FISHKILL

(CG LTJG GERALD L CORDERO)

The Bureau of Fisheries and Aquatic Resources (BFAR) said fish kill is sudden and significant mortality of either wild or cultured fish. It is also called "fish die-off," BFAR further defined fish kill as **the massive death of fish stocks** in a certain area due to unfavorable water quality parameters such as changes in salinity, temperature, acidity levels, dissolved oxygen levels of a certain aquatic environment that are intolerable or toxic to the fish stocks.

Fish kill may also be caused by biological diseases, detrimental anthropogenic activities, or weather conditions that affect a certain body of water. BFAR cited that fish kill can be caused by **various factors**. Some of these occur because of human activity, although around 50 percent of all kills around the world are due to **natural causes**. Natural causes may be infectious diseases, algal blooms, toxins from run-off water, or part of their natural life cycle. One of the most common causes that result in fish kills is algal blooms and the resulting water quality issues, such as low oxygen or the production of toxins.

Algae are microscopic plants in various forms, shapes, and colors. They are natural food and their abundance in the water is **one factor attributed** to the aquaculture business's success. Aside from being a food source for fish and other aquatic life, these algae provide dissolved oxygen through photosynthesis. The oversupply of nutrients like nitrate and phosphate makes the water very **eutrophic**, or in layman’s terms, very fertile. The algae can grow quickly with environmental conditions such as sufficient sunlight, high water temperature, and calm water. If these environmental conditions are sustained, algal bloom happens which appears like a thick green or blue-green soup.

Fish kills from pesticides, chlorine, gasoline, fuel oil, ammonia fertilizer, acids, and other toxic chemicals are **not as common**, but can occur. The risk of large marine oil spills, such as the Exxon Valdez oil spill (Peterson et al., 2003) and the Deepwater Horizon disaster (Crone and Tolstoy, 2010; Kerr et al., 2010), is often perceived as a threat to fish stocks. Very few studies have demonstrated increased fish mortality due to oil spills (Fodrie et al., 2014; Hjermann et al., 2007; IPIECA, 1997). Nevertheless, fish stocks may be especially vulnerable to oil spills close to the spawning grounds or egg and larval drift areas (Hjermann et al., 2007; Rooker et al., 2013). Fish eggs and larvae are typically vulnerable to toxic oil compounds due to their small size, poorly developed membranes, detoxification systems, and their position in the water column. When exposed to oil, adult fish may experience reduced growth, enlarged livers, changes in heart and respiration rates, fin erosion, and reproduction impairment. Fish eggs and larvae can be especially sensitive to lethal and sub-lethal impacts. Even when **lethal impacts are not observed**, oil can make fish and shellfish unsafe for humans to eat. Hence, there are no instances and events in which **fish ingestion** of oil causes direct mortality but may accumulate in their body and can instigate **tainting**.

Most often, shellfish and finfish either are unaffected by oil or are affected only briefly because most oils float and routes of exposure to organisms living in the water column or on the ocean floor are typically very limited. However, these animals can be substantially affected in some circumstances, especially when oil spills into shallow or confined waters. Even so, it was observed fish kills were caused by spills of light oils and petroleum products (such as diesel fuel, gasoline, and jet fuel) into shallow water. It was found that fish eggs in shallow water can be wiped out by an oil spill. Other habitats of concern for fish kills are in contained areas, such as lakes, lagoons, and some shallow-water nearshore areas, where spilled oil naturally concentrates.

Many shellfish species are relatively immobile and often are indiscriminate filter-feeders, which means they may be unable to avoid oil exposure. In addition, they don't possess the same suite of enzymes to break down contaminants as finfish and other vertebrates. Juvenile and adult finfish, on the other hand, usually are much more mobile, can be more selective in the foods they ingest, and have a variety of enzymes that allow them to detoxify many oil compounds. As a result, they are often better suited to limit oil exposures and related impacts.

The Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) **recommended** a continuous fishing ban on 21 March 2023 after traces of oil were found in fish and water samples from areas affected by the Oriental Mindoro oil spill. Dangerous pollutants were found in fish samples collected between March 3 and 14 from the municipalities of Naujan, Pola, Pinamalayan, Bansud, Gloria, Roxas, Mansalay, Bongabong, and Bulalacao in Oriental Mindoro. The DA-BFAR likewise found low-level contaminants or polycyclic aromatic hydrocarbons (PAH) in the fish samples which are harmful to humans and other living organisms and may accumulate in the fish meat over time.

In conclusion, though oil has an adverse effect on fish, a few dead fish floating on the surface of a pond, lake, or sea is not necessarily caused for alarm. Expect some fish to die of old age, injury, starvation, or even post-spawning stress. However, when **large numbers of fish** of all sizes are found dead and **dying over a long period of time**, it is necessary to investigate and determine the cause (L. A. Helfrich, 2009). Very often, dead fish can also be a "fish dump" or "bycatch discards" from net fishing, trawl fishing, or bait fishing may be mistaken for a fish kill (Solomon, 2009).

Further, extensive fish kills after oil spills have not been documented (National Research Council 1985). This is primarily because, in the open sea, toxic concentrations are seldom reached in significantly large areas and depths. moreover, adult fish are mobile and can avoid the oil. Avoidance behavior has been observed in salmon and cod exposed to oil (Ernst et al. 1989; Serigstad 1992). In coastal areas where oil can be trapped in shallow bays and inlets, toxic concentrations can build up to levels where adult fish kills can occur.

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