

NEW YORK STATE FISH MORTALITIES, 2009

- A Summary Report for Fishery Managers, Staff & Administrators -

Timothy L. Preddice
Biologist I (Aquatic)
Hale Creek Field Station
182 Steele Avenue Extension
Gloversville, NY 12078

Bureau of Habitat
Division of Fish, Wildlife & Marine Resources
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233

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Executive Summary

In 2009, a total of 90+ fish mortalities were reported in New York State. The total number (90+) of notifications for 2009 was about the same as the mean number (92) for the past 26 years. **More importantly, in 2009 there were only five pollution-caused kills and none were major, i.e. >10,000 fish.** The largest of these affected an estimated 2,000 fish, mostly minnows and suckers. About 90% of the notifications in 2009 were due to natural causes.

During 2009, the largest natural fish mortality reported, affected several hundred thousand (~500,000) menhaden in the Marine District. This kind of major attention-drawing fish mortality was caused by a combination of factors; low dissolved oxygen levels due to eutrophic conditions coupled with wind and tide factors, and the crowding of menhaden into dense schools by aggressive bluefish. Similar-sized menhaden mortalities have occurred in the Marine District during several previous years.

Of the 86+ freshwater notifications in 2009, three each affected thousands of fish. Two of these were caused primarily by winter cold water temperatures which affected low-temperature intolerant alewives (Canadarago Lake, Region 4) and gizzard shad (Bosket Lake, Region 7). Pathology reports found that the gizzard shad were also weakened by a severe *Trichodina sp.* infestation. The third and perhaps largest natural mortality affected “tens of thousands of smelt” in Lake Erie during August. This was probably due to a rapid temperature inversion that followed a period of strong eastward-blowing winds. Regions 3, 7 and 9 had the most reported notifications in 2009 with 24, 22 and 12, respectively. Other Regions had fewer than nine reports.

The five 2009 pollution-caused fish kills included only one more incident than in 2008, which holds the record for having the fewest number of pollution-caused kills. **Fortunately, the five 2009 pollution-caused kills affected a small estimated total of only 2,834 fish in Regions 2, 3 and 9.** Most (2,000+) of these were minnows and suckers killed by hypochlorite (bleach) during one July incident in Nauraushuan Brook, Rockland County. Other pollution-caused kills involved partially treated sewage, liquid manure, a suspected volatile compound and an oxygen scavenger chemical used to minimize oxidation in boilers.

During the past 26 years, the number of fish mortalities reported has ranged from a low of 49 in 2004 to a high of 147 in 1993, mean = 92 ± 21 . The 90+ mortalities reported in 2009 fall about mid-range. There appears to be a slight but unreliable trend towards fewer reported fish mortalities statewide but **there definitely is a strong positive trend for fewer pollution-caused fish kills.** This decline became most evident beginning in 1994 when the number of pollution-

caused kills consistently dropped to < 20 per year. With the exception of the 16 pollution-caused kills in 2005, the number of pollution-caused kills has been less than ten since 2002. For more than ten years, chlorine and liquid manure have continued to be leading recurring causes of fish kills.

Water cooling systems for steam-electric and hydroelectric generating stations continue to injure and kill millions of fish and fish eggs each year via impingement and entrainment. On the bright side, improvements are being made as FERC licenses and SPDES permits are renewed.

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Introduction

This annual summary report describes natural and pollution-caused fish mortalities that occurred in New York State during 2009. Information provided includes: number of kills, regional distribution of kills, number of fish affected, and major kills and their causes for the past ten years. The Introduction, Brief History and Notification sections from previous reports have been updated to provide a complete package for the person reading one of these summary reports for the first time.

Beginning in the mid-1980s, an annual summary report or memorandum was prepared by the Bureau of Habitat and its predecessor, the Bureau of Environmental Protection, from fish kill notification and investigative records, i.e. fish kill logs, kept by each of the nine New York State Department of Environmental Conservation (NYSDEC) regions and the Marine District. An annual summary of these informative logs has served to monitor statewide trends, particularly for pollution-caused kills, and to keep staff abreast of recurring issues. These summary reports are prepared to inform Central Office administrators and regional staff about the distribution of fish mortalities, causes, apparent trends and the estimated numbers, species and waters affected statewide.

Brief History

Records show that the NYSDEC and its predecessor agencies, the New York State Conservation Department and the New York State Department of Fish and Game, have addressed fish mortality notifications for nearly a century. Serious interest in these natural and anthropogenic occurrences has driven the desire to determine the cause and source, and, where possible, to ensure that necessary measures are taken to prevent re-occurrences and further damage to the state's aquatic resources.

Prior to the mid-1960s, many man-induced low dissolved oxygen caused fish kills such as from municipal sewer plants and canneries were nearly predictable during warm weather periods with peak production or cleanup activities prior to vacation breaks. For these, it was often un-necessary to investigate quickly because the degraded water quality conditions responsible for the fish kills sometimes lasted several days. However, during the 1960s with new Clean Waters legislation and related funding these kinds of water quality problems

were nearly eliminated. During subsequent years, this kind of pollution-caused fish kill decreased in number but the number of kills caused by spills of hazardous chemicals and manure became more prevalent. Fish mortalities caused by toxic substances usually require an immediate investigation in order to gather appropriate evidence.

Fish kill investigations before 1984 frequently involved one of two specialized biologist-chemist fish kill teams that provided investigative, analytical and bioassay capabilities to the regions. Historically these teams were located in western New York in the Region 8 headquarters at Avon. In 1978, one of these teams was relocated to Gloversville to provide a quicker response to problems in eastern New York. Eventually an even quicker response was needed and to accommodate this regional staff were trained to investigate fish kills because they could respond most quickly to water quality problems in their area. The original fish kill teams were gradually assigned other duties. However, the Gloversville team located at the Hale Creek Field Station in Region 5 remained marginally involved with fish kill investigations until 2003 when the Environmental Disturbance Investigations Unit was officially terminated. Since then, fish kill notifications have been addressed almost completely by regional NYSDEC personnel. Pollution-caused kills continue to be considered a type of water quality accident that is to be covered by each NYSDEC Regional Water Quality Accident Contingency Plan.

Notification

Fish kill notifications are typically telephoned by an observer to the nearest NYSDEC regional office or to a local Environmental Conservation Officer. During off-hours initial contact is occasionally made via the N.Y.S. Spills Hot Line (1-800 457-7362), an answering service with the New York State Police, that has been in service since the mid-1970s. When contacted, the regional fish kill coordinator (Table 1) or another staff member begins the investigation process by recording where, when and who, and specific details of the mortality. Next, it is determined if the mortality is natural or pollution-caused. This process is crucial but fairly simple. Natural fish kills such as those caused by disease can affect many fish but usually involve only one or two species, and the dead fish are often about the same size and age. Three exceptions are the classic summer kill and winter kill, and some of the more recent fish disease problems such as those related to viral hemorrhagic septicemia (VHS). Summer kills and winter kills are caused by depleted or very stressful dissolved oxygen (D.O.) levels. Summer kills are usually associated with warm summer temperatures and often dense algal blooms, and are also frequently complicated by spawning stress and parasitic or disease problems.

Winter kills, which can also be related to parasites and disease problems, occur under thick, opaque layers of ice and snow and, are usually not discovered until about April when the ice cover melts. Sometimes the fish, which may have been dead for more than a month, still appear quite fresh because the cold reduced bacterial decomposition. Summer kills and winter kills in lakes are never completely devastating. However, for small, shallow ponds these types of mortalities and almost all pollution-caused events, can affect all year classes of fish and often other aquatic forms such as frogs, turtles, crayfish, aquatic insects and aquatic worms.

Almost all large natural fish mortalities and pollution-caused fish kills are investigated as soon as possible by regional staff. For many of these situations a rapid response is essential because some common pollutants (e.g., ammonia and chlorine) disperse and dilute quickly which reduces the opportunity to collect incriminating samples. Notifications received several days following the first observation of dead fish, particularly if in a small or private pond, are often not investigated but still should be recorded in the regional fish mortality notification log. Fish mortalities that occur over several days and are reported multiple times should be reported on the regional fish kill notification log as one case with a date for the first and last notifications to indicate the approximate period of mortality. Additional dates can be recorded for multiple site investigations.

Large pollution-caused fish kills require accurate and defensible natural resource injury estimates to fishery resources including miles of stream, species and number of dead fish represented by several size categories. These numbers can become very important when monetary estimates are established during any subsequent legal proceeding. The American Fishery Society (2005) and United States Fish and Wildlife Service (1990) present several methods for accurate damage estimates that are adaptable to all conceivable stream, river, pond and lake situations. For major investigations, when more than one investigative team is involved, it is imperative that natural resource damage assessment efforts be well coordinated from the very beginning so that each team follows the same assessment method.

Shortly after notification, be aware that confusion is almost always inherent with large fish kills. Experience has shown that this confusion is reduced if sampling equipment is organized and instruments are maintained ready for use. These should minimally include sample containers and labels, nets, plastic bags, dissolved oxygen and pH meters, thermometer, measuring board, waders and coolers. It is natural to want to respond to fish kills quickly but, in doing so, always remember to place personnel safety first. Be aware that you or a staff member

might unknowingly be an early responder to a situation that is later discovered to be caused by a hazardous chemical.

It is important for new and seasoned staff alike to be trained in investigative techniques and to be kept abreast of recommended methods to assess damages and estimate at least a minimum value for the loss to the fishery resource. Investigators are encouraged to take advantage of a college credit course entitled “Training for Investigating Fish Kills” which is organized by the National Conservation Training Center (NCTC). When funding is available, staff with the Division Fish, Wildlife and Marine Resources can sometimes be scheduled as a group to attend a local training session; contact Jack Cooper, Central Office at (518) 402-8907. In the event there are only a few individuals that request training, Jack Cooper may be able to make arrangements to attend the same course at the USFWS, National Conservation Training Center in Shepherdstown, WV. A manual is provided with this fish kill investigation course that is an excellent reference (USFWS, 1990).

Data Reporting for 2009

This document basically presents total numbers of fish affected in 2009 based on estimates listed in regional fish mortality notification/ investigation logs (Appendix). These totals are used to assess damages, and to show regional and statewide distribution of fish mortalities and any trends. Where the regional fish kill logs indicate the words “several hundred”, the number 500 was added to the total. Where “several thousands, tens of thousands or hundreds of thousands” were reported, the numbers 10,000, 50,000 and 500,000 were added, respectively. This approach is consistent with previous years of reporting. When no estimate was provided a plus sign or the word unknown was used in the regional fish kill logs. Generally, totals represent a very conservative or minimal estimate of the actual number of fish affected because there are fish mortalities that are undiscovered or not investigated for a variety of reasons. Also, be aware that estimates of fish in this report do not include the many dead fish that seemingly disappeared within a day after notification due to predation by crows and raccoons, or those that blend in with the background or are unseen because of turbid water and silt, undercut banks, algal blooms or dense aquatic vegetation.

2009 Fish Kills

General – Table 2 shows there was a total of 90+ fish mortalities reported to regional NYSDEC offices in 2009. This total is not a firm number because a few situations were reported multiple times over a period of several days and were listed as separate mortalities. The average total number of notifications reported during the last 11 years is 92 ± 21 , so the difference from other years is small and

unimportant. About 54 of the 2009 reports were investigated by regional staff or someone from another state agency or county organization (Table 3). This is lower than usual but still shows that even when short-staffed, fish mortalities are not overlooked. Table 3 also shows that Regions 3, 7 and 9 had 24 (27%), 22 (24%) and 12 (13%) of the reported fish mortalities, respectively, for a combined total of 64% of the reported notifications. During some previous years, mortalities in Region 3 have comprised about one-third of the statewide total. Other Regions had less than nine notifications in 2009.

In the Marine District, the number of fish affected by natural causes exceeded 500,000 in just one 2009 incident. Once again, in the Peconic River Basin, enormous schools of menhaden were affected over vast stretches of water (Appendix - Region 1). This seemingly annual event occurs as bluefish herd large schools of menhaden into bays and river mouths where eutrophic conditions coupled with unique tidal and wind conditions create large areas of near zero D.O. levels. Also, contributing is the fact that bluefish have a greater tolerance for freshwater. Hundreds of menhaden also died in a similar May event in Great South Bay, near Patchogue.

In freshwater, there were two large March/ April natural fish mortalities attributed to cold temperature stress. These affected an estimated 5,000 alewives in Canadarago Lake (Region 4) and perhaps as many as 50,000 gizzard shad in Bosket Lake (Region 7), respectively (Appendix - Regions 4 and 7). Both of these species are not able to tolerate a rapid temperature decrease especially in cold, winter water. A third large 2009 mortality affected an estimated 50,000 (“tens of thousands”) smelt in Lake Erie, which was attributed to a temperature inversion caused by strong winds (Appendix – Region 9).

Pollution-caused Kills – Tables 2 - 4 shows there were only five pollution-caused fish kills in 2009. This low number was matched in 2002 and was one less in 2008 (Table 2). When combined, these five mortalities affected a total of only 2,824 fish of which about 70% were mostly minnows and suckers killed by hypochlorite bleach spilled to Nauraushuan Brook (Table 4 and Appendix – Region 3). Other pollution-caused kills involved a suspected oxygen scavenger used in boiler feed-water to slow oxidation, a suspected volatile petroleum product, partially treated sewage and liquid manure (Table 4 and Appendix – Regions 2, 3 and 9). Litigation for the cases with the oxygen scavenger product and the hypochlorite bleach were reported to be underway (Appendix – Regions 2 and 3). Table 5 presents a summary of the largest pollution-caused kills during the past ten years.

Natural Mortalities – Based on the Regional fish kill logs, it appears that at least 81 of the 90+ reported mortalities were due to natural causes (Table 3). Of these, about five scattered mortalities were classic summer kills caused by elevated water temperatures and depleted D.O levels. About 21 fish mortalities were attributed to winter kill, with about one-half of these in Region 3 (Appendix Region 3). As usual, post-spawning stress coupled with stress from warming waters and occasional bacterial infections were responsible for as many as 14 other natural mortalities mostly affecting bluegill and pumpkinseed sunfish. In the marine environment, it was already mentioned that 500,000+ menhaden were affected by low D.O. levels related to crowded conditions caused by bluefish.

In freshwater environs across the state, three large natural mortalities stood out because they affected a combined total of at least 65,000 fish. The majority (50,000+) of these involved Lake Erie smelt killed during an August water temperature inversion following several days of strong winds (Appendix- Region 9). The other two large natural mortalities affected cold-temperature- sensitive alewives (5,000+) in Region 4's Canadarago Lake and gizzard shad (10,000+) in Region 7's Bosket Lake (Appendix – Regions 4 and 7). Pathology results found that the gizzard shad were also stressed by a severe parasitic *Trichodina sp.* infestation.

Table 6 presents a regional summary of the 17 natural mortalities related to parasites, bacteria and viruses. Parasites and bacterial infection accounted for about one-half of these mortalities. Two of these are suspected to have been unconfirmed type E botulism cases because they not only affected fish but a cormorant and a seagull. One case occurred in Lake Neatahwanta, Oswego County (Region 6) and the other in Lake Erie, Wilson Bay beach (Appendix- Regions 7 and Region 6). Perhaps as many as eight unconfirmed cases were suspected to be related to viral hemorrhagic septicemia which has plagued Lakes Erie and Ontario for at least 3 - 4 years.

Unknown and Miscellaneous Causes – Every year the regions report several minor fish mortalities due to unknown causes. Generally, the majority of these are not investigated due to late notifications and because the fish are too badly decomposed to be useful for pathological examination and testing. However, after an assessment of these reports by the author, 14 mortalities originally labeled as due to unknown causes were highly suspected of being summer kill or disease situations, and were finally categorized accordingly. Nearly all of these cases were in Regions 3, 7 and 8.

Also reported each year are a few minor fish mortalities that are categorized as miscellaneous (Table 3). In 2009, Region 1 reported an incident that involved the disposed remains of two Atlantic sturgeons. In Region 4, an estimated 90 trout suffered from stocking stress and eventually died. Region 5 reported less than 100 Hudson River fish that likely died from low D.O. water behind a sheet piling containment area during sediment dredging operations. Region 7 reported a mortality that affected hundreds of black crappie in Dean Pond, Cortland County which was attributed to a blue-green algal bloom. A search of previous records found that a similar event was reported for this same pond in 1994.

Trends

During the past twenty six years (1984 – 2009), the number of reported fish mortalities has ranged from a low of 49 in 2004 to a high of 147 in 1993: mean = 90 ± 21 . During this period only ten years had fewer than 90 notifications reported. Figure 1 plots the number of notifications during this period and shows a trend line fitted to these points. The trend line demonstrates a slight decline over this period but because of the scatter between points, means very little. More important is the fact that the number of pollution-caused events has dramatically declined since 1984 (Figure 2). From 1984 to 1998, the number of pollution-caused kills per year ranged from 11 - 43, mean = 22 ± 9 . During the latter 11 years (1999- 2009), the number of these events declined to 4 - 16 cases per year: mean = 8 ± 3.5 . The decline was most obvious beginning about 1994 when the number of annual pollution-caused kills consistently became less than 20. Obviously, this is a positive trend which reflects that businesses in New York State have become more environmentally conscious when they handle hazardous chemicals and other substances capable of causing fish kills.

Table 2 shows the nine most common recurring reasons for pollution-caused fish kills during the last ten years. Chlorine is the leading cause, responsible for one or more kills during each of these years. Manure was the next most frequent cause with kills in nine of the 10 years. Pesticides followed with six kills during this period. Copper sulfate and liquid manure have affected the greatest number of fish since 2000. In 2009 there were no major (>10,000 fish) pollution-caused kills. This is a welcomed trend since the major kill caused by liquid manure in 2005.

Overview of Fish Mortalities Related to Electric Generating Facilities

Billions of gallons of water are used each day in the process of generating electricity at power plants across New York State. Whether water passes directly through turbines at hydroelectric projects, or is used for cooling purposes at steam-

powered generating stations, the fact remains that this water contains fish and other aquatic organisms that are injured or killed through two processes, impingement and entrainment. Impingement occurs when juvenile and adult fish become pressed against intake screens or racks designed to keep debris from entering the hydro turbines and cooling system. Entrainment occurs when fish, fish eggs and larvae are injured as they travel through the entire generating facility system. In total, impingement and entrainment at New York's power plants kill millions of adult fish and, billions of fish eggs and larvae each year. Fishery damages from impingement and entrainment at individual plants in NYS are only periodically estimated at steam generating plants and rarely, if ever, estimated at hydroelectric facilities.

Hydroelectric Generating Facilities - Fish are injured or killed every day at hydroelectric projects in New York State due to direct contact with the turbine blades or other physical components of the turbine, or due to water pressure sheers that are present as fish pass through the turbines. Not all fish that are entrained are seriously injured. Studies indicate the magnitude of fish injury differs between fish species, age and size. Turbine size and design, and the head differential at projects, i.e. height of the dam, also influence the fish injury/ kill rates between projects.

Although hydroelectric generating facilities in New York State are not required to monitor fish injury and mortality at each project, during the mid- 1990's a series of fish entrainment studies was conducted by Niagara Mohawk Power Corporation (NMPC) to assess fish damages and identify factors influencing fish kills. Study results for the Hoosic River Project showed that initial mortality was low but latent fish mortality occurred during a subsequent 48-hour holding period. Mean mortality rates for the tests groups ranged from 32% (small percids) to 93% (large centrarchids) at the Schaghticoke site on the Hoosic River (NMPC, 1995). Entrainment studies estimated that 28,689 fish were entrained at the Schaghticoke site from mid-October 1993 through mid-October 1994 and, of those, approximately 15,264 (53%) fish were killed by turbine passage. Species experiencing the greatest losses were bluegill, black crappie and spottail shiner. Most sportfish killed were young-of-year or juvenile. Based on results from state-wide studies, NYSDEC has established criteria for the design of fish protection/passage facilities that apply to generating stations throughout the State. Although studies have not been routinely conducted, fish losses have been minimized to practicable levels.

Steam-Powered Generating Facilities - Cooling water used at steam-powered generating stations also kills and injures billions of fish each year. Table 7 presents fairly recent estimates of fish impingement and entrainment for several New York State power facilities. However, these estimates do not include impingement survival estimates which can be as high as 83% when using fish-protective screens (Consolidated Edison, 1996). Even assuming a very optimistic 85% survival, millions of fish are killed from impingement annually. The Northport Power Station in Suffolk County reported over eight billion fish affected by entrainment during an approximate 1-year period from 2002 to 2003 (Table 7). Eight billion fish is three orders of magnitude greater than all the fish killed statewide in 2008 by natural and pollution-causes combined and this damage is from just one power generation facility.

The Astoria Generating Station along the East River in Queens is reported to entrain or impinge nearly 630 million fish each year (Table 7). NYSDEC recently modified this generating station's SPDES permit which by 2013 will require installation of variable speed pumps to reduce the volume of cooling water used and replace old trash racks with fine mesh intake screens. This combination is expected to reduce entrainment mortality 65 percent and result in 85 percent impingement survival, both major improvements (Calaban, 2009).

Important News

Type E Botulism - During 2009, only two suspected type E botulism kills were reported (Appendix Regions 6 and 7). Based on the regional fish kill logs, it would appear that neither case was investigated, probably because the fish and birds (2) were too decomposed.

Type E botulism was first documented in NYS in 1999 when thousands of dead waterfowl and several dead freshwater drum washed up on the eastern shore of Lake Erie. By 2002, this disease spread to Lake Ontario where it was documented to have affected several waterfowl and fish species. By August 2005, several dead terns, gulls and cormorants found along the shore of eastern Lake Ontario and into the Thousand Islands Region of the St. Lawrence River tested positive for type E botulism, (Young, 2005). This disease has since moved further downstream in the system and has affected hundreds of waterfowl and even more fish.

Fish mortalities due to type E botulism are triggered by food-chain interactions between *Cladophora*, a green alga, and three invasive species: zebra and quagga mussels, and the round goby. The very abundant mussels tend to increase water clarity tremendously by filter feeding on plankton. This increased water transparency allows much more sunlight to penetrate the water and the

Cladophora responds with huge blooms enhanced by abundant nutrients from mussel wastes. Dense algal growths form which eventually die off only to create anoxic conditions and rotted algal mats that float to shore in smelly heaps. This is when botulism comes into play. *Clostridium botulinum* spores, which pass through the mussels, flourish only under these anoxic conditions. This bacterium eventually releases a paralyzing type E neurotoxin that all too often first affects hundreds of thousands of vulnerable, bottom-dwelling round goby (Traverse City Record-Eagle, 2006). The dead and infected goby then spread the disease when they are eaten by waterfowl and other fish. Shorebirds pick up the disease when they scavenge the algal mats on shore looking for washed up mussels and dead fish.

During June 2008 representatives from Great Lakes government agencies and academia met in Detroit to assess the state of knowledge, research, and management and control options for type E botulism at the 'Great Lakes Basin-wide Botulism Coordination Workshop'. Besides professional discussions and information sharing, there was consensus to establish a botulism coordination network to advance ongoing activities and to help identify new collaborative projects. Several agencies working together have already begun to develop a manual to standardize procedures for carcass collecting, disposal, and best management practices. Laura Evans (312-886-0851) has agreed to serve as the network administrator.

Viral Hemorrhagic Septicemia (VHS) – Table 6 shows that during 2009, there was a total of eight suspected fish mortalities attributed to VHS: five in Regions 6, two in region 7 and one in Region 9. Fish from these reported cases were badly decomposed and were not sent to the pathology laboratory at Cornell University for confirmation.

VHS was first detected in New York State waters during late May through July 2006 when thousands of dead and dying fish were reported in Lake Erie, Lake Ontario and, in the Niagara and St. Lawrence Rivers (Lee, 2006; Associated Press, 2006). Cornell University's College of Veterinary Medicine received many samples of a variety of species including round goby, muskellunge, smallmouth bass, black crappie, pumpkinseed, brown bullhead, yellow perch and burbot for pathological testing. Positive results from these tests for the first time confirmed the presence of VHS in N.Y.S waters. Later in 2006, fish from Conesus Lake (Region 8) also tested positive for VHS. Since then VHS has been confirmed in fish from Skaneateles Lake, Little Salmon River, Seneca-Cayuga Canal and from a farm pond in Niagara County (NYSDEC, 2007; Associated Press, 2007a). Dr. Paul Bowser, Professor of Aquatic Animal Medicine at Cornell, has reported that VHS was responsible for serious fish mortalities in 6 of 19 species of fish submitted,

including the prized muskellunge (Associated Press, 2007b). This news article also reported that Cornell University's staff has a new molecular response test known as the polymerase chain reaction (PCR) test that can very confidently identify the strain of virus that affects New York State's fish within 24 hours instead of the previously standard inoculation test which takes 28 days to thoroughly complete.

VHS can cause fatal anemia and hemorrhaging while less affected fish show no symptoms but can still contribute to the spread of the lethal virus. So far, the virus has not been a threat to humans or other mammals. To date, there is no known cure for VHS, especially for fish in an ecosystem as large as the Great Lakes Basin. Should this virus be detected in a New York fish hatchery, the effects would be catastrophic because the entire hatchery would need to be sterilized, which is a near impossible task, and all infected fish and eggs would need to be destroyed.

On October 24, 2006 the U.S. Department of Agriculture prohibited the importation of fish from Ontario and prohibited the transportation of live fish between the eight Great Lakes States to combat the spread of VHS. These emergency regulations were subsequently amended on November 14, 2006 by Federal Order and remained in effect through February 2007. On March 9, 2007, after receiving many comments from the public and bait industry personnel, NYSDEC adopted new emergency regulations to protect the State's fishery resources. These new regulations, which drastically restrict the movement of bait fish and the stocking of fish in state waters, were finalized on June 6, 2007 (NYSDEC, 2007). NYSDEC, 2008 includes 15 baitfish species on a new "green list" which can be sold by bait dealers after batches of these fish are certified disease-free. Six other species may be purchased but used only in specified waters. Everyone hopes the new regulations prove effective. Rumors among some biologists and bait dealers are that the virus has been present in several inland waters for many years and that the fish in these waters have developed immunity. However, updated genetic testing indicates with confidence that this rumor is completely false (personal communication, Dr. Paul Bowser, Cornell University).

Invasive Species News

Northern Snakehead – In 2008, Region 3 Fisheries conducted a successful project to eradicate this aggressive invasive species in Ridgebury Lake and Catlin Creek near Wawayanda, Orange County. The project, which killed over 100 snakeheads, included the return of several warm water fishes originally netted from Ridgebury Lake prior to the eradication project (New York Times, 2008). Fisheries staff continued to monitor these waters in 2009 and, after finding some snakeheads in Hyde Pond downstream from Ridgebury Lake, lowered the water level and

treated Hyde Pond with Rotenone. Patrick Malone reports that several (~25) snakeheads were killed including some young-of-year.

Michael Kane (Bureau of Habitat) indicates Meadow and Willow Lakes in Flushing Meadows Corona Park located near the 1962 World's Fair site in Queens still harbor northern snakeheads. Fisheries staff in Region 3 also continued to monitor this situation and in 2009 captured numbers consistent with previous surveys. The smallest (213 mm) snakehead was collected in 2009 which indicated some reproductive success but consistently low catch per unit effort suggests some unknown factor may be limiting reproduction or juvenile survival.

Asian Swamp Eel – This invasive eel has not been discovered in NYS but in 2008 hundreds were found in and around Silver Lake in historic Gibbsboro, Camden County, New Jersey. It is possible that this eel may be among the next uninvited critters on the watch list for New York State. The Star Ledger (2008) indicates that it will eat all sorts of aquatic life which implies that it could greatly affect aquatic food chains and ultimately sport fishing. This invasive species is tolerant of winter freezes, can survive for weeks in the mud of dry freshwater or brackish ponds, or in swamps devoid of oxygen. When severe drought conditions threaten their habitat, these very adaptable eels, which reach up to 2-foot-long, can slither onto shore and across open space to search for new water. To make matters worse, it is reported they can change gender when it benefits breeding in newly invaded waters. Biologists in Florida and Georgia have indicated there is no good method to annihilate the Asian swamp eel. New Jersey's Bureau of Freshwater Fisheries reports this problem species is fairly contained for now but has concern for their expansion downstream to the Cooper River and a watershed leading to the Delaware River.

Hydrilla – This very aggressive, aquatic invasive plant has been causing havoc in many states across the country, particularly in the south where it literally chokes lakes making them practically useless for conventional boating, swimming and fishing. Until 2008, New York State has not had to deal with *Hydrilla* despite the fact that some neighboring New England states have been fighting to eradicate or control the spread of this dreaded aquatic plant from isolated ponds and lakes for over five years. In 2008, *Hydrilla* was confirmed from two NYS locations: one lake in Orange County and two connected lakes in Suffolk County. In 2009, *Hydrilla* was also confirmed in Long Island's Lake Ronkonkoma. Region 1 staff members have conducted surveys to map its distribution and qualitatively measure densities in this lake, and in a downstream freshwater pond. Control plans are being formulated to tackle the spread of this aggressive plant in 2010.

Personal conversation with a ‘biologist-type’ who travels south for the winter, indicates that *Hydrilla* problems in Florida and Georgia are far worse than the most degraded water quality problems caused by Eurasian water milfoil in the northeast. A presenter at the Northeast Aquatic Nuisance Species (NEANS) panel meeting in 2005 or 2006 indicated that Florida had spent over \$20 million per year for several years in an attempt to control *Hydrilla*, often with minimal success. For comparison, \$20 million is currently four times the entire 2009 budget to address all invasive species in New York State. The Federation of Lake Associations (FOLA) and the Northeast Aquatic Plant Management Society (NEAPMS) encourage the NYSDEC to take an immediate and active role to control this plant. Lars Anderson, a member of NEANS from Connecticut, indicates a rapid response mission must focus on eradication and not on management or control of this aquatic plant.

Didymo (rock snot) – In June 2009 it was confirmed that this alga, *Didymosphenia geminata*, had spread to Esopus Creek, Ulster County (NYSDEC 2009). Rock snot was identified in the vicinity of several public access sites along a 12-mile stretch from the Shandaken Portal, which transfers water from Schoharie Reservoir to the Ashokan Reservoir. This gooey, mat-like bottom growth was previously identified only in two NYS waters, the Battenkill and Delaware River drainage.

Chinese Mitten Crab – A recent e-mail from a scientist tracking the Chinese mitten crab indicates 44 specimens have been collected along the east coast of the United States and reports the most recent activity is from New York and New Jersey. Many scientists have now admitted that this invasive crustacean is here to stay and that its distribution will expand in the Hudson River drainage during the next several years. It can invade great distances upstream into tributaries and has the ability to crawl short distances overland. This crab may out-compete native crabs and is known to burrow into banks causing severe erosion problems.

Zebra and Quagga Mussels – Zebra mussels have seriously affected the ecology of the Great Lakes, as well as many inland lakes and rivers. Beginning in the mid 1970s, this invasive mussel and another related intruder, the quagga mussel, have clogged water intakes of boat motors, power stations and at other businesses needing cooling water. Their great numbers, which can reach over 200,000/m², have caused great economic hardships. Dr. Dan Malloy of the NYS Museum’s Field Research Laboratory in Cambridge, NY has fairly recently isolated a natural bacterium, *Pseudomonas fluorescens*, that will kill zebra and

quagga mussels (Ross, 2008). This type of research is nothing new to Dr. Malloy who, in the 1980s, developed and also patented the bacterium, BTI, used to control black flies. Early in 2008, Marrone Organic Innovations, the Museum's partner, received a \$550K National Science Foundation grant and the Museum received \$275K to produce *P. fluorescens* commercially.

Initial research on *P. fluorescens* began in 1991 when a group of power companies provided \$700K to the Museum for a 6-year project to isolate a bacterium to fight these invasive mussels. After testing about 700 strains without finding the right bacterium, the project nearly ended but with encouragement from the power companies and two more months of research, success was finally achieved. *P. fluorescens* was found to kill these mussels very effectively. However, the downside to this story is that *P. fluorescens* will also kill native mussels. As a result, this bio-pesticide is allowed to be used only in contained or closed systems. There are plans for a U. S. Bureau of Reclamation demonstration project to kill quagga mussels in 2009 at the Davis Dam located on the lower Colorado River in Bullhead City, Arizona. Details of how this will be accomplished in a contained manner are unknown. Perhaps in time, a bacterium more specific to the zebra and quagga mussels will be found which would remove present restrictions for the use of *P. fluorescens* in open lakes and river systems.

Koi virus – Every year there are 1-3 carp mortalities reported from which a few specimens are submitted to the pathology laboratory at Cornell University. Only one confirmed case occurred in 2009 and this affected about 38 carp (Appendix – Region 3). This invasive viral disease was imported about 8 – 10 years ago with a shipment of ornamental goldfish or koi that are commonly used in backyard, landscape ponds. Within a few years of introduction the virus mutated and during the next 3-4 years began to affect carp as well. Fortunately, confirmed reports of koi virus fish mortalities are few and fairly isolated which suggests that the disease may never be a real serious threat. However, carp mortalities suspected to be caused by this virus, despite the carp's bad reputation, should be reported immediately so fresh specimens can be garnered and submitted for necessary pathological confirmation testing.

Sea Lamprey – Nearly every year, several NYSDEC fishery members work with staff from the United States Fish and Wildlife Service, Vermont and Canada on sea lamprey control projects in the northeast which includes the Great Lakes Basin, Finger Lakes Region, St. Lawrence River Basin and the Lake Champlain Basin. History has shown that when densities of this invasive species increase, the effects to the sport fishery and the local economy can be devastating. To combat

these effects, sea lamprey treatments are carried out systematically usually in a 5-year cycle depending on available budgets and sea lamprey densities; some years are much busier than others. Patrick Malone indicates 2009 was a rather quiet year with treatment only in the Lamoille River near Burlington, VT and the Canadian border.

[Have you noticed how much the number of invasive species has increased during the last 2-3 years?]

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Acknowledgment

Regional Fish Managers and Regional Fish Kill Coordinators are acknowledged for their cooperation in keeping and forwarding regional fish kill records. Roy Jacobson, Mark Woythal and Chuck Nieder, NYSDEC- Central Office, are thanked for their contributions on effects of steam electric and hydroelectric generating facilities. Review and constructive comments to this manuscript were provided by Larry Skinner, Central Office, and by Patrick “Bart” Malone, Hale Creek Field Station.

Table 1. NYSDEC Regional Fish Kill Coordinators, 2009.

Region	Name	Div./Bureau	Telephone
Marine District	Steve Heins, Melissa Cohen	Marine Resources	(631) 444-0436 (718) 482-4022
1	Chart Guthrie	Fish	(631) 444-0280
2	Melissa Cohen	Fish & Wildlife	(718) 482-4022
3	Linda Wysocki	Fish	(845) 256-3104
4	Norman McBride	Fish	(607) 652- 2620
5	Jennie Sausville	Fish	(518) 897-1333
6	Richard McDonald	Fish	(315) 785-2261
7	David Lemon	Fish	(607) 753-3095
8	Peter Austerman	Fish	(585) 226-5340
9	Thomas Wantuck	Water	(716) 851-7070

Note: The two former “Fish Kill Investigation Teams” with the Bureau of Habitat were officially abolished in 2003. However, Biologist, Tim Preddice, (the last dinosaur) remains available through September 2010 for advice regarding fish kill investigations. He can be contacted by calling the Hale Creek Field Station, Monday through Friday from 9AM to 5PM at (518) 773-7318 ext. 3006 or at home during evenings and weekends at (518) 725-7206. These numbers have either voice mail or answering machine service.

Table 2. Ten-year summary of pollution-caused fish kills in New York State, 2000 - 2009.

Year	Total No. Notifications	Total No. Pollution-caused Kills	Est. Total Killed	Estimated Number Killed from Top Nine Re-curing Causes								
				Concrete	Pesticide	Manure	Silage Liquid	Domestic Sewage	Petroleum Products	Chlorine	Copper Sulfate	Ammonia
2000	81	9	5,000 - 10,000			>2,000		³		500 - 1,000		
2001	97	16	4,000,000 ²		<50	2,500 -3,500	50	300		12	1,000,000+	
2002	91	3 (2) ⁴	<500			³		< 25		< 25		
2003	100	8	2,000				1,500	150	³	50-100	40+	40
2004	49	8	2,000 - <10,000		2,000- <10,000	500+			20+	<320		
2005	108	12 (1) ⁴	381,200 ²		200	381,200 +		<12	few	<25	1,500+	3,500 ⁵
2006	58	8	1,500-1,700	13	500 - 600	<100		500 - 600	1	200 -300		
2007	119	7	>2,630		550	2,000				1,500	250	200?
2008	84	4	1,900		1,500					200		
2009	90+	5	2,324			200		100	24	2,000		
Est. Totals	877	83	4,399,054– 4,412,254	13	9,800- 18,900	388,300- 389,400	1,550	1,390- 1,490	41+	4,832- 5,482	1,001,789	3,740

¹ Most suspected to be affected by insecticide spraying for mosquito control related to West Nile Virus out breaks

² The large majority were killed during one spill

³ Number affected unknown

⁴ Number in parentheses represents additional kills suspected to be pollution-caused

⁵ Tannery wastes with high ammonia levels

Table 3. Regional distribution and causes of fish mortalities in New York State, 2009.

Region	Notifications ¹	Est. No. Investigations	Natural Mortalities (including suspected natural mort.)	Pollution-caused (including suspected pollution kills)	Unknown
Marine District	4	4	4 ²	0	0
1 (freshwater)	6	4	5	0	1
2 (freshwater)	2	2	0	1	1
3	24	16	20	2	2
4	3	1	3	0	0
5	2	2	2 ³	0	0
6	6	6	6	0	0
7	22	4	22	0	0
8	9	7	9	0	0
9	12	8	10	2	0
Totals	90+	54	81	5	4

¹ Record keeping for natural fish mortalities varies among the nine NYSDEC regions and the Marine District. Most regions record each incident but occasionally during busy times only the larger or more important incidents are noted. This is also true when several similar, small mortalities are reported during the same day or on several consecutive days. Some regions consider it unimportant to keep complete records for every insignificant kill, especially if it occurs in a small private pond. Therefore, the total number of natural mortalities represents a minimal number. In addition when estimates are made, many dead fish are not seen due to predation, turbid water and dense aquatic vegetation. This reflects no change from previous years of record keeping practices.

² The February 20th notification was due to fishery discards (2 Atlantic sturgeon) and not a natural or pollution-caused mortality.

³ The July 24th mortality was due to low dissolved oxygen level behind a sheet pile containment area which was man-induced.

Table 4. Regional summary of all pollution-caused fish kills in New York State, 2009.

DEC Reg.	Water	Town/ County	Est. No. Fish Killed	Pollution Type
2	Willowbrook Pond	Richmond Co.	500	Suspect oxygen scavenger for boilers
3	Nauraushuan Brook	Clarkstown (T) Rockland Co.	2,000	Hypochlorite (bleach)
	Willsey Brook	Mamakating (T) Sullivan Co.	24	Volatile petroleum compound
9	Twin Lakes South Pond	Yorkshire (T) Cattaraugus Co.	100	Partially treated sewage
	Cheney Brook	Arcade (T) Wyoming Co.	200	Liquid manure

Table 5. Ten-year summary of the largest freshwater, pollution-caused fish kills in New York State, 2000 - 2009.

Year	Water	County	Est. Number Killed	Cause
2000	Stone Mill Brook	Madison	>2,000	Manure¹
2001	Hoosic River	Rensselaer	4,000,000	acidic copper sulfate solution
2002	Rawson Creek	Cattaraugus	< 500 ?	liquid manure
2003	Twelve Mile Creek	Niagara	1,500	bunk silo leachate
2004	Cattaraugus Creek	Erie & Cattaraugus	2,000 - 10,000	TFM lamprey control treatment
2005	Black River	Lewis & Jefferson	376,000	liquid manure
2006	Private Pond	Ulster	500	insecticide - Guthion
	Forge River	Suffolk	500	domestic sewage ?
2007	Indian Kill	Schenectady	1,500	chlorinated pool water
	Rawson Creek	Cattaraugus	Undetermined, (likely few thousand)	liquid manure
2008	Sandy Creek	Oswego	1,500	lampricide likely
2009	Nauraushuan Brook	Rockland	2,000	liquid manure

¹ Liquid manure (or manure) from dairy operations was the most frequent cause of pollution-caused fish kills during five of the past ten years.

Table 6. Regional summary of disease and parasitic-related fish mortalities in New York State, 2009.

DEC Region	No. of Incidences	Parasites	Bacterial	Viral	Nos. & Species ¹ Affected
1	2	Primarily trematode infestation with some bacterial infection		-	400+ sunfish
2	0	0	0	0	0
3	1	<i>Aeromonas</i>	-	-	12 species?
	2	-	-	Koi virus (1 case confirmed)	38 carp
4	0	0	0	0	0
5	1	-	suspect viral or bacterial problem		~150 NP
6	5	-	-	Suspect VHS	61 SMB, 3 FW drum, 3 WYE, 26 carp, 1 L. sturgeon, 1 seagull
7	1	Severe infestation of trematodes, cestodes, leeches & copepods and <i>Aeromonas salmonicida</i> infection		-	~500 mostly PKS with some LMB & SMB
	1	Severe <i>Trichodina</i> infestation and winter cold temp. stress		-	~50,000 gizzard shad
	2	-	Suspect bacterial problem & spawning / bacterial stress		~600+ sunfish, 1 LMB, few CPK & suckers
	2	-	-	Suspect VHS	~150 carp, ~50 WP, few SMB, suckers, FW drum, COB suckers, and 1 cormorant
8	0	0	0	0	0
9	1	-	Suspect VHS but could be bacterial problem		~500 SMB, few FW drum, catfish, carp and RB
Totals	18	-	-	-	~53,000 ²

¹ Species: NP- northern pike, SMB – smallmouth bass, FW drum – freshwater drum, WYE – walleye pike, PKS – pumpkinseed, LMB – largemouth bass, CPK – chain pickerel, WP – white perch, COB – black crappie and RB - rock bass

² an estimated 50,00 gizzard shad were killed in one Region 7 mortality

Table 7. Estimated numbers of fish entrained and impinged at selected steam electric generating facilities in New York State.

	Facility Name	County	Number of Fish Entrained	No. of Fish Impinged	Date of Sampling
Entrainment (top 3)	Northport Power Station	Suffolk	8,448,000,000	127,118	2002-03
	Indian Point Energy Center	Westchester	1,200,000,000	1,180,000	1986-90
	Port Jefferson Power Station	Suffolk	1,014,950,951	76,104	2003-04
Impingement (top 3)	Dunkirk Generating Station	Chautauqua	47,940,000	62,778,786	2006-2007
	Arthur Kill Generating Station	Richmond	1,548,314,607	4,406,742	2006-2007
	Astoria Generating Station	Queens	627,832,154	2,916,328	2007
Totals			12,889,037,712	71,485,078	

Data References:

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Fig. 1. Total Fish Kill Notifications, 1984 - 2009

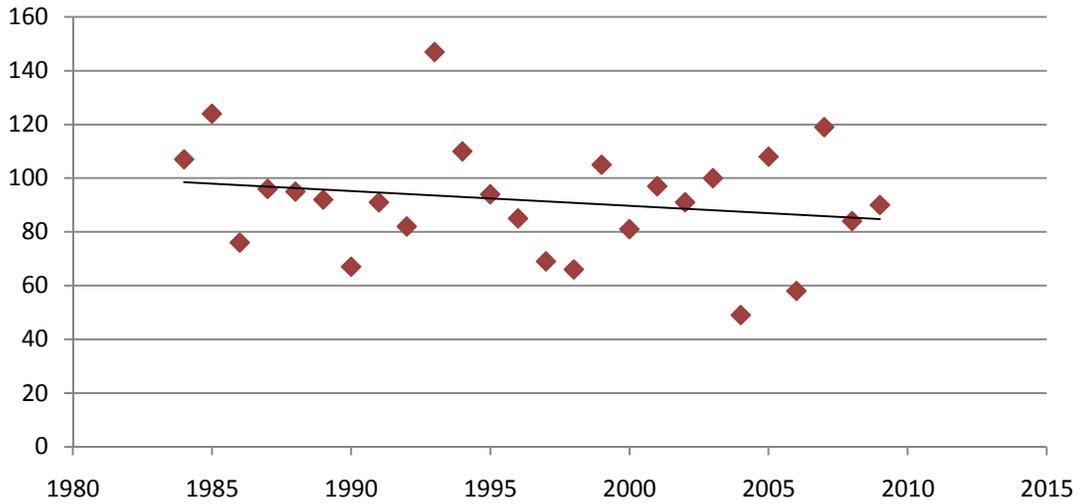
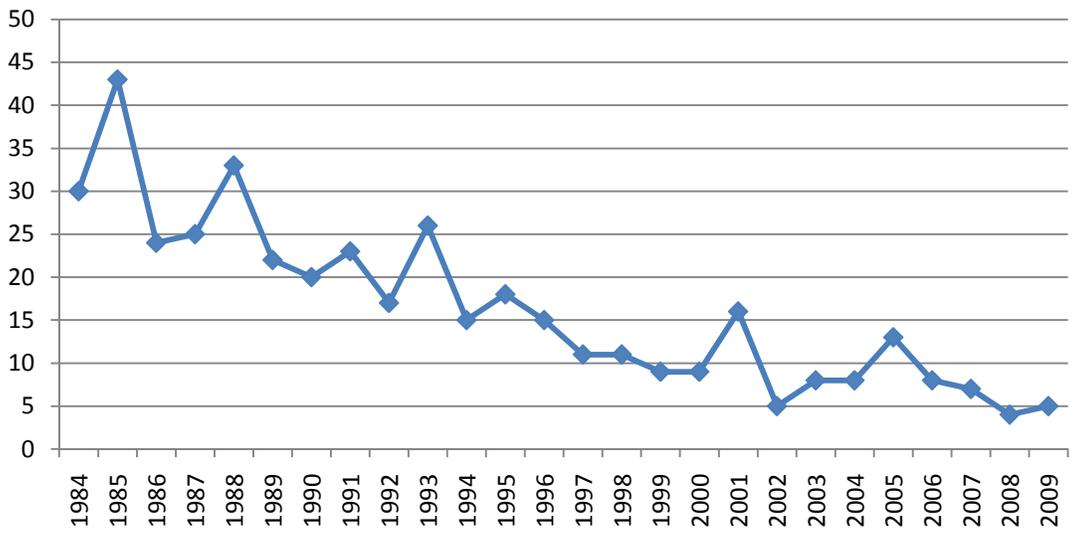


Fig. 2. Pollution-caused Fish Kills, 1984 - 2009



APPENDIX

<u>Regional Fish Kill Logs, 2009:</u>	<u>Page</u>
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Abbreviations for Fishes:

WE - walleye	RB - rock bass	NP – northern pike
WP - white perch	PKS - pumpkinseed	FW drum –freshwater drum
COB- calico bass/black crappie	BG – bluegill	YP - yellow perch
LMB - largemouth bass	BB - brown bullhead	TGC – triploid grass carp
WS - white sucker	CPK - chain pickerel	
SMB - smallmouth bass	GS – golden shiner	

2009 Fish Mortality/Investigation Log, Region 1 & 2, MARINE

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	2/20	Bob Wenegenowski, Town of Hempstead	Atlantic Ocean, Point Lookout Beach Nassau Co.	fishery discards	none	2 Atlantic sturgeon	closed
2	5/6	News 12 - Long Is.	Great South Bay near Patchogue Suffolk Co.	predation by bluefish & oxygen stress	none	100s ad. menhaden	closed
3	5/8	DEC staff	Meetinghouse Creek, Reeves Creek, Peconic River and Flanders Bay near Riverhead Suffolk Co.	predation by bluefish & oxygen stress	none	100,000s ad. menhaden, < 100 bluefish	closed
4	7/16	H. Wilkins & Sandy Chan	Rockaway Inlet, Jamaica Bay, Roxbury, Queens	natural conditions	low dissolved oxygen	~20 bluefish (20" TL)	no further investigation

2009 Fish Mortality/Investigation Log - Region 1

No.	DATE	CALLER/ INVESTIGATOR	WATER,TOWN & COUNTY	SOURCE	POLLUTANT	SPECIES & NUMBERS	STATUS
1	3/06/	C. Guthrie & E. Latremore	Forge Pond alias Peconic Lake	none - 2 BG & 1 COB sent to Cornell had severe <i>Dactylogyrus spp.</i> investation and <i>Pseudomonas</i> <i>putida</i> infection	natural	200+ mostly sunfish conc. in cove off west side of PLECO Cove, fish severely stressed by trematodes, bacterial infection pushed many past their threshold	closed
2	3/19	E. Latremore & C. Vullo	Upper Mills Pond	moderate infestation of <i>Dactylogyrus</i> <i>spp.</i> on gills & severe infestation of internal parasite cysts on tail and kidney, bacterial culture showed <i>Pseudomonas</i> <i>putida</i>	Unknown	200+ mostly sunfish distributed throughout the impoundment, parasites and bacterial infection as above but infestation not quite as severe	closed

2009 Fish Mortality/Investigation Log - Region 1 (continued)

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & COUNTY	SOURCE	POLLUTANT	SPECIES & NUMBERS	STATUS
3	5/15	Reported to ECO Lagree	Spring Lake	Unknown	Unknown	~100 sunfish & COB	Fisheries Unit notified 6/5, survey already planned for 6/16 but no unusual conditions observed
4	5/19	Reported by Joe Guarino	Deer Lake or Gugenheim Lake	Unknown	Unknown	< 100 fish (species?) by caller	Not investigated
5	8/26	Erik Latremore	Bellport Country Club Pond	Unknown	Suspect summer kill - low DO, toxicant ?	killifish, tadpoles & frogs	Not investigated
6	9/21	Heidi O'Riordan	DeSeverky Pond	Unknown	Unknown, suspect low DO, toxicant?	~200 carp and 10 LMB	carp distressed on 9/17, reported to DEC too late

2009 Fish Mortality/ Investigation Log, Region 2

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	8/26	F. Geary & M. Cohen	Trib. of Kill Van Kull near Kissel Ave. Richmond Co.	unknown	unknown	nos.? American eels, killifish, WP	closed
2	9/11	J. Candrilli & M. Cohen	Willowbrook Pond, Richmond Co.	possibly College of Staten Island	possible oxygen scavenger for boilers?	100s LMB, BB, BG, PKS, GS Amer. eel	investigation ongoing

2009 Fish Mortality Investigation Log, Region 3

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	Feb 2	C. North 845-338-6159	Unnamed Pond Private Ulster (T) Ulster Co.	None	Natural- Winter kill No DO	~30 total bass (spp?), pickerel, panfish (spp?)	no invest.- kill over
2	March 9	J. Ryan-Barker 845-876-5354	Unnamed Pond Private Rhinebeck (T) Dutchess Co.	None	Natural- Winter kill	possibly 100s - minnows (spp?), bass (spp?), BGS, koi, TGC	no invest.- kill over
3	March 16	E. Aackerly 845-721-4214	Unnamed Pond Private Plattekill (T) Ulster Co.	None	Natural- Winter kill	100s bass & bluegills (spp?)	no invest.- asked to call back if kill continues
4	March 17	L. Baker 845-485-8513	Unnamed Pond Private Poughkeepsie (T) Dutchess Co.	None	Natural- Winter kill	~40 bass & sunfish (spp?)	no invest.- kill over, location is State Superfund Haz. Waste Site.
5	March 18	J. Christy 845-430-1243	Lily Lake Lloyd (T) Ulster Co.	None	Natural- Winter kill	50-100 bass & sunfish (spp?)	no invest.- kill over
6	March 18	K. Kinsella 845-876-6263	Unnamed Pond Private Rhinebeck (T) Duthess Co.	None	Natural- Winter kill	100s bass (spp?) & carp	no invest.- kill over
7	April 13	P. Solomon 845-679-2885	Unnamed Pond Private West Hurley (T) Ulster Co.	None	Natural- Winter kill	40 total, LMB and sunfish (spp?)	no invest.- kill over

2009 Fish Mortality Investigation Log, Region 3 (continued)

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
8	May 22	B. Petrillo 845-674-6849, Fisheries, Larry Wilson	Chadwick Lake Newburgh (T) Orange Co.	None	Unknown – natural suspect spawning stress, Winter Kill or toxicant, no spills, reported, DO 7.9 ppm	~20 crappie, catfish, bass, park workers collected ~150 fish, (spp?) later same day	no further investigation, Bob to call if more fish die
9	May 29	E. Schwab 646-522-5905, Fisheries - Ron Pierce (retired)	Unnamed Pond Private Greenburgh (T) Westchester Co.	Unknown	None suspected	100 goldfish	reported late - fish badly decomposed
10	June 1	Z. Daufekias 845-778-3802 Fisheries, L. Wilson 845-256-3070	Unnamed Pond Private Marlboro (T) Ulster Co.	None	None suspected	17 carp, bass (spp?)	no further investigation
11	June 4	B. Chasna 914-941-3189	Reservoir Park Pond Ossining (T) Westchester Co.	None	Natural-suspect spawning stress/disease	~140 BG	no further investigation - fish badly decomposed
12	June 9	L. Jimenez 914-879-2399	Grassy Sprain Res. Yonkers (T) Westchester Co.	None	Natural- suspect spawning stress/disease	~100 mostly BG and few COB	reported late - kill over
13	June 2	D. Sinnott 745-522-0330 Fisheries-R. Coulter 845-256-2204 and R. Pierce (retired)	White Pond Kent (T) Putnam Co.	None	Natural-suspect spawning stress	~100 BG, RB, bullhead (spp?), PKS, COB	reported late - kill over

2009 Fish Mortality Investigation Log, Region 3 (continued)

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
14	June 12	K. Heller 917-407-5013	Unnamed Pond Private Warwick (T) Orange Co.	None	Natural-suspect temperature/DO fluctuations causing stress	~50 LMB and koi	No further follow up - kill over
15	June 17	E. Halsey Halsey.everett@yahoo .com	Browns Pond New Windsor (T) Orange Co.	None	Natural-suspect spawning/disease stress.	12 (spp?)	1 live LMB caught with "bruises", <i>Aeromonas</i> infect. - kill over
16	June 22	J. Pullman 201-784-1660	Masten Lake Mamakating (T) Sullivan Co.	None	Natural-suspect spawning stress	~100 sunfish (spp?), YP & BB	No follow up, kill over
17	July 3	Spills, J. O'Mara 845-256-3112 ECO, N. Desottelle 845-662-5756	Nauraushuan Brook Clarkstown (T) Rockland Co.	Universal Chemicals, Inc South Kearney, NJ	200- 400 gal. of hypochlorite (bleach)	~1,000 - 3,000 suckers & , minnows (spp?), carp, few trout	tickets issued but case not resolved
18	July 8	M. Brown 845-709-4721 ECO, N. Desottelle 845-662-5756	Hacksack River@Western Highway West Nyack(T) Rockland Co.	None	Koi virus confirmed by Cornell Univ.	32 carp	fish dead for several days, 3 live carp submitted to Cornell - kill over
19	July 14	F. Nicholson 914-556-6067 DEP, T. Baudanza 845-340-7857 Fisheries - D. Dominesey 845-256-3104	Amawalk Outlet Somers (T) Westchester Co.	None	Unknown	24 to 36 BT	trout sent to private lab - results negative - kill over

2009 Fish Mortality Investigation Log, Region 3 (continued)

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
20	July 17	J. Zuzek, NJ Cons. Officer 201-207-1870 Fisheries, T. McNamara 845-256-3841	Muddy Brook Orangetown/Pearl River (T) Rockland Co.	None	Unknown	~200 WS, CC, & BND, 2 BB	Investigation inconclusive, fish dead <24 hours - kill over
21a	Aug 12	Laura Kopezak 845-901-4967	Esopus Creek (.5 miles above village beach) Saugerties (T) Ulster Co.	None	Natural-suspect species specific pathogen, koi virus?	6 carp	Most fish decomposed, 2 died while watching - kill over
21b	Aug 14	S. McElrath 845-246-0607	Esopus Creek Saugerties (T) Ulster Co.	None	Koi Virus confirmed by Cornell U.	~20 carp	continuation of the previous kill - no further calls
23	Aug 25	C. Gilbert 845-855-3266	Swamp River@Wheeler Rd Dover (T) Dutchess Co.	None	Natural-suspect summer kill	~100 fish (spp?)	No investigation - kill over.
24	Sept 22	J. Buck jbuck@hvc.rr.com ECO, B. Gillis Spills, J. Cummins 845-256-3166	Willsey Brook Mamakating (T) Sullivan Co.	Unknown	Suspect toxicant?	24 trout (spp?)	Investigation revealed volatile compounds (?) in water with 5 gal. bucket rings (?) in sand by water, no further info. - kill over.

2009 Fish Mortality Investigation Log, Region 4

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	Apr 3	Multiple callers to N. McBride	Canadarago Lake Otsego, Exeter, Richfield (T) Otsego Co.	None	Natural: cold water stress	~ several thousand alewives throughout lake	No investigation
2	Jun 8	J. Yermis 518-842-6121 S. Wells	Private Pond Amsterdam (T) Montgomery Co.	None	Stocking stress: trout died within week of stocking	~90 trout	No investigation
3	Sep 15	Unknown caller to Fisheries - J. Strassenburg	W. Br. Delaware R Hobart (V) Delaware Co.	Dewatered sect. of river between 2 small dams	None	~150 multiple species primarily cyprinids, darters, suckers.	Delaware Co. DPW told to return water to stream and follow permit conditions

2009 Fish Mortality Investigation Log, Region 5

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	7/24	Dave Rosoff (EPA), central office staff	Hudson River@ Griffin Island Fort Edward (T) Washington Co.	None	Natural - low D.O. conditions w/in a sheet pile containment area of PCB clean-up dredging project	Unknown species, reported as 10's (<100?) of "small fish"	General Electric directed to collect fish & measure D.O. to determine cause of mortality - no follow-up invest.
2	8/21	H. & G. Marirea, 518- 359-2030, Fisheries- R. Preall, B. Kress	Raquette River, from Moody Bridge to Follensby Pd. Bridge Tupper Lake (T) Franklin Co.	None	Natural – suspect a viral or bacterial infection - no external lesions seen	100 - 200 NP, 8-18"	Fish badly decomposed - no further investigation

2009 Fish Mortality Investigation Log, Region 6

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	2 Apr	David Erway received call from the owner, Don Raymond, who noticed the dead fish after ice-out	Private Pond in Lowell Westmoreland (T), Oneida Co.	none	Winter kill - low D.O.	~120 Channel catfish	Advanced decomposition - none collected
2	6 July	Rodger Klindt received call from Dale Walts - noticed dead fish near dock	St. Lawrence River, Morristown (T), St. Lawrence Co.	none	Unknown ?	20-30- SMB	Advanced decomposition - none collected
3	13 July	Steve Litwhiler received call - Don Lucas and neighbors noticed dead fish	St. Lawrence River, Morristown (T), St. Lawrence Co.	none	Unknown ?	20-30 large SMB	Advanced decomposition - none collected
4	14 July	Mike Connerton - Cape Vincent Fisheries Station	L. Ontario, Wilson Bay beach, Cape Vincent (T), Jefferson Co.	none	Unknown ?	~36 SMB 3 FW Drum 3 WYE 1- Seagull (bird)	Advanced decomposition - none collected
5	31 July	Doug Carlson received call from Aaron Backus, ECO Joel Schneller received call from Matt Richardson	Oswegatchie River (below Eel Weir dam), Oswegatchie (T) St. Lawrence Co.	none	Unknown ?	20~30 Carp	Advanced decomposition, none collected
6	10 Aug	Doug Carlson received call and performed a field investigation	Lake Ontario Jefferson Park & Sunset Bluff Roads Ellisburg (T) Jefferson Co.	none	Unknown ?	1 - Lake sturgeon 1 - Carp	L. sturgeon tissue collected for potential DNA analysis - no other samples collected because of advanced decomposition

2009 Fish Mortality Investigation Log, Region 7

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	3/18	Rick Winters & Jeff Robins	Cayuga Lake Scipio (T) Cayuga Co.	None	Likely natural	75 BB	No investigation
2	3/25	Roger Boyer 754-1637 743-0613/ David Lemon	Bosket Lake Union (T) Broome Co.	None	Natural – winter kill, recent rapid warm up likely stressed fish	1000's gizzard shad	Winter stress and high Trichodina parasite load
3	3/25	Neighbor & David Lemon	Oakley Corners Pond Owego (T) Tioga Co.	None	Ice just going off, likely winter kill	85+ LMB and BG	No invest. - fish decomposed, low numbers suggest only partial kill.
4	3/30	Jim Homovich 607-336-7317 & Dave Lemon	Mead Pond Norwich (T) Chenango Co.	None	Ice just off, likely winter kill (probably bass)	40-50 fish probably LMB, 10-12"	No investigation
5	3/30	ECO Stanley Winnick	Spencer Park Pond Spencer (T) Tioga Co.	None	Likely winter kill	~50 BG	No investigation fish severely decomposed
6	4/06	ECO Tom Fernandez & Dave Lemon	Papish Pond Cincinnatus (T) Cortland Co.	None	Likely winterkill, ice recently off, fish not fresh.	Several 100 LMB, sunfish and others (?) on 300 yards of shoreline	No investigation, anglers report some fish still present in summer
7	4/27	Email from Dwight Mengel, Ithaca & Dave Lemon	Cayuga Lake at lighthouse Ithaca (C) Cayuga Co.	None	Likely combination of winter stress and recent rapid warming	Dozens of dead and dying alewives	Diagnosis inconclusive - no pathogens, VHSV negative by QRT-PCR and cell culture
8	5/18	Glenn Bundy 315-889-5165 & Jeff Robins	Cayuga Lake Springport (T) Cayuga Co.	None	Unknown	100s sunfish and some YP	No invest., 5 th year in a row with major sunfish mortality

2009 Fish Mortality Investigation Log, Region 7 (continued)

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
9	5/20	Multiple sources & Dave Lemon	Onondaga Lake Onondaga Co.	None	Unknown – die-off continued for several weeks as of 6/5/09	100s of PKS, some LMB and SMB	<i>Aeromonas salmonicida</i> infection, monogenean & digenean trematodes, cestodes, leeches and copepods, VHSV negative by QRT-PCR and cell culture
10	5/23	Cy Weichert 315-345-4227 & Jeff Robins	Skaneateles Lake Skaneateles (T) Onondaga Co.	None	Unknown	large number (100s?) RB	No investigation
11	5/27	ECO Matt Dorret & Jim Everard	Lake Neatahwanta Fulton (T) Oswego Co.	None	Unknown	~50 WP, 2 COB, 2 WS and 1 Cormorant	No investigation
12	5/28	Lorraine Greenlese 315-380-0493 & Jeff Robins	Cayuga Lake Springport (T) Cayuga Co.	None	Unknown	100s (multiple species)	No investigation
13	5/28	Matthew MulHoland 513-728-1832 & Jeff Robins	Skaneateles Lake Skaneateles (T) Onondaga Co.	None	Unknown	~20 fish inc. sunfish, carp and LMB	No investigation

2009 Fish Mortality Investigation Log, Region 7 (continued)

NO.	DATE	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
14	6/5	ECO Stanley Winnick & Dave Lemon	Dean Pond Marathon (T) Cortland Co.	None	Blue green algal bloom	100s COB	2nd blue green algae- related kill in 15 years
15	6/15	Jerry Lamanna 315-683-5592, Martha Ganely 315-440-8016 & Dave Lemon	Tully Lake Preble (T) Cortland Co.	None	Suspect bacterial infection	100+ sunfish, 1 LMB, CPK and suckers	No invest. - fish partially decomposed
16	6/17	Jay Wilcox 315-224-6540 & Jeff Robins	Cayuga Lake (north end)	None	Unknown	Unknown species and No.	No investigation
17	6/18	Pauline Burns email to Jeff Robins	Skaneateles L. Skaneateles (T Onondaga Co	None	Unknown	~20 (species ?)	No investigation
18	6/22	Ann Hotchkin & Scott Prindle	Otter Creek-near SPCA & Gutchess Lumber Cortlandville Cortland Co.	None	Unknown – low D.O. & poor H ₂ O quality (stagnant)	10 BB	Fish partially decomposed, no investigation
19	6/23	Dan Wysnewski & Jeff Robins	Cayuga Lake Springport (T) Cayuga Co.	None	Unknown	50-100 sunfish and a few LMB	No investigation
20	7/7	Karen Lauretti 607-277-1716, Jeff Robins 607-342-0947 & ECO Milewski	Cayuga Lake Ithaca © Tompkins Co.	None	Unknown	A few carp	No investigation

2009 Fish Mortality Investigation Log, Region 7 (continued)

No.	Date	CALLER/ INVESTIGATOR	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
21	7/29	ECO Colesante & Jeff Robins	Little Sodus Bay Sterling (T) Cayuga Co.	None	Unknown	~150 total - carp, suckers, SMB and FW Drum	No investigation
22	8/20	Dan Johnston 315-857-3558 & Jeff Robins	Tully Lake, Tully Onondaga Co. and Preble (T) Cortland Co.	None	Unknown	~ 15 cisco	No investigation – suspect low DO below thermocline, ciscos have died in other summers, suspect adults emigrate from Green Lake into Tully Lake where temperatures are cooler

2009 FISH KILL NOTIFICATION/ INVESTIGATION LOG, REGION 8

NO.	DATE	CALLER/ INVESTIGATOR(s)	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	5/4	Fisheries	Seneca Lake, Lodi Pt. Lodi (T) Seneca Co.	Natural	None suspected	200- 300 NP reported but only 2 found, none collected	Closed
2	5/19	Fisheries received call from resident, Terry Senglaub, (585-738-7528)	Canandaigua Lake (SE shore) Middlesex (T) Yates Co.	Natural	None suspected	Caller reported 15 dead sunfish on southeast shore of Canandaigua Lake	No fresh specimens available for collection, resident to call if fresh specimens become available
3	6/11	Fisheries received call from resident, Terry Book (585-243-1687)	Conesus Lake West Lake Road Geneseo (T) Livingston Co.	Natural	Spawning stress likely	Caller reported 10 - 12 fish (species?), Fisheries found 15 BG, LMB and 1 RB - no samples collected	Closed
4	6/16	Fisheries received call from Francis Track	Honeoye Lake (north of Calif. Ranch) Canadice (T) Ontario (C)	Natural	Spawning stress likely	Caller reported 15 panfish, neighbors saw similar numbers, no samples collected	Closed
5	6/17	Fisheries received call from Ken Hecker (E. Lake Rd.)	Conesus Lake Livonia (T) Livingston (C)	Natural	Spawning stress and low DO likely	Caller found on his property ~ 50+ BG &PKS, 1 large YP and 2 BB	All fish had been dead for several days but many healthy panfish in the area, no samples collected, closed

2009 FISH KILL NOTIFICATION/ INVESTIGATION LOG, REGION 8 (continued)

NO.	DATE	CALLER/ INVESTIGATOR(s)	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
6a	6/24	Fisheries received call from Larry Gilg (585-293-2461) of Willow Bank Drive	Black Creek Riga (T) Monroe (C)	Unknown	Unknown	Caller reported 20 carp	No fresh fish to collect
6b	6/25	Fisheries received call from Linda Lagree (585-293-0893) of 3 Willowbank Dr.	Black Creek Riga (T) Monroe (C)	Unknown	Unknown	Caller reported 12+ large fish along creek with more floating downstream as she called	Unknown
7	6/25	Fisheries received call from resident at Dacula Shores	Conesus Lake Conesus (T) Livingston (C)	Natural	Spawning stress & low DO likely.	Resident reported 38 sunfish on her property	No fresh fish to collect
8	7/6	Fisheries received 1 st call from (Carol Ash - 585-554-3647)	Canandaigua Lake East shore Middlesex (T) Yates (C)	Natural	None suspected	Several other calls received reporting primarily BG, YP & BB affected	Fisheries found only decomposed fish, 4YP & 1 RB, Law Enforcement also responded and found no fresh fish to collect - Closed

2009 FISH KILL NOTIFICATION/ INVESTIGATION LOG, REGION 9

No.	Date	CALLER/ INVESTIGATOR(s)	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
1	2/17	J. Vogel, DOW T. Wantuck, DOW	Hoyt Lake Buffalo (C) Erie Co.	suspected natural	Suspect winter kill	~100 gizzard shad	closed
2	3/13	T. Wantuck, DOW	Retention Pond Amherst (T) Erie Co.	suspected natural	Suspect winter kill	~150 gizzard shad	closed
3	3/15	M. Clancy, Fisheries	Alma Pond Alma (T) Allegany Co.	unknown	Suspect winter kill	~100 carp	closed
4	Spring 2009	various regional personnel	numerous private ponds throughout Region 9	suspected natural	Suspect winter kill	variety of species and numbers	closed
5	5/29	A. Sarkees, DOW	Twin Lakes South Pond Yorkshire (T) Cattaraugus Co.	Pioneer Village WWTP	partially treated sewage	~100 sunfish	unknown
6	5/29	D. Skaros, DOW W. Smythe, DOW	Cheny Brook Arcade (T) Wyoming Co.	Bray Farm	several 1,000 gal. of liquid manure	~200 fish, mostly LMB, suckers and sunfish	unknown
7	6/5	J. Zanett, Fisheries	Harwood Lake Farmersville (T) Cattaraugus County	suspected natural	probable spawning stress	~400 BG	unknown

2009 FISH KILL NOTIFICATION/ INVESTIGATION LOG, REGION 9 (continued)

No.	Date	CALLER/ INVESTIGATOR(S)	WATER, TOWN & CO.	SOURCE	POLLUTANT & QUANTITY	SPECIES AND NUMBERS	STATUS
8	6/8	J. Zanett, Fisheries	Chautauqua Lake Eltery (T) Chautauqua Co.	suspected natural	probably spawning stress	~200BG	closed
9	Late June 2009	Fisheries Staff	Lake Erie Erie & Chautauqua Cos.	suspected natural	unknown	~100s mostly SMB but also a few FW drum, carp, catfish and RB	closed
10	8/10	Fisheries Staff	Lake Erie Erie and Chautauqua Cos.	unknown	unknown Temp inversion?	tens of 1,000s of smelt	closed
11	8/28	T. Wantuck, DOW	Conewango Creek Conewango (T) Cattaraugus Co.	suspected natural	probably low dissolved oxygen stress	~100s YP and sunfish	closed
12	9/4	R. Rink, DOW T. Wantuck, DOW	Park School pond Amherst (T) Erie Co.	unknown	possibly low dissolved oxygen and homemade explosive	~200 of various species	closed