Conseil Cri de la santé et des services sociaux de la Baie James
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Cree Board of Health and Social Services of James Bay

CREE OUTFITTING AND TOURISM ASSOCIATION
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CENTRE RÉGIONAL DE SANTÉ ET DE SERVICES SOCIAUX DE LA BAIE-JAMES
DIRECTION DE SANTÉ PUBLIQUE

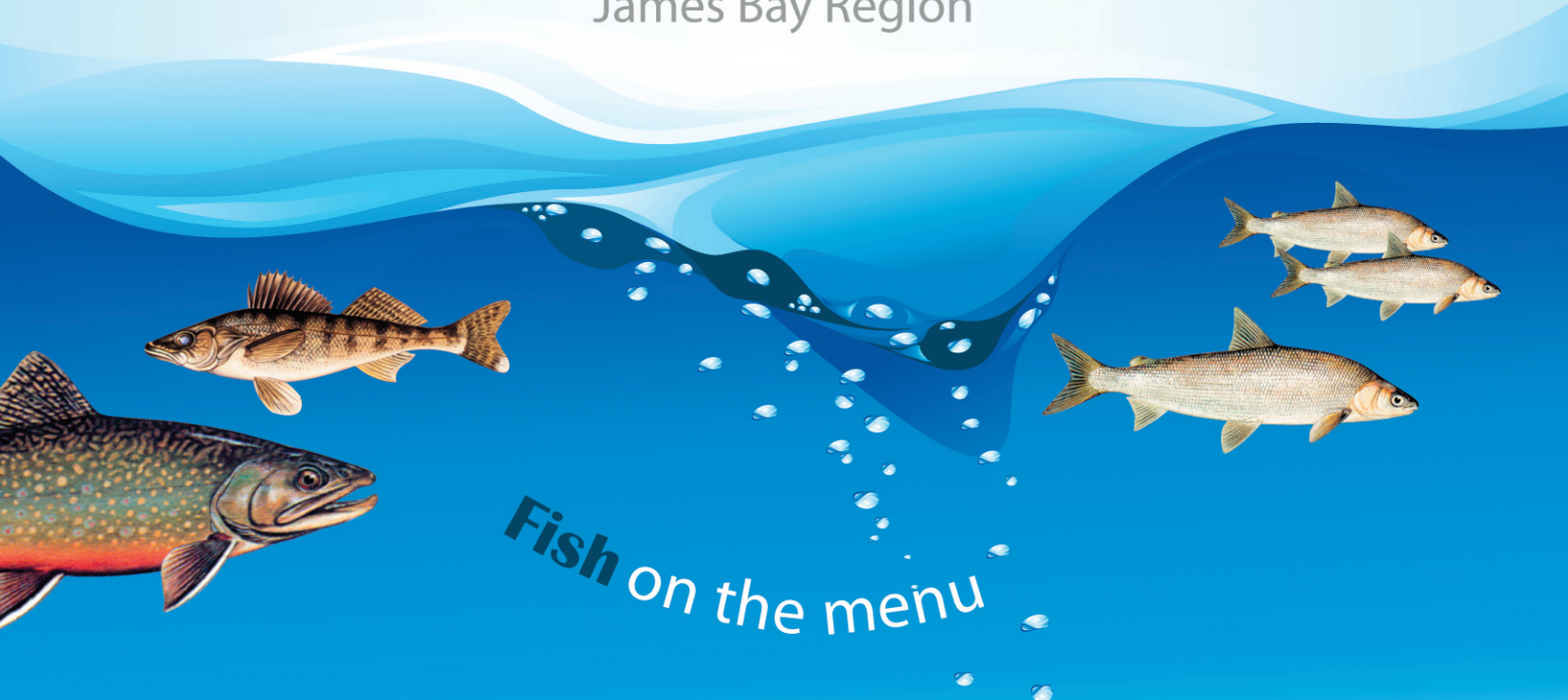
CHU de Québec
Centre de recherche

Hydro Québec Production

Institut national de santé publique Québec

The Northern Fish Nutrition Guide

James Bay Region



Fish on the menu

Map 1: Categories of land, waterways and hydroelectric development in the James Bay region

Fish and health

Fish is good for you. It has plenty of vitamin D and selenium. We need these nutrients to stay healthy. Fish is high in omega-3 fats and generally low in saturated fats. So fish fits with Health Canada's advice to eat low-fat protein. Also, research shows that fish may help prevent chronic illnesses like heart disease. It is healthy to eat fish at least twice a week, as part of a good diet.

Enjoy the benefits of eating fish! To help you get started, this guide contains a few healthy recipes for cooking fish.

Did you know ?

Fish is good for your heart! Studies show that if you eat fish at least twice a week, you lower your risk of dying from heart disease by 25-30%.

Eating heads, bones and eyes of fish gives you more nutrients like calcium and vitamin A.

Main nutriments found in fish

Proteins: Proteins are the building blocks of the human body. They build and repair flesh and muscles, and help our bodies to work properly. They also help us to fight off infections.

Vitamin D: Vitamin D helps us absorb calcium, so our bones and teeth can stay strong. It keeps our muscles and nerves healthy. Research suggests that it can help prevent some chronic diseases like heart disease and stroke, diabetes, cancer, multiple sclerosis and inflammatory bowel disease (serious digestive problems).

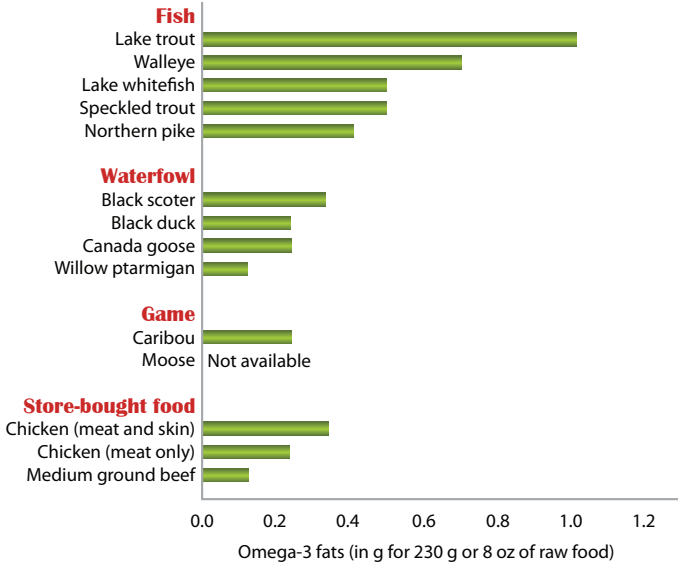
Selenium: Selenium is an "antioxidant". This means it fights off reactive chemicals that can damage our body. It may play a role in preventing heart disease and cancer. It may also reduce the harmful effects of mercury.

Omega-3 fats: Omega-3 fats are protective fats that we need to eat to stay healthy. They are mainly found in fish.

Fish are an excellent source of healthy fats

The omega-3 fats found in fish are great for the heart. Also, babies in the womb need these fats for the good development of their brain, nerves, and eyesight.

Omega-3 fat content in different foods

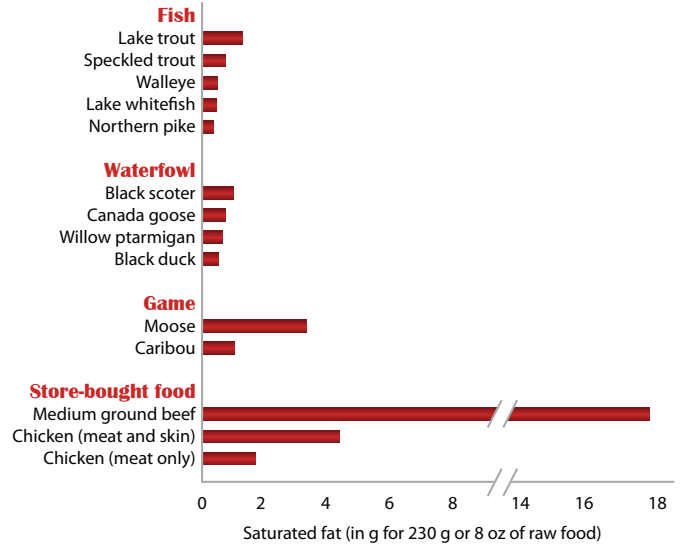


The chart above shows how much omega-3 is found in fish compared to other foods.

Fish are generally low in saturated fats

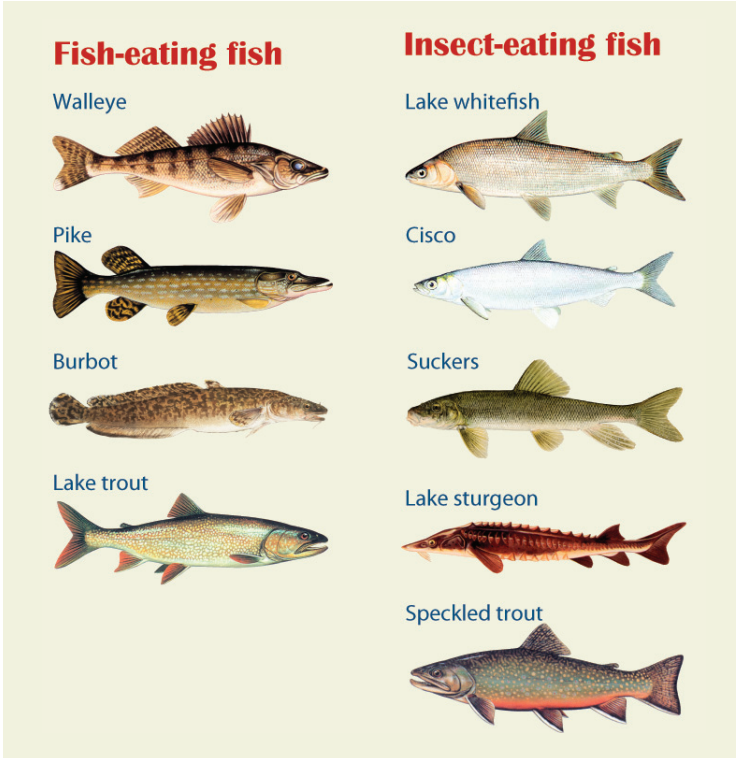
Compared to animal sources of protein, like beef, pork, or processed meats, fish has generally less total fat and less saturated fat. Some of these fats increase the risk of heart disease.

Saturated fat content in different foods



The chart above shows how little saturated fat is found in fish compared to other foods.

Contaminants in fish of the James Bay region



Some chemicals do not break down easily, such as:

- PCBs (chemicals that used to be in electric transformers);
- DDT (an insecticide).

These chemicals remain in the air, water, and soil for long periods. They may originate in the South, and be carried to the North by wind or rain. These chemicals are taken up by plants and tiny creatures in the water (plankton). From there, they are passed up the food chain to insects, then fish, then birds and animals that eat the fish.

Small amounts of PCBs and DDT have been found in fish in the James Bay region. But the levels are low, and within Health Canada's guidelines for what is acceptable. There is no reason to avoid fish because of concerns about PCBs or DDT.

Mercury is another contaminant that is present in the environment. But unlike other contaminants, the levels in fish increase temporarily in hydroelectric reservoirs. Mercury can come from industries in the South, but it also occurs naturally. Because it is carried by wind and rain, fish all over the world contain at least some mercury.

The amount of mercury in a fish depends on:

Age and size: Mercury builds up throughout a fish's life, so large, older fish contain more mercury than young and small ones.

Location: All types of James Bay costal fish are low in mercury and safe to eat. Inland, fish from reservoirs or areas directly downstream from hydroelectric plants may have more mercury than those in natural lakes. However, this depends on the species of fish. It also depends on the age of the reservoir, because mercury levels in reservoirs go back to normal over the years.

Species: Predatory fish (fish that eat other fish), like walleye, pike, lake trout, or burbot, contain more mercury than fish that eat insects, like lake whitefish, speckled trout (brook trout), lake sturgeon, cisco or suckers.

Traditional dip-net fishing of cisco on the Rupert river

Fish on the Menu

At high doses, mercury in fish can affect the nervous system. But at the levels found in the James Bay region (Eeyou Istchee), the health benefits of eating fish far outweigh the risks. Eating fish is without a doubt good for your health.

For most adults (except pregnant women and those who may become pregnant soon)

If you eat local fish once a week or less, you should not worry about mercury. You can continue to enjoy fish from anywhere in the James Bay region.

For adults who eat a lot of fish

If you eat fish more than once a week, all year round, you will need to be a bit more careful. You should consult the fish consumption recommendations in the Learn More section (pages 44 to 49).

That section tells you how often you can eat fish, to make sure your mercury levels stay within health guidelines. The number of meals recommended depends on the type of fish and where they are caught.

For pregnant women, those who may become pregnant soon and children under 13

Pregnant women need to get enough omega-3 fats. This helps the baby's brain, nerves, and eyesight develop well. Fish contain omega-3 fats. If you are pregnant (or may soon become pregnant), public health experts recommend that you eat low-mercury fish at least twice a week. This means fish like lake whitefish, speckled trout, suckers, lake sturgeon and all coastal fish (like cisco, sea trout, arctic char, and sculpins). You should avoid eating predatory fish, like walleye, pike, lake trout, and burbot, while you are pregnant.

Young children can also benefit from the goodness of fish. We recommend that children—like adults—eat fish at least twice a week, but it should be low-mercury fish.

Safe recommendations

The fish consumption recommendations in this guide are safe because they have a built-in safety factor to make sure everybody is well protected.

For example, the consumption recommendation for predatory fish from the Robert-Bourassa reservoir is 2 meals per month, but in fact, to reach the mercury level at which health symptoms may appear, most people would have to eat them at least once a day, for a whole year.

Even if you eat fish every day for a few weeks in summer, like during a fishing trip, it is not a concern, as it takes several months to build-up meaningful amounts of mercury.

Eating fish while breastfeeding

Breastfeeding has always been an important part of our culture. Breast milk transfers very little mercury to children. If you eat fish, you have more Omega-3 fats in your breast milk, and this is good for your baby. So we recommend that you continue to eat low-mercury fish at least twice a week while breastfeeding. Fish broth or small pieces of flaked low-mercury fish can be offered to babies as young as 6 months.

Main sport fishes of the James Bay region

The sections that follow present information on the main sport fish in the James Bay region. For each type of fish, you will find:

Habitat, feeding habits, and fishing tips

You will find where each type of fish lives, its feeding habits, and the best lures to catch it.

Nutritional value

The nutritional value of each type of fish is shown in weight (g or mg), in international units (IU), or as a percent of the Recommended Daily Value (the amount of a specific nutrient that we are advised to eat each day to stay healthy). The Daily Value recommendations apply to everyone, except women who are pregnant or breastfeeding.

Recipes

Healthy recipes for each species of fish are suggested. In order to keep the full health benefits of the omega-3, fish should be:

- poached,
- boiled,
- grilled,
- barbecued,
- dried,
- smoked.

If you fry, use only a small amount of vegetable oil (olive or canola oil).

Parasites in fish

You may sometimes catch fish that have worms or cysts in their flesh. When cleaning the fish, you may notice worms in and around the intestines, or fungus on the skin, fins, or gills. These parasites, while unsightly, are not a health hazard if the fish is well cooked.

Lake Whitefish

Grand corégone

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Coregonus clupeaformis

Nutritional value

of 230 g or 8 oz (raw flesh, before cooking)

	Content	% recommended daily value
Protein (g)	42	69%
Vitamin D (IU)	258	131%
Selenium (mg)	0.08	124%
Omega-3 fatty acids (EPA+DHA) (mg)	500	77%

Distribution

In the entire area shown in green on the map, whitefish is reserved for beneficiaries of the James Bay and Northern Québec Agreement.*

Habitat: A cool water species, it is found at all depths in northern lakes. In the southern part of its range, it descends into the cooler waters during summer months. In the fall, whitefish move into shallow water to spawn. Sea-run populations occur in coastal brackish waters of James Bay, Hudson Bay and Ungava Bay and in some large rivers.

Food: Lake whitefish are bottom feeders. They mainly eat insect larvae, molluscs (shellfish like snails), shrimp-like creatures, and fish eggs (their own and those of other fish). Occasionally they eat small fish and insects caught at the surface.

Best time for fishing: Whitefish are easiest to catch in fall and winter, although they are sometimes caught in spring or even summer.

Lures: Lake whitefish are rarely caught by casting or trolling. They are caught with small hooks lowered to their depth or with small flies at the surface. Hooks have to be small and hooking gentle since the mouth is small and delicate.

Catch record: 6.9 kg (15 pounds 6 ounces) in Lake Clear, Ontario, in 1983.

Distinctive features: Lake whitefish is the most valuable commercial freshwater fish in Canada. In Québec, it is mostly fished by the Cree, for whom it is a staple. Once hooked, it puts up a strong fight.

Taste and quality: The exceptionally fine flavor of whitefish has been known and appreciated for centuries. The liver, when cooked, is also tasty and can be made into an excellent pâté. Whitefish eggs, when properly prepared, are sometimes marketed as caviar.

*** See page 40 for other types of fish reserved for beneficiaries of the Agreement.**

Recipe 

Boiled whitefish

Ingredients

- Whitefish
- Water
- Salt

Preparation

Remove gut.
Scale fish.
Cut into big pieces.
In a big pot, cook fish in boiling salted water.

Cree traditional recipe

Recipe 

Lake whitefish fiesta chowder

Ingredients

- 500 g (1 lb) whitefish fillets
- 125 ml (1/2 cup) chopped onion
- 125 ml (1/2 cup) chopped green pepper
- 1 crushed garlic clove
- 30 ml (2 tbsp) olive or vegetable oil
- 540 ml (19 oz) can of tomatoes
- 213 ml (7.5 oz) can of tomato sauce
- 250 ml (1 cup) diced potatoes
- 1 small bay leaf
- 1 ml (1/4 tsp) oregano
- Salt and pepper

Preparation

Cut the fish in 2 cm (1 in) pieces. Soften onion, green pepper and garlic in the oil. Add the rest of the ingredients, except the fish. Simmer for 15 minutes. Add the fish and simmer for 5 to 7 minutes or until the flesh is opaque and flakes easily.

Makes 4 servings.

Adapted from: *Seafood and fish at all seasons,* Fisheries and Oceans Canada.

Recipe 

Lake whitefish pemmican

Ingredients

- Dried and powdered lake whitefish
- Bear fat, caribou fat, goose fat or moose fat
- Berries and sugar (optional)

Preparation

Smoke the dried fish. Pound it and make a nice powder. Melt fat. Add the powder. Mix like batter. Some people like to add berries and sugar.

In winter, put it outside to freeze. Keep it frozen.

In summer, make it more like a dough and cover it. It keeps well for a long time.

Pemmican is used, especially in the winter, by trappers when they walk all day and want to travel light. A piece the size of a date square is enough for a meal. It is good with a cup of tea.

Traditional Cree recipe adapted from: *Traditional Indian Recipes from Fort George, Québec*. Highway Book Shop Publ. Cobalt, Ontario.

Recipe

Smoked lake whitefish

First, cut fish and remove guts. Hang fish out to dry for at least a day. Some people add salt before drying. Then, cook fish using a string and hang over an open fire. Cook until fish is a golden brown. Then it is ready to eat.

Traditional Cree recipe adapted from: *Traditional Indian Recipes from Fort George, Québec*. Highway Book Shop Publ. Cobalt, Ontario.

Drying of the fish before smoking

Smoking of the fish

Speckled Trout

Truite mouchetée

Mâsimâkus

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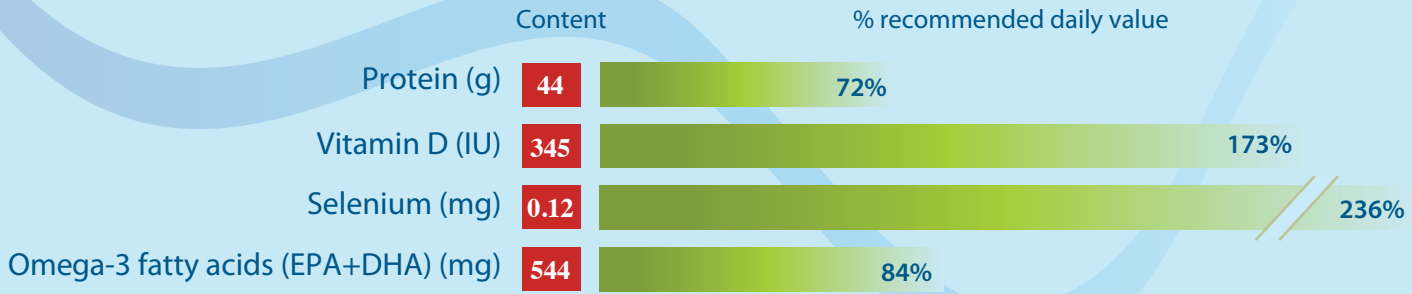
Salvelinus fontinalis

Nutritional value

of 230 g or 8 oz (raw flesh, before cooking)



Distribution

Habitat: Speckled trout live in clear, cool streams and lakes with lots of oxygen in the water. When surface waters warm up, they seek cooler temperatures (below 20°C/68°F).

Food: Speckled trout will eat anything that fits into their mouths: [zooplankton (tiny creatures), worms and leeches, crustaceans (crayfish, shrimp, etc), land and water insects, spiders, frogs, salamanders, and many kinds of fish, including their own eggs and young]. In northern areas, speckled trout also eat small animals like field mice, voles, and shrews.

Best time for fishing: Speckled trout are most easily caught at dawn or twilight.

Lures: Toronto Wobbler (silver or bronze), Lake Clear Wabler (silver or gold), Veltic (red and gold), Williams Wabler (gold and silver), Krocodile (silver and red), RAPALA Shad Rap (silver), Weaver Grabber (gold, prune and black).

Catch record: 86 cm (34.4 in) and 6.6 kg (14 pounds 8 ounces) in the Nipigon River, Ontario, in 1916.

Distinctive features:

- Some speckled trout live where the river mouth meets the sea, or in coastal waters. This is why speckled trout is also known as sea trout.
- The appetite of speckled trout varies with the water temperature. One study found that at 13°C (55°F), speckled trout ate half their own weight each week. But at colder and hotter temperatures (below 9°C/48°F or above 17°C/67°F), the trout ate less.
- At spawning time, trout become more brightly coloured. The lower flanks and bellies of the males turn orange-red.

Taste and quality: Speckled trout is a very popular game fish. Its flesh is delicate and sweet smelling. The flesh varies from white to orange depending on what the fish feeds on.

Recipe 

Speckled trout with dill

Ingredients

- 4 X 140 g (5 oz) trout fillets
- 1 ml (1/4 tsp) onion powder
- 0.5 ml (1/8 tsp) garlic powder
- Salt and pepper
- 60 ml (4 tbsp) dill leaves
- 60 ml (4 tbsp) lemon juice
- 4 lemon slices

Preparation

Prepare a steamer.
Sprinkle onion powder, garlic powder, salt and pepper over trout fillets.
Cover fillets with dill leaves. Place fillets in the steamer. Cook for 3 minutes.
Sprinkle with lemon juice, serve the fillets with lemon slices.

Makes 4 servings.

Translated from: *Cuisine santé: Qu'est-ce qu'on mange? 4,* Les Cercles de fermières du Québec, 1997.

Recipe 

Tinfoil-cooked speckled trout with couscous

Ingredients

- 500 g (1 lb) fish fillet
  (char, trout, and landlocked salmon, etc.)
- 125 ml (1/2 cup) couscous
- 125 ml (1/2 cup) grated carrot
- 2 ml (1/2 tsp) lemon zest
- 1 ml (1/4 tsp) curry powder
- 125 ml (1/2 cup) chicken broth
- 0.5 ml (1/8 tsp) white pepper
- 1 thinly sliced lemon
- 125 ml (1/2 cup) grated zucchini
- 60 ml (1/4 cup) finely chopped onion or scallions
- 2 ml (1/2 tsp) salt
- 1 ml (1/4 tsp) oregano
- 1 bay leaf

Preparation

Preheat oven to 190°C (375°F). Prepare tinfoil sheet to make a large wrapper.

Couscous
In a medium-sized bowl, mix the couscous, zucchini, carrot, onion and lemon zest, 1 ml of salt, oregano, curry powder and chicken broth. Mix well.
Pour the couscous mixture onto the tinfoil and top with the fish fillet. Add remaining salt, pepper, a bay leaf and lemon slices.
Wrap the tinfoil around the mixture. Place on a baking pan. Cook in the oven for 20 to 25 minutes or on a barbecue. Cook a little longer if the fillet is very thick. Serve.

Makes 4 servings.

Recipe adapted from: *Cuisine santé: Qu'est-ce qu'on mange? 4,* Les Cercles de fermières du Québec, 1997.

Recipe 

Maple speckled trout

Ingredients

- 60 ml (1/4 cup) maple (or maple-flavoured) syrup
- 30 ml (2 tbsp) soy sauce
- 1 garlic clove, minced (or 1 ml = ¼ tsp garlic powder)
- Pepper to taste
- 454 g (1 lb) speckled trout fillets or steaks

Preparation

In a small bowl, mix the first 4 ingredients. Place trout in a shallow baking dish, and coat with the maple syrup mixture. Cover the dish, and marinate in refrigerator for 30 minutes, turning once.
Preheat oven to 200°C (400°F). Place the baking dish in the preheated oven, and bake trout uncovered for about 20 minutes, or until easily flaked with a fork.

Makes 4 servings.

Adapted from: *http://allrecipes.com/Recipe/Maple-Salmon/*

Recipe 

Pan-fried speckled trout

Ingredients

- 1 kg (2 lb) speckled trout
- 125 ml (1/2 cup) flour
- 0.5 ml (1/8 tsp) salt
- 0.5 ml (1/8 tsp) pepper
- 125 ml (1/2 cup) milk
- 60 ml (1/4 cup) canola or olive oil

Preparation

Wipe fish with damp cloth and cut into individual servings. Dip fish in seasoned flour, then into milk and then again in flour. Fry in hot oil until brown, turn and brown the other side.

Makes 4 servings.

Traditional Cree recipe adapted from:
Northern Cookbook. Eleanor A. Ellis.

Walleye

Doré jaune

Ukâu

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Sander vitreus

Nutritional value

of 230 g or 8 oz (raw flesh, before cooking)

	Content	% recommended daily value
Protein (g)	43	70%
Vitamin D (IU)	271	135%
Selenium (mg)	0.06	126%
Omega-3 fatty acids (EPA+DHA) (mg)	687	106%

Distribution

Habitat: Usually lives in shallow (less than 15 m or 50 feet), silty lakes, large streams, or rivers.

Food: Walleye eat any kind of fish they can find.

Best time for fishing: Usually feeds only at dawn and dusk, in shallow waters. In more silty waters, walleye may be active during the day. In bright daylight, they move to deeper water and take shelter in rocky shoals.

Lures: Husky Jerk (clown or Tennessee Shad), original Rapala (silver), Wally Diver (Fire Tiger), Power Minnow (rainbow/silver fleck), Jigs.

Catch record: 10.31 kg (22 pounds 7 ounces) in Arkansas in 1982.

Distinctive features: This fish's eye is very sensitive to bright light. Their cheeks have few or no scales, which is how they can be told apart from sauger. Walleye put up a steady fight, but not a spectacular one; they always try to go to bottom.

Taste and quality: Highly valued by anglers, the walleye has a firm, white to pinkish flesh, which is easily filleted and prepared.

Recipe 

Tinfoil-cooked walleye

Ingredients

- 500 g (1 lb) walleye fillet
- 125 ml (1/2 cup) vegetable broth
- 125 ml (1/2 cup) julienne carrots
- 1/2 sliced onion
- 1 diced tomato
- 5 ml (1 tsp) dried tarragon
- Salt and pepper

Preparation

Preheat oven to 175°C (350°F).
Place the walleye fillet at the centre of a large sheet of tinfoil; fold the edges to form a wrapper. Pour the broth on the fish. Cover with carrots, onion and crushed tomato; sprinkle with tarragon; add salt and pepper. Close the wrapper.
Cook for 15 minutes.
Remove from oven. Open the wrapper. Let rest for 4 minutes.
Serve with boiled vegetables, if desired.

Makes 4 servings.

Translated from: *Cuisine santé: Qu'est-ce qu'on mange? 4,* Les Cercles de fermières du Québec, 1997.

Recipe 

Stuffed walleye

Ingredients

- 1.4 kg (3 lb) walleye
- 250 ml (1 cup) fresh bread crumbs
- 125 ml (1/2 cup) cooked rice
- 30 ml (2 tbsp) vegetable or olive oil
- 125 ml (1/2 cup) chopped mushrooms
- 15 ml (1 tbsp) chopped onion
- 15 ml (1 tbsp) chopped parsley
- 2 ml (1/2 tsp) curry powder
- 1 beaten egg
- Salt and pepper

Preparation

Stuffing

Soak bread crumbs in hot milk for 30 minutes. In a frying pan, cook onion in oil. Add mushrooms and cook for 5 minutes. Add drained bread crumbs, cooked rice, parsley, curry powder, salt and pepper. Remove from heat and thicken with a beaten egg.

Fish

Scale, gut and clean the fish. Pat dry and sprinkle with salt, pepper, lemon juice and drops of oil. Fill the fish cavity with the stuffing. Sew the cavity closed.

Place the fish on an oiled baking dish. Add 500 ml of liquid. Cover the dish and bake at 200°C (400°F), for 40 minutes.

Makes 6 servings.

Recipe adapted from: *Traditional Indian Recipes from Fort George, Québec.* Highway Book Shop Publ. Cobalt, Ontario.

Recipe 

Walleye casserole

Ingredients

Bechamel sauce

- 30 ml (2 tbsp) oil
- 30 ml (2 tbsp) flour
- 600 ml (2 ½ cups) 2% milk
- 1 tbsp Dijon mustard

Casserole

- 4 potatoes, thinly sliced
- 1 onion, minced
- 500 ml (2 cups) partly-skim mozzarella cheese, grated
- 675 g (1 ½ lb) walleye fillets, cooked
- 250 ml (1 cup) shrimps (optional)
- 284 ml (10 oz) mixed peas and carrots*, canned
- Salt, pepper and spices to taste
- Corn Flakes cereal, crushed

* Or use 250 ml (1 cup) frozen mixed vegetables, cooked

Preparation

Bechamel sauce

In a medium saucepan, heat the oil over medium-low heat. Add the flour and stir until smooth. Cook for about 3 minutes, or until the mixture has the texture of wet sand. Meanwhile, heat the milk in a separate pan until just about to boil. Add the hot milk to the mixture 1 cup at a time, whisking continuously until very smooth. Bring to a boil. Cook 10 minutes, stirring constantly, then remove from heat. Season with Dijon mustard, and set aside until ready to use.

Casserole

To assemble, arrange bottom of a 3-litre (9x13 in) pan with the sliced potatoes. Cover with onion and half of the grated cheese. Add a layer of fish fillets mixed with shrimps. Continue with a layer of vegetables, then the rest of the Mozzarella cheese. Spread the bechamel sauce over and sprinkle with Corn Flakes. Bake uncovered at 190°C (375°F) for about 45 minutes. Remove from oven 5 minutes before cutting it into square portions.

Makes 6 servings.

Adapted from: http://www.recettes.qc.ca/

Recipe 

Oven-baked walleye

Ingredients

- Fillets of walleye
- Olive or canola oil
- Italian bread crumbs
- Garlic powder or minced (optional)

Preparation

Brush walleye fillets with a small quantity of oil. Sprinkle with Italian bread crumbs. Season with garlic. Put in the oven 190°C (375°F) for about 15 to 20 minutes.

Makes 2 servings.

Recipe from: Karine Soares and Philippe Tremblay (Wemindji)

Northern Pike

Grand brochet

Chinushâu

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Esox lucius

Nutritional value

of 230 g or 8 oz (raw flesh, before cooking)

	Content	% recommended daily value
Protein (g)	43	71%
Vitamin D (IU)	286	143%
Selenium (mg)	0.06	113%
Omega-3 fatty acids (EPA+DHA) (mg)	411	63%

Distribution

Habitat: Pike live in slow-moving rivers that have lots of plants, and are clear and warm. Or they live in the warm, weedy bays of lakes. They are found in shallow water in spring and fall.

Food: Northern pike don't move around much, and they feed on whatever is handy. They eat things that can be up to half of their own size. As soon as they are 5 cm (2 inches) long, pike feed mostly on fish like yellow perch, minnows, suckers, and whitefish. Adult pike may also eat frogs, crayfish, mice, muskrat, and ducklings.

Best time for fishing: Pike are easily caught during hot summer days, in full daylight.

Lures: Buzz'N Frog (REBEL), Daredevle, Skitter Prop (RAPALA), Quick Silver, Spinnerbait Bushwacker (white), Musky Killer (gold spoon, yellow hair).

Catch record: 1.3 m (51 inches) and 21 kg (46 pounds 2 ounces) in New York State in 1940.

Distinctive features: Pike is the most widely distributed freshwater fish in the world. Pike are strong fighters. They are solitary, and do not allow others in their territory.

Taste and quality: The flesh is sweet, white, and flaky. Some people claim it has a muddy taste in summer, but this is rare if the fish is properly prepared. The muddy taste may come from the skin, so it is best to skin the fish before cooking.

Recipe 

Pike burger

Ingredients

- 500 g (1 lb) cooked deboned pike, flaked
- 500 ml (2 cups) mashed potatoes
- 1 small onion or 2-3 green onions, thinly chopped
- 5 ml (1 tsp) parsley
- Pinch of thyme
- Salt, pepper to taste
- 2 eggs, beaten
- 125 ml (½ cup) plain flour
- 125 ml (½ cup) bread crumbs
- Vegetable oil

Preparation

Lightly grease a baking tray. In a mixing bowl combine first 6 ingredients. Mix well. Divide into 8 equal burgers. Coat with flour, then dip in egg and finally coat with the crumbs. Place burgers on prepared tray; chill for 10 minutes.
Meanwhile, preheat oven to 190°C (375°F). Brush burgers on both sides with oil. Bake for about 30 minutes in total, turning them once after 15 minutes.

Makes 8 servings.

Recipe adapted from: *http://www.food.com/*

Recipe 

Pike loaf

Ingredients

- 500 ml (2 cups) cooked deboned pike, flaked
- 250 ml (1 cup) bread crumbs
- 2 ml (1/2 tsp salt)
- 1 ml (1/4 tsp) paprika
- 1 small onion, diced
- 7 ml (1/2 tbsp) parsley flakes
- 5 ml (1 tsp) lemon juice
- 2 eggs
- 125 ml (1/2 cup) 2% milk

Preparation

In a big bowl, mix all ingredients together. More milk may be added if the fish is dry. Put ingredients in a greased baking dish, cover. Cook in the oven at 350°F (180°C) for 50 minutes.

Makes 6 servings.

Contemporary Cree recipe adapted from: *Foods for Health Student Handbook* – Food for Health Teaching Aids

Recipe 

Pike egg bannock

Ingredients

- pike eggs (best in January, February and March)
- 4 ml (1 tsp) baking powder
- 125 ml (1/2 cup) vegetable oil
- 160 ml (2/3 cup) water
- Flour

Preparation

Mash the eggs and beat until foamy. Add baking powder and oil. When mixing batter, add water. Grease and heat a large pot. Put in the batter and let this cook and rise like a cake for about 1 1/2 hour. The amount of oil determines the moistness of the bannock.
When flour is available, add to egg mixture until combined ingredients can be kneaded as a soft dough before cooking.

Lake whitefish and cisco eggs are best in July.

Traditional Cree recipe adapted from: *Traditional Indian Recipes from Fort George, Québec*. Highway Book Shop Publ. Cobalt, Ontario.

Recipe 

Pike soup

Ingredients

- Cooked and deboned pike, flaked
- *al dente** cooked rice or noodles
- Frozen or canned vegetables
- Fish broth (or chicken)

**al dente* = that have been cooked so as to be firm but not hard.

Preparation

In a big pot cover pike with water (add onion, celery, carrots and bay leaves if desired, to add flavor to broth).
Bring to a boil until fish is cooked. Remove fish, debone and flake it.
Reserve broth.
In a big pot, mix flaked pike, *al dente* rice or noodles, vegetables and broth together. Bring to a boil.
Simmer until vegetables are cooked.

Original recipe

Lake Trout

Truite grise

Kukimâsh or Namekush

ᑯᑭᒪᔨᓴ ᓇᒣᑯᔨᓴ

Salvelinus namaycush

Nutritional value

of 230 g or 8 oz (raw flesh, before cooking)

	Content	% recommended daily value
Protein (g)	42	69%
Vitamin D (IU)	258	129%
Selenium (mg)	0.08	152%
Omega-3 fatty acids (EPA+DHA) (mg)	955	147%

Distribution

Habitat: Lake trout like water at about 10°C (50°F). In spring, just after breakup, they can often be found near the surface. As the surface waters warm, lake trout move to deeper, cooler waters.

Food: Lake trout eat many things:

- crustaceans (crayfish, shrimp…);
- water and land insects;
- many kinds of fish (including other lake trout);
- small animals like mice and shrews.

Best time for fishing: Lake trout are most easily caught at dawn or dusk, but may also be caught in the middle of the day.

Lures: Cristal Minnow (violet), Whitefish (silver), Sutton (hammered silver), Streamer JR Cisco, Pixee (candy pink/fluorescent red contour), Spoonbill (silver/blue), Red Flash Wiggler.

Catch record: 32.8 kg (72 pounds 4 ounces) in Great Bear Lake, Northwest Territories, in 1995.

Distinctive features: Lake trout is prized because it can grow very big. It is common to catch trout that weigh 5 kg (11 pounds) or more. This fish does not usually like salt water, although in the North it is sometimes found in areas where the water is slightly salty.

Taste and quality: The lake trout is an esteemed food fish. The flesh, firm and tasty, may be white, pink, orange or orange-red. The color is influenced in part, at least, by diet. Large fish-eating lake trout often have white flesh.

Recipe 

Lake trout soup

Ingredients

- 500 ml (2 cups) cubed lake trout
- 1 medium-sized onion
- 2 large cubed potatoes
- 250 ml (1 cup) milk
- 1.5 L (6 cups) water
- 30 ml (2 tbsp) olive oil
- Salt and pepper

Preparation

Cut the fish in small cubes after removing skin and bones, to get 2 cups. Finely chop a medium sized onion. Cut two large potatoes in small cubes. In a large pot, sauté the onion in the olive oil and add the fish. Cook slightly without coloring the flesh. Add the potato cubes; stir for a few minutes. Add water, salt and pepper. Bring to a boil, cover and simmer for 40 minutes. Vigorously beat the soup to slightly crush the potato cubes. The starch released will thicken the soup. Be sure not to purée. Cover and boil for 5 minutes. Remove from heat. Add one cup of milk.

Makes 4 to 6 servings.

Original recipe

Recipe 

Oriental lake trout in tinfoil

Ingredients

- 4 X 125 g (4 oz) trout fillets
- 4 shallots, thinly sliced at an angle
- 1 large seeded red pepper, cut in thin strips
- 30 ml (2 tbsp) soy sauce
- 30 ml (2 tbsp) red wine vinegar
- 10 ml (2 tsp) sesame oil
- 10 ml (2 tsp) ground fresh ginger, or 2 ml (1/2 tsp) powdered ginger
- 15 ml (1 tbsp) sugar
- 20 ml (4 tsp) sesame seeds

Preparation

In a bowl, mix shallots, red pepper, soy sauce, red wine vinegar, oil, ginger and sugar. Cut four rectangles of tinfoil, 35 cm x 30 cm (14 in x 12 in). Place one trout fillet on half of each rectangle of tinfoil. Distribute the shallot mixture equally on each fillet and sprinkle with 5 ml (1 tsp) of sesame seeds. Fold tinfoil over fish and close tightly by folding edges twice. Place tinfoil folders on a baking dish.

Cook in preheated oven at 220°C (425°F) for 10 to 12 minutes or until the tinfoil folders have inflated and fish flesh is easily flaked with a fork. Serve immediately.

Makes 4 servings.

Translated from: *Coup de pouce magazine.*

Recipe 

Blueberry lake trout pudding (Shougoumin)

Ingredients

- 1 kg (2 lb) fresh lake trout (or lake whitefish)
- Water
- Salt
- 500 ml (2 cups) blueberries

Preparation

Cook the fish in boiling salted water. After fish is cooked, remove skin and bones. Mix the fish with blueberries. Stir. It is ready to eat.

Makes 4 servings.

Traditional Cree recipe adapted from: *Northern Cookbook.* Eleanor A. Ellis.

Recipe 

Lake trout chowder

Ingredients

- 500 ml (2 cups) potatoes, diced
- 500 ml (2 cups) carrots, diced
- 125 ml (1/2 cup) onion, diced
- 125 ml (1/2 cup) celery, diced
- 5 ml (1 tsp) salt
- 5 ml (1 tsp) pepper
- 1 kg (2 lb) fresh lake trout, cut into bite sized pieces
- 250 ml (1 cup) milk
- 30 ml (2 tbsp) vegetable oil
- Water

Preparation

Put water and potatoes in cooking pot. Bring to boil, simmer and cook for 30 minutes. Fry vegetables in oil. Add fried vegetables, fish, salt and pepper to cooking pot and simmer for another 10 minutes. Remove from heat, add milk and serve.

Makes 4 to 6 servings.

Contemporary Cree recipe adapted from: *Native Women's Picture Cook Book*. Native Women's Association of the N.W.T.

Advice for non-residents who wish to fish in the North

The James Bay and Northern Québec Agreement divides the James Bay territory into three categories (see map 1). Only beneficiaries of the Agreement are allowed to hunt, fish, or trap on category 1 and 2 lands. On the remaining (Category 3) lands, certain species are reserved exclusively for beneficiaries:

- Lake whitefish (non anadromous*)
- Lake sturgeon
- Longnose sucker
- White sucker
- Burbot
- Cisco (non anadromous)
- Round whitefish (non anadromous)
- Goldeye
- Mooneye

* Non anadromous: fish that don't go to sea

For more information on fishing regulations, please consult the Québec Ministry of Natural Resources site at:
www.mrn.gouv.qc.ca/english/wildlife/hunting-fishing-trapping/index.jsp

Non-residents who wish to fish north of the 52nd parallel must hire an outfitter. For a list of Cree outfitters in the James Bay territory, please visit the Cree Outfitters and Tourism Association website at:
www.creetourism.ca.

Fishing and Cree tradition

Fishing is an important Cree tradition. Many Crees in James Bay still live at least partly from hunting and fishing, and almost all hunt and fish for recreation. Everyone can fish: children, elders, women, and hunters.

The Cree consider fish a staple: when other animals are not available, there are always fish. It is the first food given to an infant. Before baby bottles, the Cree used to crush fish, place the juice in a sac made of pike stomach, and attach a goose quill as a nipple for babies.

September

The main activities would be goose and duck hunting, muskrat trapping, and some fishing. The black bear is still roaming in September/October, very fat. As soon as the berries are ripe, the porcupine is ready and its harvest continues right through March.

October

There are still migratory birds around but much fewer than in September. There is muskrat trapping. Caribou hunting starts. The trapper does his inventory of beaver but the beaver is not yet considered prime. October/November is the time for spruce grouse and snowshoe hare.

November

The migratory birds are gone, except for an occasional goose. The trapper sets up his permanent camp, and starts heavy trapping of beaver. He also traps otter, fox, mink, marten, lynx, squirrel, and weasel. There are still a few muskrat taken, but fewer than before. There is ice fishing. The hunt for hibernating black bear begins.

December

Trapping continues. There are still spruce grouse and snowshoe hare, and ptarmigan become important. There is occasional ice fishing, and there are cisco with eggs on some of the coastal lakes. Many trappers break camp and return to the village for Christmas, bringing their furs.

January

Trappers return to their bush camps, and resume trapping all kinds of animals except muskrat. The ice is thick enough that trappers walk on it and tap the ice to find beaver tunnels.

February

Trapping continues, and there is some fishing—especially for burbot, which spawns in February-March. There is still big game. Cold does not normally restrict activities: except in extreme cold spells.

The Cree traditional cycle of harvesting activities

March

The weather changes, and hare, ptarmigan, fish and lynx become more active and are caught more often. The day is longer, and the trapper is able to go further from his base camp. Towards the end of the month, the trapper starts to take his traps out.

April

Trapping of most furbearers is finished, except for otter. Muskrat is being taken now. Hunting of snowshoe hare continues, but ptarmigan and spruce grouse are no longer taken.

May

The hunt for geese and ducks is central. This includes scoters and other saltwater ducks, mergansers, long-tailed ducks (oldsquaw), and black duck. Red-throated loons are also taken. The ice breaks up in the lakes, and open-water fishing starts. Muskrat and otter trapping is tapering off.

June

No furbearers are being taken, but there is still fishing, and ducks are abundant. People hunt goldeneye and eider, as well as the species hunted in May. Some people collect duck eggs.

July

There is fishing, and some duck hunting.

August

Fishing is important, especially at traditional sites like the First Rapids on the La Grande river, and Smokey Hill on the Rupert river. Berries are starting to ripen, and all the berry-eating animals are putting on fat. The hunt for black bear and porcupine starts toward the end of the month.

Offerings to animals

A black bear is brought into camp. The hunters sit in a circle with the bear in the middle. Someone smokes a pipe and makes a gesture of offering it to the bear. Or a piece of tobacco is placed in the bear's mouth as an offering. Once the bear is skinned, a chunk of its meat is thrown into the fire.

In the past, offerings were made to all animals, including fish. Making an offering to an animal shows respect. Through their offering, the hunters are thanking the Provider. They are also asking the animal to provide game for them.

Mercury, a unique contaminant

Unlike other contaminants found in the environment, mercury levels in fish increase in new hydroelectric reservoirs (see mercury and reservoirs).

Sources of mercury

Mercury can be released by volcanoes and forest fires. Or it can come from industries (like those burning coal or garbage) located in southern Canada or the United States. Most of the mercury in the James Bay region is carried by wind from far away. Dust particles and rain then move it into lakes and forests. Once mercury enters lakes and rivers, bacteria convert it into methylmercury—a form that is easily absorbed by living creatures. Methylmercury can be toxic in high doses.

How mercury gets into fish

Plankton (tiny plants and animals that live suspended in water) pick up mercury from the water. From there, it moves into insects that live in the water, into fish that eat insects, and then into fish that eat other fish. At each step, the amount of mercury increases. This is why fish that eat other fish (walleye, pike, lake trout and burbot) contain more mercury than fish that mainly eat insects (whitefish, speckled trout, cisco, suckers and sturgeon). Besides this, mercury builds up throughout a fish's life. So the older and bigger the fish, the more mercury it has.

The fish in lakes and rivers all over Québec contain some mercury. In the James Bay region, we have been monitoring mercury levels for years. The tests for the past 28 years tell us that, in natural lakes, the mercury levels in fish are stable.

Mercury and reservoirs

The green parts of plants may contain some mercury. When a hydroelectric reservoir floods land, those plants turn into food for bacteria. The bacteria change the mercury in the plants into methylmercury—the form that other living things absorb. As a result, the fish in reservoirs (and downstream from them) contain more mercury than usual shortly after flooding. The increase is not permanent, because the green parts of plants eventually get used up. Monitoring of fish in reservoirs show us that:

- It takes 10–20 years for mercury levels to go back to normal in fish that eat insects. ("Normal" means the levels we find in natural lakes in the area).
- It can take 20–35 years for mercury levels to go back to normal in fish that eat other fish.

Mercury levels in the James Bay reservoirs

In most of the La Grande reservoirs (except Eastmain 1 and Opinaca), mercury levels are now back to normal in insect-eating fish. They are not yet back to normal in fish-eating fish, but they are getting there. In contrast, in the Eastmain 1 and Opinaca reservoirs, and in the Rupert diversion bays, mercury levels in most types of fish are predicted to increase until 2020.

Despite the mercury, you can still eat fish regularly and benefit from its high nutritional value. If you eat fish more than once a week, you just need to follow the recommendations in this guide about limiting certain types of fish caught in specific areas (see pages 45 to 49).

Eating fish that contain mercury

Humans get most of their mercury from fish. Anyone who eats fish has some mercury in their body, but the levels are usually low and not harmful to health. However, the fetus is more sensitive to mercury, so pregnant women need to limit how much mercury they take in. In adults, very high doses can damage the nerves and lead to problems with coordination, sight, and hearing. Studies of anglers in Québec have shown that their mercury levels are well below this point. Recent studies show that mercury levels in most Cree are also well below the danger point.

Fish consumption recommendations

If you eat fish more than once a week, all year round, you should limit your intake of predatory fish (walleye, pike, lake trout, and burbot). You can still eat all the insect-eating fish (lake whitefish, speckled trout, suckers, or sturgeon) you want[1], and all the coastal fish.

The maps that follow show the recommended amounts of various species of fish, depending on where they are caught. Colour codes indicate how often you can eat them. For instance, green means the fish is low in mercury, and you can eat as much of it as you want. Red indicates a high-mercury fish that you should eat only once a month. Please note that you should not add the number of meals recommended for each colour group. For example, you can have 8 meals per month of fish indicated by a yellow circle, or 4 meals per month of fish indicated with an orange circle, but not the sum of both.

These recommendations are based on an 230 g (8 oz) portion (before cooking), and a 60 kg (132 lb) adult. This portion is about the size of your hand. If you weigh more than this, you can increase your portion size accordingly.

1 There is one exception: Lake whitefish taken from the Upper and Lower Nemiscau rivers, the Lemare river, and the Rupert Bays should not be eaten more than eight times per month.

Mercury levels in fish in ppm* (mg/kg)	Maximum number of meals recommended per month
0.00 to 0.29	No restriction
0.30 to 0.49	8 meals per month
	or
0.50 to 0.99	4 meals per month
	or
1.00 to 1.99	2 meals per month
	or
2.00 to 3.75	1 meal per month

* parts per million

The recommendations are also based on average-size fish, as indicated in the maps. If your fish is much bigger than this, you should divide your number of meals by two, because mercury levels are higher in big fish.

For a given area, the recommendations for lake whitefish also apply to round whitefish, cisco, suckers, speckled trout, sturgeon, mooneye and goldeye. The recommendation shown for walleye also applies to burbot.

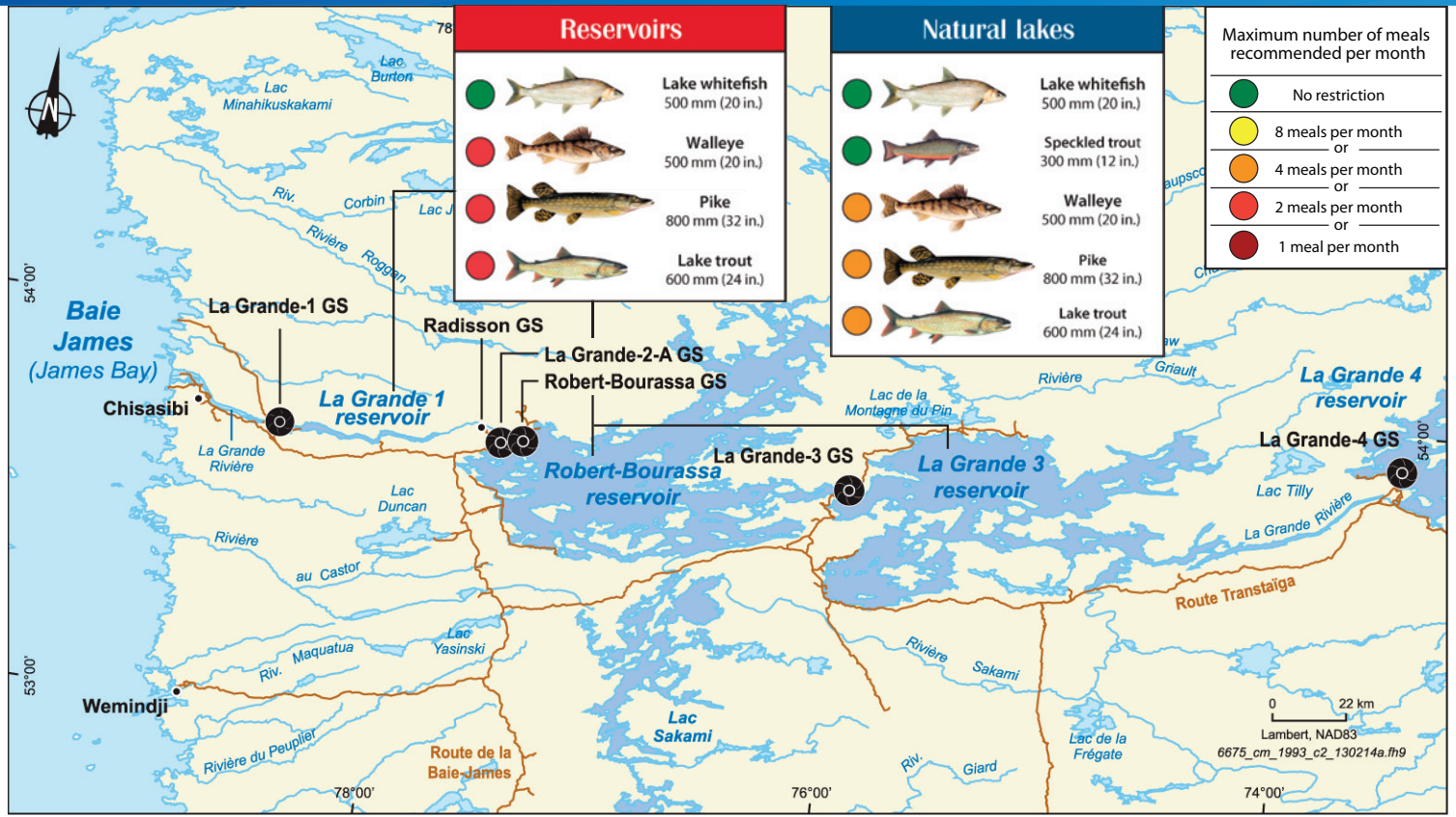
Eating fish every day for a few weeks during summer, like on a fishing trip, is not a concern, as it takes several months to build up meaningful amounts of mercury.

Remember...

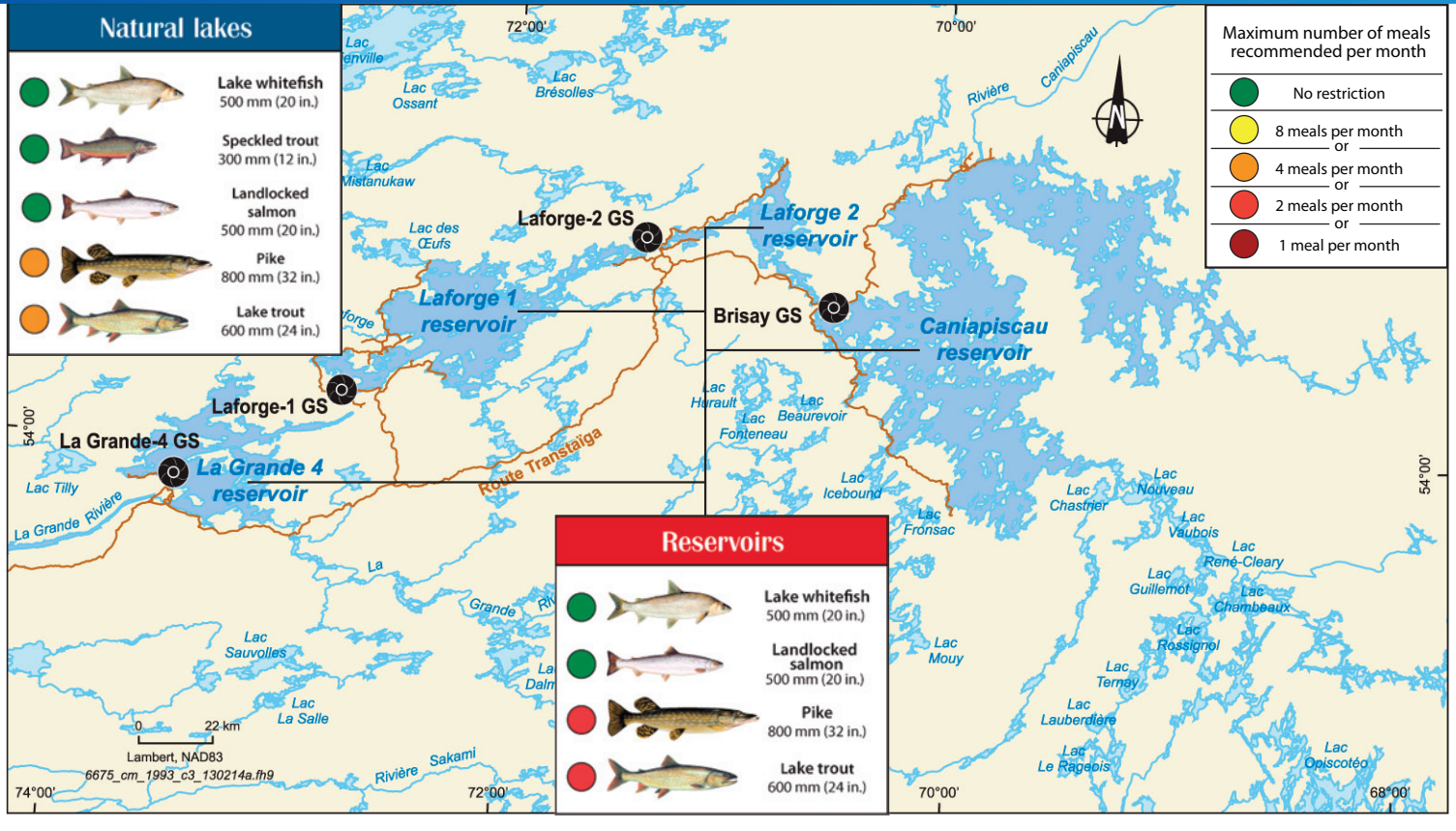
Pregnant women, and those who may become pregnant soon, should eat at least two meals a week of low-mercury fish. This means fish like lake whitefish, speckled trout, suckers, or sturgeon (coded in green on the maps).

Map 2: Coast of James Bay and Hudson Bay

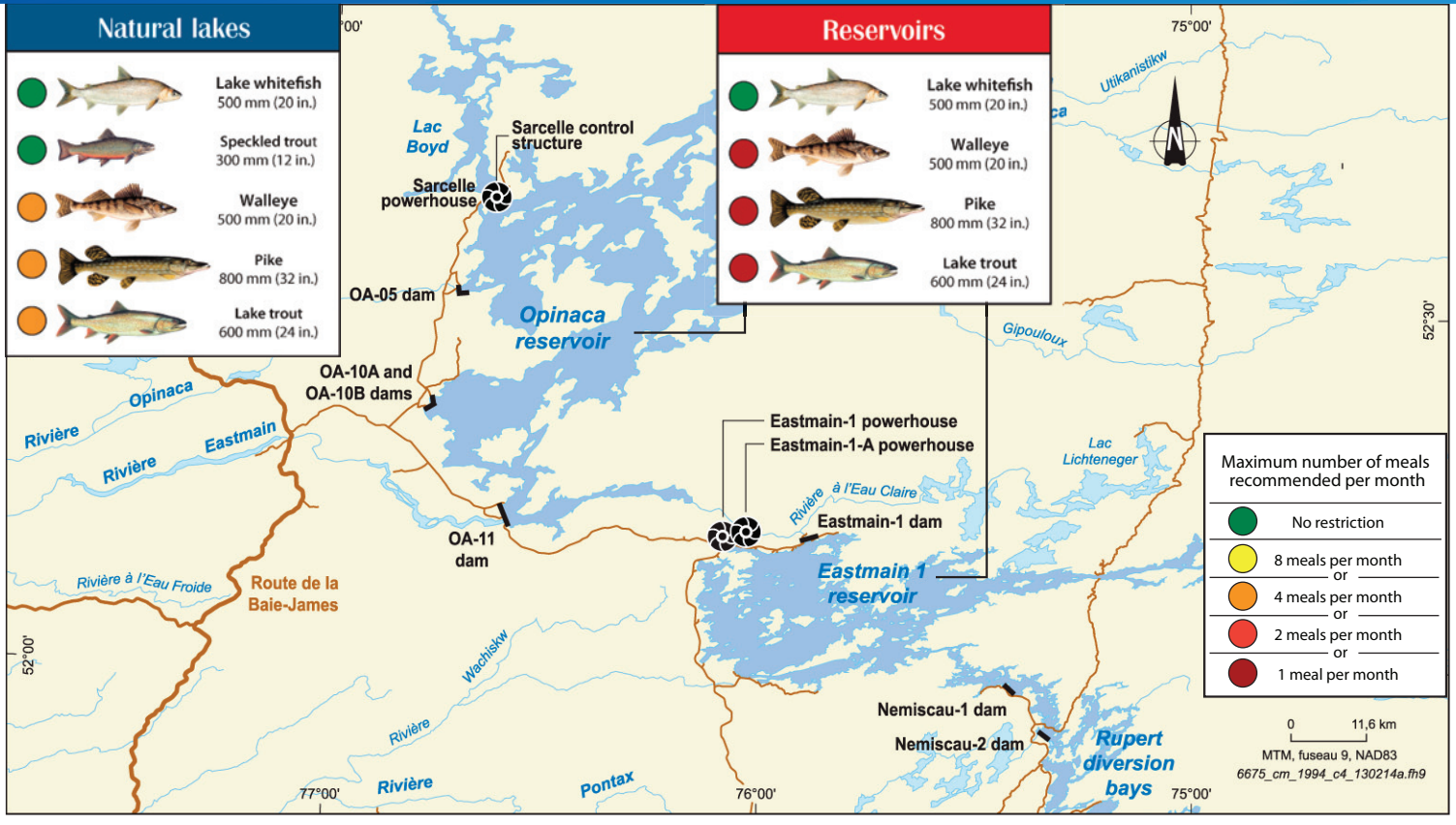
Map 3: La Grande – Western sector



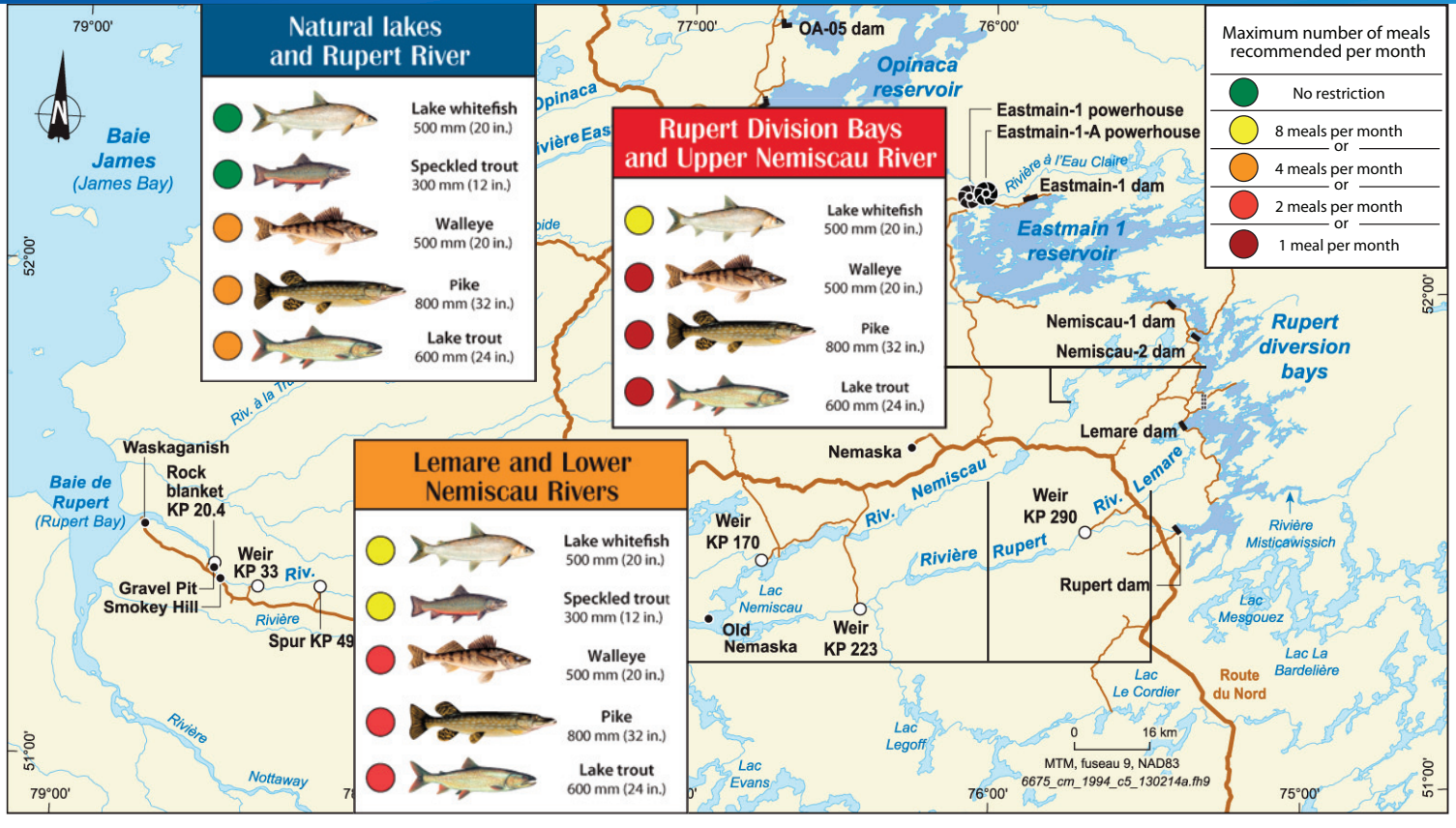
Map 4: La Grande – Eastern sector



Map 5: Eastmain 1 sector



Map 6: Rupert sector



Additional copies of this guide

For French or English copies of the ¨**Northern Fish Nutrition Guide – James Bay Region**¨,
please contact Hydro-Québec at 1-800-ENERGIE.

This guide is also available on Hydro-Québec's web site:
http://www.hydroquebec.com/sustainable-development/documentation/mercure.html

For the Cree version, please contact the Public health department of the Cree board of health and social services of James Bay at 418-923-3355.

Other fish consumption publications

The Cree board of health and social services of James Bay has also published other materials on fish consumption:

The "**Healthy Fish Eating in Eeyou Istchee**" poster

The "**Fish Facts for Families**" flyer

The "**Why fish is good for you and your children**" pamphlet (created by the Maternal and Child Health Program)

These can be obtained from the Public health department of the Cree board of health and social services of James Bay at 418-923-3355, or visit: www.creehealth.org

Source of illustrations

Poissons d'eau douce du Québec. www.mddep.gouv.qc.ca et www.mrnf.gouv.qc.ca

Eugène Klinoff, Germaine A. Bernier-Boulanger and Michel Poirier, *La grande encyclopédie de la pêche.*

Breast feeding pictures:

- left: the Cree board of health and social services of James Bay
- right: Mirador des Marmots (L'AMIE)

References

Fish distribution, fish biology and lures

Bernatchez, L, Giroux, M. *Les poissons d'eau douce du Québec et leur répartition dans l'Est du Canada*, Éd. Broquet, 2000, 343 p.

Monfette, R. «Quinze leurres pour la saison. Doré». *Annuel de pêche*. 2003, p. 58-63.

Ruel, J. «Quinze leurres pour la saison. Truite grise». *Annuel de pêche*. 2003, 34-37.

Scott, WB, Crossman, EJ. *Poissons d'eau douce du Canada*. Ministère de l'Environnement. Office des recherches sur les pêcheries du Canada, Ottawa, Ministère des approvisionnements et services Canada, Bulletin 184.1974, 1026 p.

Smedley, J. «Quinze leurres pour la saison. Brochet». *Annuel de pêche*. 2003, 40-43.

Trudel, S. «Quinze leurres pour la saison. Truite mouchetée». *Annuel de pêche*. 2003, 28-33.

Verdon, R. *Répartition géographique des poissons du territoire de la Baie-James et du Nord Québecois*. Hydro-Québec, Hydraulique et environnement. 2001, 44 pages.

Nutritional value

Blanchet, C, Dewailly E. *The St. Lawrence Food Guide. A Guide on Aquatic Resources of the St. Lawrence. Saint-Laurent Vision 2000*. Gouvernement du Québec. Gouvernement du Canada. 2003. http://www.inspq.qc.ca/pdf/publications/1296_GuideAlimentStLaurent_VA.pdf, Accessed April 15, 2013.

Doré, N, Le Hénaff, D. *Mieux vivre avec notre enfant de la grossesse à deux ans, guide pratique pour les mères et les pères*. Québec, Institut national de santé publique du Québec, 2013. 776 pages.

Gouvernement du Canada. *Loi sur les aliments et drogues*. Règlement modifiant le Règlement sur les aliments et drogues (étiquetage nutritionnel, allégations relatives à la teneur nutritive et allégations relatives à la santé). *Gazette du Canada* 2003; partie 2, volume 137, no 1, p. 154. DORS/2003-11. http://canadagazette.gc.ca/partII /2003/20030101/pdf/g2-13701.pdf, Accessed May 28, 2003.

Health Canada. Eating Well with Canada's Food Guide - First Nations, Inuit and Métis. 2007. Available from: www.healthcanada.gc.ca/foodguide, Accessed Feb 26, 2013.

Health Canada. *Eating Well with Canada's Food Guide*. 2011. Available from: www.healthcanada.gc.ca/foodguide, Accessed Feb 23, 2013.

Lucas, M, Blanchet, C. Dewailly, É, Schetagne, R. 2003. *Profil nutritionnel des poissons nordiques. Complexe La Grande*. Rapport conjoint réalisé par l'Unité de recherche en santé publique du Centre de recherche du CHUL-CHUQ et Hydro-Québec, Production, direction Santé et sécurité. 29p et annexes.

Santé et Bien-Être Social Canada. *Recommandations sur la nutrition*. Rapport du Comité de révision scientifique. Gouvernement du Canada. 1990, 224 p.

Simopoulos AP, Leaf A, Salem N, Jr. Workshop statement on the essentiality of and recommended dietary intakes for Omega-6 and Omega-3 fatty acids. *Prostaglandins Leukot Essent Fatty Acids*. 2000; 63:119-121. http://www.issfal.org.uk/adequateintakes.htm, Accessed, July 2003.

Mercury issue

Lucotte, M, Schetagne, R, Thérien, N, Langlois, C, Tremblay, A (eds). 1999. *Mercury in the Biochemical Cycle: Natural Environments and Hydroelectric Reservoirs of Northern Qué-bec (Canada)*. Environmental Science Series, Springer-Verlag, Berlin, Heidelberg, New York, 334 p.

Ministère de l'Environnement et ministère de la Santé et des Services sociaux (MSSS). *Guide de consommation de poisson de pêche sportive en eau douce*. http://www.menv.gouv.qc. ca/eau/guide/, Accessed Oct 17, 2003.

Mercury levels in fish

Schetagne, R, Thérien, J, 2013. Suivi environnemental du complexe *La Grande. Évolution des teneurs en mercure dans les poissons*. Rapport synthèse 1978-2012. GENIVAR inc. et Hydro-Québec Production. (in preparation).

Schetagne, R, Thérien, J, R. 2012. Centrales de l'Eastmain-1, de l'Eastmain-1-A et de la Sarcelle et dérivation Rupert. *Suivi environnemental en phase d'exploitation (2011). Suivi du mercure dans la chair des poissons*. Rapport conjoint du Consortium Waska-GENIVAR et Hydro-Québec Production. 73 p. et annexes.

Notes

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