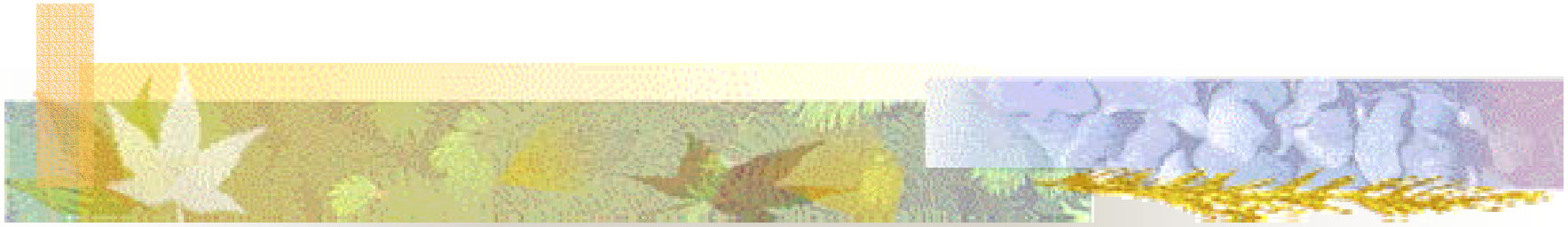
MINNOWS GET THEIR FREE WAY



Dr J Bothma

Introduction

- To plan, design, construct and operate a road in harmony with the environment

- April 1997, the first South African toll concession, the N4 Maputo Development Corridor Toll Road signed

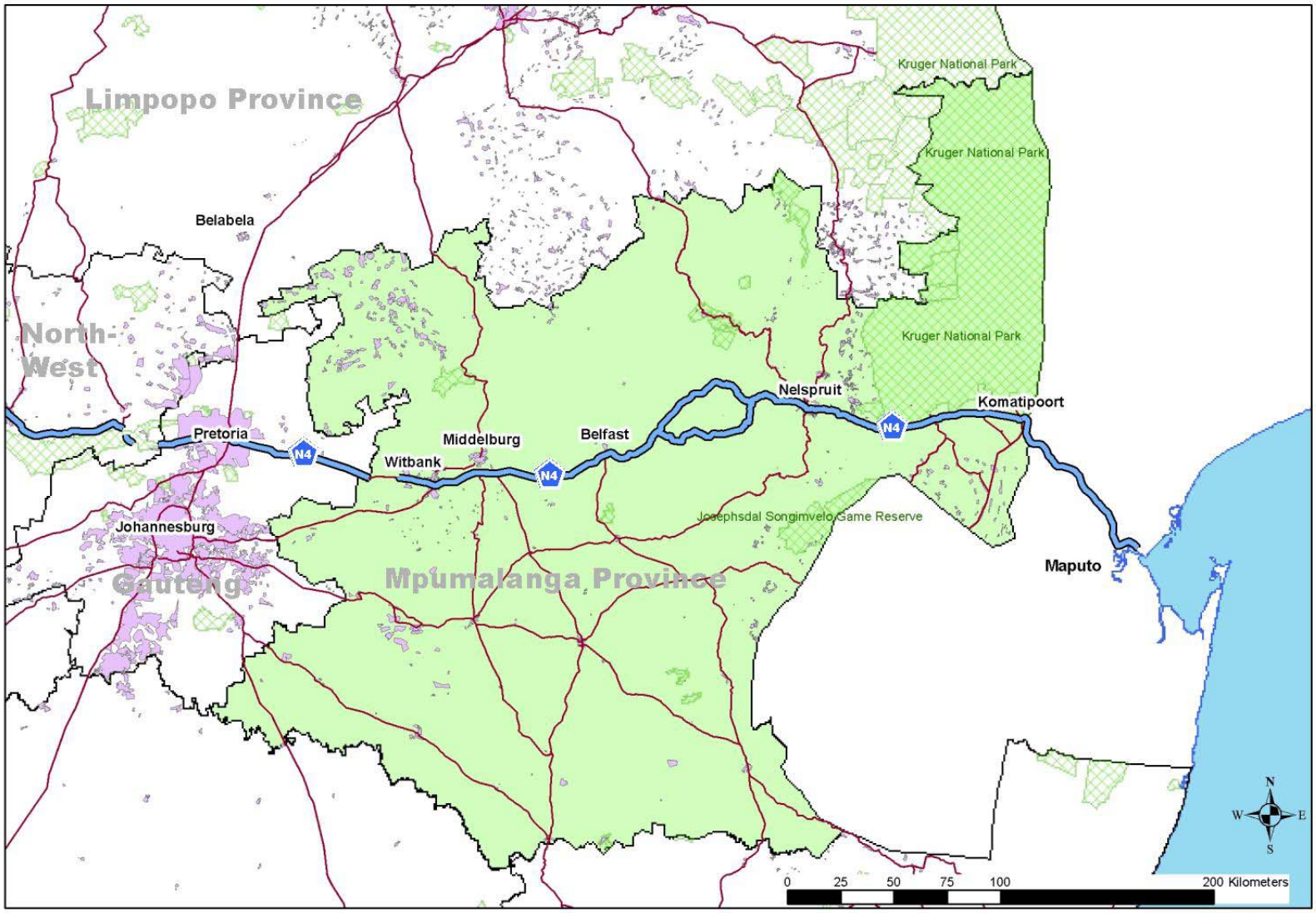
Introduction

- Concession Contract between a private sector company and SANRAL, entailed the design, building, operation and maintenance of the National Route 4 from the Mpumalanga Border to Maputo in Mozambique.

INTRODUCTION

- National Route 4 through Schoemanskloof in the Mpumalanga Province
- The N4 through Schoemanskloof passes over the Elands River, home to the rare and endangered minnow


ZIMBABWE
BOTSWANA
MOZAMBIQUE
NAMIBIA
LIMPOPO
MPUMALANGA
GAUTENG
NORTH WEST
SWAZILAND
FREE STATE
KWAZULU-NATAL
NORTHERN CAPE
LESOTHO
EASTERN CAPE
EASTERN CAPE
WESTERN CAPE
N
W
E
S
0
125
250
500
Kilometers


Limpopo Province
Kruger National Park
Kruger National Park
Kruger National Park
Belabela
North-West
Nelspruit
Komatipoort
N4
N4
N4
Pretoria
Middelburg
Belfast
Witbank
Josephsdal Songimvelo Game Reserve
Johannesburg
Gauteng
Mpumalanga Province
Maputo
N
W
E
S
0
25
50
75
100
200 Kilometers

More about the Minnow

- *Kneria auriculata*, is on the red data list
- Head smooth, rounded, mouth tadpole-like
- Body is translucent brown with flecks and blotches on the upper body
- Thin dark mid-lateral line
- 70 mm in total length

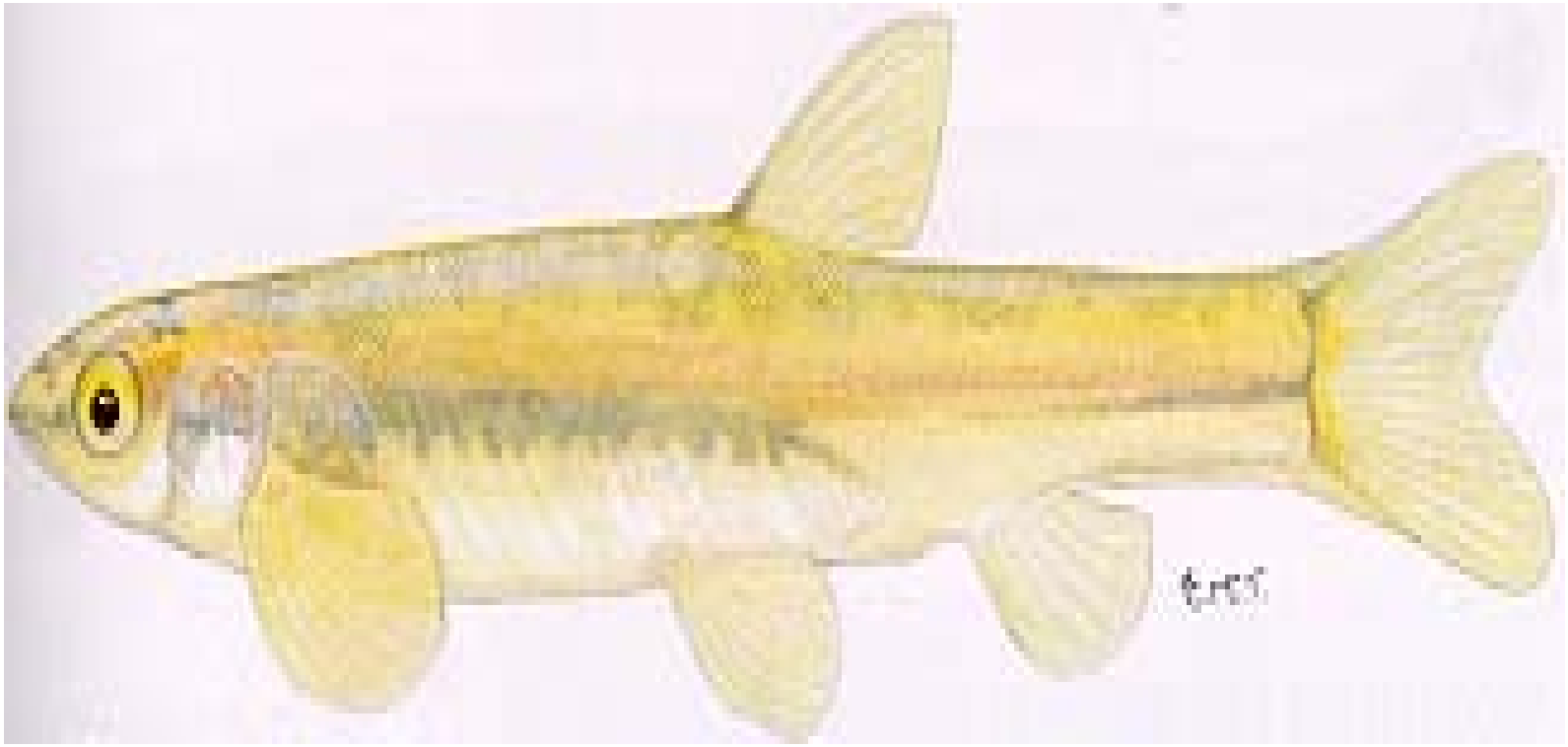


Figure B: The minnow (*Kneria auriculata)*

More about the Minnow

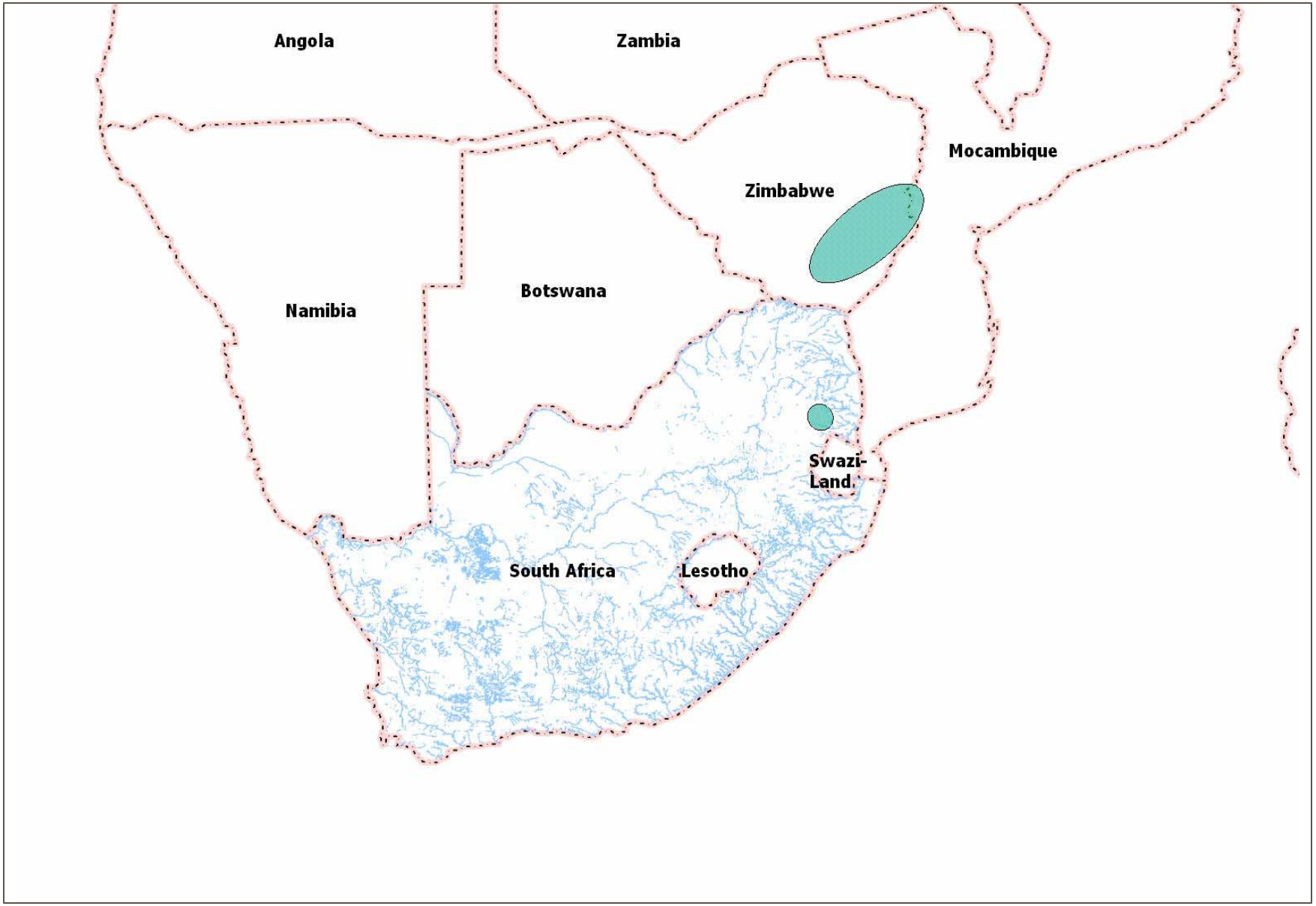
- Small, clear, rocky streams
- Breathe air and climb over damp rocks and up the sides of waterfalls during migrations
- Scrapes diatoms, algae and detritus from rock surfaces and also takes small aquatic insects such as mayfly nymphs and midge larvae

More about the Minnow

- Matures after a year
- Breeding takes place in spring and summer
- Family Kneriidae
- “Alarm” pheromone

Distribution

- Zimbabwe, Mozambique
- Crocodile system (Mpumalanga)


Angola
Zambia
Mocambique
Zimbabwe
Botswana
Namibia
Swazi-
Land.
South Africa
Lesotho

PROBLEM

- Swim upstream to bread
- Bridge in the middle of a river causes and obstruction to the fish's natural migration route
- Blocking off the flow of water would have resulted in the local extinction of the species

CHALLENGE

- How to change the construction design of the N4 Toll Route to accommodate this endangered fish species while catering for the usual practical constraints?

SOLUTION

- Unique bridge design
- Unique fish ladders
- The fish bridges were designed to allow the fish to ‘climb’ approximately 1 m to reach the bridge floor from the actual river

Attenuation blocks

- Once on the actual bridge floor the little fish faced additional challenges
- Water accelerate over the concrete floors
- Attenuation blocks were spaced on the bridge floors, providing shelter for the tired fish

INTEGRATION

- This project represents an achievement, a balanced integration of practical engineering requirements and conservation of the environment.
- Considerable effort was expended to protect the minnow, without compromising public safety

CONCLUSION

- PROOF THAT PEOPLE AND NATURE CAN WORK TOGETHER!