

**Water
Resource
Quality
Monitoring**

VOLUME 5

sampling protocol for

**Fish kill
investigations**



September 2004



The background of the cover is an underwater photograph. In the upper right, a diver is visible, partially obscured by the water's murkiness. The water is filled with a dense network of thin, brownish reeds or grasses. In the lower center, a dead fish lies on the bottom, its body pale and showing signs of distress. The overall tone is somber and emphasizes the environmental theme of the document.

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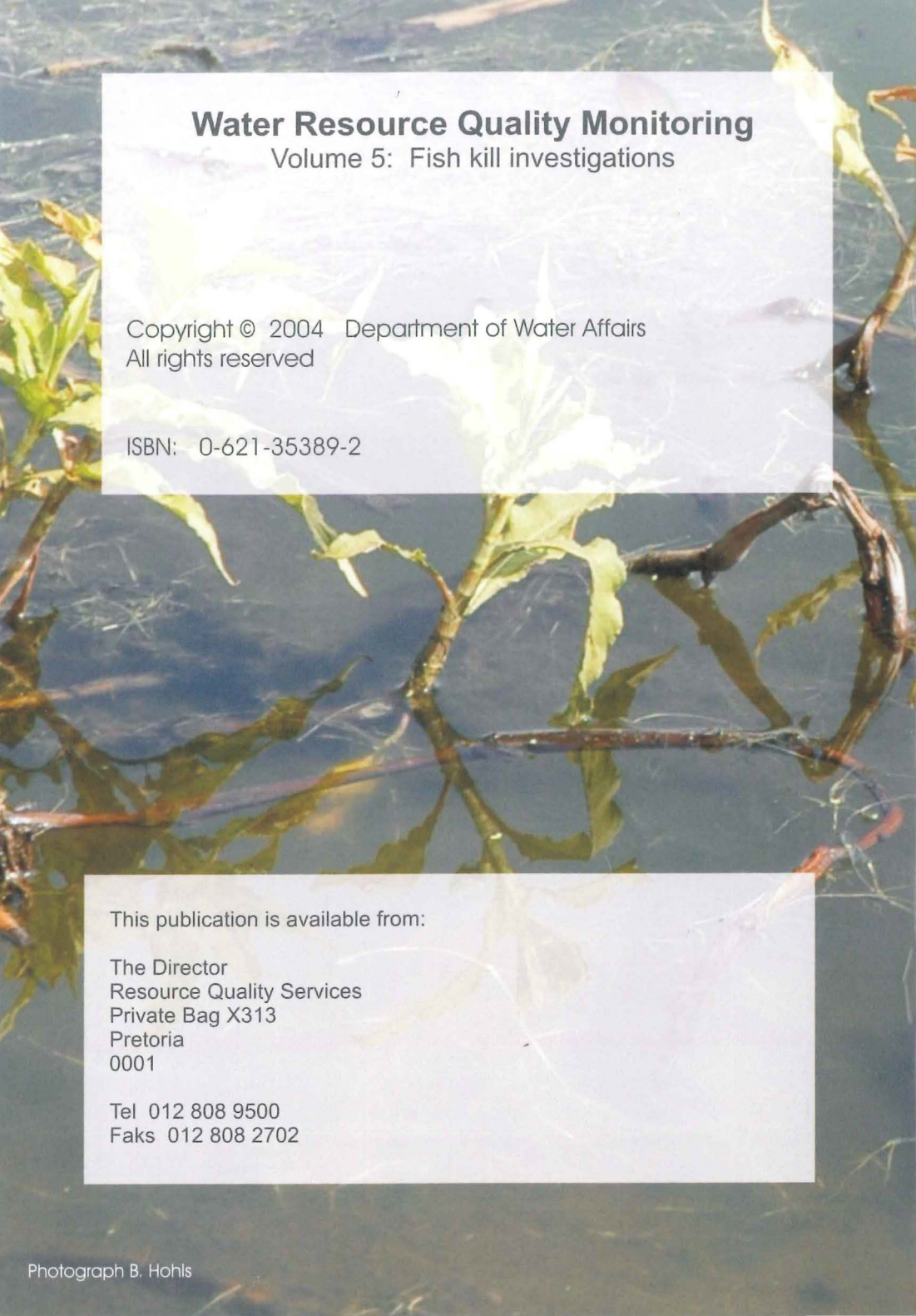
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Resource Quality Services
Department of Water Affairs

November 2004

The background of the entire page is a photograph of a body of water. In the foreground, there are several green, leafy plants with long, thin stems, possibly water hyacinths, partially submerged. The water is dark and reflects the light. In the middle ground, a small, light-colored fish is visible, swimming towards the right. The overall scene suggests a natural aquatic environment.

Water Resource Quality Monitoring

Volume 5: Fish kill investigations

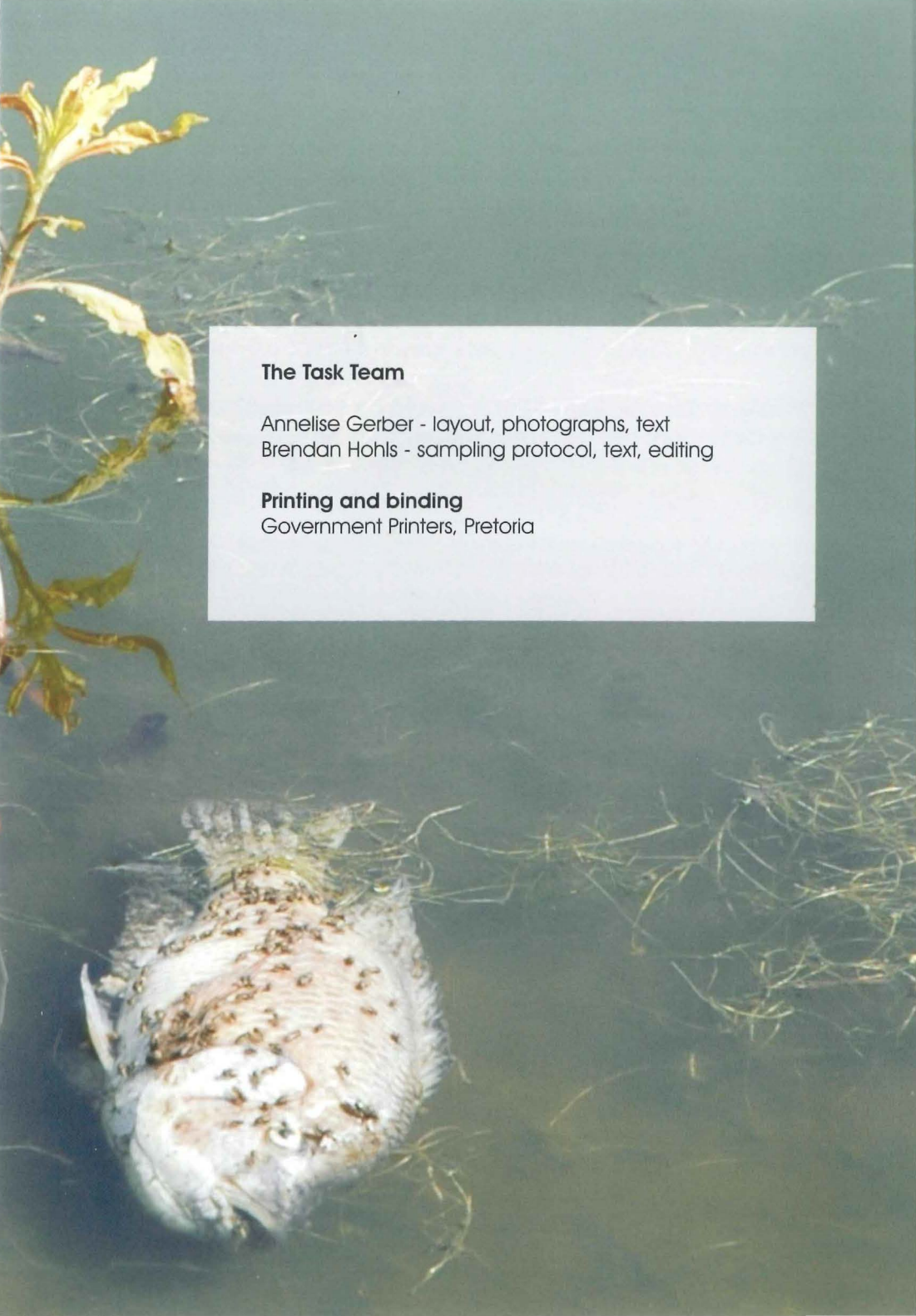
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Background information

Fish kills are a world-wide phenomenon and can take place due to natural causes such as old age or unnatural causes such as pesticides in the water.

Whatever the cause, a fish kill should be investigated. This document provides methodology to be followed when encountering or investigating such a kill.



FISH KILL INVESTIGATIONS

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1.0 Common Causes of Fish Kills

Natural causes:

- oxygen depletion
- oxygen supersaturation
- toxic algal blooms
- turnover of the water column
- sudden temperature changes (e.g. after a hail storm)
- salinity changes
- bacterial infections
- viruses
- parasites

Man-induced factors:

- discharging pesticides / fertilisers / other chemicals into the water which can kill fish or lower available dissolved oxygen.

2.0 Reporting a Fish Kill

**Report to Regional Director responsible for the area in which the kill took place.
Supply the following information:**

- **Name, address, tel. no. of person who reported the fish kill**
- **An estimate of number of fish dead/dying**
- **Time when kill was first noticed**
- **What other organisms were affected**
- **The species of fish affected**
- **The size of the fish affected**
- **The physical extent of the area affected**
- **Possible causes**
- **What possible sources of pollution are in the area**

3.0 The Fish Kill Investigation

The following equipment is necessary when conducting an investigation:

- Dissolved oxygen meter
- pH meter
- EC meter
- Sample bottles - macro, trace, organic, toxicity, bacteriology, algal identification, algal scum
- Cooler box with ice bricks
- Labels for bottles, pen and masking tape
- Aluminium foil and plastic bags
- Bucket
- Scoop net
- Boots or waders
- Camera
- Boat (when fish kill is on a dam)
- GPS
- Map of the area (if you are not familiar with the region)

4.0 IMPORTANT!

- Liaise with laboratories before collecting samples
- Determine extent of the kill on site
- Estimate the time that the incident started
- Observe things such as excessive turbidity, unusual water colouration, odours, algal blooms etc.
- Consult with farmers in the area to gather information on recent crop spraying or other practices
- Observe behaviour of dying fish - look out for injuries, lesions, gasping, loss of equilibrium, erratic behaviour, flared gills, attempts to leave the water, lethargy, convulsions or other indications of distress.
- Where the cause of the fish kill is not known, dying fish should be collected and taken to the nearest state or private veterinarian for pathological examination.
- Fish kills occurring in the vicinity of Onderstepoort should make use of the pathologists available there as the most ideal option.



Fish must never be frozen

FISH KILL QUESTIONNAIRE

GENERAL INFORMATION

WHO IS THE INFORMANT?

NAME: _____

TEL: _____

ADDRESS: _____

AFFILIATION/ORGANISATION: _____

DATE & TIME REPORTED: _____

REPORTING SOURCE

NAME OF OFFICIAL/INVESTIGATOR: _____

ORGANISATION: _____

ADDRESS: _____

TEL: (W) (_____) (H) (_____) _____

DATE & TIME OF INVESTIGATION: _____

SITE INFORMATION (Details of the site of the fish kill)

Type of water body:

Stream

Wetland

Reservoir

Ocean

Other

Name of water body: _____

Latitude: _____ S Longitude: _____ E

Has a fish kill been observed at this site before? Yes No Unsure

Duration of the kill (first noticed and ended) - Date and time: _____

Extent of the kill or the area covered (kilometers of river or size of pond or reservoir): _____

Approximate total number of fish affected: 10 - 100 100 - 1 000 1 000 - 10 000

Species affected

Number

Size (length - min and max)

BEHAVIOUR OF THE AFFECTED FISH (Indicate which is applicable)

Rate of mortality was abrupt and most fish died within 24 hours

Small fish died first

Large fish coming to the surface and gulping for air

Small fish alive and well

Jerky movements of fins

Fish hyperexited

Fish swim erratically

Any other behavioural observation: _____

External appearance of affected fish (any abnormalities): _____

Own opinion as to the cause: _____

Known recent activities in the surrounding area? (eg. Crop spraying, weather change etc) _____

Possible sources of pollution: _____

FIELD MEASUREMENTS:

Variable Measured	Units	Upstream	In Kill Area	Downstream
Temperature	°C			
pH				
Electrical conductivity				
Dissolved oxygen	mg/l and %			
Odour/Colour/Foam				

Collected sample information:

	Upstream	In Kill Area	Downstream
Water sample (major inorganic)			
Water sample (trace metals)			
Water sample (organic)			
Water sample (toxicity)			
Fish sample (fresh)			
Fish sample (frozen)			

General remarks:

COPY FOR YOUR RECORDS AND SEND A COMPLETED QUESTIONNAIRE TO:

The Director: Resource Quality Services
 Department Water Affairs and Forestry
 Private Bag X313
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