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# YUKON **FISH HEALTH** HANDBOOK

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**Yukon**  
Environment

© April 2014

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Photo: D. Overall

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## Definitions

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**Anadromous:**

Fish that migrate up rivers from the ocean to breed in freshwater.

**Cataract:**

Damage or injury to the lens of the eye that results in the lens becoming cloudy and opaque.

**Cyst:**

An enclosed sac formed by a thin membranous tissue that usually contains a small amount of fluid and single or multiple parasite larvae.

**Fluke:**

A parasitic flatworm with a complex life-cycle (also called a trematode).

**Host:**

An animal or plant that harbours and provides sustenance for another organism (a parasite).

**Invertebrate:**

An animal that does not have a backbone. This includes snails, worms, clams and insects.

**Larva (plural: larvae):**

An immature life-stage between egg and adult.

**Life cycle:**

A series of different stages of development of an organism. Life cycles can involve one or more than one host.

**Parasite:**

A plant or animal that lives on or within another living organism (host), usually at the hosts' expense.

**Predatory fish:**

Fish that consume or prey on other fish.

**Protozoa:**

A one-celled organism that may be parasitic on fish or other animals. Protozoa are too small to be seen with the naked eye.

**Roundworm:**

A worm-like parasite, usually large enough to be seen with the naked eye (also called a nematode).

**Salmonids:**

The group of fish that includes salmon, char, trout, whitefish, inconnu and grayling.

**Tapeworm:**

A flat, segmented parasitic worm, usually large enough to be seen with the naked eye (also called a cestode).



Photo: O. Barker

## Benefits of Eating Fish

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Harvesting Yukon fish provides many social, cultural and economic benefits. Eating fish is also healthy, because fish are an excellent source of protein, omega-3 fatty acids, vitamins, and minerals important for good health.

Omega-3 fatty acids are considered essential fatty acids: they are necessary for health but the human body can't make them. We have to get them through our food. Numerous studies and reports have linked eating a diet rich in omega-3 fatty acids to many health benefits including:

- Reduced inflammation
- Lower blood pressure
- Healthy functioning of brain (memory and performance)
- Healthy functioning of eyes
- Increased longevity
- Reduced risk of:
  - Cardiovascular disease
  - Cancer
  - Arthritis
  - Diabetes
  - Autoimmune diseases

Fish vary in the amount of omega-3 fatty acids they contain. Some fish from our clean, cold Yukon waters have levels that are equal to or greater than store-bought fish.

SPECIES		OMEGA-3 FATTY ACIDS (G / 100 G SERVING)
Yukon Fish	Lake Whitefish	0.72
	Northern Pike	0.21
	Lake Trout	0.18
Other Fish	Pollock	0.38
	Haddock	0.18
	Atlantic Cod	0.19
	Halibut	0.51
	Coho Salmon (non-Yukon)	1.23
	Chinook Salmon (non-Yukon)	2.32

Omega-3 fatty acid values for Yukon fish are based on an average value from a small number of fish that have been sampled. Omega-3 fatty acid values for non-Yukon fish are from Health Canada<sup>1</sup>.

*Canada's Food Guide* recommends that we eat at least two 75g servings of fish each week to enjoy these health benefits.



## Fishing - Best Practices

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### **Choosing Your Lake**

Fish from some Yukon lakes have heavier parasite loads. While most of these parasites are not harmful to humans, heavy infections may make the fish unappetizing to eat. Harvesting these fish but not eating them is wasteful and should be avoided.

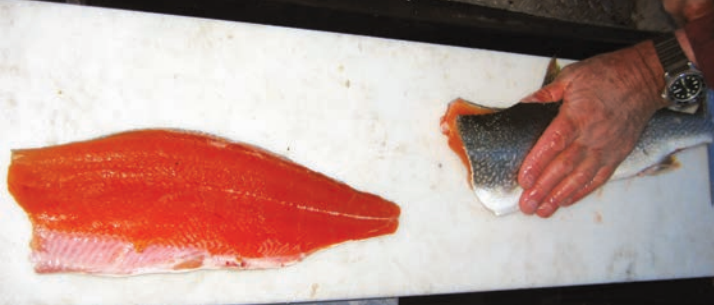
### **Treat Your Fish With Respect**

If you are successful in catching a fish, kill it quickly and humanely, with a sharp blow to the head just behind the eyes. Keeping live fish on stringers or letting them suffocate in the bottom of your boat is disrespectful to the fish.

### **For The Best Tasting Fish...**

- Gut the fish immediately. If you choose to gut the fish later, bleed it immediately by inserting a knife through the gills and cutting down.
- Put the cleaned or bled fish in a plastic bag and put the bag in your ice-filled cooler, keeping the cooler out of the sun. Keeping dead fish on stringers does not keep them cool enough for the best possible preservation.
- If you fillet your fish, do not rinse the fillets in water; wipe them with paper towels.
- Cook the fish within 24 hours, or preserve it by freezing, smoking or canning.





## Food Safety

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Food safety means handling, preparing, and storing food using practices that prevent food-borne illness. Food safety principles apply to all food that we eat, including caught or harvested foods like fish. The key principles are to properly clean, separate, cook, and chill food while handling and preparing it<sup>2</sup>.

- **Clean:** Wash hands and work surfaces with warm, soapy water before and after preparing foods.
- **Separate:** Keep raw fish and meat separate from cooked foods, or foods that will be eaten raw like vegetables or fruit.
- **Cook:** Use a thermometer to check if food is cooked to the correct temperature by inserting the food thermometer in the thickest part of the food.
- **Chill:** Chilling food properly is important to prevent harmful bacteria from growing in food. Refrigerate or freeze cooked food within 2 hours of preparing it<sup>2</sup>.

### Preserving Fish

The best tasting fish is fresh from the lake, but if you choose to preserve it, there are several options:

## Freezing

Freezing fish is one of the best ways of preserving fish. Sealing in an airtight bag or freezing in water will prevent freezer burn. Some types of fish freeze very well, such as trout and salmon, while grayling do not freeze well due to the fine texture of the flesh. If fish is to be eaten raw (for example in sushi), Health Canada recommends that the fish be frozen at or below  $-20^{\circ}\text{C}$  for at least seven days to kill potentially harmful parasites<sup>3</sup>. Otherwise, cook all fish thoroughly to an internal temperature of  $63^{\circ}\text{C}$  before feeding to people or pets to prevent potential infection by parasites<sup>3</sup>.

## Smoking

In the past, large amounts of salt and long smoking times were used to preserve fish. Current smoking methods use much less salt and shorter smoking times, so fish that will be smoked are usually frozen first. Almost all fish can be smoked, but fatty fish like salmon are easiest because they don't tend to absorb too much salt like leaner fish do (e.g. grayling).

Fish should be cleaned thoroughly before being salted or brined, then dried at a cool temperature (below  $40^{\circ}\text{C}$ ). When hot-smoking fish, an internal temperature of  $71^{\circ}\text{C}$  should be reached for at least 30 minutes at some point in the process (usually toward the end of the smoking cycle)<sup>4</sup>. If cold-smoking fish, freeze at or below  $-20^{\circ}\text{C}$  for at least seven days to kill parasites and bacteria before smoking the fish<sup>3</sup>.

Smoked fish may be stored up to 14 days in the refrigerator. If keeping smoked fish for longer periods of time, wrap well and store in the freezer. Note that vacuum-packed smoked fish must still be kept refrigerated or frozen.

## Canning

Pressure canners must be used to can fish. For low-acid foods like fish, just boiling the canning jars will not kill bacteria that could cause botulism. Pressure canners use steam under high pressure to ensure that the fish reaches the high temperatures necessary to eliminate the bacteria that cause botulism. Make sure the pressure canner is working properly and follow the manufacturer's instructions carefully. Use canned fish within one year for best quality. Once the container has been opened, refrigerate leftovers immediately and eat them within 3-4 days.

## Recommended Storage Times<sup>3</sup>

FISH	REFRIGERATOR (4°C / 40°F)	FREEZER (-18°C / 0°F)
Cooked fish	1-2 days	1 month
Uncooked fish	1-2 days	3-6 months
Smoked fish	1-2 weeks	4-5 weeks

## Botulism

Botulism is one of the most serious types of food poisoning. It is caused by the toxin produced by bacteria in fish or meat that is not properly cooked immediately before eating. You can avoid botulism by:

- Gutting and cleaning fish as soon as possible and before freezing, to avoid contamination of the flesh by the gut contents;
- Cooking all fish, including canned fish, before eating;
- Following canning instructions from a known supplier of canning equipment;
- Making sure that fish you smoke were properly gutted and cleaned while fresh;
- Keeping your smoked fish frozen and well-sealed or vacuum-packed in plastic bags.

## **Feeding Fish To Pets**

Raw fish should not be fed to pets, since some fish parasites may infect pets causing health issues. All fish and fish parts that are fed to animals should be cooked thoroughly to an internal temperature of 63°C, or frozen at or below -20°C for at least seven days, to kill potentially harmful parasites and bacteria<sup>3</sup>.



Photo: A. Foos

## Your Role in Fish Health Monitoring

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Yukon fish are generally healthy and are a good food choice. Like any wildlife population, fish in Yukon may have parasites or diseases that may affect the fish themselves or the people and animals that eat the fish. It is important for wildlife managers to monitor these diseases and parasites so that risks to animal or human health can be assessed and managed if necessary. The prevalence of parasites and disease can also be used as an indicator for fish population health and fitness as well as a sentinel of environmental change.

### **How You Can Help**

Recreational anglers and subsistence harvesters often have firsthand experience handling large numbers of fish and are valuable partners in monitoring fish health. If you suspect your fish has parasites or a disease or if you find a dead fish, please bring it to our attention.

### **What To Look For**

- Dead fish with no obvious cause of death
  - Unusually thin fish
  - Unusual bumps or lumps on the body or in the flesh
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- White spots on the flesh, liver or other internal organs
- Enlarged or bleeding internal organs (spleen, liver, kidney)
- Parasites on the inside of the body or in the flesh
- Anything that seems unusual to you

## **Finding And Reporting Sick Or Dead Fish**

- If possible, take pictures of the fish as it was found.
- Use rubber or latex gloves to handle the fish.
- Record the weather conditions, date, and location the fish was caught or found.
- If multiple fish were found sick or dead, record the number and species of fish.

### **If you have a whole fish**

- Seal the fish in a plastic bag (if you have more than one fish, put each fish into a separate bag) and label with the date and location that the fish was caught or found.

### **If you do not have a whole fish**

- Do not cut into parts of the fish that look abnormal or unhealthy.
- Seal the abnormal tissues in a plastic bag; label with the species of fish, the type of tissue (liver, stomach, etc.), and the date and location the fish was caught or found.

After handling diseased fish, wash your hands and knives well with warm, soapy water.

Unless otherwise directed, freeze the sample as soon as possible and bring to your local Department of Environment office along with recorded information and pictures. The samples will be examined and results reported to you as soon as possible.

## **Contact Information**

Animal Health Unit, Department of Environment: 867-667-8531  
Fisheries Section, Department of Environment: 867-667-5721



## Mercury in Yukon Fish

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Yukon fish are safe to eat, and as part of a balanced diet offer many health benefits. As with fish available in stores and supermarkets, however, fish caught in the Yukon may contain small amounts of mercury. In some circumstances, certain people may have to limit their intake of some types of fish to avoid adverse health effects.

### **Where does mercury come from?**

Most mercury in Yukon lakes and rivers comes from natural sources such as volcanoes, erosion and forest fires. Mercury is also released from industrial sources and fuel burning and can travel to the north from industrial areas in the south through the movement of large air masses. Plants and animals absorb mercury from their environment. When we eat those plants and animals, we take in the mercury as well. Mercury can be found in many of the foods we eat, both those found in grocery stores and in wild harvests of meat and fish.

### **Why should we be concerned about mercury?**

Long-term exposure to low amounts of mercury may affect the development of the brain and nervous system in unborn babies and children under the age of 12. Because of this,

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Health Canada's advice for fish consumption<sup>5</sup> takes a cautious approach in avoiding or reducing mercury exposure.

### **How much mercury is in Yukon fish?**

Fish have different levels of mercury depending on the species and age/size of the fish and also depending on the size, location and type of lake they live in. Younger, smaller fish usually contain less mercury than older fish, and predatory fish species like lake trout and burbot tend to have higher levels of mercury than non-predatory fish like grayling and whitefish.

Most Yukon fish that have been tested have been below Health Canada's maximum limit of mercury for retail fish (0.5 parts per million)<sup>5</sup>. However, some larger fish (lake trout and burbot) may have levels approaching or exceeding Health Canada's maximum limit for mercury.

### **What fish are safe to eat?**

Most Yukon fish, including grayling, whitefish, inconnu, sucker, salmon and pike have mercury levels well below Health Canada's maximum limit and consumption of these fish does not need to be limited<sup>6</sup>. In general, Yukon adults do not need to limit their intake of lake trout or burbot. However, consuming lake trout and burbot that are less than 60 cm (24 inches) in length gives a higher degree of safety in limiting mercury exposure.

Women of child-bearing age and children under 12 should limit their consumption of large Yukon lake trout and burbot to the levels listed below:

- Fish shorter than 40 cm (about 2 lbs): unlimited consumption
- Fish measuring between 40 and 60 cm (about 2-6 lbs): limit to 3-4 meals/week
- Fish longer than 60 cm (>6 lbs): limit to 1 or 2 meals/week



Women of child-bearing age and children under 12 should also limit their consumption of commercially available swordfish, tuna and shark to one serving/month. Others should limit their consumption to one serving/week.



Photo: O. Barker





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PARASITES AND  
DISEASES IN  
YUKON FISH

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# Fish Lice

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## What will I see?

Clear or white oval to round parasites with 2 tubular egg sacs (about 1 cm long). Fish lice are typically found attached to the outside of the fish near the base of the fins or in the gills or mouth.



Lice on a lake trout tail. Photo: B. Schonewille

## Cause

A parasite called *Salmincola*.

## Commonly affected fish species

Many freshwater and anadromous fish species can be infected, particularly salmonids.

## Can I eat it?

Yes. This parasite is not known to infect humans.

## Can I feed it to my pets?

Yes. This parasite will not affect your pets.

## Life cycle

The adult parasite sheds eggs directly into the water. Free-swimming larvae hatch from the eggs and attach to the outside of a fish where they grow into adults. ([See life cycle A](#))

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# Leeches

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## What will I see?

Slender, worm-like parasites (2-3 cm) that are clear to light brown with thin horizontal white bands. Leeches can be found attached to the skin anywhere on the fish. Small red bumps on the skin may be left after a leech falls off.



A single leech attached to a burbot.

## Cause

An external parasite called *Piscicola*.

## Commonly affected fish species

All freshwater and anadromous fish species can be infected.

## Can I eat it?

Yes, although leeches may try to attach to your skin while you are handling a fresh fish.

## Can I feed it to my pets?

Yes. This parasite will not affect your pets.



An unusually heavy infection of leeches on a burbot.

### **Life cycle**

The adult leech detaches from the fish and lays its eggs on the bottom of a lake or river. The eggs hatch and the free swimming juveniles attach to a fish where they feed and grow into adults. (See [life cycle A](#))

# Eye Flukes

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## What will I see?

Infected fish may have cataracts (damage to the lens) that make the eye look cloudy. These flukes are too small to be seen with the naked eye.



Cataract caused by eye flukes in a burbot.

## Cause

A parasite called *Diplostomum*.

## Commonly affected fish species

Many freshwater and anadromous fish species can be affected.

## Can I eat it?

Yes. This parasite is not known to infect humans.

## Can I feed it to my pets?

Yes. This parasite will not affect your pets.

## Life cycle

The adult fluke lives in the gut of a fish-eating bird. Fluke eggs are shed into the water with the bird feces. The eggs hatch into larvae and infect aquatic snails. A second type of larvae are released from the snails into the water. These larvae attach to a fish, penetrate the skin, and migrate through the body until they reach the eye. When an infected fish is eaten by a bird, the fluke grows into an adult in the gut of the bird.

[\(See life cycle C\)](#)

# Fungal Skin Infections

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## What will I see?

White to brownish cotton-like patches on the skin and/or gills of the fish. The skin around the fungus may be white or reddened. In some cases, the fungus may be growing at the site of an injury. Masses of fungus may be present in the internal organs.



Fungal skin infection in a grayling tail (top) and at the site of a previous injury on a burbot (bottom).

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## **Cause**

A freshwater fungus called *Saprolegnia*. Fish are more susceptible to this fungal infection if they are already stressed by other infections, injuries, damage to the skin, or by stressful environmental factors such as migration or excessively warm water.

## **Commonly affected fish species**

All freshwater and anadromous fish species can be affected.

## **Can I eat it?**

Yes. This fungus is not known to infect humans. However, infected fish may be sick with other diseases, so it is not recommended to feed them to your pets.

## **Can I feed it to my pets?**

Yes. This fungus will not affect your pets. However, infected fish may be sick with other diseases, so it is not recommended to eat them.

## **Life cycle**

Spores from the fungus are released into the water and can infect susceptible fish. [\(See life cycle A\)](#)

# Tumors

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## What will I see?

External or internal swelling or abnormal tissue growth can occur anywhere on or in a fish. Tumors often appear as well-defined, round, lumpy growths.

## Cause

Viruses, chemicals, or genetic predisposition are some of the factors that can stimulate the growth of some types of tumors in fish.

## Commonly affected fish species

All fish species can be affected.

## Can I eat it?

Yes, however tumors may make the fish unappetizing to eat.

## Can I feed it to my pets?

Yes. Fish tumors will not affect your pets.

## Common types of tumors:

- **Pike lymphosarcoma**

Common in northern pike, pike lymphosarcoma appears as lumpy white or red growths on jaws, sides, base of fins and occasionally in internal organs. It is caused by a viral infection.



Pike lymphosarcoma. Photo: Minnesota Dept. of Natural Resources

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- **Fibroma**

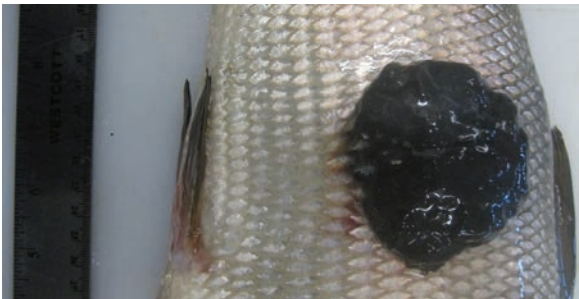
Found in many species of fish, fibroma appears as lumpy internal or external growths made of fibrous connective tissue.



Fibroma in the gills of a lake trout.

- **Melanoma**

Found in many species of fish, melanoma appears as darkened spots or raised masses most often found on the skin and sometimes in internal organs.



Melanoma in the skin of a whitefish.

# Injuries

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## What will I see?

Injuries may occasionally be seen in Yukon fish. Injuries include: Cuts, tears, scrapes, puncture wounds or discoloured lines around the body. In some cases injuries may have become infected by a fungus. See Fungal Skin Infections on page 24.



Injuries caused by fishing gear on a burbot (left). An old injury on the mouth of a pike with secondary infection (right). Photo: A. Foos

## Cause

Injuries may be caused by other fish, fish-eating birds and mammals, or fishing gear. Fish may also be injured during specific behaviours, such as migration or spawning.

## Commonly affected fish species

Any species of fish can have physical injuries.

## Can I eat it?

Yes, however, physical injuries may make some parts of the fish unappetizing to eat.

## Can I feed it to my pets?

Yes. Fish with injuries will not affect your pets.

# Fish Die-offs

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## What will I see?

Large numbers of dead fish in one location.

## Cause

**Winter kill** occurs under the ice in lakes and ponds when there is not enough oxygen in the water and fish suffocate. Shallow lakes or bays are more prone to winter kill since deeper waters are able to maintain higher oxygen levels. Dead fish are not often seen until after the ice melts.

**Summer kill** occurs in lakes and ponds in the summer when the amount of oxygen in the water is reduced by high temperatures and/or algae growing in the water. The fish suffocate due to insufficient oxygen. This may occur in only one part of a lake such as a shallow bay, where water temperatures are more likely to be higher.

**Changing water levels** can also cause die-offs when fish are trapped in an area by low water levels.

**Parasites and diseases** can cause fish die-offs. This may be more likely to occur if the fish are already stressed in some way (for example they have insufficient oxygen or are in excessively warm water).

**Toxins** found in industrial or agricultural run-off, hazardous chemical waste or sewage can all cause fish die-offs.

## Commonly affected fish species

All fish species can be affected.

## Can I eat it?

No, it is not recommended to eat fish that have been found dead.

## Can I feed it to my pets?

No, it is not recommended to feed fish that have been found dead to your pets.

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# Tapeworm (*Triaenophorus*)

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## What will I see?

White to beige elongated oval cysts (1-3 cm long) in the flesh or less commonly in internal organs of infected fish. The cysts contain tightly coiled white worm-like larvae, which can be longer than 10 cm when pulled out of the cyst. White adult tapeworms, up to 40 cm long, may be found inside the guts of predatory fish.

The cysts of this parasite may be confused with cysts of the broad tapeworm (page 32).



Adult tapeworms attached to the inside of a fish intestine.



Tapeworm cysts in fish flesh.

## **Cause**

A parasite called *Triaenophorus*.

## **Commonly affected fish species**

Cysts and larvae in the flesh and internal organs are most common in salmon and whitefish, but can also be in grayling and burbot. Adult tapeworms are most common in pike.

## **Can I eat it?**

Yes. This parasite is not known to infect humans.

## **Can I feed it to my pets?**

Yes, this parasite will not affect your pets.

## **Life cycle**

The adult tapeworm lives in the gut of a predatory fish, such as pike. Eggs are shed into the water with feces. The eggs hatch into larvae which are eaten by aquatic invertebrates, and the invertebrates are eaten by fish, such as whitefish. The larvae burrow into the gut or flesh where they form cysts until the fish is eaten by a predatory fish. The parasite grows into an adult in the gut of the predatory fish. [\(See life cycle C\)](#)

# Broad Tapeworm

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## What will I see?

Small, white, round cysts (3-15 mm wide) on the internal organs, or less commonly in the flesh. Broad tapeworm cysts can be confused with the cysts of another tapeworm (*Triaenophorus*, page 30). *Triaenophorus* cysts are elongated oval white cysts usually found in the flesh following the grain of the muscle. Broad tapeworm cysts are more round and are often found on the internal organs as well as in the flesh.



Broad tapeworm cysts on a fish stomach.  
Photo: C. Banner, FishPathogens.net

## Cause

A tapeworm called *Diphyllobothrium*.

## Commonly affected fish species

Many freshwater and anadromous fish species can be affected.

## Can I eat it?

This parasite can be passed to people if the tapeworm is not killed before the infected fish is eaten. People can develop mature tapeworms in their intestines that can be

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up to 9 meters long and live up to 20 years. Most people who are infected with this tapeworm have no symptoms. Rarely, people may experience fatigue and/or diarrhea. If you experience these symptoms, you should consult your physician, as medication can be used to treat the infection.

To kill these parasites, Health Canada recommends that you:

- Cook fish to an internal temperature of at least 63°C<sup>3</sup> OR
- Freeze fish at -20°C for at least 7 days<sup>3</sup>

**Note that smoking fish does not kill this parasite.**

### **Can I feed it to my pets?**

This parasite can be passed to your pets if the tapeworm is not killed before the infected fish is eaten. If the fish is cooked or frozen by following the recommendations above, then it is safe for your pets to eat infected fish.

### **Life cycle**

The adult tapeworm lives in the gut of mammals and birds. Tapeworm eggs are shed into the water with feces. The eggs hatch into larvae, which are eaten by aquatic invertebrates, which are then eaten by small fish. When a predatory fish eats the small fish, the larvae can make cysts in the organs or flesh of the predatory fish. When a mammal or bird eats the predatory fish, the larvae develop into adult tapeworms in the gut. (See life cycle D)

# Herring Worm

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## What will I see?

White, worm-like larvae coiled like watch springs in the body cavity, flesh, or internal organs of an infected fish. The coils are about 1 cm wide, and the larvae are 2-4 cm long when stretched out.



*Anisakis* larvae on fish liver. Photo: Alaska Department of Fish and Game.

## Cause

A roundworm called *Anisakis*.

## Commonly affected fish species

Anadromous fish species can be infected, particularly salmon. Only fish that spend at least part of their life in the ocean can become infected with *Anisakis*.

## Can I eat it?

This parasite can be passed to people if the roundworm is not killed before an infected fish is eaten. Symptoms in people can occur within hours of eating infected fish and may include:

- Severe stomach pain
- Nausea and vomiting

- Some people may develop allergic reactions after eating these parasites.

Seek medical attention if you become ill after eating raw or undercooked fish.

To avoid infection, gut and process the fish immediately to stop larvae from moving into the flesh.

To kill these parasites Health Canada recommends that you:

- Cook fish to an internal temperature of at least 63°C<sup>3</sup> OR
- Freeze fish at -20°C for at least 7 days<sup>3</sup>

**Note that smoking fish does not kill these parasites.**

### **Can I feed it to my pets?**

Yes, this parasite cannot survive in your pets for very long. The fish should be cooked or frozen by following the recommendations above before feeding infected fish to your pets.

### **Life cycle**

Adult *Anisakis* worms live in the gut of marine mammals. Eggs from the roundworm are shed into the water with feces. The eggs hatch into larvae, which are then eaten by marine invertebrates, and are in turn eaten by fish. The larvae burrow into the gut or flesh of the fish, and are passed on when the fish is eaten by a marine mammal or human. (See [life cycle C](#))

# Roundworm (*Raphidascaris*)

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## What will I see?

Small (3-10 mm) round, white cysts on the stomach of infected fish. These cysts can be confused with tapeworm cysts as they often occur in the same fish. Roundworm cysts are smaller, more round, and firmer than tapeworm cysts. In some species such as burbot, the larval roundworms may travel through the liver causing damage (dark and light mottled areas in a enlarged liver). Adult roundworms are white, about 30-40 cm long, and found inside the gut of infected predatory fish such as pike.



Liver damage from roundworm larvae in burbot.

## Cause

A roundworm called *Raphidascaris*.



Roundworm cysts on a fish stomach.

### **Commonly affected fish species**

Many freshwater and anadromous fish species can be infected.

### **Can I eat it?**

Yes. This parasite is not known to infect humans.

### **Can I feed it to my pets?**

Yes. This parasite will not affect your pets.

### **Life cycle**

The adult roundworm lives in the gut of a predatory fish. Eggs from the roundworm are shed into the water with feces. The eggs hatch into larvae, which are eaten by aquatic invertebrates, and are in turn eaten by fish that are prey for other fish. The larvae usually form cysts on the stomach and may burrow through the liver causing damage. If infected fish are eaten by a predatory fish such as pike, the larvae can grow into adults in the gut of the predatory fish. (See [life cycle C](#))

# Spiny-headed Worm

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## What will I see?

Yellowish, straight or curved worm-like parasites (1-3 cm long) attached to the inside of the gut of an infected fish. Infected fish may be very thin and the intestines may be thickened and red.



Adult spiny-headed worms inside a fish gut.  
Photo: C. Banner, FishPathogens.net

## Cause

A parasite called *Neoechinorhynchus*.

## Commonly affected fish species

Many freshwater and anadromous fish species can be infected, particularly salmonids.

## Can I eat it?

Yes. This parasite is not known to infect humans.

## Can I feed it to my pets?

Yes. This parasite will not affect your pets.

## Life cycle

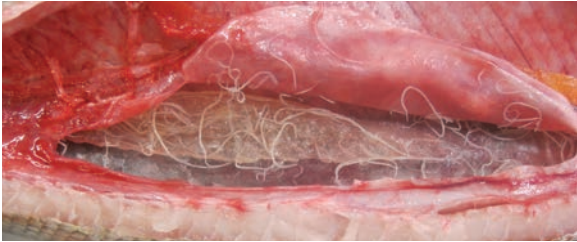
The adult parasite lives in the gut of a fish. Eggs from the parasite are shed into the water with feces. The eggs hatch into larvae, which are eaten by aquatic invertebrates, and are in turn eaten by a fish. The parasite grows into an adult in the gut of the fish. Sometimes, the larvae encyst in the fish rather than growing into an adult. In this case, that fish must be eaten by a predatory fish for the parasite to develop into the adult form in the intestines. (See life cycles B and C)

# Roundworm (*Cystidicola*)

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## What will I see?

Clear or white, thread-like roundworms (3-10 cm in length) in the swim bladder of an infected fish.



*Cystidicola* in a whitefish swim bladder.

## Cause

A roundworm called *Cystidicola*.

## Commonly affected fish species

Many freshwater and anadromous fish species can be affected, particularly salmonids.

## Can I eat it?

Yes. This parasite is not known to infect humans.

## Can I feed it to my pets?

Yes. This parasite will not affect your pets.

## Life cycle

Adult roundworms live in the swim bladder of a fish. Eggs from the roundworm are shed into the water with feces. The eggs hatch into larvae, which are eaten by aquatic invertebrates, and are then eaten by a fish. The parasite grows into an adult in the swim bladder of the fish. (See [life cycle B](#))



# Less Common Parasites and Diseases in Yukon Fish

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The following parasites and diseases are not normally transmitted to humans or pets, so infected fish are considered safe to eat.

## **Ceratomyxosis**

- The skin of infected fish may appear darker than normal with swollen or bleeding vents and/or bloated bellies. There may be abscesses on the guts of some fish. The parasite itself is too small to be seen by the naked eye.
- Caused by the protozoan parasite *Ceratomyxa shasta*.
- Primarily found in salmonids.
- This disease is seasonal, occurring between May and September. Infections are usually more common and more severe when water temperatures are warmer than 10°C.  
(See life cycle B)



Coho salmon with swollen vent and bloated belly due to ceratomyxosis.  
Photo: Alaska Department of Fish and Game

## White Spot

- White, yellow, or tan spots (about 1 mm wide) appear in the internal organs (particularly the heart) or in the flesh. Similar spots may appear on the skin.
- Caused by the protozoan parasite *Ichthyophonus hoferi*.
- Primarily found in salmon, particularly chinook.  
(See life cycle A)

## Milky Flesh Disease

- Numerous white cysts (about 1 cm wide) appear in the flesh of the fish. Creamy, white liquid oozes out of the cysts when filleting the fish. The parasite itself is too small to be seen by the naked eye.
- Caused by the protozoan parasite *Henneuya*.
- Primarily found in salmon.  
(See life cycle C)



Cysts in the flesh of a fish with milky flesh disease.  
Photo: C. Banner, FishPathogens.net

## Furunculosis

- Infected fish may show a range of signs, including darkening of skin colour, swelling under the skin, deep, ulcerated craters in the flesh or swollen abdomens.
- Caused by the bacteria *Aeromonas salmonicida*.
- Primarily found in salmonids.

(See life cycle A)



Swelling under the skin, as in this adult sockeye salmon, is a typical sign of furunculosis. Photo: Alaska Department of Fish and Game



This young salmonid fish shows darkening and ulceration of the skin, which are early signs of furunculosis. Photo: Alaska Department of Fish and Game

## “Sand Grain” Heart

- Tiny white grain-like cysts (1-5 mm) are seen on the surface of the heart.
- Caused by a fluke called *Cotylurus*.
- Many freshwater fish species can be infected.  
(See life cycle C)



*Cotylurus* cysts on a whitefish heart.



# LIFE CYCLES

# Life Cycle A

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## Life cycle for these parasites:

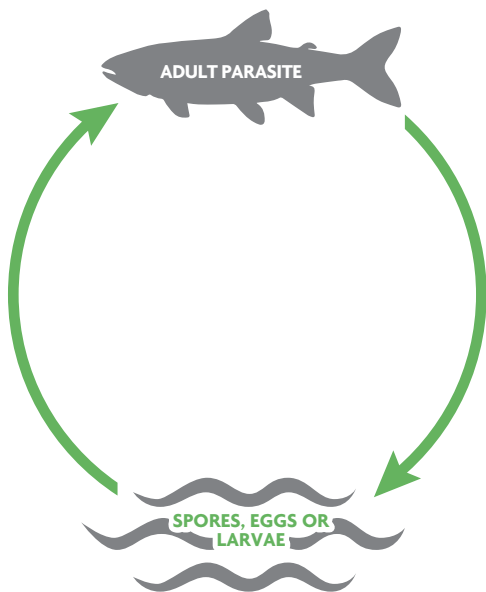
Fish Lice (page 20)

Leeches (page 21)

Fungal Skin Infection (page 24)

White Spot (page 42)

Furunculosis (page 43)



# Life Cycle B

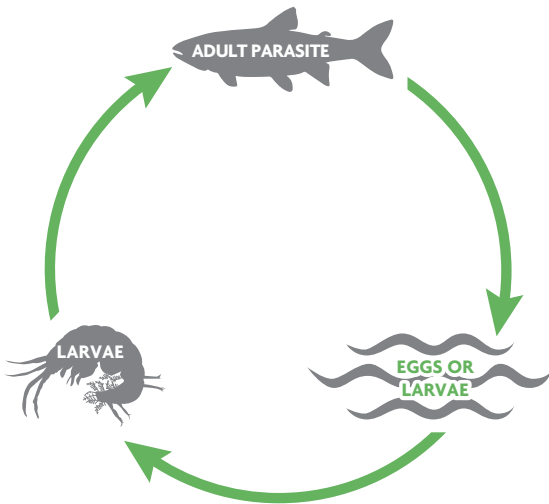
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## Life cycle for these parasites:

Spiny-headed Worm (page 38) – Also see Life Cycle C

Roundworm (*Cystidicola*) (page 40)

Ceratomyxosis (page 41)



# Life Cycle C

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## Life cycle for these parasites:

Eye Flukes (page 23)

Tapeworm (*Trienophorus*) (page 30)

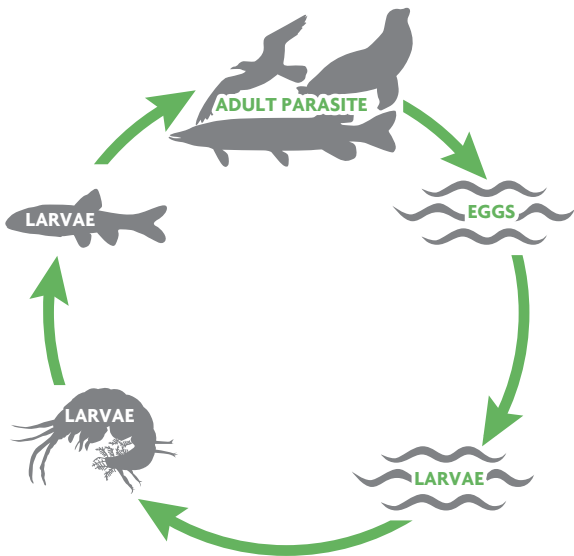
Herring Worm (page 34)

Roundworm (*Raphidascaris*) (page 36)

Spiny-headed Worm (page 38) – Also see Life Cycle B

Milky Flesh Disease (page 42)

“Sand Grain” Heart (page 44)



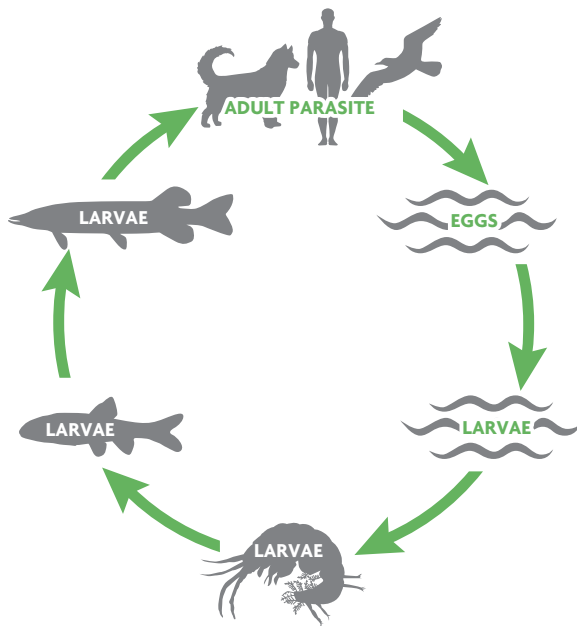


# Life Cycle D

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## Life cycle for this parasite:

Broad Tapeworm (page 32)





## References:

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- <sup>1</sup> Health Canada: <http://webprod3.hc-sc.gc.ca/cnf-fce/>
- <sup>2</sup> Government of Canada: <http://www.healthycanadians.gc.ca/eating-nutrition/safety-salubrite/food-steps-precautions-aliments-eng.php>
- <sup>3</sup> Health Canada: [http://www.hc-sc.gc.ca/fniah-spnia/pubs/promotion/\\_safety-salubrite/fish-poisson-eng.php](http://www.hc-sc.gc.ca/fniah-spnia/pubs/promotion/_safety-salubrite/fish-poisson-eng.php)
- <sup>4</sup> University of Alaska: <https://www.uaf.edu/files/ces/publications-db/catalog/hec/FNH-00325.pdf>
- <sup>5</sup> Health Canada: [http://www.hc-sc.gc.ca/fn-an/securit/chemchim/environ/mercur/merc\\_fish\\_qa-poisson\\_qr-eng.php](http://www.hc-sc.gc.ca/fn-an/securit/chemchim/environ/mercur/merc_fish_qa-poisson_qr-eng.php)
- <sup>6</sup> Mercury in Yukon Fish. Yukon Contaminants Committee. February, 2010. Available on the Government of Yukon website, [www.gov.yk.ca](http://www.gov.yk.ca)



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