Global Re-introduction Perspectives: 2016

Case-studies from around the globe

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IUCN/SSC Re-introduction Specialist Group (RSG)

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Published by: IUCN/SSC Re-introduction Specialist Group & Environment Agency-ABU DHABI

Citation: Soorae, P. S. (ed.) (2016). *Global Re-introduction Perspectives: 2016. Case-studies from around the globe*. Gland, Switzerland: IUCN/SSC Re-introduction Specialist Group and Abu Dhabi, UAE: Environment Agency-Abu Dhabi. xiv + 276 pp.

ISBN: **978-2-8317-1761-6**

Cover photo: Clockwise starting from top-left:
i. Bolson's tortoise, USA @ Turner Endangered Species Fund
ii. Wetapunga, New Zealand @ Richard Gibson
iii. Morelos minnow, Mexico @ Topiltzin Contreras-MacBeath
iv. *Silene cambessedesii*, Spain @ Emilio Laguna
v. Tasmanian Devil, Maria Island, Tasmania @Simon DeSalis
vi. Agile frog, Jersey @ States of Jersey Department of the Environment

Cover design & layout by: Pritpal S. Soorae, IUCN/SSC Re-introduction Specialist Group

Produced by: IUCN/SSC Re-introduction Specialist Group & Environment Agency-ABU DHABI

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Re-introduction of giant kokopu to Nukumea Stream, New Zealand

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Introduction

The giant kokopu (*Galaxias argenteus*) is the largest of the galaxiid species and is endemic to New Zealand. Giant kokopu are mainly amphidromous, although they are also known to form land-locked populations in lakes. It is one of five galaxiid species that in its juvenile stage makes up the culturally and recreationally significant whitebait fishery in New Zealand. Giant kokopu occur widely at low elevations, although are rare in Northland, Auckland and on the east coast of both the North and South Islands of New Zealand. They typically inhabit slow flowing, deeper pools with an abundance of cover in streams close to the coast.

Continued habitat loss has contributed to the abundance of this iconic species declining across New Zealand. As a consequence they are listed as "Vulnerable" by the IUCN and as "At Risk- Declining" in the New Zealand threat classification. The Nukumea Stream is located in the Auckland region of northern New Zealand. It is considered one of the most intact and natural streams within the urbanized greater Auckland region. It is thought that giant kokopu were once common in the stream, but the last recorded sighting was in 2002.

Goals

- Goal 1: Re-establish a self-sustaining population of giant kokopu.
- Goal 2: Determine whether translocated fish are able to naturalize and survive in the receiving stream.
- Goal 3: Establish that there are no adverse ecological impacts on existing stream flora and fauna.
- Goal 4: Restore natural recruitment of juveniles to the catchment.

Giant kokopu © Paul Franklin

Success Indicators

- Indicator 1: Removal of the perched culvert in the lower reaches of the

stream that was impeding upstream migration and therefore restricting recruitment to the catchment.
- Indicator 2: Re-introduced fish successfully establish in the stream and survive for a minimum of 2 years.
- Indicator 3: Existing fish are not displaced by the re-introduced fish species.
- Indicator 4: A successful pilot study is followed by a larger scale release of fish in the stream.
- Indicator 5: Giant kokopu juveniles are present in the whitebait run.

Project Summary

Feasibility: This project was initiated as partial mitigation for the impacts of a large road that was being built through the upper catchment. The objective was to offset adverse ecological effects caused by the road through enhancing ecological communities in the stream. The Nukumea Stream is a small, second order catchment draining directly to the coast. Despite being located adjacent to the urban area of Orewa, much of the catchment remains in native bush cover and as a consequence the stream is considered of high ecological value. Despite this, there was evidence to suggest that giant kokopu may have become extirpated from the catchment with the last recorded capture in 2002. It was thought this was likely a result of a number of factors including a perched culvert in the lower reaches of the stream that was impeding upstream migration of the juvenile life-stage; low adult numbers meaning an inadequate pheromone cue for attracting juveniles into the catchment from the marine pool; and a decline in the broader marine pool of giant kokopu larvae due to loss of adult habitats and therefore reduced recruitment at a regional scale.

The relatively intact nature of the stream and its catchment, combined with a prevalence of suitable habitat for the giant kokopu, made it a good candidate for attempting to re-establish a local source population for the species.

Implementation: All giant kokopu are considered to belong to a single gene pool, eliminating this as an issue to be considered in translocating fish between catchments. However, it was necessary to provide evidence that giant kokopu had previously been present in the catchment in order to obtain a permit for the translocation. This was gained from records in the New Zealand Freshwater Fish Database (NZFFD), showing the last recorded captures occurred in 2002. It was also agreed that a pilot study be undertaken to evaluate the likely success of the re-introduction, prior to a full scale release being carried out.

Juvenile fish were sourced for the pilot study from a catchment on the west coast of the North Island. The fish were subsequently reared in captivity by Mahurangi Technical Institute to a size (≥150 mm total length) suitable for implantation of 23 mm HDX passive integrated transponder (PIT) tags. PIT tags were surgically implanted which allowed tracking of the released individuals over time. A total of 30 fish were initially reared, tagged, released and monitored for the pilot study. An important consideration in undertaking the re-introduction was to gain the approval of local indigenous groups. Following consultation to ensure that

Giant kokopu follow-up survey March 2010
© David Tate

appropriate cultural protocols were followed, approval was gained and the pilot trial was undertaken with the blessing of local groups.

Post-release monitoring: The perched culvert was removed in mid-2009 and the pilot release of 30 giant kokopu was carried out in December 2009. Routine monitoring showed that the re-introduced giant kokopu gradually dispersed from the section of stream (200 m) where they were released. Records from the fixed PIT antennae installed in the stream indicated that the number of fish detected moving in or out of the release reach each day declined rapidly over the first 3 months, and that no fish were detected moving in either March or April 2010.

Since that time, three different fish were subsequently recorded passing the fixed antennae at various times, particularly during winter 2010, until the removal of the fixed antennae in 2013.

It was expected that the fish would slowly disperse from the release reach in search of food and suitable habitat. However, the very low flows experienced during the summer and autumn of 2010 may have accelerated this dispersal because most of the deeper pool habitat preferred by giant kokopu was eliminated from the release reach. Consequently, the fish dispersed in search of their preferred habitats elsewhere in the stream. This made tracking the tagged fish and recapturing them more difficult due to them being spread across a much wider area. Trapping surveys targeting suitable habitat over a 2 km reach were subsequently implemented as the best way of trying to track and monitor the fish.

In the 2 year period following the release (2010 - 2011), recaptures of three of the 30 fish were confirmed. All three fish were in good condition and showed average annual growth rates of 10 - 20 mm per year. This suggests that these fish successfully adapted to living in the stream following their release. In subsequent surveys (2012 - 2015) no PIT tagged giant kokopu have been captured. However, three fish have been trapped that are suspected to belong to the release group due to the presence of healed incision marks in the location where PIT tags were

originally inserted. The discovery of a single large (355 mm TL) giant kokopu in the stream indicated that a small remnant natural population was also still present.

Major difficulties faced

- Obtaining agreement and approval for the re-introduction project from all agencies and stakeholder groups.
- Sourcing a sufficient number of fish large enough to be tagged with 23 mm half -duplex (HDX) PIT tags for the pilot study. However, 12 mm HDX tags have become available since 2010 which will help to reduce this issue.
- Effectively tracking and monitoring the low number of fish released as they progressively dispersed through the stream over time.
- Gaining backing for a follow-up release of giant kokopu following the successful pilot study.

Major lessons learned

- It can be very challenging to collect robust evidence that effectively demonstrates the success of a re-introduction project in an open stream system.
- Removal of small-scale migration barriers, such as culverts, can be a cost-effective way of achieving rapid biodiversity gains.
- Outcomes are dependent on all agencies and stakeholders fulfilling their commitments for the duration of the project.
- Successful restoration of a self-sustaining population of giant kokopu, even in a small stream, will likely take many years.

Success of project

Highly Successful	Successful	**Partially Successful**	Failure
		√	

Reason(s) for success/failure:

- Removal of the perched culvert in the lower catchment has overcome a significant impediment to the upstream migration of fish and increased the abundance and diversity of fish present in the stream.
- Re-capture of a limited number of the re-introduced fish indicates that 2 years post-release the fish had become successfully established in the stream.
- There was no evidence of displacement or disruption of existing fish communities in the stream as a consequence of the re-introduction of giant kokopu.
- Securing support and commitment from all agencies and stakeholders for a follow-up full scale re-introduction of giant kokopu to the stream has been challenging and unsuccessful to date.
- The successful restoration of a self-sustaining population of giant kokopu in the stream will require a long-term commitment to the project from all Parties.

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