Fish distribution in the Western Cape's upper Doring River and its implications for river management and flyfishing

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Introduction

The Doring River is the largest tributary of the Olifants River System of the Western Cape Province. This system is the most notable hotspot of threatened fish species in South Africa as eight (all endemic) of its 10 indigenous fish species are listed as threatened. The main threats to the indigenous fishes here are the impact of predatory invasive fish species such as smallmouth black bass (*Micropterus dolomieu*) and habitat degradation and destruction, primarily from unsustainable irrigation-dependent agricultural development.

The Doring River, although non-perennial, has a very large catchment (about 24 044km^2) and associated mean annual run-off (present day MAR is 384 mm^3) and is largely undeveloped, apart from four small weirs. Not surprisingly, it has been the recent focus of intensive study for future large dam development.

An Olifants/Doring basin study was undertaken in 1997 to determine the feasibility and suitability of various dam proposals for the system, including four on the Doring River (the Groot, Aspoort, Melkboom and Melkbosrug dams) of which the former two are on the upper Doring valley. The environmental situation assessment of the Doring River, undertaken in response to the potential dams, concluded that the river had an exceptionally high ecological status and that none of the proposed dams should be considered further. This study, however, acknowledged the inadequacy of existing biological data on the Doring River as a major limitation to the study.

The mainstream of the Doring River has been poorly surveyed due to the inaccessibility of the terrain, as the river flows through a series of gorges for most of its length. Cape Nature Conservation (CNC) in the past sampled fishes at points on the river easily accessible by road (i.e. Die Mond, Aspoort, Elandsvlei and Doringbos). Last month CNC was fortunate to survey the upper Doring River between the farms Die Mond and Elandsvlei using inflatable rafts supplied by a commercial rafting company, Aquatrails. A week after the rafting expedition, CNC organised a flyfishing weekend at Die Mond for CPS members to expose them to indigenous Olifants river yellowfishes.

The objectives of this paper are to document fish distribution in the upper Doring River based on survey work since 1990 and discuss its significance in response to future management of this river, including its value as a sports fishery.

Study Site

The Olifants River system is located about 250 km north-west of Cape Town and comprises two major rivers, the Olifants and Doring rivers, which are hydrologically and geologically different. The Olifants is a perennial river with acidic, low nutrient waters that drain mainly sandstone catchments whereas the Doring is a seasonal river draining sandstone and shale catchments on its western border and sediment rich tillites and shales on its eastern side. The Doring consequently

has more alkaline, nutrient rich waters that may vary in chemical composition seasonally depending on whether run-off from the wetter western or drier eastern catchments dominates its flow.

The Doring River above its confluence with the Groot River is called the "Dry Doring" as it hardly ever flows. The river here has a sandy floor. Below the confluence with the usually perennial Groot River, the Doring changes character markedly, becoming a large, often braided river that flows strongly in winter and maintains some flow for most of the year. Below Aspoort, the river enters a spectacular 40 km long gorge where it consists of a series of long deep permanent pools and fast flowing rapids and riffles, ideal habitat for large streamlined fish such as Clanwilliam yellowfish (*Barbus capensis*), Clanwilliam sandfish (*Labeo seeberi*) and sawfin (*B. serra*). The river bottom alternates between rock and sand in the pools to a boulder and bedrock dominated riffles and rapids. The riparian and floodplain vegetation is characterised by *Acacia karoo*, *Salix capensis*, *Phragmites* and two invasive aliens *Prosopis glandulosa* (mesquite) and *Nerium oleander* (Oleander). The vegetation outside the floodplain is succulent Karooveld, characteristic of the arid winter rainfall interior.

The Doring exits the gorge at the farm 'Elandsvlei', about 48km from 'Die Mond'. Here the river is wider, slower flowing and has more sand. The river flows for a further 100 km approximately before it joins the Olifants River near Klawer.

Fish Distribution

Most distribution records for the upper Doring were obtained from CNC's Fish Database. In addition, the river was surveyed from 29/9/99 to 1/10/99, using inflatable rafts, between the farm 'Die Mond', just above the confluence of the Groot and Matjies rivers to the farm 'Elandsvlei', a distance of approximately 48 km (Figure 1). The Groot River, just before its confluence with the Doring River, was also angled at Die Mond between 8/10/99 and 10/10/99 by 12 fly fishers of the CPS.

The rafting survey included the use of a gill net and angling at four sites; at 'Die Mond', at the first lunchtime stop (about 10 km downstream), the first overnight stop (about 14 km downstream) and at the second overnight stop about 35 km downstream of 'Die Mond'. A gill net of 15 m X 2m with a mesh diameter of 5cm was used. Angling involved spinning with various artificial lures (spinners and Rapalas).

The distribution of fishes in the upper Doring River is shown on Table 1. Seven species have been recorded to date here comprising the three large endemics (Clanwilliam sandfish, Clanwilliam yellowfish and sawfin) and four species alien to the system (smallmouth and largemouth bass *M. salmoides*, bluegill *Lepomis macrochirus* and banded tilapia *Tilapia sparrmanii*). The bass and bluegill are indigenous to North America whereas the banded tilapia is indigenous to other parts of southern Africa. The smallmouth and largemouth bass were introduced into the Olifants system for sportsfishing purposes in the 1930's and the other smaller alien species were introduced later on as fodder fish for the bass. All four introductions can only be described as an ecological disaster for this unique system as the bass and bluegill have eliminated redfin minnows from much of their former range and have dramatically reduced yellowfish, sawfin and sandfish recruitment. The bluegill and banded tilapia are pest species and have negligable socio-economic value.

The recent rafting survey and flyfishing trip were valuable in that they confirmed that all three large endemic species still occur within the study area and that densities of the highly invasive

smallmouth bass and bluegill sunfish appear to be low, especially below the Die Mond weir. Here the river is dominated by rapids and riffles and has moderate to strong flow for over half of the year, conditions which are marginal for the pool - preferring bass and bluegill.

The highlight of this trip was confirmation that the critically endangered Clanwilliam sandfish was relatively abundant at the weir pool at Die Mond, with 33 adult fish caught using a 15m long gill net over two short periods (about an hour each). This species was also recorded at Aspoort in 1993. *Labeo seeberi* is a large river fish preferring slow flowing reaches, habitats now invaded by smallmouth bass and bluegill. It is suggested that the primary reason for the apparently healthy Clanwilliam sandfish population here is the excellent habitat diversity and quality that is still present in the Groot and Doring rivers.

Table 1: Fish species recorded between Die Mond and Elandsvlei on the upper Doring River.

SITE	SAMPLING DATE	SPECIES RECORDED*							NOTES
		BC	BS	LS	MD	MS	LM	TS	
Die Mond (DM)	2/11/93	X		X			X	X	Fish observed by snorkeling in pools
	7/12/93	X		X	X		X		Fish observed snorkeling in pools downstream of Die Mond weir
	11&12/2/94	X		X	X	X	X	X	Fish observed by snorkeling in pools 1-2 km upstream and/or downstream of Die Mond weir
	2/3/94	X		X			X		Fish observed by snorkeling in pools 1-2 km upstream of Die Mond weir
	5/99	X	X						Anglers in Nick Mound's fishing party
	29/9/99			X			X		25 Clanwilliam sandfish between 38-47,5 cm FL caught at weir in 15 m long gill net set for about 90 minutes. Bluegill observed from bank
	9-10/10/99	X		X	X		X		CPS anglers caught 12 Clanwilliam yellow between 1,5 - 3 kg with bass and bluegill common in weir. 8 adult Clanwilliam sandfish caught in weir in 15m long gill net set for about 60 minutes
Aspoort	7/12/93	X		X	X	X	X		Fish observed by snorkeling in pools
Wildehondskloof (about 10km below DM)	30/9/99								Spinner and Rapalas used for 30 minutes in pool and rapid. River flowing strongly
Overnight 1 (about 14 km below DM)	30/9/99	X							1 adult male Clanwilliam yellow caught in gill net set overnight along bank of pool in water about 3 m deep. Angling unsuccessful
Overnight 2 (about 35 km below DM)	31/9/99	X	X						6 adult Clanwilliam yellows and 1 sawfin caught in overnight gill net set in pool. Males with spawning tubercles and female ripe running. Angling unsuccessful

*where BC = *B. capensis*, BS = *B. serra*, LS = *L. seeberi*, MD = *M. dolomieu*, MS = *M. salmoides*, LM = *L. macrochirus* & TS = *T. sparrmanii*, *FL = fork length.*

Key to dam sites:
1 Groot Dam
2 Aspoort Dam
3 Melkboom Dam
4 Melkbosrug Dam

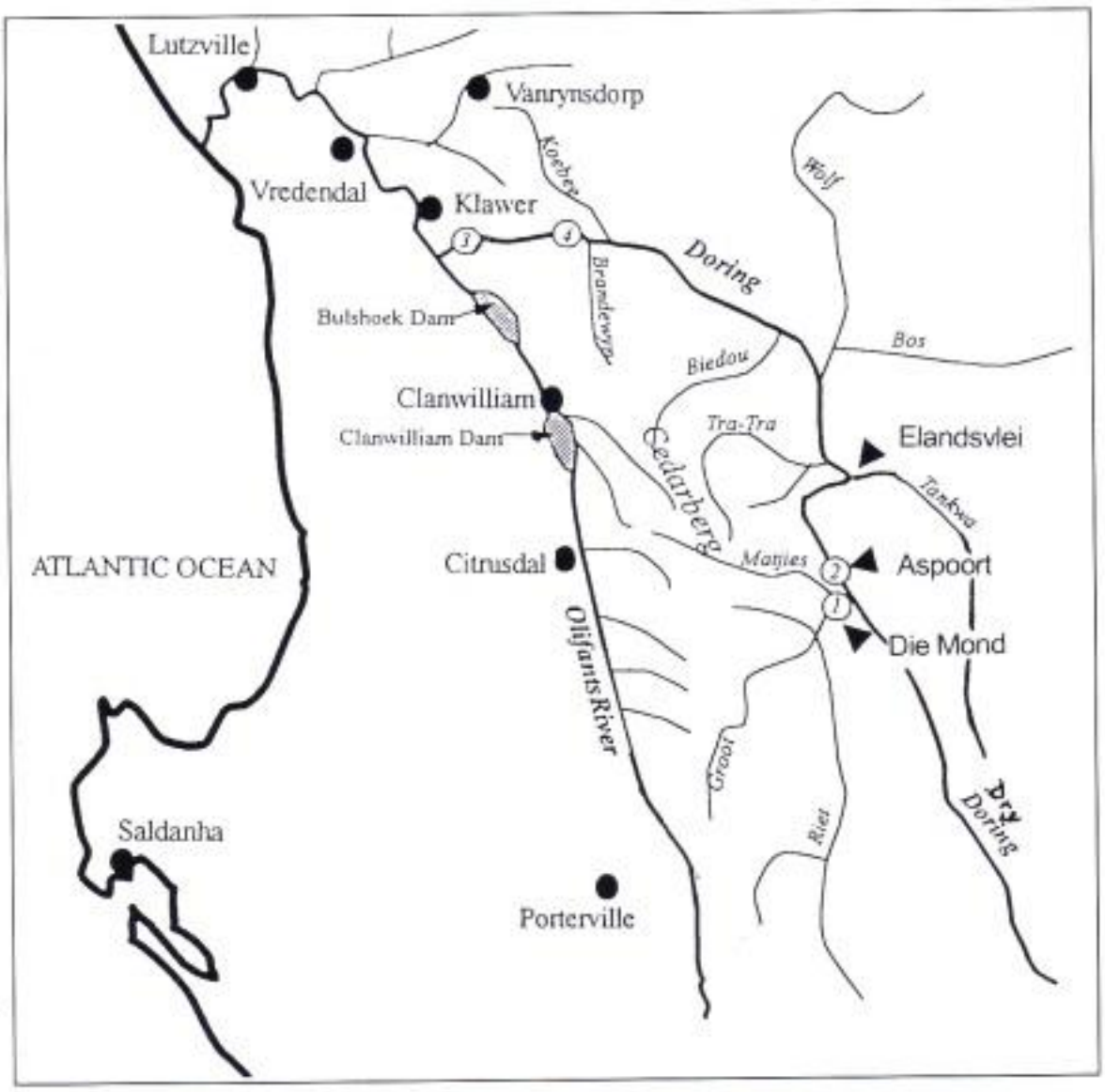


Figure 1: Map of the Olifants River system showing the upper Doring River between Die Mond and Elandsvlei and the four proposed dam sites on the Doring River (map adapted from Brown & Day 1997).

Clive Prior clearly enjoying the CPS outing to the Doring River at Die Mond.

Clanwilliam yellowfish appear to be widespread and common but not abundant. CPS anglers caught 12 fish between 1,5 to 3 kg in two days fishing, mainly in shallow fast flowing water below the Die Mond weir. A Durban flyfisherman with yellowfishing experience caught 12 fish up to 4 kg in weight in a day's fishing in the same area. Successful anglers were ecstatic about their first experiences with Clanwilliam yellowfish describing the fish as powerful and beautifully streamlined.

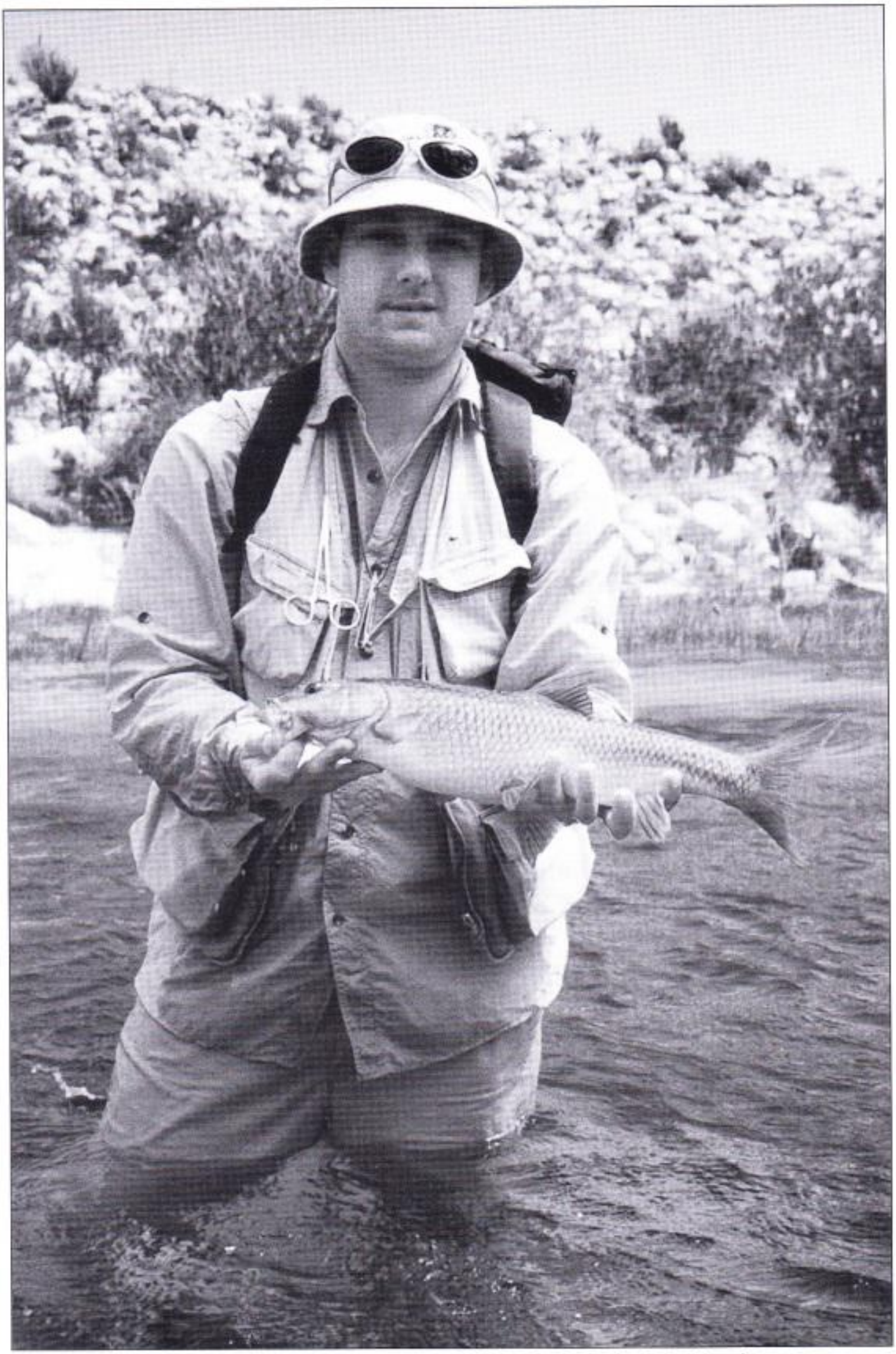
Yellowfish numbers in the upper Doring may be regulated by the following factors. Firstly, the river offers diverse and high quality habitat throughout the study area, but most of this habitat (rapids and riffles) is only available when the river flows (May to November). Bass are rare then preferring areas with the slowest flow. During summer all fish are concentrated in the large relatively clear pools that remain and juvenile yellowfish are then very vulnerable to bass and bluegill predation. Hence, mainly adult yellowfish are present which spawn well in the favourable habitat but few juveniles attain adulthood due to presence of bass.

The low numbers of the endangered sawfin are cause for concern. Only one fish was caught in the recent survey compared to 33 sandfish and 19 yellowfish. Sawfin were not recorded previously except for one caught at Die Mond by an angling group in May this year. This may indicate that this species is more susceptible to bass predation than the other two indigenous species or alternatively prefers smaller, perennial rivers such as the Ratels and upper Matjies rivers where it is known to be abundant.

Bass and bluegills are abundant in large rocky pools particularly at and above Die Mond. The low numbers below the Die Mond weir indicate that they are at a disadvantage in the rapids and riffles that dominate the upper Doring within the gorge. The Clanwilliam yellowfish, a large (up to 10 kg in weight) and omnivorous species, may also exert significant predatory pressure on bluegill and juvenile bass. Bass plugs and trout flies resembling bait fishes took most of the Clanwilliam yellows caught by anglers during the CPS trip
The river was assessed for ecological status by Brown & Day during a rafting trip from Die Mond to near its confluence with the Olifants River. The survey showed that the Doring had a status above 80%, the highest status of 25 rivers assessed within the Western Cape. Our rafting survey confirmed this assessment with the upper river offering a diverse array of high quality aquatic and riparian habitat. Examples include waterfalls, cascades, long rapids and riffles, braided channels, pools exceeding 4m in depth and vegetated backwaters. The lack of man's influence from Die Mond to Elandsvlei is obvious with the impacts restricted to light infestations of mesquite and oleander, a Water Affairs measuring weir at Aspoort and two weirs, one each at Die Mond and Elandsvlei respectively. None of the weirs unfortunately have fishways as these were not required by law when constructed. The weirs at Aspoort and Elandsvlei have walls exceeding 3 m in height which preclude passage to fish except during floods. It is strongly recommended that fishways are constructed on them in future.

Management recommendations

The upper Doring River is in excellent ecological condition and serves as an important refuge for the Clanwilliam sandfish and yellowfish and the sawfin, three endemic and threatened Olifants River system fishes, The area is also popular with river rafters and canoeists and Die Mond is an increasingly popular tourist resort for anglers,



Craig Middleton with a Doring River Yellowfish hooked at the Die Mond resort.

boaters and bathers.

The key recommendations with regard to future management of the upper Doring River include:

❍ The upper Doring, including the lower Groot River should be managed as a riverine conservancy or natural heritage site due to its natural splendour and elevated ecological value.

❍ No further instream weirs or dams should be constructed. Future agricultural development should be appropriate for this low rainfall area and be excluded from the 1 in 50 floodline area. It is essential that the river remains as unregulated and natural as possible and that fish have as few barriers to migration as possible. The river has a significant socio-economic value if maintained in healthy condition due to increasing eco-tourism opportunities (rafting, hiking, flyfishing etc).

❍ Future water resource development in the upper Doring catchment, especially the Kouebokkeveld plateau, needs to be strictly regulated and carefully planned as this area provides the bulk of the Doring's water. Already certain tributaries such as the Kruis and Leeu rivers have been over-utilised through instream dams and abstraction by pumps. These impacts and the associated use of fertilisers and pesticides have resulted in these tributaries becoming degraded and having a low ecological status. Clearly, a Catchment Management Plan, as required by the Water Act of 1998 is needed for the Kouebokkeveld area to effectively regulate future agricultural development here.

❍ Die Mond has huge potential to become the Western Cape's premier indigenous yellowfish destination. It is a legal requirement that fishing for the Clanwilliam yellowfish and sawfin is practised on a catch and release basis, and fish should also not be fought to exhaustion by ultra light tackle. Single hooks should be used on all flies and lures to avoid unnecessary injury to the yellowfish's mouth. All catches should be reported to the author for monitoring purposes. Anglers are encouraged to kill all bass and bluegill caught here, to assist recovery of the yellowfish populations.

References

Although not quoted, the following references were used in compiling this paper:
Brown, C.A. & E.G. Day. 1997. *Impacts of water resource development on the riverine ecosystem. Volume 3: Doring River situation assessment.* Southern Waters Research and Consulting cc, University of Cape Town.
Mound, N. 1999. *Mastering the mighty yellows of the Doring River. Flyfishing* Vol 12, No. 54: 20-22.

"During the past two seasons I have looked in vain for the shoals of yellowfish and indigenous fingerlings. In previous seasons the shallows in both the Olifants and Jan Dissels rivers were black with these fingerlings. If, as I think, the bass are destroying the 'yellows', then I regret my part in introducing the bass. The bass may be edible, but that is no compensation for the loss of what, in my opinion, is one of the finest fighting fish in the country." Thos H Brooks, Piscator, September, 1949.