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Canadian Cooperative Wildlife Health Centre, Volume 3-2, Spring/Summer 1995

Canadian Cooperative Wildlife Health Centre

Centre Canadien Coopératif de la Santé de la Faune

Newsletter Volume 3 - 2, Spring/Summer 1995

In this issue:

CCWHC News

Budget Cuts and the Wildlife Health Centre

Fiscal restraint in the 1995 federal budget has translated into a 30% reduction in the Wildlife Health Centre's budget. However, the Centre continues to receive substantial support from federal, provincial and territorial governments and will remain active in all regions. The budget reduction means that the Centre will be a smaller organization in 1995 than it was in 1994; some of its activities will be reduced and some may be curtailed. The core activities of providing consultative information and diagnoses to sponsoring agencies will continue. The national database of wildlife health information has been fully designed and implemented as of the end of the 1994-95 fiscal year, and emphasis now will be placed on input, output and analysis of data. Dwight Welch, the Centre's data specialists and database designer, is taking up a new position as a wildlife biologist with the State of Maine, but he will continue a formal relationship with the Centre regarding database matters. The Centre views the Newsletter as a principle means of communication with its broadest constituency. For this reason, the Newsletter will continue to be produced and distributed without charge in 1995. Each issue costs about $2,500 to translate, print and distribute. Non-government sponsors for the Newsletter currently are being sought. In the absence of such sponsorship, two issues, rather than three, will be produced in the 1995-96 fiscal year.

Avian Botulism Workshop

The Western/Northern regional centre of the CCWHC, in cooperation with the Institute for Waterfowl and Wetland Research (Ducks Unlimited, Winnipeg) hosted a workshop in Saskatoon on March 16, 1995 to deal with the problem of botulism in waterfowl. The meeting was attended by 23 participants representing Ducks Unlimited Canada (from the three prairie provinces), the Canadian Wildlife Service (from the three prairie provinces), Alberta Fish and Wildlife, Saskatchewan Environment and Resource Management, Manitoba Department of Natural Resources and Delta Waterfowl Research Station. After a general discussion of the ecology of the disease, an attempt was made to define the extent of occurrence of botulism, types of management being used, cost of management, and questions about the disease that should be answered. The number of outbreaks in any one year is highly variable and "average" losses are meaningless. Each province has several wetlands on which summer outbreaks have occurred several times in the past decade. These extend from arid short-grass prairie areas to boreal wetlands. Spring outbreaks have only been recognized in Saskatchewan. Monitoring of botulism-prone wetlands is done in all provinces at a cost of many thousands of dollars/year. The major management procedure is carcass collection and disposal; the direct cost per carcass collected is approximately $3-4; this does not include the cost of time lost to other

activities. Treatment of sick birds has been used on a very limited basis, with success ranging from 41% to > 90%. The effectiveness of carcass collection and disposal as a management tool to reduce losses to the disease was identified as the major question that should be addressed. CCWHC personnel are working with representatives of the other agencies to develop a research protocol that could be incorporated into the management activities of agencies beginning in 1995. (Gary Wobeser - CCWHC, Western/Northern Regional Centre)

Feature Articles

Some Common Diseases of Fresh-Water Fish

Diseases or abnormalities in angler- or commercially-caught fish are relatively uncommon; however, when observed, there is often concern about the health of fish stocks and risks to humans eating the fish. Disease occurrence in wild fish is poorly understood. The causes and manifestations of disease are varied and accurate diagnosis often requires trained personnel with access to appropriate laboratory facilities. Some common conditions in hooked or netted fish are described in the following article.

Parasites

Fish, like other wildlife, are hosts to a rich array of internal and external parasites. Typically, the majority of fish in a population have very few parasites while a few fish have many. Parasites often are too small to be seen with the naked eye; such infections may be recognized by the damage done to the fish and subsequent examination of affected areas with a microscope.

External Parasites

Many different types of organisms live on the skin, gills, or in the mouths of fish. These include single-celled protozoans, crustaceans, tapeworms and leeches. Dark brown to black leeches are occasionally seen attached to the skin of fish. They have a direct life cycle involving an adult stage and a cocoon stage which is either carried by the adult or is attached to some object in the environment. Adult and immature forms periodically attach to the skin of fish and take a blood meal. Heavy leech infestations can result in significant blood loss.

Several kinds of copepod, a type of crustacean, are important external parasites of fish and also can act as intermediate hosts for other fish parasites. Copepods have a complex life cycle involving several larval stages. Typically, mature females are the only form which attach to fish; other forms are free-living. Species of copepods come in many different shapes and sizes, and have common names such as "anchor worm" and "salmon louse". Copepod infestations can be significant in some circumstances.

Internal Parasites

Fish harbour a number of internal parasites, and can be both "intermediate" and "definitive" hosts. A definitive host is infected with the adult, sexually reproductive form of the parasite; typically these forms are in the digestive tract. An intermediate host contains larval or juvenile parasites. These forms can be found throughout the body and often are the stages most detrimental to the health of the fish. Examples of a few, common, larval parasitic diseases include:

Trematode or fluke larvae One group of flukes (called "digenetic flukes") require at least 2 different hosts to complete their life cycle. Adult flukes produce eggs which are passed in the feces of the infected host. Eggs hatch, releasing a motile larva known as a miracidium which infects a mollusc (snail, mussel, etc.) intermediate host. In the mollusc, the parasite undergoes asexual reproduction resulting in another motile larval form, called a cercaria, which is released into the water and subsequently is ingested by or invades a second host. If the cercaria infects a definitive host, it develops into an adult fluke; if it infects another intermediate host, it encysts in the tissues of its new host. The encysted form is called a metacercaria. Ingestion of metacercaria by the appropriate definitive host, such as a fish, bird or mammal, results in development to the adult form and completion of the life cycle.

Encysted larvae (metacercaria) are common in fish and occur in a variety of tissues. Larvae in muscle or beneath the skin are frequently recognized by anglers and are often referred to as "white grub" or "black spot," depending on their appearance. The presence of larvae in muscle frequently results in fish fillets being discarded for aesthetic reasons. However, these parasites do not cause disease in humans and are readily killed by cooking the fish.

Larvae of some species of trematodes also can invade the lens of the eye, resulting in cataracts or opacities in the lens. These cataracts may impair vision, thus resulting in reduced ability to obtain food and avoid predation.

Cestode or tapeworm larvae Tapeworms also have complex life cycles involving one or more intermediate hosts, and fish can act as definitive hosts, intermediate hosts or both. Adult worms are found in the intestine of the definitive host and are frequently observed in the intestine of fish. Eggs passed in feces or hatched larvae are ingested by an intermediate host, usually a copepod. The larvae penetrate the tissues of the copepod and encyst, forming other larval forms called procercoids or plerocercoids. Procercoids require another intermediate host to complete their life cycle. When the copepod is ingested by a fish, the procercoid is released. It penetrates the wall of the gut and encysts in the tissues forming a plerocercoid. The migrating plerocercoids, if in sufficient numbers, can result in significant destruction and inflammation in the body cavity and tissues of the fish. Fish can die directly from these infections or their health and reproductive potential may be impaired. Recognition of plerocercoids in muscle often results in fillets being discarded by fishermen. Again, freezing and/or cooking renders the parasites harmless.

Ingestion of fish containing plerocercoids, by a suitable definitive host, will result in development of the adult worm in the gut. The definitive host may be a bird, mammal or another fish. One cestode called Diphyllobothrium is quite common in fresh-water fish in Canada. Humans, dogs or cats ingesting raw or undercooked fish containing larvae of this cestode will develop intestinal tapeworm infections. These larvae are very small and are seldom visible in infected fish. For this reason, thorough cooking of fish is advised.

Tumors

Tumors in fish, as in other species, may originate from a variety of different tissues and the suspected tissue of origin is used to name the tumor (ie. fibroma or fibrosarcomas develop from fibrous tissue). Tumors arise due to alterations in cells which result in excessive growth. Tumor development is complex and is as yet incompletely understood. Factors such as continuous tissue injury, infections and damage to genes by viruses or chemicals are a few of the factors which have been associated with tumor development. Some fish tumors are caused directly by virus infections. Fish tumors are of interest for a number of different reasons, including their potential use as indicators of environmental degradation.

Skin tumors are commonly observed in fish and are frequently termed papillomas. These papillomas vary from small plaques to large protruding masses and may be found anywhere on the body. Viruses and environmental contaminants have been implicated in the development of papillomas. Lymphocystis is a virus disease of fish which results in variably sized, pale, cauliflower-like nodules on the skin and occasionally in other tissues. The virus induces clusters of fibrous tissue cells to become greatly enlarged.

Tumors of fibrous tissue (fibromas or fibrosarcomas) are common in a wide variety of species. The masses vary in consistency and size and often protrude from the surface of the fish. The overlying skin may be ulcerated. Dermal fibrosarcoma of walleye is a specific entity characterized by single or multiple hard nodules scattered over the skin. This tumor is associated with a retrovirus.

Lymphosarcoma, a tumor of cells of the immune system called lymphocytes, is widely recognized in northern pike and muskellunge. This tumor typically starts as a small nodule in the skin, then enlarges and spreads throughout the body. The disease is usually fatal in muskellunge but northern pike often recover. This tumor also is caused by a retrovirus.

Viruses associated with tumors in fish, and for that matter mammals and birds, are not known to be infectious to humans; however, we generally suggest that fish portions containing tumors should be discarded.

Skeletal deformities

Skeletal deformities are occasionally seen in wild fish. They develop very early in life and, in general, their cause is unknown. One of the more common deformities is

deviation or curvature of the back. This condition is seen in a variety of species and can be the result of disease in bone, muscle or nervous tissue. In cultured fish, this condition has been associated with nutritional deficiencies and, in some situations, pollution with heavy metals has been implicated.

Walleye Myopathy

A syndrome characterized by muscle degeneration, necrosis, inflammation, fibrosis and mineralization is observed occasionally in walleye. In local areas, the condition is seen with enough frequency to result in economic losses to commercial fishermen. The fillets from affected fish have variably sized regions of yellow to brown discoloration which are gritty and tough in texture. The cause of this disease is unknown but is thought by some to be related to deficiencies in nutrients such as vitamin E and selenium.

Disease Updates

Atlantic Region

Mortality of common terns in Kouchibouguac National Park

The Tern Islands are a small group of barrier islands, approximately 1 km offshore, in the St. Louis de Kent River estuary, New Brunswick. These islands are part of Kouchibouguac National Park and they are utilized as a summer nesting site by the largest colony of common terns (Sterna hirundo) in the Maritimes. In June and July 1994, during routine patrols of the islands, three separate mortality incidents involving a total of approximately 485 common terns were identified. A sample of 68 of these birds was submitted to the CCWHC Atlantic Region for post mortem examination.

The terns were in very good body condition and there was no evidence of an infectious disease problem. All birds had penetrating wounds with hemorrhage in the surrounding soft tissues and approximately 60% of them had single or multiple skeletal fractures. These lesions were very similar to those identified in waterfowl dead from gunshot trauma. However, lead pellets were not identified by radiography, fluoroscopy or necropsy in any of the submitted common terns. This is in direct contrast to waterfowl in which lead shot can be distinguished radiographically in approximately 90% of the birds killed by shotgun. Perhaps, depending on the size of shot and firing distance, lead pellets are not retained in the flesh of common terns due to their smaller body mass in comparison to waterfowl. Another confusing finding in this case was the concentration of lesions in the chest, back and cranial abdomen of many birds.

Approximately 30% of the birds had broken wings but none of the birds had leg, head or neck injuries. The lesions from shotgun trauma in waterfowl are more randomly distributed with leg, head and neck wounds encountered with relatively high frequency

(approximately 25% of those examined). It is possible that the more compact body of the tern (short neck/legs and small head) decreases the probability of these anatomical sites being hit by lead pellets. Therefore, despite the apparent conflicts with a diagnosis of gunshot trauma, we suggest that this was the most likely cause of death in this case. The lack of other potential causes of such lesions on the Tern Islands (i.e. there are no predators or dogs that could cause crushing injuries, and no trees, hydro lines or other objects which a large number of birds might strike) also makes this the most likely etiology.

It is also important to note that the mortalities occurred during the breeding season and involved healthy, adult, reproductively active birds (males had enlarged testes and females had well developed ovaries and/or intrauterine shelled eggs). This finding is significant because it indicates that, in addition to the direct loss of adult birds, there was an unquantifiable loss of reproductive potential and fecundity within the colony, the effect of which may only be realized in subsequent breeding seasons. Therefore, this common tern colony will be closely monitored in the summer of 1995 for indications of population decline and identification of further mortalities. (Pierre-Yves Daoust and Scott McBurney - CCWHC, Atlantic Regional Centre, and B. Richard - Parks Canada, Atlantic Region)

Québec Region

Salt poisoning in White-Winged Crossbills

Approximately 20 white-winged crossbills were found dead on a road near the Valcartier military base at the end of February. Shortly before death, these birds demonstrated abnormal behaviour characterized by weakness. Two white-winged crossbills submitted frozen for analysis to the Québec Regional Centre were in excellent body condition and had no significant lesions. Due to a suspicion of salt poisoning (NaCl), the concentration of sodium (Na) in the brain was evaluated in one bird. A value of 2.98 mg/g was obtained, approximately double the concentration found in the brain of a pigeon used as a control. We were unable to find reference values for birds, but, in pigs, a cerebral salt concentration above 1.8 mg/g strongly suggests salt poisoning. We believe therefore that salt poisoning might be the cause of death in these white-winged crossbills. The salt used on the roads in this area during the winter is the most likely source of this poisoning. This type of poisoning has rarely been reported in the literature, therefore the impact of road salt on avifauna is difficult to evaluate. Measurement of salt in the brain should be done routinely in all birds found near roads on which road salt is used and where the cause of death is unknown.

Prevalence of Raccoon Roundworm (*Baylisascaris procyonis*) in Québec

Baylisascaris procyonis, the raccoon round worm, is a common parasite of raccoons. The larvae of this worm can infect and undertake erratic migrations in other animal species,

including humans. These larval migrations can prove fatal if the central nervous system is affected and can cause visual problems when present in the eyes. Even though only two cases of fatal encephalitis have been confirmed to date in humans, the abundance of raccoons in urban areas increases the risk to people. A study to determine the prevalence of this parasite in the St-Hyacinthe region has just been completed. Of the 21 raccoons examined, 57% were carriers of B. procyonis. Contact with Québec raccoon excrement is therefore a potential human health risk . (Source: Anna MacKay, Agriculture et Agroalimentaire Canada).

Massive Amphibian and Fish mortality in Mauricie after a Sulphuric Acid spill

On January 21st 1995, a freight train derailed and spilled approximately 254 000 litres of concentrated sulphuric acid (90%) into the Petit Lac Masketsi and the Rivière Tawachiche near Hervey-jonction, Portneuf County. This spill caused a fatal "acid shock" to the entirety of the river's fauna over a distance of a dozen kilometres. The water pH dropped to 2.5 and numerous carcasses of frogs, salamanders, and fish of several species were found. The Petit Lac Masketsi was still frozen; therefore the impact of the spill on the lake fauna will be fully evaluated only in the weeks to come. The populations of lake charr, brook charr and smallmouth bass will be severely affected. Under the supervision of the ministère de l'Environnement et de la Faune, more than 660 tons of calcium carbonate were placed in the river and the lake to bring the water pH back to acceptable levels. Since sulphuric acid is very dense, the deepest parts of the lake are still very acid. An environmental follow-up study will permit the evaluation of the impact, in the medium to long term, of this faunal catastrophe. (Source: Michel Lemieux, Direction régionale de la Mauricie - Bois-Francs - Environnement).

Intentional Poisoning of Snow Buntings by Carbofuran

Approximately twenty snow buntings were found dead under a bird feeder on Montreal's south shore. Several of these birds were submitted to the Québec Regional Centre. The birds were all in good body condition and their gizzards and crops contained a large quantity of seed which matched samples collected at the site by wildlife conservation agents. Carbofuran was detected at a concentration of 34 m/g in the gastro-intestinal contents submitted to the National Wildlife Research Centre of Hull. Carbofuran (Furadan 480F) is a highly toxic insecticide used to control insect pests in agriculture. The use of this pesticide to poison migratory birds is illegal and can lead to prosecution for the offense. (Stéphane Lair and Daniel Martineau, Quebec Regional Centre)

Ontario Region

Conjunctivitis in house finches

In the Winter, 1994-95 Newsletter (Vol.3, No.1), it was reported that conjunctivitis due to infection with Mycoplasma gallisepticum had been reported in house finches

(Carpodacus mexicanus) in the eastern United States, in an area extending from Georgia to New York state. At that time, there were no confirmed reports from Canada. In March, a participant in Cornell University's Project Feederwatch, who had been alerted to the presence of this disease, reported affected house finches at her feeder in Queenston, Ontario in the Niagara Peninsula to a biologist at the Canadian Wildlife Service. Two affected birds were captured and submitted to the CCWHC laboratory in Guelph for diagnostic testing. Both birds had severe bilateral conjunctivitis grossly. Microscopically, the infection extended into the nasal sinuses, oropharyngeal cavity and nasolacrimal glands, and was characterized by a mononuclear, predominantly lymphocytic submucosal inflammatory infiltrate. These findings were considered to be compatible with mycoplasma infection. Swabs from affected eyes were submitted to the Veterinary Laboratory Services (VLS) branch of the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA): polymerase chain reaction (PCR) testing was positive for Mycoplasma gallisepticum but the organism was not isolated in culture.

Project Feederwatch had previously received reports from 8 Ontario locations of affected finches. They included Trenton, Brighton and Picton at the eastern end of Lake Ontario, metropolitan Toronto, and Cambridge and Shelburne, west and north of Toronto. Since this time, additional reports have been received from the Trenton-Kingston area and as far north as Owen Sound. No specimens have been received from any of these locations, and these reports are based solely on the observation of affected birds.

It is possible then, that this condition is relatively widespread in the Ontario population of house finches. Most of these sightings occurred prior to the arrival of spring migrants. This disease is of considerable importance to the poultry industry, which maintains breeder flocks free of exposure. There is a high density of poultry operations in the Niagara region, which is also an area in which house finch populations are well-established. Another concern more directly related to wildlife is the potential for this organism to infect wild turkey populations. When they were first transported and released, Ontario wild turkey stocks were tested and found to be free of Mycoplasma infections. However, if a Mycoplasma species is present in house finch populations, there is a potential risk that the disease could become endemic in Ontario wild turkey populations as well.

The CCWHC is cooperating with OMAFRA and the Ontario Ministry of Natural Resources in an attempt to further characterize the distribution of this organism in house finches in Ontario, and to monitor its affect on other wild bird populations. (Doug Campbell - CCWHC, Ontario Region)

Collisions of migrating birds with office towers

Birds that migrate at night are attracted to lights and may collide with brightly lit office towers as they migrate through urban areas. This problem is exacerbated when weather conditions are overcast, obscuring natural navigational cues, and in windy conditions in which flying is more difficult. A volunteer organization called the Fatal Light Awareness Program (FLAP) has been formed in southern Ontario and is active in attempting to

convince managers of Toronto's office towers to reduce night-time lighting. They also collect casualties and mortalities from the streets of Toronto's financial district in the early morning hours during the spring and fall migration seasons.

FLAP has provided the CCWHC with its data on species involved and the numbers of birds collected each year. A sample of the mortalities has been necropsied. Most commonly, the birds have suffered severe cranial contusions. There may also be marked hemorrhage into the body cavity. Relatively few limb fractures were detected. In 1993, FLAP volunteers collected a total of 1292 birds, almost evenly divided between alive and dead. The majority of the birds are warblers, sparrows, and thrushes. The most common species were white-throated sparrows and ovenbirds, which accounted for 20% and 17% of submissions, respectively. A significant number of brown creepers (65) also were involved. In 1994, 1960 birds were picked up, 930 alive and 1030 dead. A similar species distribution occurred, with white-throated sparrows and ovenbirds accounting for 38% of the retrievals.

Raccoons

The threat of raccoon rabies moving into Ontario from New York State has focussed public attention on raccoons, and animals showing neurological signs are often submitted for post mortem examination by animal control agencies and animal shelters. No case of rabies, due to infection with either the fox strain of rabies which remains endemic in Ontario or with the raccoon strain which occurs to the south, has been diagnosed in raccoons submitted to the CCWHC Ontario lab.

Canine distemper (CD) virus remains the most common disease seen in raccoons and the leading cause of neurological disease. Other diseases, either alone or in conjunction with CD, have been seen recently in individual animals. A severe encephalitis due to protozoal infection, likely Toxoplasma, was seen in an animal with concurrent distemper infection. Interstitial nephritis due to leptospirosis was diagnosed in an animal from suburban Toronto. Common incidental findings include Sarcocystis cysts in the tongue, Capillaria plica worms in the bladder, and Baylisascaris procyonis worms in the duodenum. Crenosoma sp. worms are occasionally found in bronchioles. The opportunity of diagnosing these conditions in raccoons may be lost should raccoon rabies become endemic in Ontario. In that circumstance, most raccoons would likely be examined for rabies only, seriously compromising our knowledge of the occurrence of other conditions in this species.(Doug Campbell - CCWHC, Ontario Regional Centre)

Northern and Western Region

Pesticide poisonings in eagles

Insecticides, either carbamates or organophosphates, were responsible for 6 separate incidents of poisonings in eagles submitted by Saskatchewan Environment and Resource

Management personnel. The first was in late winter of 1994 and involved 2 bald eagles found dead in close proximity to one another near Estevan in south eastern Saskatchewan. Crop contents contained meat, and brain cholinesterase levels were significantly depressed. Five other incidents occurred in late winter and spring and involved at least 12 bald eagles in total. The birds are suspected of becoming poisoned after scavenging previously poisoned coyotes. Steps are being taken to determine which insecticides were used in each incident. Insecticides are increasingly being used illegally as poisons and should therefore be considered in any suspected cases of poisoning in wild and domestic carnivores. (Trent Bollinger - CCWHC, Western/Northern Regional Centre)

Tularemia in muskrats and beaver

Tularemia is an infectious disease in muskrats and beaver caused by a small bacterium, Francisella tularensis palaeartica. Tularemia was diagnosed in 3 beaver from east central Saskatchewan near Preeceville, 1 beaver from Meadow Lake in west central Saskatchewan, and a muskrat from west central Manitoba near Winnipegosis. All animals were found dead by trappers during February and March, 1995, and were submitted to the CCWHC by staff of Saskatchewan Environment and Resource Management and Manitoba Natural Resources. Local reductions in beaver and muskrat populations also were reported in some of these areas; however, the role of tularemia in these declines and their extent and magnitude are unknown. Animals appeared to have died suddenly with one or all of the following lesions: multiple small areas of necrosis in the spleen and liver, and moderate to severe pulmonary congestion and edema. The disease is transmitted by contact with contaminated water or by direct contact with infected animals or their secretions. This form is caused by Francisella tularensis tularensis and is spread by ticks and other biting arthropods. Tularemia is a zoonotic disease (infectious to humans) and therefore precautions should be taken when handling infected animals. The muskrat from Manitoba also was infected with the bacterium Yersinia enterocolitica, another zoonotic bacterium which causes mortality in beaver and muskrats. (Trent Bollinger - CCWHC, Western/ Northern Regional Centre)

Lead poisoning in eagles

Since the beginning of 1992, lead poisoning has been diagnosed as the cause of death in 2 golden eagles and 5 bald eagles in Saskatchewan. Six of the eagles were from southwestern Saskatchewan and 3 were found along the South Saskatchewan River. This region of the South Saskatchewan river receives considerable hunting pressure, as it is a fall staging area for hundreds of thousands of ducks and geese. The dead eagles are thought to have consumed lead pellets while scavenging on hunter killed and crippled waterfowl. Lead pellets were identified in the gizzard of one of the birds, but were not recognized or present in the other 6 eagles. Three of the birds were still in good body condition and died acutely as a result of ingesting large amounts of lead. Four eagles were severely emaciated and this, along with tissue lead levels, indicated chronic toxicity. Lead poisoning was not diagnosed in eagles from Saskatchewan between 1987 and 1991. The apparent increase in lead poisonings in eagles since 1992 is likely due to improved

reporting and surveillance by field personnel, in part as a result of a study on lead levels in eagles on the prairies initiated by Mark Wayland, Canadian Wildlife Service, Saskatoon. This highlights the importance of active surveillance for wildlife mortality and the submission of carcasses to diagnostic facilities for thorough analysis. (Trent Bollinger - CCWHC, Western/Northern Regional Centre)

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