

FINAL REPORT



Aquatic Animal Health Subprogram: Development of national investigation and reporting protocols for fish kills in recreational and capture fisheries

**Barbara Nowak, Mark Crane
and Brian Jones**

June 2005

FRDC Project No. 2005/620


Australian Government
Department of Agriculture,
Fisheries and Forestry




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Fisheries Research and
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FRDC 2005/620 Aquatic Animal Health Subprogram: Development of national investigation and reporting protocols for fish kills in recreational and capture fisheries

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OBJECTIVES:

1. To improve investigation and reporting of major fish kills in recreational and capture fisheries.
2. To publish national investigation and reporting protocols for fish kills in recreational and capture fisheries.

Non Technical Summary:

OUTCOMES ACHIEVED TO DATE

A workshop was conducted and draft national investigation and reporting protocols for fish kills in recreational and wild capture fisheries were developed and accepted by workshop participants that included representatives of Native Fish Australia, Federal Government Department of Agriculture, Fisheries and Forestry, State and Territory Government agencies and the Australian Wildlife Health Network.

Wild fish kills happen regularly across Australia. The more spectacular kills are reported in the media, but many remain relatively obscure. Often the causes of fish kills remain unknown. This can be a problem, particularly if pollution or some other human activity is to blame and if further fish kills are to be avoided.

Timely sampling of dying fish and their environment is critical to achieving a reliable diagnosis. Identification of the causes of significant wild fish kills is important to the public, environmental groups, recreational, aquaculture and wild capture fisheries. It is important to detect exotic diseases, and major pollution events (both accidental and deliberate) as soon as possible to both minimise harm and to support Australia's surveillance and monitoring capability at the international level. This activity underpins export market access and strengthens our national biosecurity initiatives.

The sampling of dead and dying fish is a complicated procedure. There needs to be a system for reporting incidents and getting trained staff to the site quickly with appropriate sampling equipment. Since many fish kills are associated with poisoning events, there are significant OH&S issues involved. If prosecutions are to be successful, legal issues must be addressed and forensic sampling techniques (chain of custody etc.) must be employed. Planning and funding fish kill responses

therefore requires detailed planning and funding across agencies within jurisdictions. The ability to respond to fish kills varies greatly between Australian jurisdictions.

The National Aquatic Animal Health Technical Working Group (NAAH-TWG) identified the need for a consistent approach to investigating fish kills as an important component of the national biosecurity initiative. The concept of a national workshop to progress this issue was endorsed by the Aquatic Animal Health Committee (AAHC) and was incorporated into the national AQUAPLAN 2005-2010 initiative. There has been strong positive feedback from stakeholders to the concept of a workshop.

The funding provided through the Budget Initiative was seed money for the project. The objective of this project is consistent with the objectives of the new Australian Government's *Securing the Future – Protecting our Industries from Biological, Chemical and Physical Risk* budget initiative.

This project's two objectives were to improve investigation and reporting of major fish kills in recreational and capture fisheries and to publish national investigation and reporting protocols for fish kills in recreational and capture fisheries.

The first output of this project was to run a fish kill workshop that would bring together people with expertise and/or an interest in fish kill management from around Australia to develop a consistent set of protocol to deal with fish kills. This project's second output was to document and distribute the outcomes of this workshop.

KEYWORDS: fish kills; natural resources sustainability; wild-catch fisheries, recreational fisheries

Acknowledgments

We thank all workshop participants and the workshop facilitator for contributing to this project. We are grateful to Munro Mortimer, Marty Deveney, Nick Moody, Joanne Slater and Tom Rose for their input into drafting the fish kill investigation protocol. We would like to thank the following people for comments on the draft protocol: Eva-Maria Bernoth, Belinda Wright, Allan Lugg, Matt Landos, Jane Frances, Kevin Ellard, Judith Handlinger, Marty Deveney, Paula Brown, Tom Rose, Paul Hillier, Peter Beers, Richard Whittington, Paul de Lestang and John Humphrey.

Background

The National Aquatic Animal Health Technical Working Group (NAAH-TWG) identified the need for a consistent approach to investigating fish kills as an important component of the national biosecurity initiative. The concept of a national workshop to progress this issue was endorsed by the Aquatic Animal Health Committee (AAHC) and is incorporated into the national AQUAPLAN 2005-2010 initiative. There has been strong positive feedback from stakeholders to the concept of a workshop. The funding provided through the Budget Initiative supported this project. The objective of this project is consistent with the objectives of the new Australian Government's *Securing the Future – Protecting our Industries from Biological, Chemical and Physical Risk* budget initiative.

Fish kills investigation is a complex procedure, which includes careful observation, accurate recording of data, proper use of sampling procedures and application of a range of analytical and diagnostic methods (Meyer and Barclay 1990, Nowak 1996). While it is usual for water samples to be collected, many toxicants are not persistent in water. Chemical analysis of fish gills can provide evidence confirming that a toxicant killed the fish (Nowak et al 1995, Daglish and Nowak 2002, Daglish et al 2004). Most fish kills are blamed on pollution, however natural environmental conditions can result in a fish kill (Nowak 1996b). Infectious diseases can also cause mass mortality of fish (Whittington et al 1997, Hyatt et al 1997). It is essential that consistent protocols are used by all States and Territories.

Other Related Projects

"Fish Kills: Causes and Investigation in Australia" Workshop was run by the School of Aquaculture, University of Tasmania in early 1995. This five-day workshop was led by Drs Nowak and Handlinger and attended by 39 participants from government departments, aquaculture industry, other industries, veterinary diagnostic laboratories and conservation groups. It involved a series of lectures, hands-on classes and case presentations. The proceedings were published as Aquaculture Sourcebook 13, Key Centre for Aquaculture Workshop Series. This publication contains a review of fish kill information in Australia until 1994. Dr Nowak, together with Mr Bryan, was contracted to develop fish kill response training and protocols for Lihir Gold Mine in Papua New Guinea. This workshop was run in 2001 in Lihir, it was attended by participants from three mines in PNG as well as PNG government departments and resulted in a significant improvement in fish kill investigations in Lihir.

FRDC projects:

- 1999/225 The development of a model of the spread of the pilchard fish kill events in southern Australian waters
- 1999/227 Pilchard (*Sardinops sagax*) mortality events in Australia and related world events.
- 2002/668 Aquatic Animal Health Subprogram: Enhancing the emergency disease response capability of Department of Fisheries and industry bodies associated with non-maxima oyster culture
- 2002/661 Enhancing the emergency disease response capability of NSW and Qld. Government agencies and industry bodies associated with oyster culture.
- 2002/652 Victoria's Arrangements for the Management of Aquatic Animal Disease Emergencies – Final Report

- 2003/640 Aquatic Animal Health Subprogram: Subprogram Conference
“Emergency Disease Response Planning and Management”

Need

Wild fish kills happen regularly across Australia. More spectacular kills are reported in the media. Fish kills often remain unexplained. Timely sampling of dying fish and their environment is critical to achieving a diagnosis. The identification of the causes of significant wild fish kills is important to the public, environmental groups, recreational, aquaculture and wild capture fisheries. Early detection of exotic diseases and of major pollution events (both accidental and deliberate) is vital. Identification of the causes of fish kills also supports Australia's surveillance and monitoring capability at the international level, which in turn underpins export market access and strengthens national biosecurity initiatives.

The sampling of dead and dying fish is a complicated procedure. There needs to be a system for reporting incidents and getting trained staff to the site quickly with adequate sampling equipment. Since many fish kills are associated with poisoning events, there are significant OH&S issues involved. If prosecutions are necessary and are to be successful, legal issues must be addressed and forensic sampling techniques (chain of custody etc.) must be employed. Fish kill responses therefore require detailed planning and funding across agencies within jurisdictions. The ability to respond to fish kills varies greatly between Jurisdictions across Australia. Thus there is a need to develop nationally agreed protocols for the investigation and reporting of fish kills in recreational and capture fisheries.

Objectives

1. To improve investigation and reporting of major fish kills in recreational and capture fisheries
2. To publish national investigation and reporting protocols for fish kills in recreational and capture fisheries

Methods

A national approach to developing appropriate and standardised national fish kill investigation and reporting protocols was developed with the cooperation of the National Aquatic Animal Health Technical Working Group (NAAH-TWG).

A workshop was used to develop protocols to deal with fish kills in recreational and wild capture fisheries. The workshop brought together representatives from Government agencies and other stakeholders from around Australia to address cross-agency issues including: reporting and investigating fish kills, access to Commonwealth lands, OHS&E, prosecutions, funding and training.

Because of the complexities involved, a professional workshop facilitator was engaged to assist with organisation of the workshop and to lead the workshop. Thus a brief was developed for a professional workshop facilitator and for the workshop participants.

Current fish kill investigation guidelines and manuals were accessed from Queensland, Western Australia, New South Wales, Victoria, the Northern Territory and Murray-Darling Basin Commission. These guidelines were provided to workshop participants and were used as a basis for discussion.

A professional workshop facilitator was contracted to run the workshop. Representatives from government agencies and other stakeholders were invited. Invitations were given to agricultural, fisheries and environmental agencies and managers in all States and Territories. Other invitees included the Australian Wildlife Health Network (AWHN), RecFish Australia, representatives of the Animal Health Committee (AHC) and the Aquatic Animal Health Committee (AAHC), Australian Fisheries Managers Forum (AFMF), Australian Fisheries Management Authority (AFMA) and the Marine and Coastal Community Network (MCCN).

A one-day national workshop was organised to take place on 28 April 2005. The main aims of this workshop were to provide a basis for improvement of investigation and reporting of major fish kills and to obtain agreement on a draft protocol covering minimum requirements for investigation of fish kills.

To achieve these aims, workshop participants were placed in several discussion groups to consider the following topics:

1. Fish kill investigation protocol
2. Fish kill investigation kit
3. Communication
4. Resourcing
5. Further development - where to from here?

Following discussion of these topics each group reported back to the entire workshop and the results were scrutinised and further developed to obtain agreement by all workshop participants.

Subsequently, a draft protocol, including fish kill kit content, was prepared by a working group consisting of B. Nowak, M. Crane, T. Rose, M. Mortimer, M. Deveney, N. Moody and J. Slater. This draft was sent to all workshop participants, DAFF, Biosecurity Australia and NAAH-TWG for review and comment. Following this stakeholder consultation, protocols were fine-tuned and presented to Aquatic Animal Health Committee and Primary Industry Health Committee for endorsement.

Results/Discussion

Current status

While most States attempt to identify the causes of fish kills, on average 50% of reported fish kills remains unexplained.

Protocols

All States except for South Australia and Tasmania had current fish kill investigation protocols or manuals. South Australia and Tasmania anticipated using the outputs of this project to assist with the development of fish kill investigation protocols or manuals for their States.

Fish kill investigation protocols were the discussion point for Topic 1. The outcomes from this discussion are provided in the protocols (Appendix 3).

Fish Kill Investigation Kits

The Western Australian Government fish kill investigation kit was presented to workshop participants and then discussed by the discussion group addressing Topic 2 (Fish kill investigation kits).



Fish Kill Kit as demonstrated at the workshop by Fisheries Western Australia

Most States have a fish kill investigation kit. Western Australia's kit is the most comprehensive and contains formalin as a fixative as well as a range of safety equipment. Other fish kill investigation kits are more basic and usually focus only on one part of a fish kill investigation, such as water quality sampling or fish health sampling. The kit requirements may vary between States or Territories, depending

on the degree of isolation found within the jurisdiction and the availability of appropriate services in remote areas.

Appendix B in the Protocol (Appendix 3) details the recommended contents of Fish Kill Investigation Kits.

Databases

Most regions (Western Australia, Queensland, New South Wales and the Northern Territory) have fish kill databases based on either Access or Excel. These databases hold basic information on reported fish kills. New South Wales has the most extensive database.

While the potential for developing a national database was discussed, most workshop participants were against setting one up and wanted to continue with individual databases for each State. An example database is shown in Appendix 7.

Detailed notes on “Communication”, “Resourcing” and “Further Development - Where to from Here” (discussion topics 3 to 5) are provided in Appendix 6.

Benefits and Adoption

All State/Territory agencies involved in investigation of fish kills will benefit from this project. The main benefit will be that the recommended minimum response protocol should ensure that adequate tissue and environmental samples and measurements are collected. Thus it will be more likely that the causes of fish kills will be reliably identified if they result from infectious disease or environmental conditions.

Further Development

Lead agencies in all States and Territories should ensure that there is adequate funding to provide appropriate training and resources for key personnel. There also needs to be capability to respond rapidly to fish kills to ensure that thorough and effective investigations can be carried out.

To ensure that better reporting of fish kills occurs it is important that community awareness of the significance of these events is raised. Appropriate response and lead agency contact details need to be better publicised.

Most importantly, lead agencies in all Australian jurisdictions should be made aware of the protocols required for a comprehensive fish kill investigation. These protocols should be publicised and their adoption encouraged. Future training workshops would be a useful way to achieve this outcome.

Planned Outcomes

A workshop was conducted and draft national investigation and reporting protocols for fish kills in recreational and wild capture fisheries were developed and accepted. Participants included members of State and Territory agencies and the Australian Wildlife Health Network.

Agreed national investigation and reporting protocols for fish kills in recreational and wild capture fisheries were adopted. Adoption of these protocols will ensure that State agencies can respond effectively to fish kills and ensure that these events are adequately investigated.

Conclusion

Many fish kills remain uninvestigated. When fish kills have been investigated, slow response time has been a major obstacle to collecting adequate tissue samples and environmental information. Lack of such data often makes it impossible to determine the cause of fish kills and makes it difficult to make appropriate management decisions to reduce or eliminate the possibility of future fish kills.

Three conclusions can be drawn from this current situation:

1. RESPONSE TIME SHOULD BE FASTER

Responses to fish kills need to be faster and management agencies need to ensure that resources are available to deal with fish kills whenever and wherever they occur within their jurisdiction.

It is essential that adequate tissue samples and environmental measurements are collected as soon as possible to allow a broad investigation. Delays can make the collection of vital information impossible due to the rapid nature of tissue decay and the rate at which environmental conditions change. Response time needs to be as short as practicable to maximise the value of tissue samples and environmental samples and measurements that can be collected.

2. MORE FUNDING IS NEEDED

Lack of resources was identified as one of the main constraints when investigating fish kills. Financial commitment is required to implement effective fish kill investigation protocols and to ensure that management agencies can respond adequately.

As speed of response is critical to successful fish kill investigations, personnel, equipment and response strategies need to be prepared in advance and funding set aside to support agency responses to these events.

3. TRAINING AND RESOURCES NEED TO BE IMPROVED

Personnel need to be trained in proper techniques for investigating fish kills if causes are to be reliably identified. Sampling should be comprehensive and allow identification of causes, whether they are infectious diseases, pollution or other environmental factors. Personnel also need to be trained in relevant OH&S procedures.

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Appendix 1: Intellectual Property

All this information is available to the public.

Appendix 2: Staff

Dr Barbara Nowak, University of Tasmania
Dr Mark Crane, AAHL CSIRO Livestock Industries
Dr Brian Jones, WA Fisheries

Appendix 3: Protocols

DRAFT FISH KILL INVESTIGATION PROTOCOL

Objective of protocol

The main aim of this protocol is to improve investigation and reporting of major fish kills in the wild and in recreational waters. This does not include aquaculture operations. It covers minimum standardised requirements for fish kill investigation and reporting. The protocol will ensure consistency of fish kill responses among States and Territories. It is based on a one day national workshop and draws on experience and documentation developed by various States.

Fish Kill Definition

For the purpose of this protocol, a fish kill defined as a significant and sudden death of fish or other aquatic animals.

When to Investigate

See Figure 1 for an example of a decision tree to determine whether a fish kill investigation is warranted.

Reason for Investigation

The main reasons for fish kill investigations are: environment protection, natural resource protection, control of aquatic animal disease, public safety, public concern and tourism. Fish kills are investigated if they have commercial or environmental or political significance. Fish kills can indicate that there is an emerging environmental/pollution problem or a new disease outbreak.

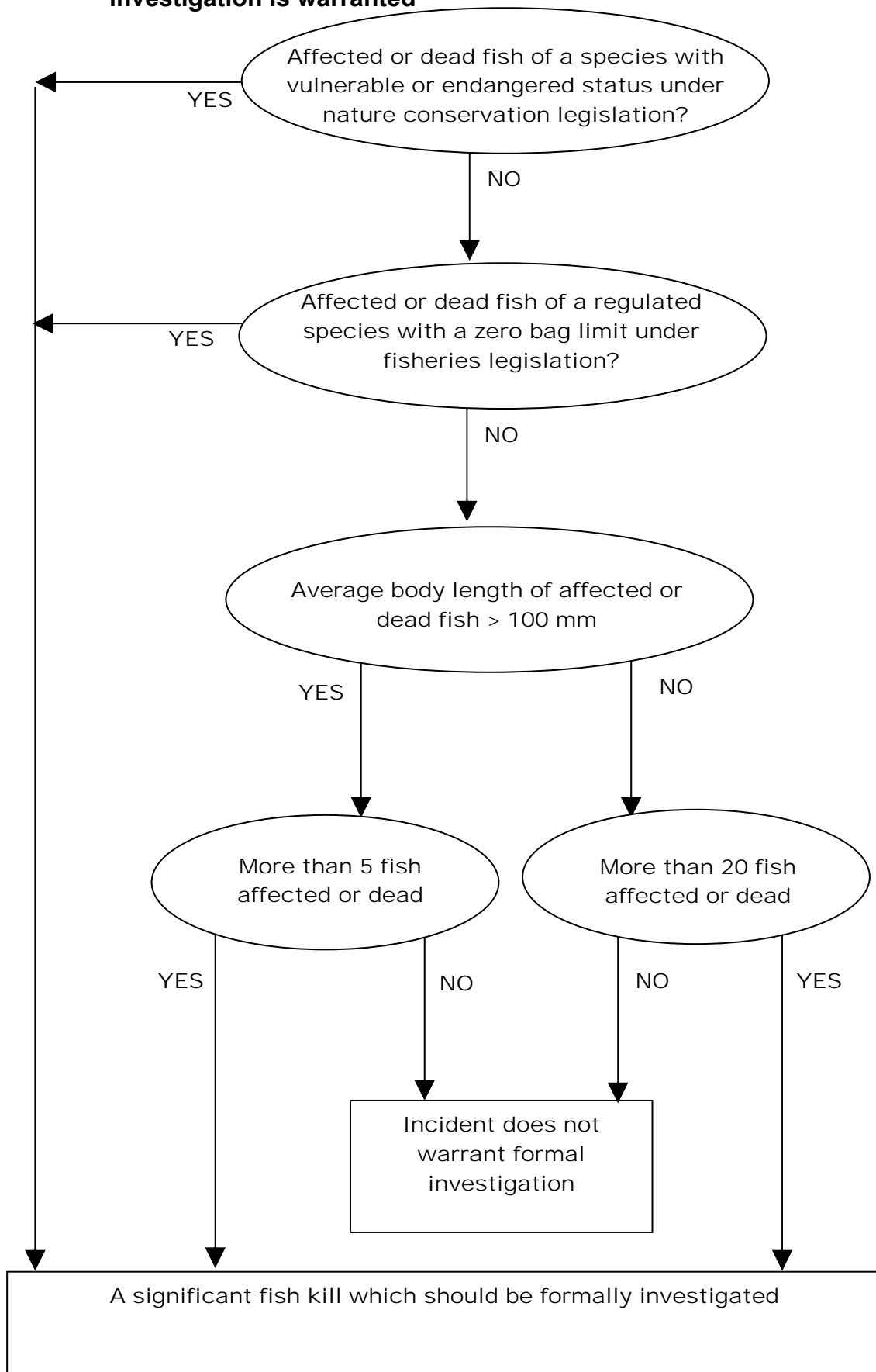
State Agencies

Several State agencies may be involved during a fish kill investigation. The State Environment Protection Agency (or Department of Environment and Conservation) and the State Department of Primary Industry/Fisheries (or equivalent) will be directly involved. The State Department of Health (or equivalent) need to be kept informed so that any queries from the community regarding human health can be addressed.

Roles and responsibilities of agencies

Roles and responsibilities of different agencies based on their legislative responsibilities, expertise, skills and resources should be determined before a fish kill occurs. Fish kill investigation is a complex process and usually involves agencies covering environmental, primary industry/fisheries and possibly public health issues. One of these agencies should lead the investigation and provide the Fish Kill Incident Coordinator, however full cooperation, resource and results sharing and debriefing are essential for a successful fish kill investigation.

Figure 1. Example of a decision tree to determine whether a fish kill investigation is warranted



Notification Process

Usually members of the public will be the first to notice a fish kill. It is essential that a fish kill hotline is identified in each State (for example Fish Watch or Pollution Watch or special Fish Kill Hotline), which should be operated 24 hours each day. The hotline number should be promoted to the community on government websites, fish kill investigation brochures and posters and during any interactions of relevant staff with the public.

The information reported should be recorded as comprehensively as possible and should include:

- personal identification and return phone number
- date and time of the notification
- location and extent of the incident
- date of observation of the incident
- number of dead fish (and species if possible) and other wildlife affected
- appearance of dead and any surviving fish
- flow conditions of the waterway
- weather conditions (current and over previous 48 hours)
- any signs of discharge
- what actions if any are currently undertaken
- who else has been notified

Agency receiving the report should notify other relevant agencies and reach an agreement as to who will take lead and who will provide support.

Regional Directors and Media Units should be notified.

Investigation Process

Following a fish kill report the investigation should follow a logical process, as shown in Figure 2, which outlines typical steps the investigation process. Since evidence deteriorates rapidly site inspection should take place as soon as possible.

Steps of the investigation include:

- Fish Kill Notification
- Background data
- Survey of the fish kill location and collection of samples, evidence, photos etc
- Reporting on on-site survey
- Samples analysis/storage
- Analysis and interpretation of data and results of sample analysis
- Follow-up investigation and initiating other actions
- De-briefing

Communication contacts

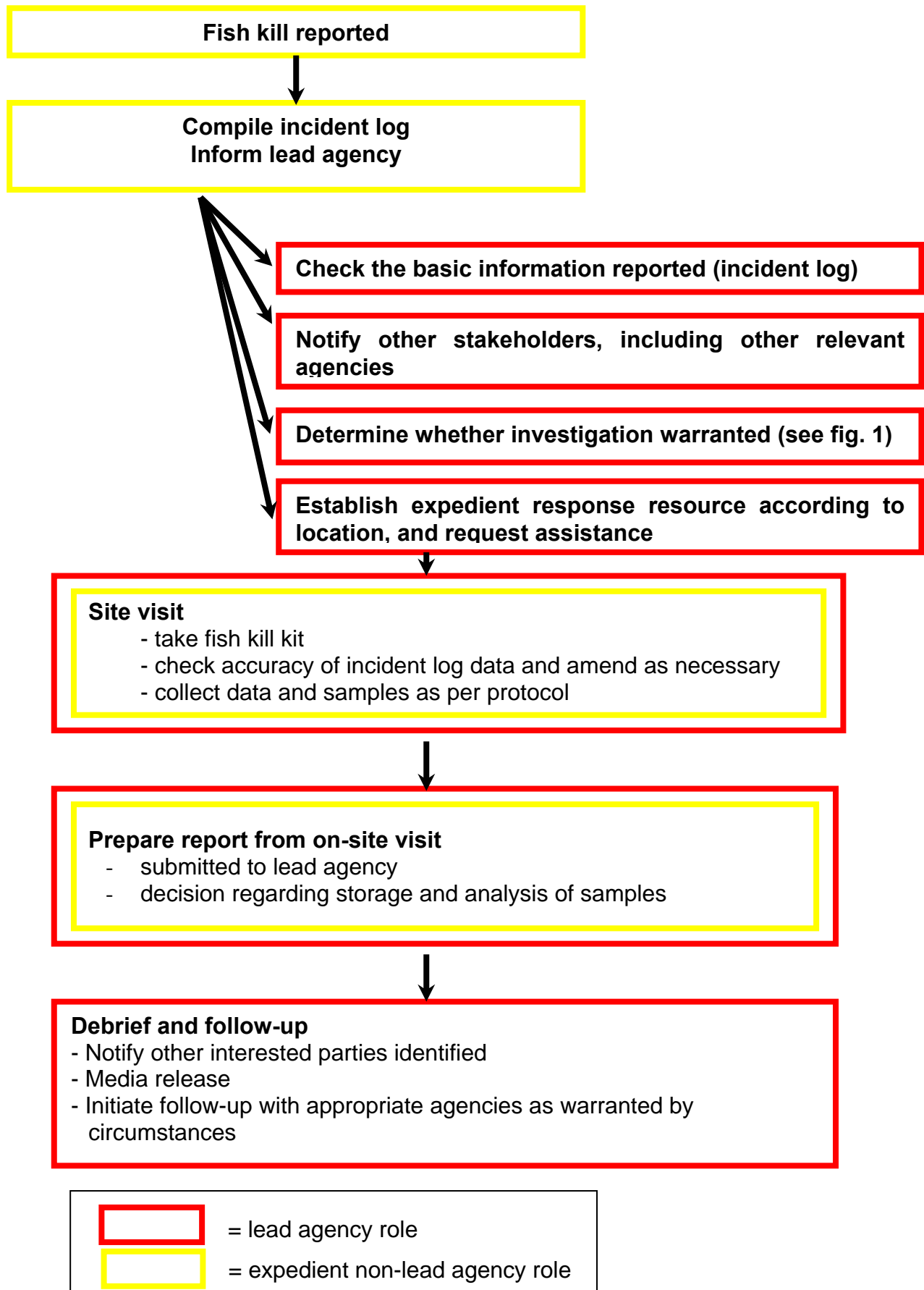
A number of organisations, media and members of the public have legitimate interest in fish kill events, their investigation and follow-up. It is essential that media procedures are followed to avoid transfer of inaccurate information and potential confusion, and demonstrate competent management of the incident to media and public. An up-to-date list of contacts should be available to the Fish Kill Incident Coordinator for the agencies involved, including: environment agency, fisheries

agency, fish health labs, boating and fisheries patrol, local government, analytical laboratories and technical advice.

Media procedure

While all agencies should be provided with talking points, it is preferable that a Communication Manager should be identified/assigned to the fish kill, provided with talking points from the fish kill investigation team, and all media inquiries should be directed to that manager. It is desirable for all agencies involved to defer to one common communication manager as the only source of media releases.

Figure 2. Checklist for Responding to a Fish-Kill Incident



Sampling protocol

i. Check list (prior to leaving laboratory):

- Copy of Fish Kill Incident Log
- Fish kill kit: contents, expiry dates, safety info (dangerous chemicals?)
- Job Safety Analysis (Check list/Form?)
- Take: Chain of custody form, Interview record form
- Camera (unless already in the fish kill kit)

ii. Location

At the location of the fish kill complete relevant sections of the Fish Kill Incident Log

Description of the fish kill site:

- Location (longitude/latitude if possible)
- Access; what is adjacent land use? Draw map with location of sampling sites noted
- Estimation of number and size of aquatic animals involved
- All species involved and estimation of proportion of different species
- Proportion (or number) of dead fish
- Proportion (or number) of moribund animals
- Aquatic animals: External signs
- Other organisms present
- Water: Calm/choppy, flow rate, visible discharges, smell, colour, depth, temperature, water quality parameters (dissolved oxygen, pH, turbidity, scums/slicks, floating matter)
- Take photos
- Weather: Present and previous 24 - 48 hours
- Wind, rain (signs of recent), temperature
- Interview witnesses (interview record form)

iii. Minimum samples:

a. Pollution/environment

- Collect water samples from at least 3 points (at the kill site, upstream and downstream) for laboratory testing:
 - ✧ Nutrients
 - ✧ Heavy Metals
 - ✧ Sulphides
 - ✧ Phytoplankton
 - ✧ Pesticides
 - ✧ Sediment
- May also require upstream/downstream of any suspected pollution sources (which may all be upstream from the fish kill location)
- Record samples taken (Sample submission form)

b. Disease/biological

- Whole, live, moribund fish are preferable – place in clean water with aerator for transportation to laboratory
- Take photos

- Describe external lesions and signs (for example appearance of the eyes)

Alternatively, dissect aquatic animals (depending on fish size), take photos of internal lesions if present, and take samples, as aseptically as possible, from major organs:

- Gills
- Kidney
- Liver
- Spleen
- Heart
- Skin/muscle
- Gut
- Gonads from mature fish
- Brain

iv. Storage/preservation:

1. Fresh on ice for bacteriology, virology, molecular diagnostics (use transportation medium for tissues if necessary), toxicology
2. 70% ethanol or RNAlater for diagnostic Polymerase Chain Reaction (PCR)
3. <1 cm cube placed in formalin (1:10 tissue weight: formalin volume) for histological procedures (can be reprocessed for Electron Microscopy - EM) – dangerous goods transportation form
4. frozen samples are only useful for toxicant residue analysis (toxicology), gills are the best organs to analyse for suspected toxicant

v. Laboratory contacts/Sample transport:

- Contact diagnostic laboratory to inform incoming samples (communication log form; chain of custody form)
- Complete sample submission form
- Reconfirm transport arrangements as needed (emergency transport procedure form; dangerous goods transportation form)

Reporting

i. Initial

- Fish Kill reported to relevant agencies, including Department of Fisheries, Department of Environment, Department of Health
- Complete record of initial report in Fish Kill Incident Log (name, title and contact details of caller) - **Form 1.2**
- Complete all sections of Fish Kill Incident Log/chain of custody forms etc - **Form 1.5**
- Sample submission forms as required by receiving diagnostic/analytical laboratory
- Copies to Fish Kill Incident Coordinator, Registry
- Fish Kill Incident Coordinator to contact key agencies

ii. Up-dates

Interim Reports prepared when new significant results obtained and forwarded to all relevant agencies

iii. Post-investigation

- Post result analysis prepared for Formal Diagnostic Report
- Diagnostic Report with conclusions to relevant agencies
- Media release sent to stakeholders

iv. De-brief

- Incident debriefing conducted with all relevant agencies
- Actions identified to prevent further deaths implemented
- Follow-up monitoring and reporting until event is resolved
- Actions to improve response, investigation, communication and clean-up in the future

v. Stand down

- Formal closure of the event based on final report and actions
- Recording of summary data on database

Appendices

Appendix A

Forms (examples from Qld and WA)

- 1.1 Summary of the Chain of Paperwork**
- 1.2 Fish Kill Incident Log**
- 1.3 Communication Log**
- 1.4 Job Safety Analysis Form**
- 1.5 Chain of Custody Form**
- 1.6 Interview Record Form**
- 1.7 Incident Coordinating Officer Check List**

Appendix B

Basic Fish Kill Kit Contents

Appendix A

1.1 Summary of the Chain of Paperwork

Documentation	Purpose
1.2 Fish Kill Incident Log	To record the initial report details on and take to the site survey to amend the given information to reflect the actual current situation
1.3 Communication Log	Record all phone calls related to the kill
1.4 Job Safety Analysis Form	Ensure you have assessed the risks and have the required equipment
1.5 Chain of Custody	To sign and send with a copy of the all of the paperwork with the samples to the Fish Health Laboratory
1.6 Interview Record Sheet	To take witness accounts on Site
1.7 Incident Coordinating Officer Check List	To ensure all tasks have been completed and that all parties have been informed

1.2 Fish Kill Incident Log

FISH KILL INCIDENT LOG

Report received by

Department/Region _____

Date _____ **Time** _____

Received From

Address

Phone (H)

Phone/Fax/Mobile(W)

Email

Record the name, address and contact number(s) of the original observer if different to above.

Provide details of any other person(s) who observed the fish kill incident?

Person 1 sampling the site:

Name:

Contact details:

Person 2 sampling the site:

Name:

Contact details:

Location of fish kill (Try to provide cross roads, distances and accurate reference points)

Type of waterbody

marine estuarine fresh

running still

When was the fish kill first observed?

Date _____ **Time** _____

Is the fish kill still occurring?

How can the site be accessed?

**WHAT IS THE ADJACENT LAND USE
(LIVESTOCK/CROPS/HOUSES/INDUSTRY/SPORT GROUNDS)?**

Draw or attach a map of the area on the following page indicating:

- 1. The sites at which you sampled (usually 1, 2 and 3).**
- 2. Indicate photographs taken and the direction**
- 3. Landmarks**
- 4. Direction of water flow, including any discharge**
- 5. North arrow**
- 6. Vegetation**

MAP OF THE AREA

HOW MANY FISH ARE DEAD OR AFFECTED?

Area/length	Number dead	Species or Common Name	General Numbers for Different Sizes of Dead Fish i.e. Total Length (snout to tip of tail) x Number Fitting in General Size Categories

If live fish are present describe their behaviour

What is the condition of the dead fish?

- Bleeding
 Fresh
 Slightly decomposed
 Very decomposed
 Unusual colour
 Lesions
 Injuries
 Abnormalities

Details:

Are any other organisms affected?

Weather observations now:

Wind _____ Rain _____ Temperature _____

Weather observations 24 - 48 hours previously:

Wind _____ Rain _____ Temperature _____

Water observations now:

Smooth/Rough _____ **Turbidity/Colour** _____

Current/flow rate and direction:

Visible discharges: _____

Floating Matter _____ **Scums** _____

If any samples have been taken provide details (KEEP ADDITIONAL FROZEN SAMPLES)

SITE 1 SAMPLE DATA SHEET

SAMPLE	TICK SAMPLES TAKEN	DATE	TIME	COMMENTS
<i>Eg. nutrients</i>	√	<i>1/11/01</i>	<i>11:00am</i>	<i>Water cloudy</i>
HEAVY METALS (Fill to neck only)				
NUTRIENTS (Fill to neck only)				
PHYTOPLANKTON (Fill to neck only)				
SEDIMENT (Fill to 2/3 only)				
SULPHUR (Fill to TOP)				
GENERAL WATER SAMPLE (Fill to neck only)				
ORGANOCHLORINES/ ORGANOPHOSPHATES (Fill to neck only)				
FIXED FISH (Cardboard label in bag, open abdomen)				
FRESH FISH (Label)				
OTHER				

Please indicate the sampling method used for collection of water and sediment samples.

SITE 2 SAMPLE DATA SHEET

SAMPLE	TICK SAMPLES TAKEN	DATE	TIME	COMMENTS
<i>Eg. nutrients</i>	√	<i>1/11/01</i>	<i>11:00am</i>	<i>Water cloudy</i>
HEAVY METALS (Fill to neck only)				
NUTRIENTS (Fill to neck only)				
PHYTOPLANKTON (Fill to neck only)				
SEDIMENT (Fill to 2/3 only)				
SULPHUR (Fill to TOP)				
GENERAL WATER SAMPLE (Fill to neck only)				
ORGANOCHLORINES/ ORGANOPHOSPHATES (Fill to neck only)				
FIXED FISH (Cardboard label in bag, open abdomen)				
FRESH FISH (Label)				
OTHER				

Please indicate the sampling method used for collection of water and sediment samples.

SITE 3 SAMPLE DATA SHEET

SAMPLE	TICK SAMPLES TAKEN	DATE	TIME	COMMENTS
<i>Eg. nutrients</i>	√	1/11/01	11:00am	<i>Water cloudy</i>
HEAVY METALS (Fill to neck only)				
NUTRIENTS (Fill to neck only)				
PHYTOPLANKTON (Fill to neck only)				
SEDIMENT (Fill to 2/3 only)				
SULPHUR (Fill to TOP)				
GENERAL WATER SAMPLE (Fill to neck only)				
ORGANOCHLORINES/ ORGANOPHOSPHATES (Fill to neck only)				
FIXED FISH (Cardboard label in bag, open abdomen.)				
FRESH FISH (Label)				
OTHER				

Please indicate the sampling method used for collection of water and sediment samples.

Water Quality Measurements

	<u>Depth</u>	<u>Date</u>	<u>Time</u>	<u>Cond.</u>	<u>Temp.</u>	<u>pH</u>	<u>DO</u>	<u>Other</u>
<u>SITE 1</u>								
<u>SITE 2</u>								
<u>SITE 3</u>								

Physical Site Observations

<u>Type</u>	<u>Species</u> <i>If known, (or common names and/or description)</i>	<u>Alive</u>	<u>Dead</u>	<u>Present</u>	<u>Absent</u>
<u>Algae</u> <i>Eg. Blue-green scum, excessive seaweed</i>					
<u>Macrophytes</u> <i>Eg fringing veg, condition etc.</i>					
<u>Riparian- stream Vegetation</u>					
<u>Zooplankton & aquatic invertebrates</u>					
<u>Insects</u>					
<u>Other vertebrates</u>					

Person 1 sampling the Site

Signature _____ Date _____

PRINT NAME: _____

Person 2 sampling the Site

Signature _____ Date _____

PRINT NAME: _____

1.3 Communication Log

Contact Name/affiliation and details (eg phone number)	Time/Date	Communication Details

1.4 Job Safety Analysis Form

Tasks	Hazard Actual e.g. acid burn	Risk High, Medium, Low, Very Low Chance of Contact	Solution

1.5 Chain of Custody Form

Fish Health Case Number: (FISH HEALTH LAB ONLY)

Chain of Custody

<u>Your File Ref:</u>	<u>From:</u>	<u>Release Signature</u>	<u>Release Date</u>	<u>Delivered By (circle)</u> <u>Courier</u> <u>In person</u>
<u>Your File Ref:</u>	<u>To:</u>	<u>Receipt Signature</u>	<u>Receipt Date</u>	
<u>Samples handed Over</u> Water: Formalin Fixed Fish: Fresh Fish:				
<u>Your File Ref:</u>	<u>From:</u>	<u>Release Signature</u>	<u>Release Date</u>	<u>Delivered By (circle)</u> <u>Courier</u> <u>In person</u>
<u>Your File Ref:</u>	<u>To:</u>	<u>Receipt Signature</u>	<u>Receipt Date</u>	
<u>Samples handed Over</u> Water: Formalin Fixed Fish: Fresh Fish:				

1.6 Interview Record Sheet

<u>Name of Witness</u>	<u>Contact Number(s)</u>	<u>Address</u>	
<u>QUESTIONS</u>		<u>ANSWERS AND COMMENTS</u>	<u>Witness Signature</u>
<u>1. What happened? What did you observed?</u>			
<u>2. Who reported the incident?</u>			
<u>3. Where and what time did the event happen</u>			

1.7 Incident Coordinating Officer Check List

Incident Coordinating Officer Check List

- Fill in incident log sheet
- Contact and fax incident log to Incident Site Office
- Notification of key stakeholders
- Establish communication with regional officers and determine sampling and safety
- Deploy Response Officers for on-site survey
- Communicate with key stakeholders
- Construct a report on the incident
- Prepare a media release
- Conduct an incident debrief (everyone)
- Summary data recorded on fish kill database

Special Instructions

Appendix B

Basic Fish Kill Kit Contents
Recommended Contents Check List
Brisbane Workshop 28-29 April 2005

1. *Information*

- Contents Check List
- Check List for each activity to be done in kit
- Sampling Protocol
- Records of: Phone calls and other communications
 Site log
 Waterproof notebook
 Chain of custody form(s)
- Contact person list
- Camera(s) (digital and note caution with expiry of film)

2. *Fish Diagnostics*

Sampling

- Fresh Fish - Live fish moribund taken quickly to lab if close/possible otherwise bagged, labelled and put on ice
- Plastic Bags
- Aluminium foil
- Esky
- Waterproof labels
- Pen/pencil
- Ice bricks (pre-frozen)
- Sample containers
- Aerator
- Batteries/12v? (for aerator)

Fixed Fish

- Formalin working solution
- Packing tape
- Containers
- Disposable gloves

3. Collection Equipment

- Telescopic scoop net with average mesh size
- Fish Identification manuals/photo sheets
- Bucket with lid
- Ruler/fish meter board
- Knife
- Dissection kit

4. Water sampling

- Sampling beaker to go on pole
- Solvent washed bottle for water x6
- Acid washed bottle for water x6
- Lugol's Iodine and container x6 (approx 1-5 mls per 100 ml water sample for phytoplankton)
- Plastic bottles for nutrient sampling

5. Sediment sampling

- Solvent washed bottle for sediment x6
- Acid washed bottle for sediment x6

6. Shipping documents

7. Cleaning equipment and disinfection (eg Decon90 or Virkon tablets)

8. Environmental monitoring

- Thermometer
- DO bottles – Winkler reagent
- pH strips

9. Safety

- Safety glasses
- Apron
- Sharps container
- Eye wash bottle
- Disposable latex gloves
- Thicker nitrile gloves
- MSDS
- Sunburn cream
- Dust mask (of appropriate class)
- First aid kit
- Disposable overalls (water proof and/or splash proof)
- Subject to suitability of working solution of formalin
- Risk assessment needs to be undertaken before the investigation and reviewed on site

NOTE:

Training – prerequisite

Consider breaking kit into 2 if heavy or awkward i.e. Pt1 and Pt2

Appendix 4: Brief for Fish Kills Workshop

Background

Through the Australian Government's "Securing the Future - Protecting our Industries from Biological, Chemical and Physical Risk" initiative, DAFF has provided some funding for a workshop on fish kill investigation and reporting in Australia. The workshop will be conducted as a part of FRDC project 2005/620. The project objectives are:

1. To improve investigation and reporting of major fish kills in recreational and capture fisheries
2. To publish national investigation and reporting protocols for fish kills in recreational and capture fisheries

The Fish Kill Investigation Workshop will be held on 28 April 2005, 8.30 am to 5 pm, in Brisbane at the Rydges South Bank.

Workshop objectives

- to provide a basis for improvement of investigation and reporting of major fish kills
- to agree on a draft protocol covering minimum requirements for investigation of fish kills

Workshop outcomes

The outcome of this workshop would be agreed minimum requirements for fish kill investigation and reporting. Existing resources, contact people, current procedures will be documented as a result of this workshop.

Workshop outline

8.30 am - welcome and agenda

8.45 am - Current efforts - presentations from each State on the current protocols of fish kill investigations (15 minutes each)

QLD - Munro Mortimer

NSW - Allan Lugg/Matt Landos

VIC - John Williamson

TAS - Kevin Ellard

SA - Marty Deveney

WA - Tom Rose

NT - Paul de Lestang

10.30 am - coffee break

11.00 am - Sharing responsibilities - collaboration within and between States (Mark Crane, AAHL)

11.30 am - Forensic evidence and legal issues (Alan Girle QLD)

12.00 pm - OHS issues in fish kill investigation (Kylie Freeman WA)

12.30 pm - lunch break

1.30 pm - group discussions

3.30 pm - coffee break

3.45 pm - presentations from the groups, discussion, identification of next steps to improve fish kill investigation

4.45 pm - Conclusions

5.00 pm - close

Appendix 5: Workshop Participants

1. Robyn Morisset, Facilitator
2. Barbara Nowak, University of Tasmania
3. Mark Crane, CSIRO
4. Joanne Slater, CSIRO
5. Nick Moody, QLD DPI
6. Tom Rose, WA EPA
7. Allan Lugg, NSW DPI
8. Marty Deveney, PIRSA
9. Helen Croft, PIRSA
10. Paul DeLestang, NT Fisheries
11. Kevin Ellard, Tas DPIWE
12. Kylie Freeman, WA Fish
13. Graham Creed, Native Fisheries
14. Munro Mortimer, QLD EPA
15. Rupert Woods, Australian Wildlife Health Network
16. Alistair Herfort, DAFF
17. Paul Hillier, WA Fisheries
18. Jane Frances, NSW Fisheries
19. Tiina Hawksford, QLD DPI
20. Simon Bewg, QLD DPI
21. Roger Chong, QLD DPI
22. Matt Landos, NSW Fisheries
23. John Williamson, VIC EPA
24. Mehdi Doroudi, VIC DPI
25. Kylie Porter, QLD EPA
26. Alan Girle, QLD EPA



Appendix 6: Workshop Notes

Topic 3: Communication

Guidelines for National Communication Plan for Fish Kill Incidences

I National Hotline

Issue debated the views ranged from "just another number" to a valuable referral procedure to get caller to inform local State lead agency (call to call centre then diverted to relevant state agency)

Have State responsible for reporting incidences to Commonwealth.
Some States already have hotlines so there is no need for a National Hotline.
(This point was later deleted.)

II State Databases:

- identifies hot spots
- identifies causes
- records frequency
- has information on species and biology
- indicates trends
- information for forensic investigations
- contribute to national fish health status reporting
- GIS references (if possible)
- quality controlled/quality assured
- share access to information

No need for a National Database

III Develop a Glossary of Common Terms

IV State Protocols are noted and the national protocol guideline sets the minimum standards. National protocol encourages agreement within states to have a lead agency and supporting agencies to minimise fragmentation (MOU between agencies if required).

National protocol needs a communication component with designated roles and responsibility.

V National Monitoring and surveillance

Very complex but important for information to be communicated.
(This point was later deleted.)

VI Training (in communication obligations) needs to be included in any protocols. WA is available as training provider.

VII Community Awareness, Education and Involvement

- web
- pamphlets
- posters
- communication plan

VIII Dedicated Fish Kill Coordinator

Should be responsible for communicating within State agencies and across States.

Topic 4: Resourcing

Commitment at Ministerial level to:

- Inter-agency delivery
 - MOU
 - service level agreement
- Protocols and Policies
- Core Funding (ie recurrent)
 - purchase of kits
 - maintenance of kits
 - analysis (laboratory costs)
- Increase awareness externally to get external funds

Fish Kill Kits

- Probes (DO, Salinity, pH) - Water monitoring capacity - proper resourcing regions
- (This point was later deleted.)

Training

- accredited (level IV certification in workplace assessments and training)
- refreshed (every 2 years)
- crisis management
- include Occupational Health and Safety training

Manual

- proformas
- (This point was later deleted.)

Monitoring/Surveillance Program

- Targeted
 - seasonal
 - "hot spots"
 - Include biological, physical and chemical aspects
- (This point was later deleted.)

National and State (National-compatible) database

(This point was later deleted.)

Improved Diagnostics and Predictive Capacity

Topic 5: Where to from here

Seek clarification from DAFF of their minimum requirements

Distribute workshop report (scope/justification)

Recommendations to AAHC

From AAHC to PISC

From AAHC to SCVOS

SCVOS progress these findings to other stakeholders involved

Focus on:

- decreasing response time
- maximise ability to determine cause
- clarify level of responsibility required
- deliver on commitments made from all of this

Determine what resources DAFF would offer to achieve the above - seek clarification

Key Recommendations

- be incorporated into AQUAPLAN
- if national protocol requires then become part of AQUAVETPLAN
- FRDC support

Q How do we get the agencies to work together / agree?

Working group to produce a document that justifies why ...

Driving document for achieving objectives

Objectives

1 Protect Ecosystem Health

2 Monitor Ecosystem Health using National Database to monitor:

- Environmental Compliance
- Disease

3 Protect Trade

4 Protect Habitats and Biodiversity

5 Protect Human Health

6 Protect Environmental Amenities

New technologies

- diagnostic
- predictive model
- overcome remoteness eg broadband / helicopter
- epidemiological analysis of existing data

Appendix 7: Database Examples

Microsoft Access

File Edit View Insert Format Records Tools Window Help

Fish Kill Report

Name: Johnston, Nathan Date report received: 11-Feb-03 Date of fish kill: 11-Feb-03
 Ref No: 234 Time report received: 12:00 Time of fish kill: 9:30

Fish Kill Information

(a) Did the person providing the information observe the fish-kill personally? Yes No Extra Information
 (b) Did any other person(s) observe the fish kill? Yes No Extra Information

Site Information

EPA Region: Central
 Shire: Rockhampton
 Waterway: yeppen lagoon
 Site within waterway: along the road going towards the rugby grounds
 Water Type: Fresh
 Water Movement: Still
 Latitude:
 Longitude:
 Access: Foot
 Other - specify: Foot
 Landuse: Residential, livestock
 Other - specify: Residential, livestock

Conditions

Wind Now:
 Rain Now:
 Temp Now (°C):
 Water Surface: Smooth
 Turbidity: very turbid
 Colour: brown
 Current: nil
 Discharges:
 Floating_matter:
 Scums:
 Sediment:
 Sediment Colour:
 Sediment Comments:
 Were samples taken? No
 Details of samples:
 Weather - previous 24 hours
 Wind:
 Rain: 200mm
 Temp (°C):
 General Comment:
 Caller Info On-Site Survey Species Info

Search New Fish Kill EXIT

Form View FLTR

Start Queensland stuff Document1 - M... ATTACHA.DOC... ATTACHB.DOC... Fish Kill Report 11:56 AM

Microsoft Access

File Edit View Insert Format Records Tools Window Help

MS Sans Serif 8 B I U A
 On Site Survey

On-site Survey Report

Date survey started: 6/04/2003
 Time survey started: 14:00
 Date survey completed: 6/04/2003
 Time survey completed: 16:00

Analysis: Add Indicator

Indicator	Result	Units	Comment/site ID
Temperature	27	deg c	Rep 1
Temperature	27.5	deg c	Rep 2
Temperature	26.5	deg c	Rep 3
pH	6.8		Rep 1
pH	6.63		Rep 2
pH	6.69		Rep 3

Record: 1 of 9

Reasons for delay or difficulty in commencing survey:
 Presumptive diagnosis of cause of fish kill: Chemical used by sunwater to kill an aquatic weed has also killed fish
 General Comments:
 Action Taken: sunwater were contacted in relation to the cause of the fishkill. EPA are awaiting a response
 List of attachments to this report:
 Primary diagnosis: Contamination by chemicals
 Add Diagnosis

Close Window

Date on-site survey started FLTR

Start Queensland... Document1 ... ATTACHA... ATTACHB.D... Document7 ... On Site Su... 12:01 PM

Appendix 8: CD-ROM Contents

Fish Kill Workshop Presentations:

A. Current efforts - presentations from each State on the current protocols for fish kill investigations (15 minutes each):

- Queensland - Munro Mortimer
- New South Wales - Allan Lugg/Matt Landos
- Victoria - John Williamson
- Tasmania - Kevin Ellard
- South Australia - Marty Deveney
- Western Australia - Tom Rose
- Northern Territory - Paul de Lestang
- Sharing responsibilities - collaboration within and between States (Mark Crane, AAHL)
- Forensic evidence and legal issues (Alan Girle QLD)
- OHS issues in fish kill investigation (Kylie Freeman WA)

B. Current Fish Kill Protocols provided by:

- Murray-Darling Basin Commission
- New South Wales
- Northern Territory
- Queensland
- Victoria
- Western Australia



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