Fish Kills & Algal Blooms

Factors contributing to fish kills
- Low dissolved oxygen: due to oxygen consumption associated with algal blooms, chemical demands, or poor mixing.
- Algal toxins: toxins produced by some species, under certain conditions.
- Contaminants: eg. hydrogen sulfide, carbon dioxide, ammonia, methane and other contaminants (e.g. metals).
- Physical irritants: suspended sediment, algal cells and bacteria interfere with fish gills.

Factors contributing to algal blooms
- Nutrients: food for algae; sources can be natural or include rural and urban inputs.
- Water temperature: higher temperatures promote growth and thus proliferation of algae.
- Reduced flushing: Nutrients more commonly accumulate in poorly flushed or mixed areas.

Common locations of blooms & fish kills
- In depositional areas (poorly flushed), e.g. lower catchments and near barriers.
- In conjunction with salt wedge (due to low oxygen condition at bottom).
- In urbanised or rural catchments.

Barriers to flow
- Barriers to flow create areas where organic material and nutrients accumulate (deposition areas).
- Barriers can also restrict the ability of biota to avoid poor water quality.
- Low Oxygen conditions often occur in deposition areas.

Micro & Macro Algae Blooms
- Algal growth requires nutrients and light. Higher temperatures can promote growth.
- Environmental effects from blooms include low oxygen (due to algae respiring at night), excess oxygen (due to algae photosynthesising during day), and the possibility of toxins produced by some species, which can affect biota.
- Social effects include odour and aesthetics.
- Excessive growth of aquatic macrophytes can also occur; having similar causes but minor negative environmental effects.

Common times for blooms & fish kills
- Spikes in nutrients (food for algae) and other contaminants often occur following rainfall (typically first flows of season). Flow stirs up sediment and washes contaminants in from the catchment.
- Summer is a common period as higher temperatures increase growth rate of phytoplankton and bacteria.

Low oxygen conditions typically occur in deeper or stratified areas, or around Barriers to Flow (poorly mixed). Salinity stratification is a common cause of reduced mixing in estuarine environments.

Low oxygen condition results in favourable conditions for breakdown of organic material by bacteria, which can reduce oxygen (due to respiration) and release bound contaminants.

Decay of organic material
- Effects from decay of organic material include low oxygen (due to growth of bacteria).
- Sources of organic material include vegetation, eroded soils and animal wastes from the catchment (natural, rural and urban sources) and large inputs following crash of Micro & Macro Algal Blooms.