

RESTORING INDIGENOUS FISH BIODIVERSITY BY MANAGING ALIEN FISHES: IMPLICATIONS FOR NEM:BA

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27 September 2013



WATER
RESEARCH
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Water Research Commission
Symposium 2013

LOCAL SOLUTIONS - GLOBAL IMPACT

Negative impacts of alien invasive fish



- Introduced over centuries for angling, aquaculture, pet trade (earliest record of goldfish in 1726), negative effects only scientifically assessed in the last two decades
- Parasites & disease
- Hybridisation
 - Nile tilapia invasions genetically pollute native species
- Predation
 - Main impact on headwater fishes
 - Increasingly fragmented populations
 - changes in fish and invertebrate community structure

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Short Note

New distribution record for the Asian tapeworm *Bothriocephalus acheilognathi* Yamaguti, 1934 in the Eastern Cape province, South Africa

T Stadlander^{1,2}, OLF Weyl^{3*} and AJ Booth¹

OPEN ACCESS Freely available online



Successive Invasion-Mediated Interspecific Hybridizations and Population Structure in the Endangered Cichlid *Oreochromis mossambicus*

Cyril Firmat^{1,2*}, Paul Alibert¹, Michèle Losseau³, Jean-François Baroiller⁴, Ulrich K. Schliewen⁵

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The predatory impact of invasive alien smallmouth bass, *Micropterus dolomieu* (Teleostei: Centrarchidae), on indigenous fishes in a Cape Floristic Region mountain stream

Darragh J Woodford^{1*}, N Dean Impson², Jenny A Day¹ and I Roger Bills³

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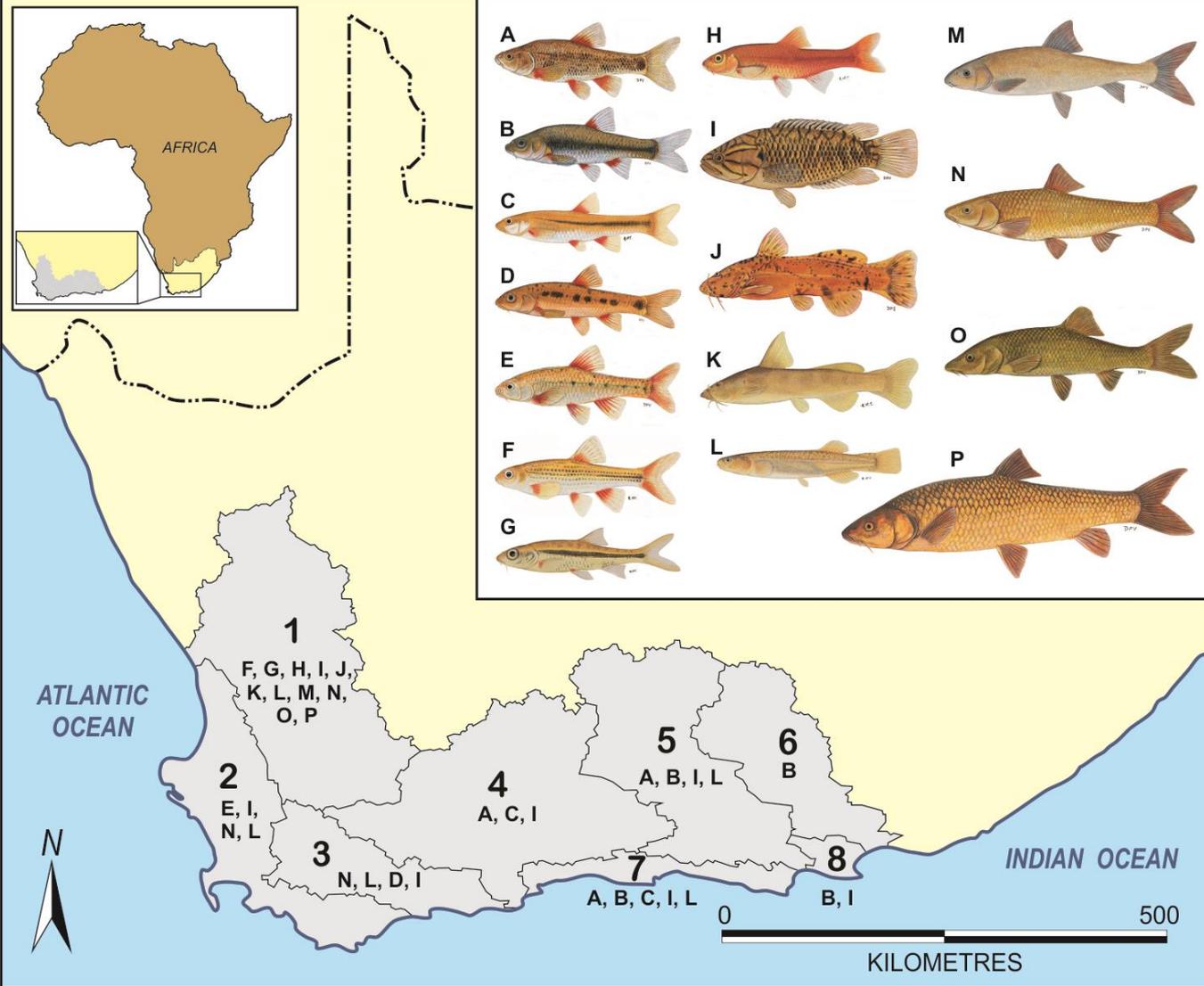
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The effect of largemouth bass *Micropterus salmoides* on aquatic macro-invertebrate communities in the Wit River, Eastern Cape, South Africa

PSR Weyl^{1*}, FC de Moor^{1,2}, MP Hill¹ and OLF Weyl³

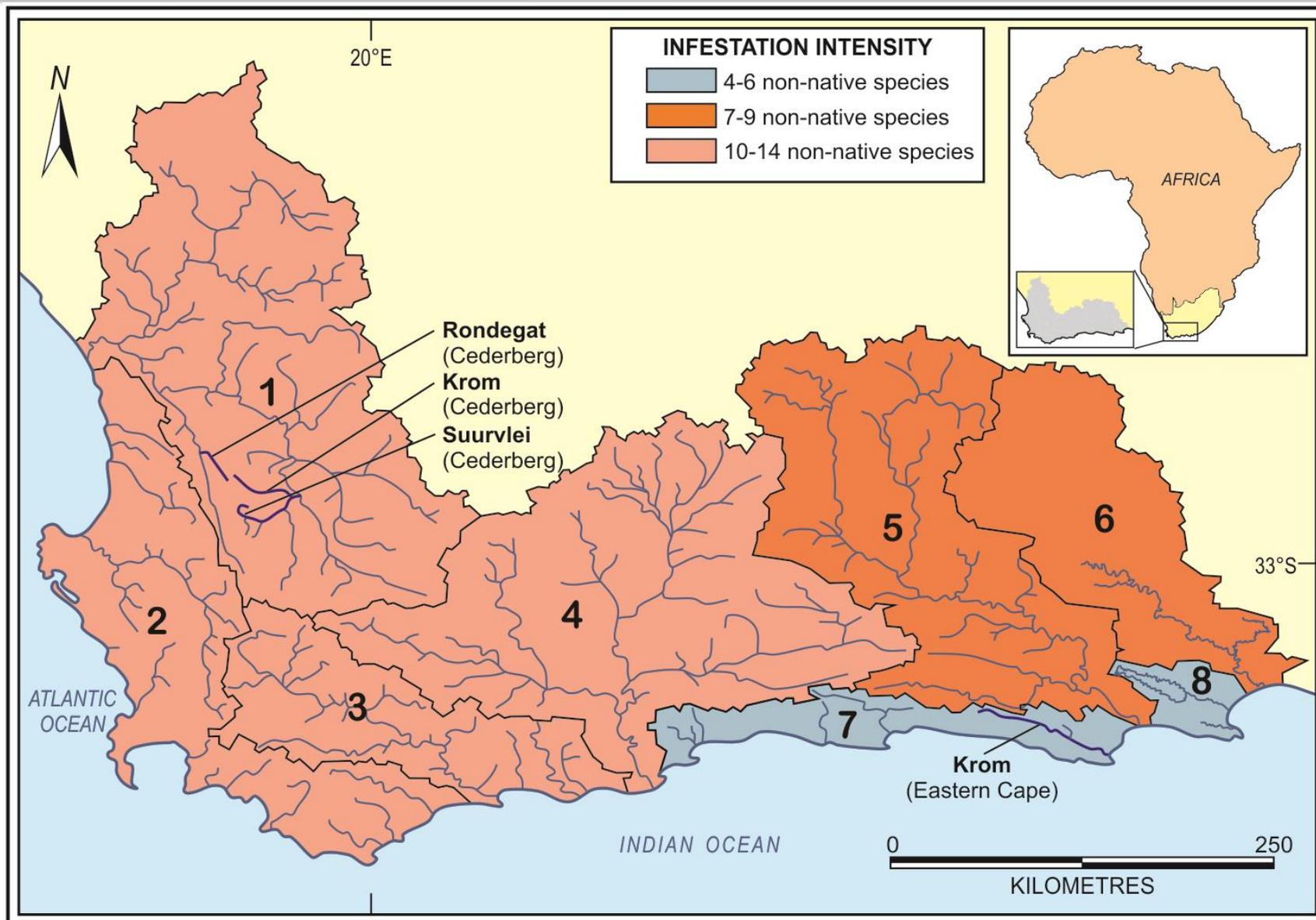
CFR fish diversity

Diverse, endemic, isolated,
vulnerable, endangered

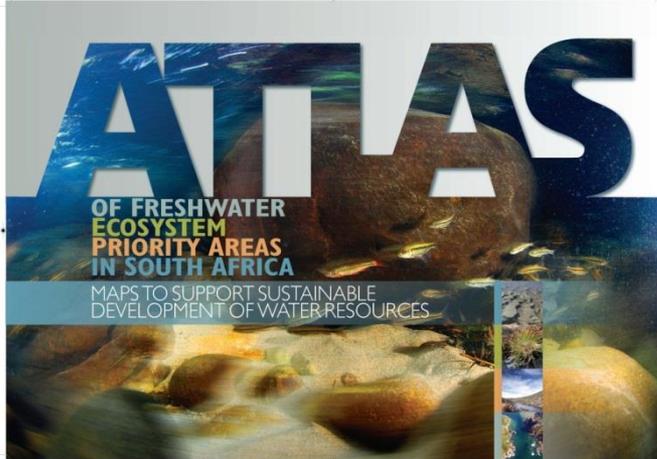


- | | |
|--|--|
| A Smallscale redfin (<i>Pseudobarbus asper</i>) | I Cape kurper (<i>Sandelia capensis</i>) |
| B Eastern Cape redfin (<i>Pseudobarbus afer</i>) | J Barnard's rock catfish (<i>Austroglanis barnardi</i>) |
| C Slender redfin (<i>Pseudobarbus tenuis</i>) | K Clanwilliam rock catfish (<i>Austroglanis gilli</i>) |
| D Burchell's redfin (<i>Pseudobarbus burchelli</i>) | L Cape galaxias (<i>Galaxias zebratus</i>) |
| E Berg River redfin (<i>Pseudobarbus burgi</i>) | M Clanwilliam sandfish (<i>Labeo seeberi</i>) |
| F Fiery redfin (<i>Pseudobarbus phlegethon</i>) | N Whitefish (<i>Barbus andrewi</i>) |
| G Clanwilliam redfin (<i>Barbus calidus</i>) | O Sawfin (<i>Barbus serra</i>) |
| H Twee River redfin (<i>Barbus erubescens</i>) | P Clanwilliam yellowfish (<i>Labeobarbus capensis</i>) |

Alien fish infestations in the CFR



Directing limited conservation resources: National Freshwater Ecosystem Priority Areas



Many FEPA sub-catchments are fish sanctuaries yet contain alien fishes



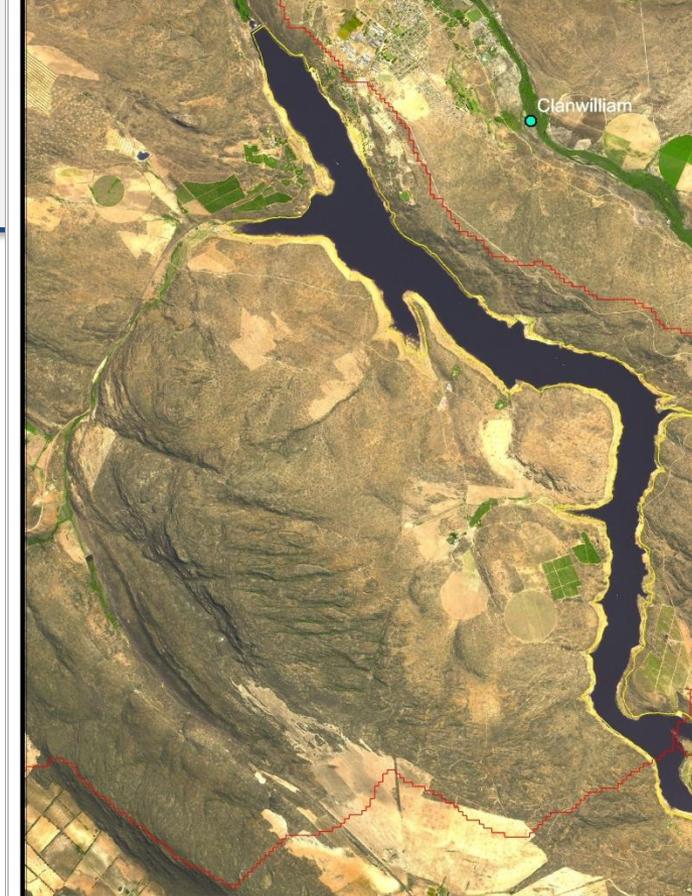
Smallmouth bass and Clanwilliam Dam

Smallmouth bass have been in the catchment since 1943

1000ha dam is considered the best bass angling venue in the country

Bass fishing important for local economy

Fed by a FEPA stream containing threatened native fishes



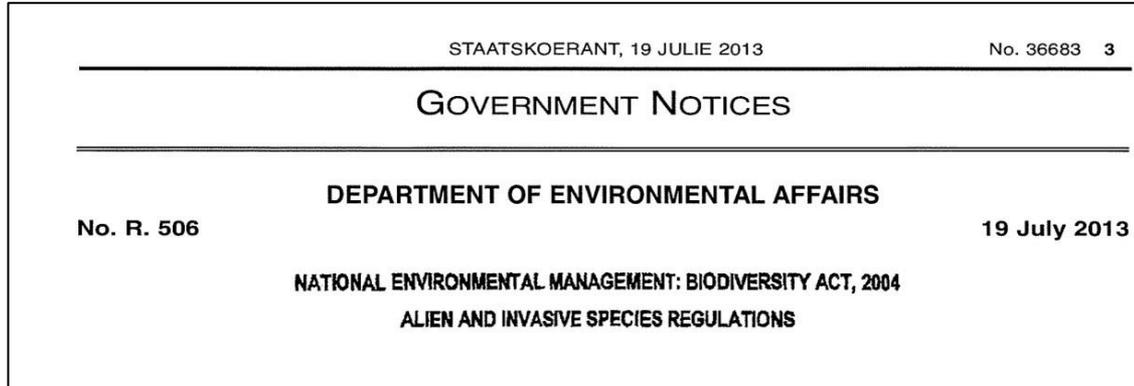
0 0.5 1 2 3 4 Kilometers

NEM:BA alien species regulations

Smallmouth bass is listed as a category 1b species in the NEM:BA list of alien and invasive species

This means the species must be controlled through a management programme

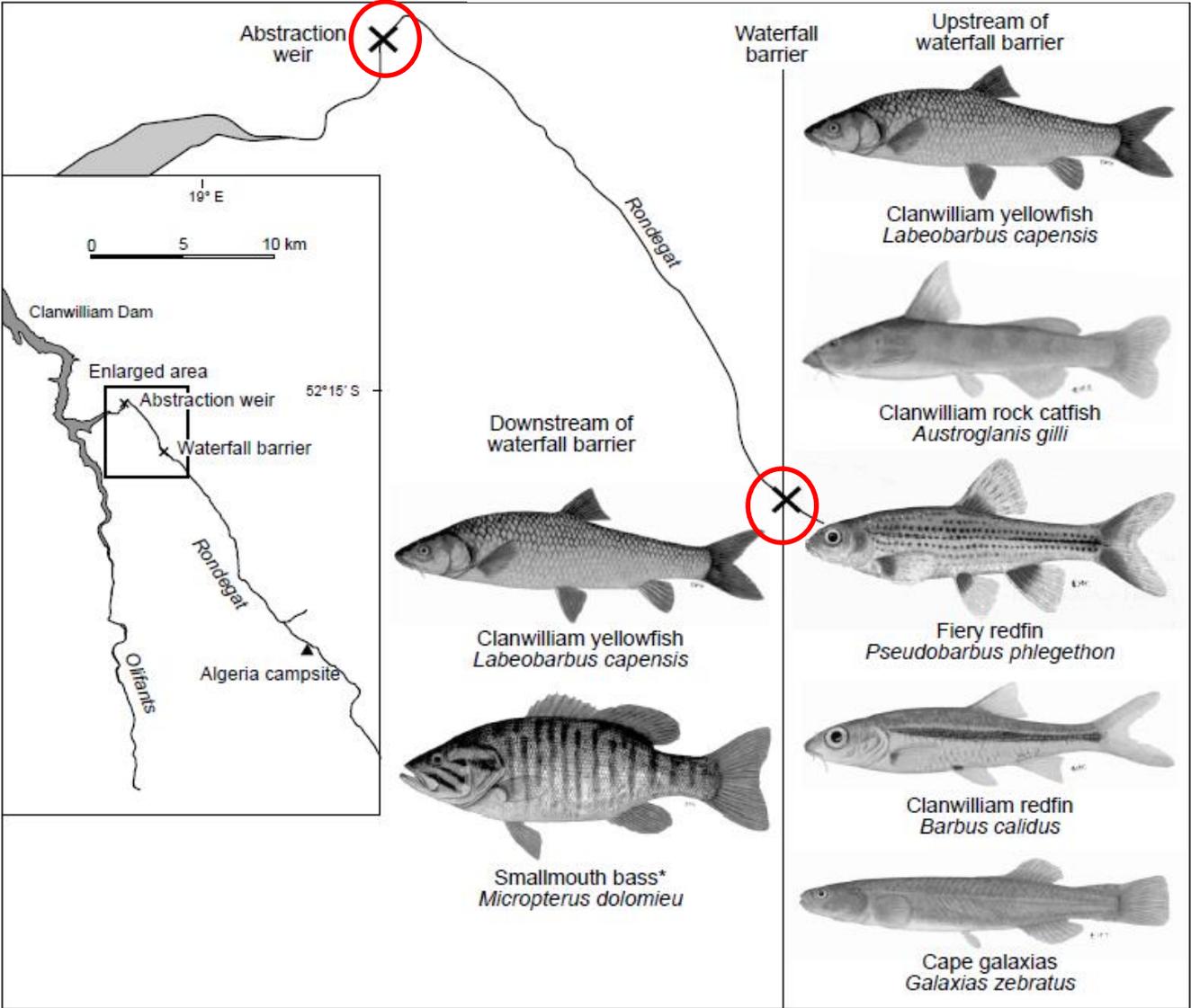
The regulations do not preclude managing bass as a positive resource in places where they do not threaten biodiversity



An assessment of a proposal to eradicate non-native fish from priority rivers in the Cape Floristic Region, South Africa

SM Marr^{1*}, ND Impson² and D Tweddle³

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Rehabilitation



Cape Nature objective:

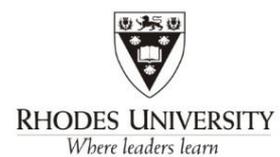
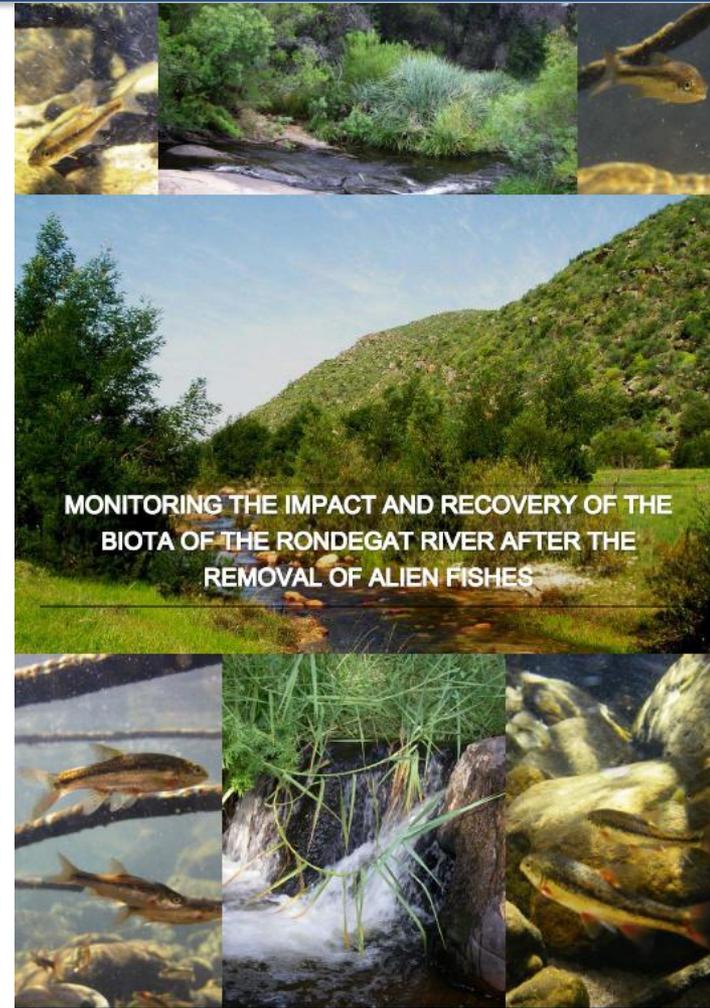
- Rehabilitate the stream's native fish fauna through the removal of bass

Success depends on:

- the ability of the piscicide to completely eradicate the alien fish
- the ability of native fish to re-colonise the river after treatment.

Partners:

- American Fisheries Society (advice)
- CapeNature (implementation)
- SAIAB (monitoring)
- WRC Project K8/922



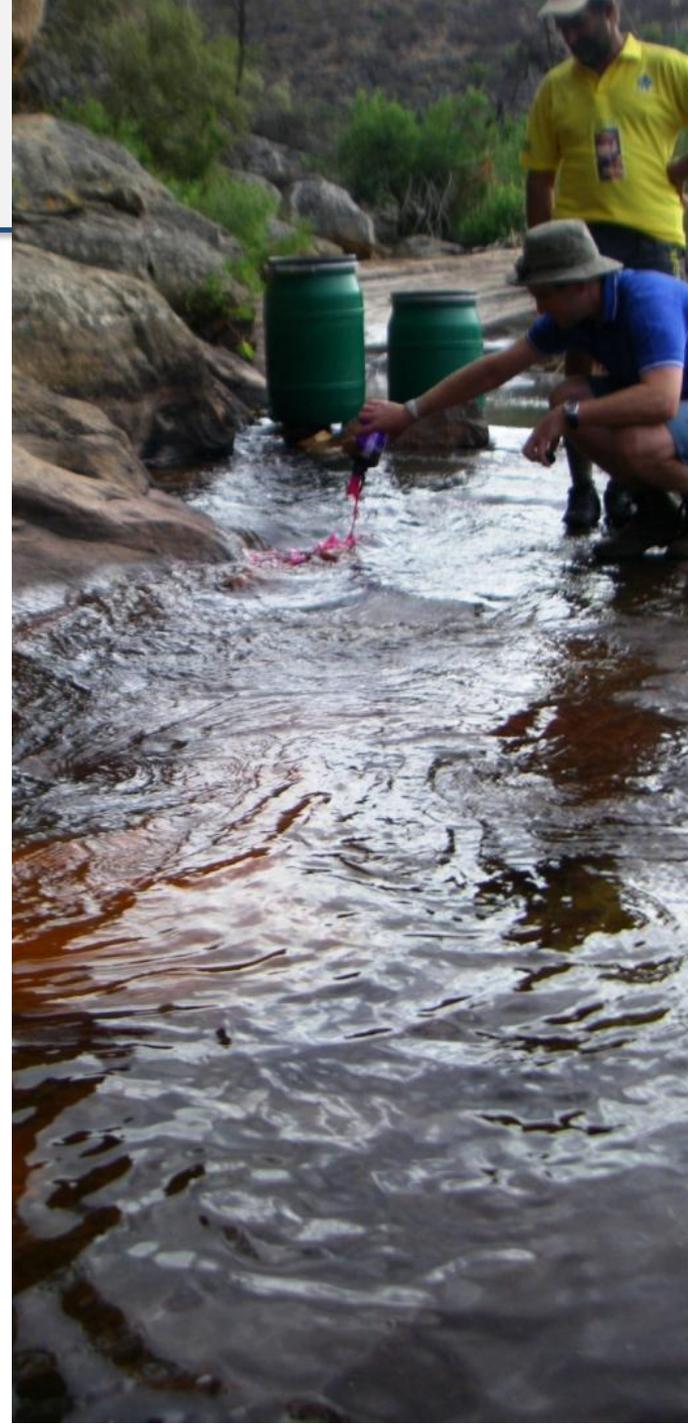
Treatment



- 29 February 2012
- 7 drip cans dispersing rotenone from 8am to 3pm
- Dead fish collected for scientific analysis



Deactivation



Efficacy of treatment



ERADICATING INVASIVE ALIEN FISH – It can be done, project shows

Scientists are cautiously optimistic that a unique pilot project aimed at removing the centuries-old invasive alien fish problem in one of the Western Cape's most critical rivers has been a success. Extensive monitoring and surveying formed a key part of the project. Lani van Vuuren reports.

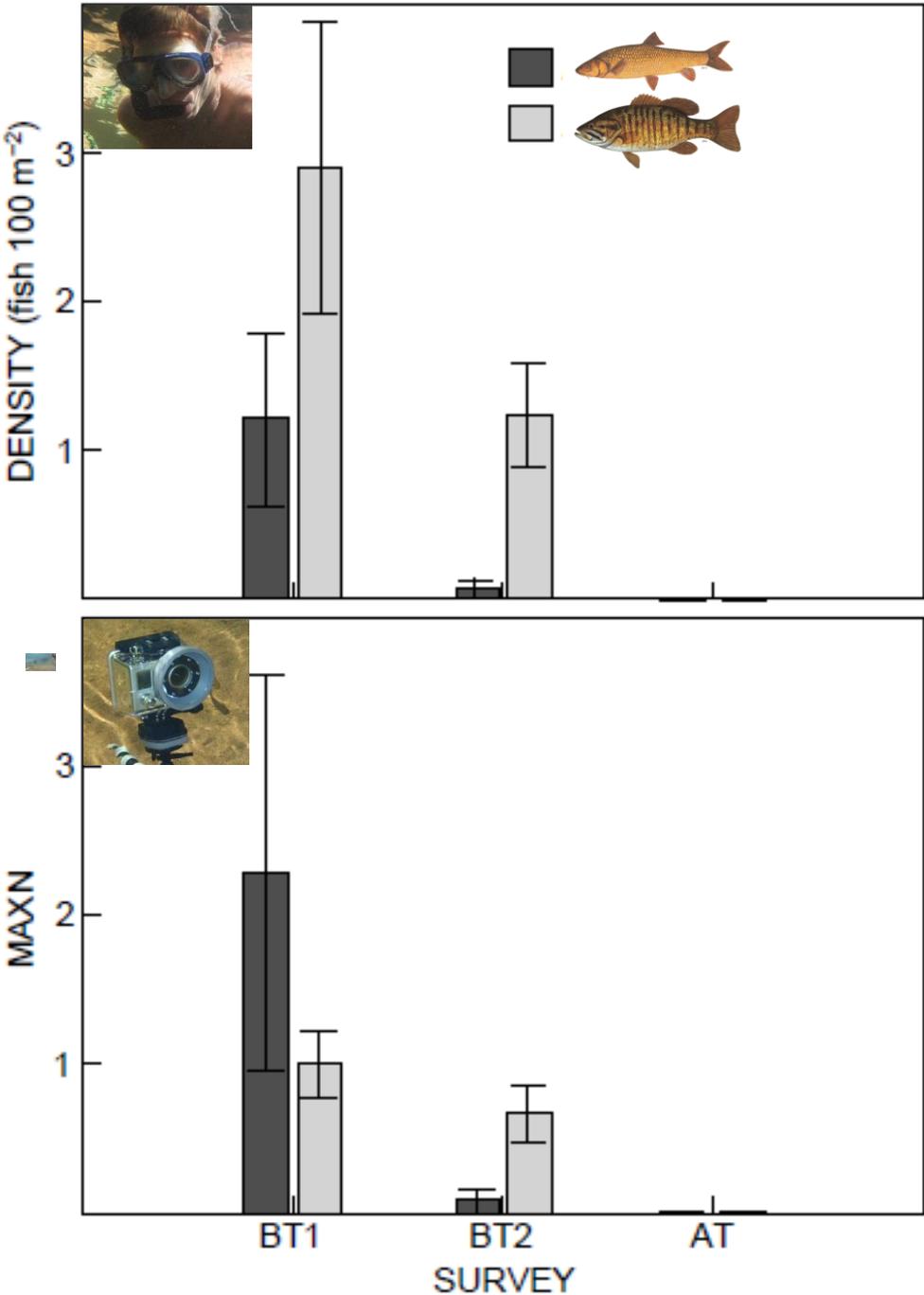
When the Western Cape introduced the first foreign fish to its waters for sport almost two centuries ago, the devastating consequences this would have on indigenous fish populations was little understood. Today, while invasive alien species

such as bass and trout still play an important role in generating tourism income, these predatory fish, along with habitat destruction and pollution, have all but wiped out several native fish communities in Cape rivers. Fish in the rivers of the Fynbos biome, which is home to 27 fish taxa (of which 24 are endemic, i.e. found nowhere else) are particularly threatened, with 16 species now either critically endangered or endangered.

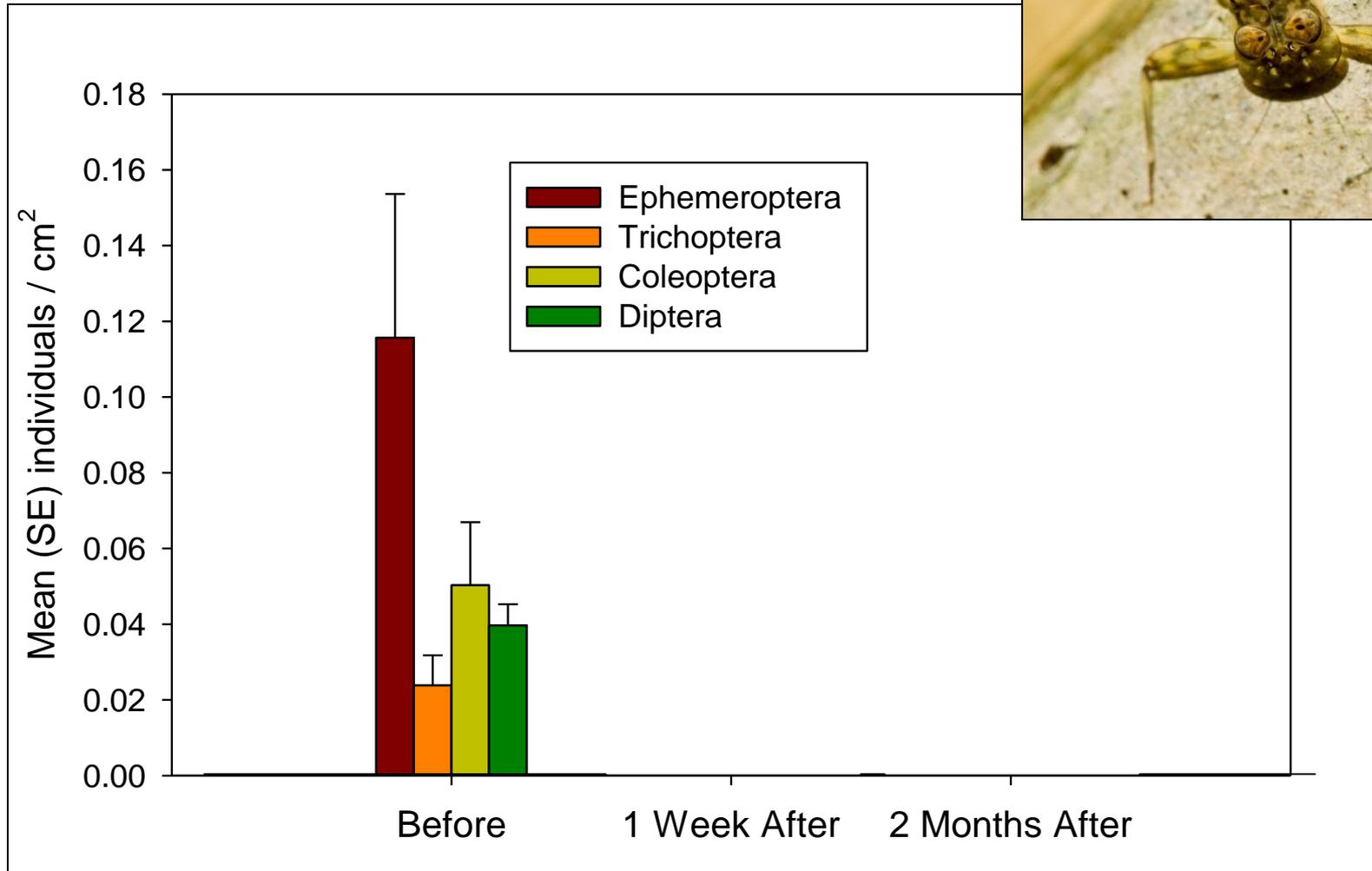
Once established in a river system, invasive alien fish are almost impossible to eradicate because of the complexities and cost involved, explains CapeNature Scientist. Freshwater Fishes, Dean Impson. Mechanical removal through electric

fishing or netting, for example, is one method of controlling these fish, but this is highly labour intensive and rarely achieves complete eradication. How then to improve the status of South Africa's highly threatened indigenous fish and associated aquatic organisms?

"It is possible to eradicate fishes from stretches of rivers (usually upstream reaches), provided there are barriers such as weirs or dams and waterfalls that prevent re-invasion from downstream sources," notes Impson. "In the same way fish can be removed from farm dams, provided that water entering the dam is not from a 'contaminated' source, which allows for re-invasion. There

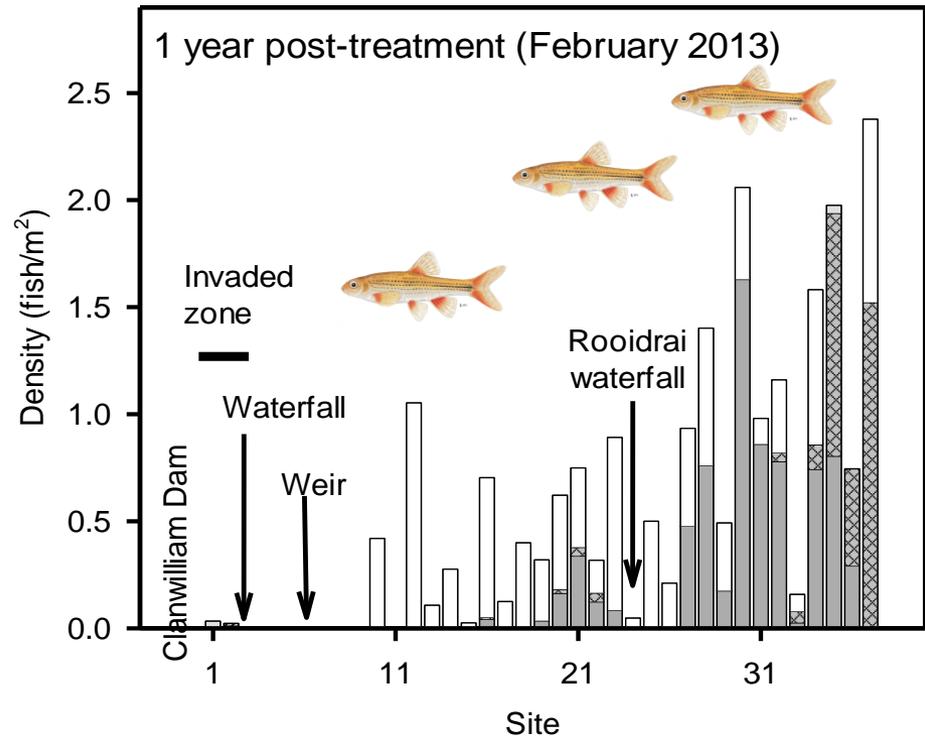
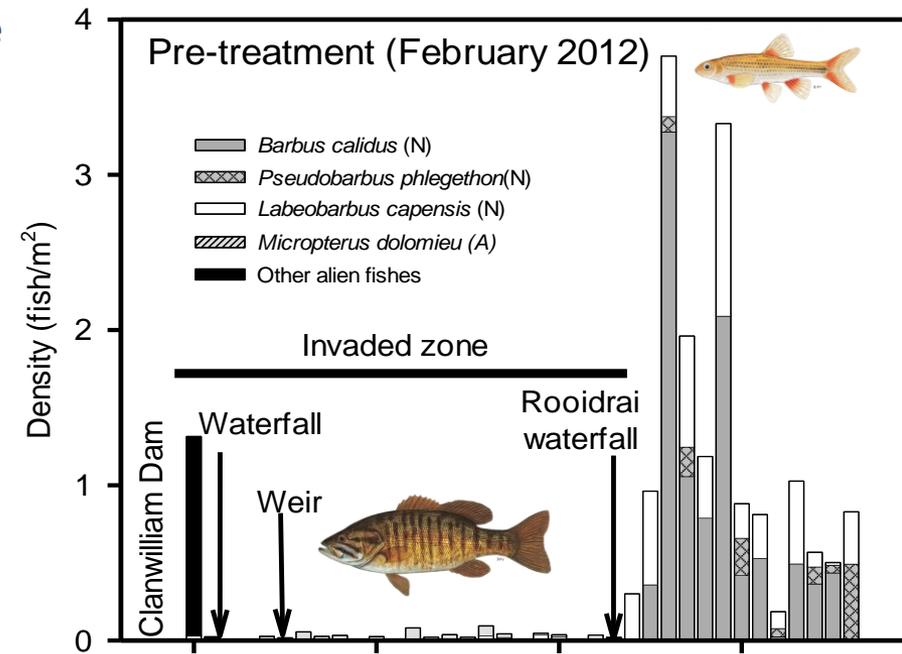


Impacts on aquatic insects



Mayfly nymphs were most sensitive taxonomic group, but recovery was rapid, with densities returning to pre-treatment levels in two months

- Native fishes recruited into the rehabilitated zone in first year
- The invaded zone in the river has effectively been shrunk from 4km to about 400m



International collaborations and impact



The project provided the opportunity for American, Norwegian and South African aquatic scientists to learn from one another through implementing the rehabilitation programme.

The results of the independent monitoring are now being published in the international peer-reviewed literature.



J Insect Conserv
DOI 10.1007/s10841-013-9578-4

ORIGINAL PAPER

Immediate impact of piscicide operations on a Cape Floristic Region aquatic insect assemblage: a lesser of two evils?

Darragh J. Woodford · Helen M. Barber-James ·
Terence A. Bellingan · Jenny A. Day · Ferdy C. de Moor ·
Jeanne Gouws · Olaf L. F. Weyl



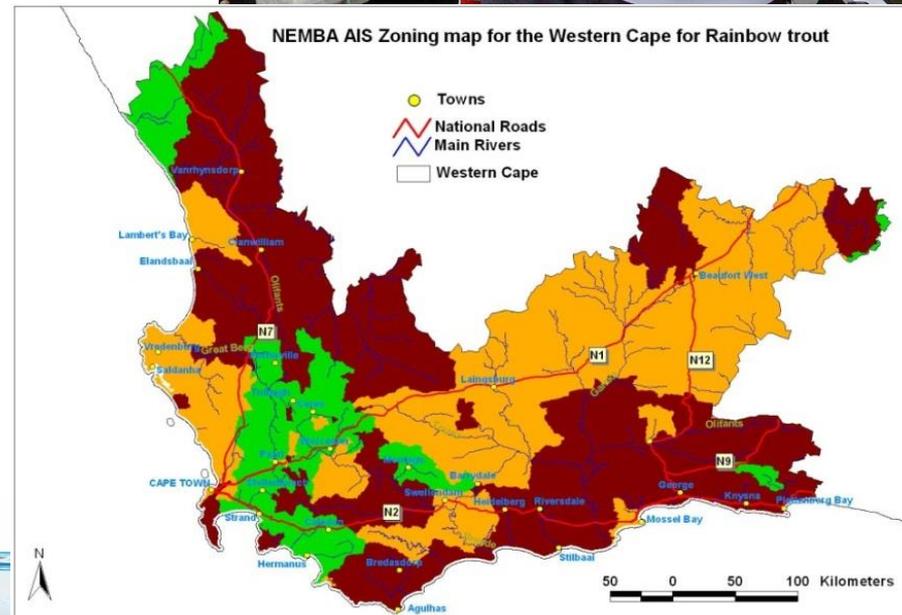
Conclusions: informing policy and decision making

The Rondegat rehabilitation programme was a key pilot study for several reasons

- 💧 Identification and training of implementing authorities (CapeNature, Working for Water)
- 💧 Engagement with stakeholders (including anglers)
- 💧 Independent scientific monitoring (WRC funded) to ensure international best practice

By successfully rehabilitating a FEPA stream without negatively affecting the valuable adjacent bass fishery, the project demonstrates how category 1b invasive species can be managed in South Africa

Management tools such as invasive fish management zones and FEPA maps can aid the implementation of NEM:BA



Thanks



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