:

- Managing structures to lessen their impacts (eg. opening flood gates at certain times of the year);
- Allocating environmental flows in regulated rivers;
- Managing existing water delivery to mimic natural flows;
- Constructing fishways at major barriers to provide fish passage;
- Removing redundant structures that are no longer used;
- Assessing and mitigating the impacts of new structures;
- Constructing multi-level off-takes and/or mixing devices to reduce the impacts of cold water pollution;
- Designing fish friendly road crossings.

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FOR FURTHER INFORMATION

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