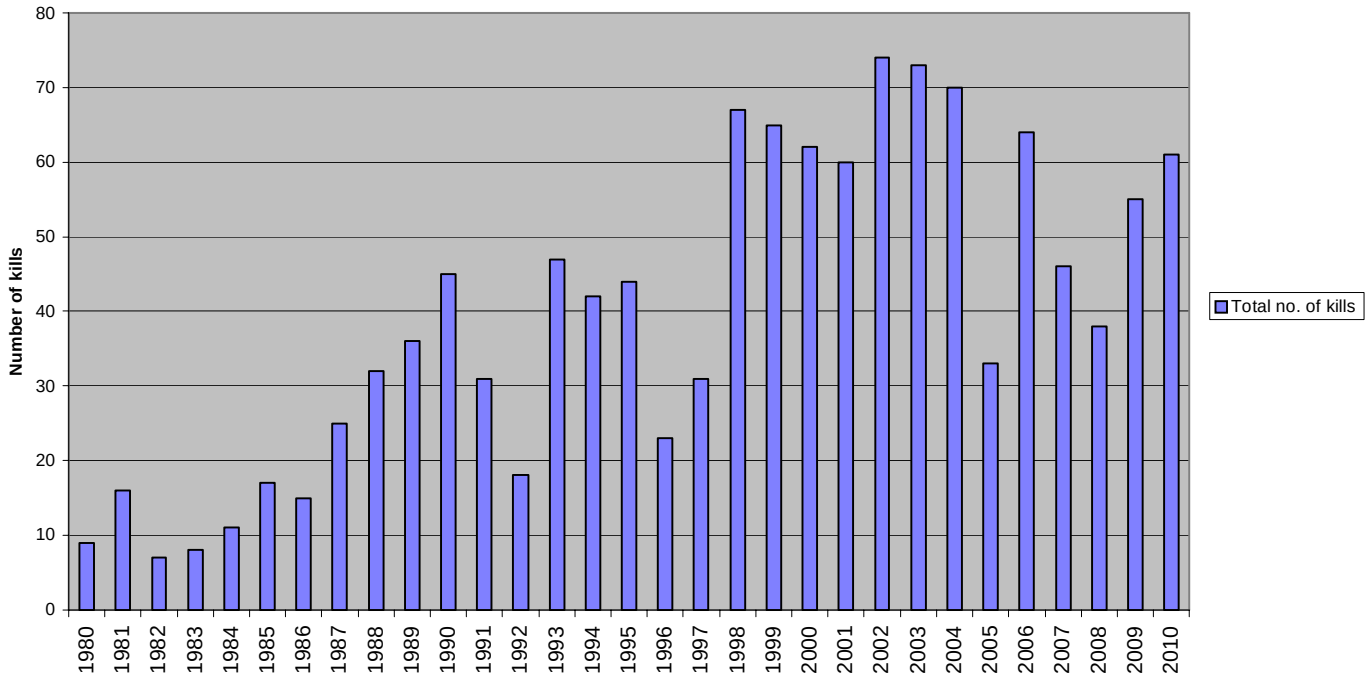
Fish Kills in NSW

Frequently Asked Questions

What is a 'fish kill'?
A fish kill is a sudden and unexpected mass mortality of wild or cultured fish. Fish kills can generate considerable public and media interest and concern as they are often perceived to be the result of water pollution. However there are many causes of fish kills and often they are caused by natural events.

How many fish kills occur in NSW each year?
The Department of Primary Industries (Fisheries) (DPI) maintains a statewide database of reported fish kills in NSW. It contains almost 1400 records dating back to the early 1970s. A review of the data shows that since 1980 an average of 40 fish kills are reported to DPI each year (see Figure 1 below). Since many smaller kills go unnoticed and others remain unreported, the real number of kills is considered to be larger. However, increasing community awareness and improved reporting arrangements are likely to result in less fish kills going unreported and will also assist DPI to gather more information on the extent and causes of fish kills in NSW.

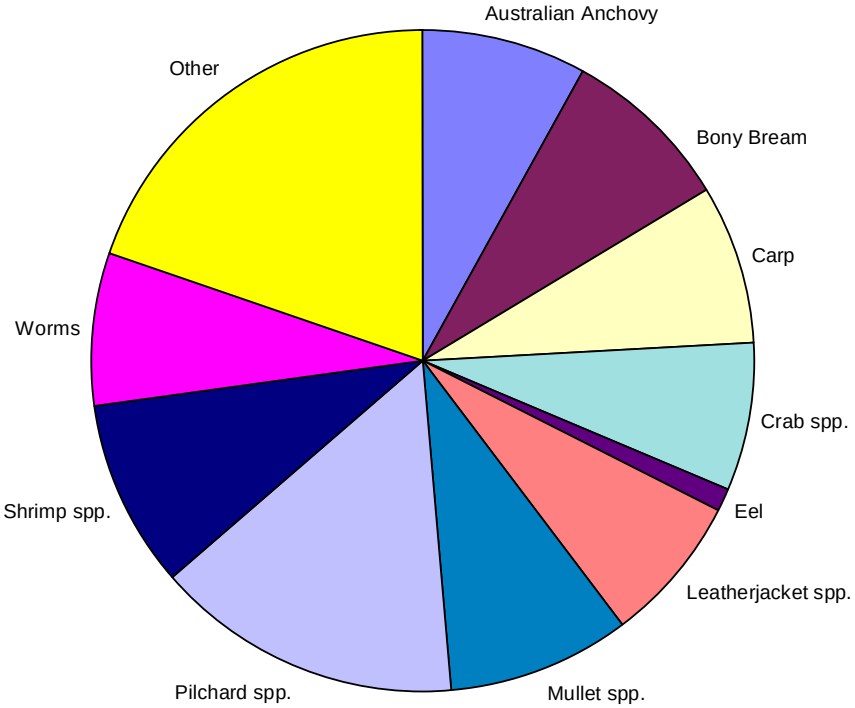
Figure 1 Total Number of Fish Kills recorded for each calendar year from 1980 to 2010



What species of fish are affected?

Over 100 species of fish, including finfish, molluscs and crustaceans, have been reported in fish kills in NSW since records began. The species most frequently observed and reported as being affected by kills include mullet, European Carp, Bony Bream, shrimp and leatherjackets. There have also been large fish kills of pilchards, Australian Anchovy, worms, Pipis and oysters (see Figure 2 below). Hardy species such as mullet and carp appear to be susceptible to fish kill events because they often occupy marginal habitats that are periodically subject to environmental influences which exceed the tolerance limits of these species.

Figure 2 Species affected



Where do fish kills occur?

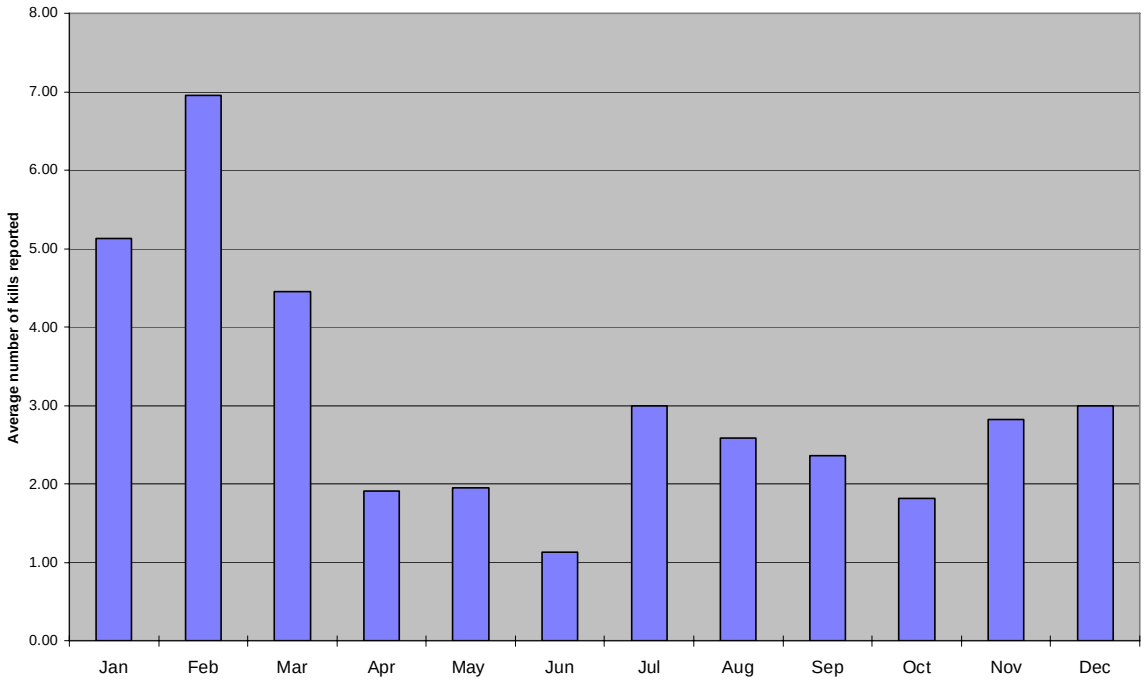
Fish kills can occur anywhere in NSW waters. Data collected over the last 30 years suggest that freshwater and estuarine areas are equally affected by fish kills (each area contributing approximately 45% of all kills) whilst oceanic marine waters contribute to approximately 10% of all events.

Areas in NSW where fish kills have been reported most frequently include the Richmond River, Murrumbidgee River, Lake Macquarie, the Hawkesbury River and other rivers and estuarine areas in the Sydney metropolitan area.

When do fish kills occur?

Fish kills can occur at any time of the day and in any month of the year. However, data indicates that fish kills are more likely to occur in summer during the months of January and February (see Figure 3 below). This is likely to be due to the generally higher water temperatures (and consequently lower dissolved oxygen levels), more frequent severe and sudden storm/flood events, and generally lower water levels in freshwater river systems during these months.

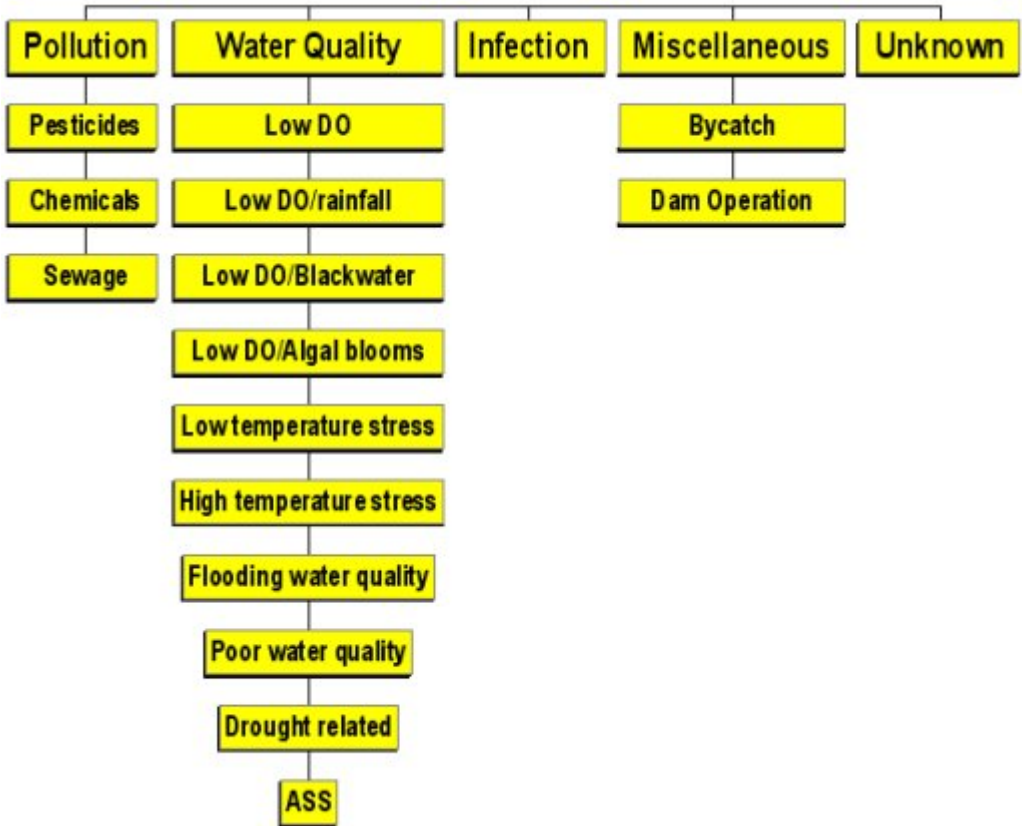
Figure 3 Reporting Rate - average number of kills per month for the years 1970 to 2010



What causes fish kills?

There are a range of causes of fish kills which are summarised below (see Figure 4). Fish kills are generally associated with water quality changes, pollution, infection, associated directly with human activities or a combination of causes. However, in almost half of all reported fish kill events the cause is unknown.

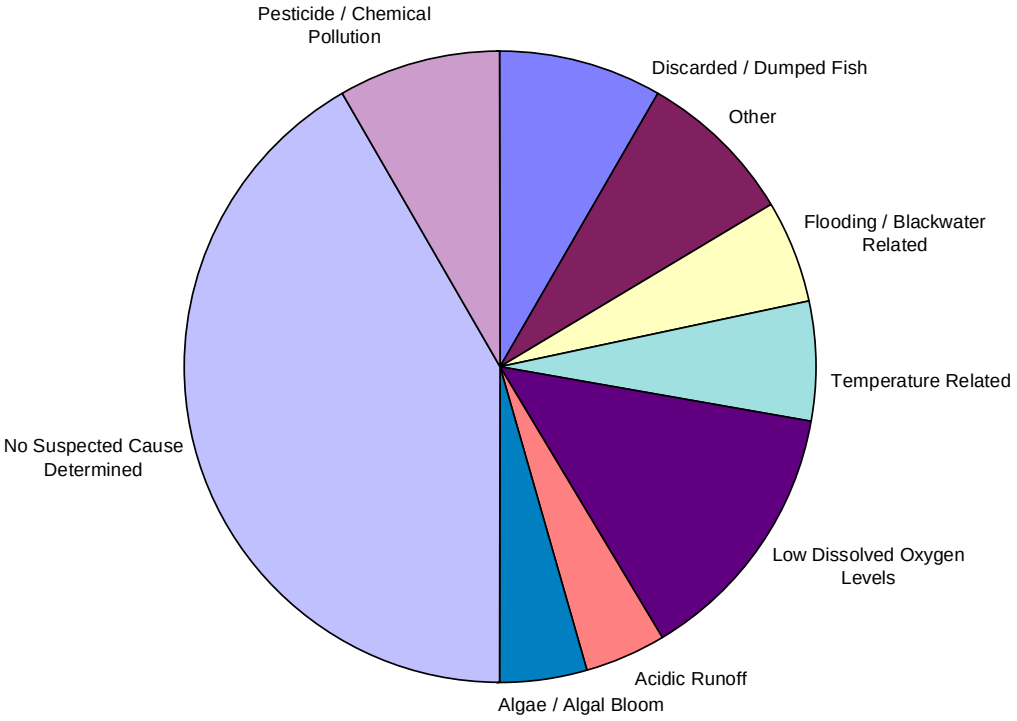
Figure 4 – Causes of Fish Kills in NSW



Note: DO = dissolved oxygen. ASS = acid sulphate soils discharge

No identifiable cause was reported for 38% of the fish kills in NSW over the last forty years (1970-2010). Of those where a suspected cause was reported, the main causes were low dissolved oxygen levels (e.g. caused by bushfires, flood events, decaying vegetation matter - 18%), pesticide/chemical pollution (8%), high or low temperatures (6%), algae and algal blooms (4%) and acidic runoff (4%). There are also a significant number of incidents attributed to dumping of waste fish or bycatch (8%) (see Figure 5 below). Other known causes of fish kills include drought conditions, disease/infections, estuary breakouts to the sea, sewage discharges, strandings and dam releases. A large percentage of fish kills are caused by several factors acting together (e.g. poor water quality due to industrial or urban pollution predisposing fish to high levels of stress, disease or a sudden temperature shock).

Figure 5 Suspected causes of fish kills



Three main factors play a major role in fish kills:

- environmental factors (e.g. salinity, temperature, acidity levels, dissolved oxygen levels),
- toxicants/pollutants, and
- infection with disease pathogens.

Fish kills can be due to a single factor acting alone, or two or more of these factors interacting together.

Fish kills are usually the result of sudden events or changes in the local environment. As far as possible, fish will avoid adverse environmental conditions and swim to another area to avoid harm. However, if the entire or a large proportion of the waterway is affected, or the adverse conditions appear very rapidly, then fish are unable to relocate and a fish kill often results. Fish are therefore generally more susceptible to fish kills in smaller sized waterways (such as dams, isolated ponds, residual pools or smaller creeks). Tides and prevailing winds and currents can also isolate and concentrate fish populations in parts of estuaries and larger waterways which may expose them to higher risk of fish kills when conditions deteriorate.

Why do fish die from low dissolved oxygen (DO)?
Low levels of dissolved oxygen (DO) can cause stress (and even death) to fish and other aquatic animals which rely on oxygen in the water to breathe.

DO in water comes from both the atmosphere (by exchange across the air-water interface, mostly from wind and wave action or agitation during flows over riffles or water falls in streams and rivers) and is released by aquatic plants via photosynthesis. The normal range for water is between 6-8 milligrams per litre (mg/L). However, this does vary between coastal and inland rivers and estuarine and marine waters.

Most aquatic animals, including fish, extract the oxygen they need from the water through their gills. Very low levels of DO will cause suffocation and death of aquatic animals. It is not necessary for the water to become completely deoxygenated for a fish kill to occur. The critical minimum level varies with different species and different physical conditions, but as a general guide, few fish species will tolerate prolonged exposure to DO levels below 3 mg/L.

Larger and more active fish species, such as Murray cod, tend to become stressed and/or die first due to their greater oxygen requirements. The main response by fish to lack of oxygen is gasping at the surface. This behaviour is an attempt to force air across the gills and some species (e.g. European Carp) can survive in this way for hours. Others, however, will die quickly under low oxygen conditions, and the gasping does not substantially prolong their life. However, gasping at the surface may also be due to gill damage caused by toxic microalgae, pesticides or parasites. In low DO conditions crayfish and crabs are often observed leaving the water and shrimp are often seen near the water's edge.

A fish kill that effects only the more oxygen-sensitive species is likely to be due to partial deoxygenation of the water. A total kill of all species could be due to severe deoxygenation, but other causes are also possible. Cool water usually contains a greater concentration of DO than warm water with the result that deoxygenation induced deaths are often associated with a rise in water temperature.

Fish killed by oxygen depletion (low DO) often exhibit three symptoms - a wide open mouth, flared gills and a bent back head.

What causes low dissolved oxygen (DO) conditions to occur?
Depletion of DO in water can lead to a fish kill. However, the actual cause of the fish kill is the factor/s which caused the depletion of the oxygen levels in the water in the first place. Often low DO is due to the increased use of the dissolved oxygen in the water column by living organisms other than fish (e.g. aquatic plants, algae, bacteria). Overcrowding of fish will also deplete the dissolved oxygen levels.

Factors that may lead to deoxygenation of waterways include:

- Excessive plant growth - plants produce oxygen by photosynthesis under conditions of strong light, but also continually consume oxygen by a process known as respiration. This applies to all plants, whether phytoplankton (microscopic algae suspended in the water) or vascular plants (such as reeds). At night or on dull days, consumption of oxygen exceeds production and a progressive removal of dissolved oxygen from the water column results. DO levels will generally reach a minimum just before dawn. Low DO mainly occurs during the warmer months, when dense growths or "blooms" of phytoplankton ("green water") are more prevalent, and when the oxygen saturation value (the amount of oxygen that can be dissolved in the water) is lower. If calm weather prevails and re-oxygenation from wind rippling does not occur, DO levels can fall to dangerously low levels.

- Rain - heavy or prolonged rainfall often results in extensive surface runoff, which can carry large loads of biologically active matter such as animal manure, fresh or decomposing plant material or organically rich soil into a waterway, where rapid bacterial decomposition occurs. The decomposition process creates a high Biochemical Oxygen Demand (BOD), which then results in very low levels of DO in the water column. Fish kills from this cause most often occur in enclosed bodies of water such as farm dams, small lakes or billabongs.
- Floods and black water - decomposition of biologically active material can also occur when floods inundate areas that are heavily vegetated (e.g. back swamps) or areas with high levels of other biodegradable material (e.g. animal manure, green immature crops and even large amounts of leaf litter). Fish kills will generally occur on the flood recession as deoxygenated water on the flood plain drains back into the main stream where the majority of fish are living.
- Fish deaths have also occurred in waterways where a section of 'black water' (so named because of the water discolouration caused by the high level of dissolved tannins and lignin from decomposing organic matter) moves downstream at the beginning of a flood. Black water usually occurs in flooded wetlands or floodplains which have large accumulations of organic material, or occurs in rivers and creeks if large amounts of leafy or woody material are washed in from storms. The two most important factors influencing the development of black water are water temperature and the amount of carbon (i.e. leafy litter and woody debris) present. Black water events are often the result of increased amounts of rapidly decaying organic material entering waterways combined with rising air and water temperatures.
- Sediment disturbance - still, quiet waters (e.g. lakes and billabongs) that contain large quantities of aquatic vegetation or have excessive nutrient loads (from sewage, farm or industrial wastes) can accumulate thick, biologically active bottom sediments. If undisturbed, these sediments will remain in a reduced or stable state as insufficient oxygen is available for their full decomposition. Normally, the overlaying water remains well oxygenated and aquatic life is not adversely affected. However, if these sediments are disturbed and mixed through the water column, then rapid deoxygenation will occur (due to increased Biochemical Oxygen Demand). When this occurs it is usually accompanied by a strong smell of hydrogen sulphide ('rotten egg gas') released from the disturbed sediments. Sediments in lakes, lagoons and billabongs can be disturbed and mixed by turbulence following heavy rain or the influx of flood waters.

What other water quality changes cause fish kills?

- Acid water - Acid Sulfate Soils (ASS) lie under many wetlands and floodplains adjacent to estuaries along the NSW coast. They can also be found in inland wetland and river systems. These soils contain high levels of iron pyrite which oxidizes to form sulfuric acid when it is exposed to the oxygen in the air or water. This interaction between ASS and oxygen most commonly occurs where wetland or floodplain soils are drained or excavated. Water trapped in drains can frequently be close to the strength of battery acid following prolonged dry spells. Rainfall can mobilize the sulfuric acid and transport it into adjacent waterways lowering the acidity of the waterway to lethal levels for fish. Acid water is often distinguished by its characteristic colour. It can range from a turquoise-bluish appearance, milky white, red and clear. This is caused by the acid water leaching metals such as aluminium and iron minerals in the soil. A pH level less than 4 will cause significant stress, if not kill most species of fish, while levels between 4 and 6 will be stressful and may predispose individual fish to diseases such as 'Red Spot' or Epizootic

Ulcerative Syndrome (EUS). Acid water runoff can also be generated from abandoned or derelict mine sites and poorly managed operating mines.

- Water temperature - changes in water temperature, both rapid fluctuations and slow seasonal variations, can also result in fish deaths. Generally, these only occur at the limits of a species distribution (both geographical and altitudinal) where individuals are likely to be exposed to temperatures above or below their tolerance levels. Fish kills caused by rapid temperature changes are rare and generally only occur in small waterbodies that heat and cool rapidly. A sudden cold snap can occasionally kill native warm water species (for example, Golden Perch and Eel-tailed Catfish) in farm dams or small streams. Rapid temperature changes due to human activities in localised areas of larger water bodies (for example, discharges of cooling water from electric power generators or cold water from large dams) have been responsible for fish kills in some areas.

  Seasonal temperature changes can also result in fish kills. For example, warm water (greater than 27^0C) can kill trout. Cold water temperatures can kill fish species adapted to warmer water conditions. An example of the latter is the large number of fish (mainly Bony Bream) that usually die each winter in the lower Murray River. The affected fish, weak from thermal stress, become susceptible to bacterial and fungal infections that can eventually kill them.

- Salinity - rapid changes in salinity levels (for example, where a major storm causes a large inflow of freshwater into an estuary) can lead to fish deaths. Similarly, breaching of a coastal lagoon sand barrier allowing oceanic saltwater to rapidly fill a lagoon can affect fish that have slowly become acclimatised to low salinity levels. Salinity increases as a result of evaporation of water in coastal and inland lakes, can also cause fish kills.

- Toxic algae – some microscopic algae (e.g. dinoflagellates) contain substances which are toxic to fish. The algae may persist in the waterway for years with no affect, but a sudden change in water temperature or other disturbance can cause the toxins to be released. Blooms of these algae are termed Red or Mahogany tides. The fish may appear to be asphyxiating even though dissolved oxygen levels are adequate.

Are many fish kills caused by pollution?

Contrary to popular belief, direct pollution of waters with chemicals or other substances is a relatively uncommon cause of fish kills. Only 8% of reported kills in NSW are attributable to this cause although it can be the most significant cause in metropolitan areas such as Sydney. However, the sublethal effects of pollutants are a cause for concern. Exposure to toxic substances may not result in immediate fish kills, but may affect fish populations by decreasing fecundity (number of eggs produced), reducing the viability of sperm, eggs and larvae, decreasing life expectancy, increasing the incidence of abnormalities and increasing natural mortality.

From its effects on aquatic life, pollution can be conveniently divided into three types: physical pollution, industrial chemicals and agricultural pesticides.

- Physical pollution. This involves pollution by suspended solids such as coal washery waste, asbestos, paper or wood fibres. The gills of fish can be blanketed by layers of suspended solids preventing oxygen uptake. Mechanical damage due to sharp, angular particles can also seriously impair gill function. Fish kills from physical pollution are rare in New South Wales.

- Industrial chemicals. Most fish kills caused by these agents result from accidental or deliberate short-term releases of chemicals, often into stormwater drains. Some very

large kills have resulted from this form of pollution. Fish are usually killed by direct poisoning, although acid or alkali releases can change the pH (the acidity of the water) so greatly that this may be the cause of the fish kill. The release of chemicals is often difficult to observe directly and since the source is often difficult to trace, prompt observation and reporting of the kill is necessary if industrial pollution is suspected. Discharge of chemicals (accidental or deliberate) is a violation of the *Protection of the Environment Operations Act 1997*, and the Office of Environment & Heritage (OEH) should be notified immediately (Ph: 131 555).

- Agricultural pesticides. Herbicides and insecticides used in agriculture have been responsible for a number of fish kills to date. In some cases these have resulted from the use of endosulphans in cotton growing areas. Pesticides are often highly toxic to fish and may persist for long periods in dry soil, although many are degraded fairly rapidly (48 hours to 2 weeks) in water. They can enter waterways by overspray, wind-drift from aerial and ground spraying, washing of spray equipment in water bodies, deliberate dumping of out-of-date or empty drums into streams, release of irrigation tail waters and by runoff from recently sprayed land. There is little or no physical evidence of death resulting from pesticide toxicity and it is often difficult to prove pesticide contamination has caused fish deaths without water quality and/or fish tissue sampling.

Are fish kills caused by diseases or parasites?

Fish deaths can be caused by disease but infection is usually the result of other factors. The primary precursor to disease is stress from physical or chemical factors such as lowered water temperature, rapid changes in salinity, chronic pollution or crowded conditions. Under these circumstances, resistance to disease is reduced and the fish become susceptible to infection. For example, 'red spot' disease which regularly occurs in estuaries in northern NSW is often associated with post flood conditions and acid water runoff.

Diseases are unlikely to kill fish instantaneously, do not necessarily affect the whole population and rarely, if ever, affect all fish species to the same degree. Characteristically a fish kill due to disease will only affect one or two closely related species, occur over a period of days or weeks, and there will generally be some individuals that are only mildly affected or not affected at all.

Australia is relatively free of many of the major fish diseases present overseas. One that is present and frequently causes deaths of juvenile Redfin and sometimes juvenile Rainbow Trout is Epizootic Haematopoietic Necrosis (EHN) virus. Another viral disease is also thought to have been responsible for the death of millions of pilchards in coastal waters of southern Australia in 1995.

Even healthy fish will carry a low level of parasite infection in the gut, gills and flesh. Fish that are under stress due to other factors may have reduced resistance to parasite infection. Examination of fish from a kill may indicate large numbers of parasites, but it can be wrong to assume that this was the primary cause of death. It may simply indicate that the fish was living under marginal environmental conditions while some other factor caused its death.

Are fish kills an indicator of an ‘unhealthy’ waterway?

Clearly many fish kills are a natural phenomenon, often related to natural events (e.g. floods and drought) and normal environmental and weather cycles. There is therefore, little that can be done to prevent them and, in most cases, no serious cause for concern as the number of fish affected is insignificant in comparison to the total population size.

However, some kills are not natural events, being related to pollution of waterways, diseases, fishing bycatch and other human related activities. This is why it is important to investigate and gather data on significant fish kills so that the probable cause can be identified, especially if it appears that it is not due to natural causes or processes.

The occurrence of regular fish kills in the same waterway would indicate that there may be a problem with the normal function or 'health' of the waterway or catchment. In these situations Investigating and where possible taking action to remove or reduce the factors causing fish kills is paramount.

How do you determine the likely cause of a fish kill?

The causes of many fish kills are difficult to determine as they result in no external symptoms or signs, and the causative agents are often transitory. Normal conditions may re-establish within hours. Diagnosis of the likely cause is therefore often by inference or by piecing together a number of pieces of evidence. Determining a cause may well involve a process of elimination resulting in one or two potential causes remaining as high probabilities.

There are a number of simple observations that can be made to assist in the diagnosis of the likely cause of fish kills. These are described in the table below.

Observation	Likely Cause of Fish Kill
• Dead fish with mouths agape, gills flared and heads bent back. Gills are deep bluish - red in colour.	• Deoxygenation.
• Only 1 or 2 species of fish are affected when many more species are known to be present in the waterway.	• Partial deoxygenation of the water column is killing susceptible species. • A disease specific to those species may be responsible for the kill.
• Fish apparently died overnight and/or live fish are swimming at surface and gulping air, especially around margins of waterway and in the early morning.	• Deoxygenation due to respiration by abundant aquatic plants (may be microscopic algae or submerged macrophytes).
• Kill occurred after heavy rain or flooding.	• Rapid change in water quality parameters (eg. pH, turbidity, salinity, temperature) may be responsible.
• Kill occurred in estuary after heavy rain or flooding and smell of "rotten egg" gas is apparent.	• Release of hydrogen sulphide gas from sediments following lagoon breakout to sea.
• Kill occurred during/after period of extreme heat, **&** only heat intolerant species (eg trout) or those at the northern geographic or lower altitudinal limit of their distribution are affected, **&** kill occurred in a small water body (eg dam, pond, creek pool).	• Lethal high temperatures may be responsible.
• Kill occurred during or after period of extreme cold or frost, **&** only cold intolerant species or those at the southern geographic or upper altitudinal limit of their distribution are affected, **&** kill occurred in a small water body (eg dam, pond, creek pool)	• Lethal low temperatures may be responsible.
• Fish have obvious lesions on body.	• Disease (may be related to poor water quality).
• Dead fish infected with grey/white fungal growth.	• Fish have been dead for a number of days and have suffered from a secondary infection (*Saprolegnia*).
• Fish die over a reasonably long period of time.	• Disease.
• Sick or unhealthy fish are also present with the dead.	• A disease or toxin is responsible.

Observation	Likely Cause of Fish Kill
• Only small fish (less than legal length) of commercial and recreational species are affected or mainly non-commercial or non-recreational species are present. • Dead fish are not characteristic of that waterbody (oceanic fish in estuary). • Dead fish are of commercial and recreational species and size but exhibit obvious physical damage (net or hook marks).	• Discarded waste or bycatch from fishing operations.
• Dead fish have burst swimbladders.	• Explosives have been used in the water.
• Kill occurred in proximity to cooling water outlet.	• Lethal high temperatures may be responsible or some toxic substance has been released with the cooling water.
• Gas bubbles (often very small) visible on head or in fins (when held up to light) **&** kill occurred in vicinity of dam/weir outlet, or aeration device (eg in aquaculture ponds).	• Gas bubble disease.
• All species and size classes of fish expected to occur in the waterway are dead.	• Poison, pollutant or contaminant has entered waterway, **or** • Severe deoxygenation, • Toxic microalage
• The kill is confined to a relatively small section of waterway.	• Poison, pollutant or contaminant has entered waterway at one point and then dispersed or been diluted, **or** • Deliberate poisoning.
• Kill occurred in an estuary flanked by land that has flood mitigation works, **&** followed a reasonably major rainfall event which caused runoff from the land **&** estuarine waters now have a clear turquoise-bluish or white appearance.	• High aluminium and acidic (low pH) conditions associated with acid sulfate drainage.
• Deaths occurred in water that has reddish appearance.	• Dinoflagellate (red-tide) or • Iron from ASS water.
• Deaths occurred in water that has a black coloration.	• Black water (low DO) due to high lignin or tannin content from rotting vegetation.
• Kill occurred during or following flood recession.	• Receding floodwaters have carried large quantities of organic material into the waterway which has decomposed causing deoxygenation **or** • Deoxygenated water stored on the floodplain has re-entered main water body.
• Fish are washed up along the shoreline.	• Kill occurred some time previously or elsewhere and fish have been blown on shore, **or** • Fish have stranded themselves following predator attack, **or** • Fish have been discarded from shore.
• Fish all of one species (especially "prey" species such as anchovies, pilchards, yellowtail, frigate mackerel) and relatively uniform size.	• Stranding from predator attack.
• Kill occurred in water which has a greenish coloration with or without green scum.	• Toxins associated with a Blue-green algae bloom are responsible. • High levels of algae in water have contributed to deoxygenation
• Kill occurred in industrial area.	• Possible pollutants from deliberate discharge or accidental spill.
• Kill occurred in an urban area.	• Pollutants or sewage overflow has caused or contributed to kill.
• Kill occurred in agricultural/horticultural area where crops are grown.	• Possible pollutants or pesticides.

Who is responsible for managing and responding to fish kills?

DPI is the lead agency for coordinating the response to fish kill incidents in NSW. The Department has fish kill response kits located at many regional Fisheries offices which include water quality testing and fish sampling equipment to allow a rapid response to fish kill events.

DPI has developed a protocol with Office of Environment & Heritage (OEH) for investigating and reporting fish kills to increase our understanding of why they occur and to address their causes. Generally, DPI Fisheries Officers will investigate fish kills in non-metropolitan areas while OEH officers will investigate fish kills in the Sydney, Newcastle and Wollongong metropolitan areas. In many cases a joint inspection will be appropriate. Regardless of the location, OEH Officers are responsible for detailed investigation of kills which appear to be related to pollution events, hazardous chemical incidents or discharges from commercial or industrial premises.

The reasons why fish kills are investigated and where possible a cause determined include:

- there may be public health risks associated with a fish kill, especially where a disease is present within the fish population, or there has been contamination with some form of pollutant.
- a fish kill may be a sign of a fundamental problem with catchment health which needs to be addressed.
- there may be an opportunity for legal action against individuals or organisations for polluting a waterway.
- the kill may be due to a new disease organism and there is a need to implement quarantine measures or other treatments.
- understanding the cause of a kill may help prevent or reduce the chance of a recurrence. This is especially relevant in an aquaculture situation or where threatened species are involved.

Who do I contact to report a fish kill?

Fish kills in the wild should be reported to a Fisheries Officer, an officer of Office of Environment & Heritage (OEH) (http://www.environment.nsw.gov.au) and/or your local Council (http://www.dlg.nsw.gov.au).

Fisheries officers can be notified by phoning:

- the Fishers Watch 24 hour hotline 1800 043 536
- your local DPI Fisheries office, and ask to speak to a Fisheries Officer

What information should I provide when reporting a fish kill?
If possible, it is useful to provide the following information when reporting fish kills:

- Name of waterway (e.g. lake, river, creek) and catchment
- Precise location in waterway (name nearby roads or other landmarks)
- Area affected by the kill (e.g. estimated length of waterway in metres or area hectares)
- Numbers of fish affected (e.g. 10s, 100s, 1,000s)
- Condition and location of fish (e.g. dead, dying, gasping, on waters edge, floating in waterway, on bottom of waterway)
- Size of fish (estimate in centimetres) and if sizes vary or are all the same size
- Species of fish (if known)
- Type of habitat (e.g. marine, estuary, freshwater)
- Weather conditions prior to kill (e.g. temperature, wet or dry, windy)
- Date and time when kill first observed
- Any other general observations (odours, look and colour of the water, any other wildlife affected e.g. birds, frogs etc.)
- Suspected cause (if possible to estimate).

Don't forget to leave your name and contact phone number so an investigating officer can contact you again if required.

For larger fish kills (over 50 fish) it is also useful to take photographs or video of dead/dying fish so that species can be identified. If possible include a measuring reference in the photo (place a ruler, measuring tape, coin etc. next to some of the fish – ideally the largest and smallest specimen) to show sizes affected. If you can, also take photos/video of the waterway to show extent of kill (in area) and general condition of water and habitat in the vicinity.

For more information on reporting fish kills, read:

- Fish kill protocol 46.8 KB

What happens when fish kills are reported?
When a report of a fish kill is received, the investigating officer records the information on a Fish Kill Notification & Investigation Report (Part A) and alerts other relevant authorities as required (e.g. local council, Office of Environment and Heritage, Catchment Management Authority).

The officer will then decide whether a site investigation is warranted and if so who will undertake the inspection. This decision will be made following discussion with other DPI staff (e.g. local Conservation Managers, biosecurity staff, other agencies) and consideration of factors including: size of kill, sensitivity of the waterway, potential cause, species affected and potential public health and interest. Generally site inspections would occur when large numbers of fish are affected and the fish deaths are continuing, pollution or contamination of the waterway is suspected, rare or threatened species have been killed, and/or the site has high public usage.

One of the key factors to consider is how much time has elapsed since the commencement of the fish kill. It is therefore important to act quickly. Deoxygenation or 'slugs' of chemical pollution usually only occur for a few hours and the effects are rapidly

reduced by natural factors such as dilution or reoxygenation. It is therefore of little benefit (in many cases) to visit the site to take direct measurements of water quality, collect fish specimens, or collect water samples, if the fish have been dead for more than a day or so.

Following the site inspection, investigating officers will send any samples taken to laboratories for testing, and record the additional information obtained on the Notification & Investigation Report (Part B). The completed forms, photographs and the results of any laboratory analyses are then forwarded to the Department's Fish Kill Database Coordinator for inclusion in the state-wide fish kill database maintained by DPI.

Investigating officers will also brief other staff and agencies on the results of the site investigation and the likely cause of the fish kill, and assist with the preparation and issuing of any media releases on the fish kill.

Should I collect samples of fish or water for analysis?

The collection of samples of fish and water for laboratory analysis is best left to the investigating officer dealing with the fish kill, as this needs to be done using correct procedures and equipment and often with specialist advice. If samples are not collected, stored and transported correctly then this will affect the quality of the testing results. For example, dead fish cannot be submitted for disease diagnosis as any deterioration in the condition of the fish following death will confound the results.

Usually, water and fish samples are only taken for laboratory analysis for larger fish kills where the cause is unknown but could be related to a pollutant, disease or algae. Sampling is of most value if done during, or immediately following, a fish kill event where fish are still dying or recently dead. This provides the greatest chance of identifying the cause of the fish kill.

Can I collect and use the dead fish?

It is important to use a commonsense approach to fish kills. It is not advisable to handle or consume unhealthy looking fish which are gasping, sluggish, dying or already dead when you find them. Consumption or handling of discoloured or unhealthy looking fish may be a health risk due to their poor condition or possible disease or contamination.

Any person collecting dead or dying fish for bait or other uses must hold a current NSW General Recreational Fishing Licence (unless exempt) and the fish collected must comply with the relevant bag and size limit for that species (and the relevant zoning rules if within a marine park).

Should the dead fish from a fish kill be cleaned up?

As many fish kills are natural events there is usually no need for the dead fish to be removed or cleaned up and the decaying bodies should be left to provide food for other organisms. In most cases the carcasses will be gone within a few days.

For larger fish kills, where significant numbers of dead fish are causing a public health or nuisance from odours, local Councils are generally responsible for cleaning up and appropriately disposing of the dead fish.