EPA United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

April 2018
EPA 823-N-18-004

In This Issue

https://www.epa.gov/fish-tech

This issue of the Fish and Shellfish Program Newsletter generally focuses on Tribal issues.

Recent Advisory News

Guidance for Safe Consumption of Walleye from Inland Lakes within the Ceded Territories of Wisconsin, Michigan, and Minnesota

The harvest of ogaa (walleye) from inland lakes is an important part of the Anishinaabe way of life. By participating in the spring and winter spearing seasons, tribal members reaffirm their off-reservation treaty harvest rights while providing their families with a nutritious food source. Yet, along with this tradition often comes a concern about exposure to mercury through consumption of fish. The Great Lakes Indian Fish and Wildlife Commission's (GLIFWC) Mercury Maps are available to help tribal members make informed choices that allow continued ogaa consumption while reducing exposure to mercury. The maps, most recently published in January 2018, provide the facts about mercury levels in ogaa in ceded territory waters where member tribes commonly harvest these fish. They are now available on the GLIFWC website and will be made available at tribal registration stations and at various tribal events this spring.

Under funding from the Great Lakes Restoration Initiative, GLIFWC updates the Mercury Maps with the most current data available every two years. The 2018 maps provide ogaa consumption advice for 348 individual lakes, including 16 new lakes with advice developed since the maps were last published in 2016. In particular, GLIFWC worked with the Lac Vieux Desert Band and the Keweenaw Bay Indian Community in recent years to significantly increase the number of lakes displayed on the maps within the Michigan 1842 Ceded Territory.

How to Use the Mercury Maps

Mercury Maps are available on the GLIFWC website for the six GLIFWC member tribes in Wisconsin as well as the 1837 ceded territory of Minnesota and portions of the 1842 ceded territory of Michigan. The Mercury Maps for Wisconsin and Michigan show the lakes from which ogaa are typically harvested by a given member tribe. The Minnesota map shows all lakes in the 1837 ceded territory of Minnesota that are available for tribal harvest.

Each top map applies to pregnant women, women of childbearing age, and children under 15 years of age. The bottom map applies to the remainder of the population, men 15 years of age, and older and women beyond childbearing age. Each lake on the map is color-coded to display how many meals of walleye per month from that lake have been deemed safe to eat. As shown on the two maps, in order to protect the developing brain of the fetus or a child from the potential detrimental effects of mercury, fewer meals are recommended for children under the age of 15 and women of childbearing age.

Suggestions for Reducing Mercury Exposure

There are a number of ways to reduce exposure to mercury while still harvesting and consuming ogaa:

- Sort and label ogaa prior to freezing.
- Put ogaa under 20 inches in bags labeled "under 20 inches."
- Put ogaa over 20 inches in bags labeled "over 20 inches."
- Label bags with the name of the lake where the fish were harvested.
- Follow the advice provided on the Mercury Maps for the maximum safe number of ogaa meals per month.
- Eat smaller ogaa (those under 20 inches) and ogaa from lakes with lower mercury levels such as those lakes color-coded blue or green.

Alternatively, tribal members can choose to eat safer giigoonh (fish) species known to contain less mercury. Giigoonh such as walleye, muskellunge, largemouth bass, smallmouth bass, and northern pike generally contain more mercury than other giigoonh such as lake whitefish, herring, bluegill, crappie, perch, or sunfish.

Fish contain a number of nutrients that are critical to good health. By making informed decisions about the size and species of fish eaten and the lake from which those fish are harvested, tribal members can safely eat ogaa and other giigoonh as a part of a healthy diet.

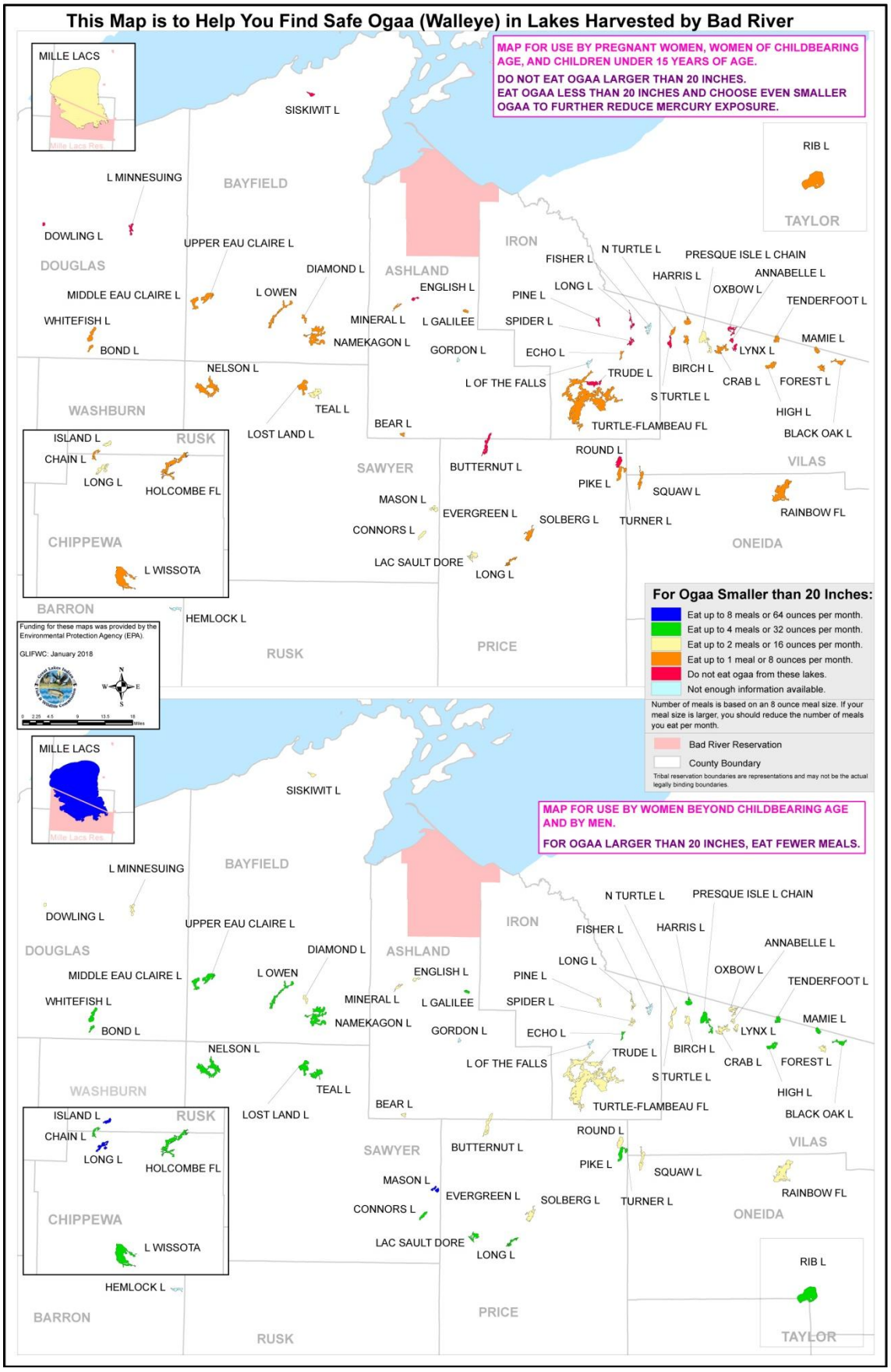
In an effort to best serve its member tribes, the Environmental Section of GLIFWC will continue to modify the information presented on the Mercury Maps as science in this area advances and additional ogaa mercury data become available.

The eight Mercury Maps and their accompanying fish advisories follow this article on the next 16 pages.

For more information, contact Sara Moses of GLIFWC at s.moses@glifwc.org.

Source: http://www.glifwc.org/Mercury/index.html

Bad River (http://www.glifwc.org/Mercury/Bad_River_2018.pdf)



Bad River (http://www.glifwc.org/Mercury/Bad_River_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Lakes Harvested by Bad River

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

LAKE	COUNTY	Women of childbearing age and children less than 15 Maximum number of meals per month	Women beyond childbearing years and men 15 and older Maximum number of meals per month
ANNABELLE L	VILAS	0	2
BEAR L	ASHLAND	1	2
BIRCH L	VILAS	1	2
BLACK OAK L	VILAS	1	4
BOND L	DOUGLAS	1	4
BUTTERNUT L	PRICE	0	2
CHAIN L	RUSK	1	4
CONNORS L	SAWYER	2	4
CRAB L	VILAS	1	2
DIAMOND L	BAYFIELD	1	2
DOWLING L	DOUGLAS	0	2
ECHO L	IRON	1	4
ENGLISH L	ASHLAND	0	2
EVERGREEN L	SAWYER	2	8
FISHER L	IRON	Not Enough Information	
FOREST L	VILAS	1	2
GORDON L	ASHLAND	Not Enough Information	
HARRIS L	VILAS	1	4
HEMLOCK L	BARRON	Not Enough Information	
HIGH L	VILAS	1	4
HOLCOMBE FL	CHIPPEWA	1	4
ISLAND L	RUSK	2	8
L GALILEE	ASHLAND	1	4
L MINNESUING	DOUGLAS	0	2
L OF THE FALLS	IRON	Not Enough Information	
L OWEN	BAYFIELD	1	4
L WISSOTA	CHIPPEWA	1	4
LAC SAULT DORE	PRICE	2	4
LONG L	CHIPPEWA	2	8
LONG L	IRON	0	2

LAKE	COUNTY	Women of childbearing age and children less than 15 Maximum number of meals per month	Women beyond childbearing years and men 15 and older Maximum number of meals per month
LONG L	PRICE	1	4
LOST LAND L	SAWYER	1	4
LYNX L	VILAS	0	2
MAMIE L	VILAS	1	4
MASON L	SAWYER	2	8
MIDDLE EAU CLAIRE L	BAYFIELD	1	4
MILLE LACS	MILLE LACS	2	8
MINERAL L	ASHLAND	1	2
N TURTLE L	VILAS	1	2
NAMEKAGON L	BAYFIELD	1	4
NELSON L	SAWYER	1	4
OXBOW L	VILAS	0	2
PIKE L	PRICE	1	4
PINE L	IRON	0	2
PRESQUE ISLE L CHAIN	VILAS	2	4
RAINBOW FL	ONEIDA	1	2
RIB L	TAYLOR	1	4
ROUND L	PRICE	0	2
S TURTLE L	VILAS	0	2
SISKIWIT L	BAYFIELD	0	2
SOLBERG L	PRICE	1	2
SPIDER L	IRON	0	2
SQUAW L	VILAS	1	2
TEAL L	SAWYER	2	4
TENDERFOOT L	VILAS	1	4
TRUDE L	IRON	0	2
TURNER L	PRICE	1	4
TURTLE-FLAMBEAU FL	IRON	1	2
UPPER EAU CLAIRE L	BAYFIELD	1	4
WHITEFISH L	DOUGLAS	1	4

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

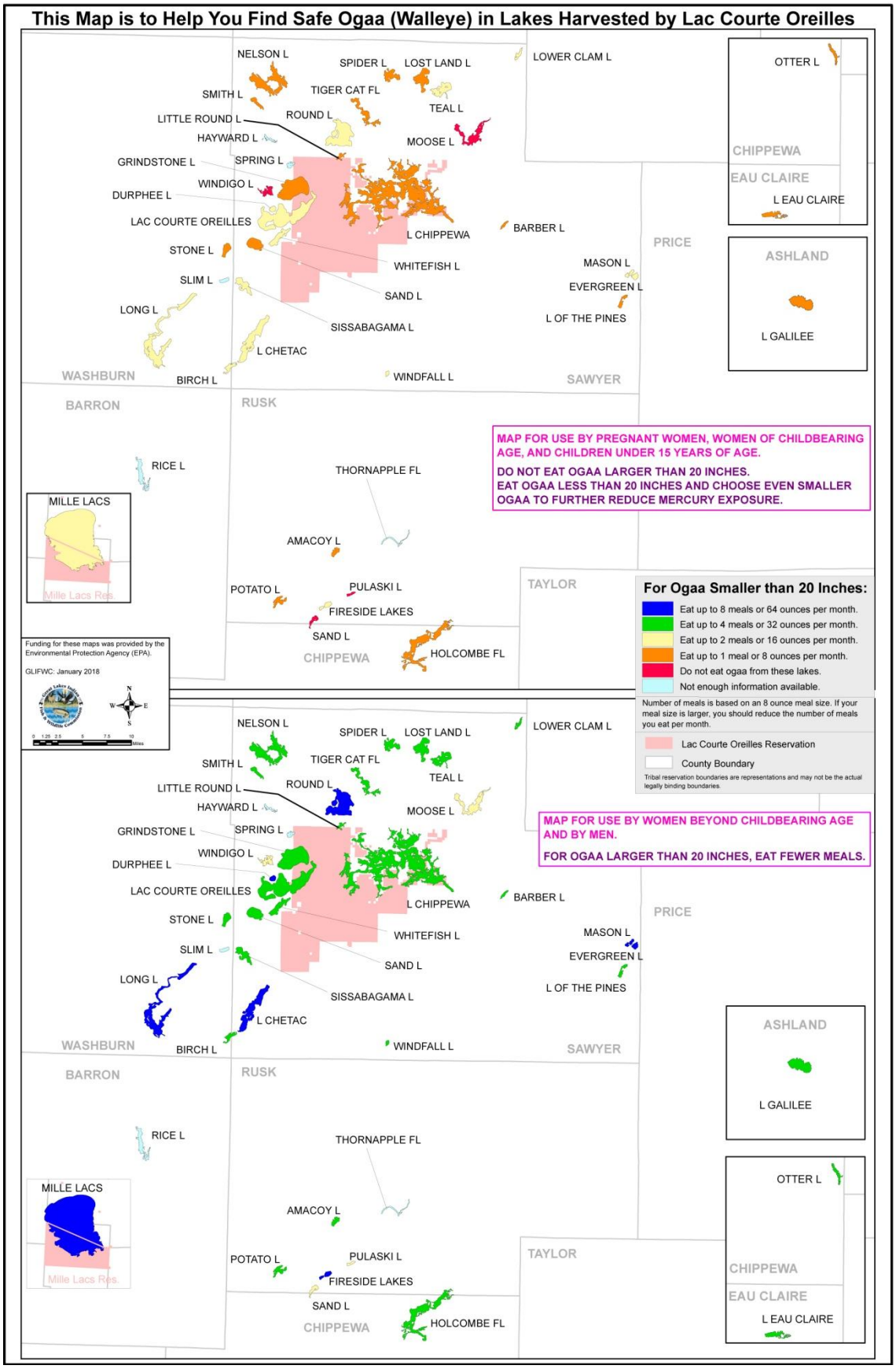
RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

Lac Courte Oreilles (http://www.glifwc.org/Mercury/LCO_2018.pdf)



Lac Courte Oreilles (http://www.glifwc.org/Mercury/LCO_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Lakes Harvested by Lac Courte Oreilles

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

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Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

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Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

		Women of childbearing age and children less than 15	Women beyond childbearing years and men 15 and older
LAKE	COUNTY	Maximum number of meals per month	Maximum number of meals per month
AMACOY L	RUSK	1	4
BARBER I	SAWYER	1	4
BIRCH L	WASHBURN	2	4
DUPHREE L	SAWYER	2	8
EVERGREEN L	SAWYER	2	8
FIRESIDE LAKES	RUSK	2	8
GRINDSTONE L	SAWYER	1	4
HAYWARD L	SAWYER	Not Enough Information	
HOLCOMBE FL	CHIPPEWA	1	4
L CHETAC	SAWYER	2	8
L CHIPPEWA	SAWYER	1	4
L EAU CLAIRE	EAU CLAIRE	1	4
L GALILEE	ASHLAND	1	4
L OF THE PINES	SAWYER	1	4
LAC COURTE ORIELLES	SAWYER	2	4
LITTLE ROUND L	SAWYER	1	4
LONG L	WASHBURN	2	8
LOST LAND L	SAWYER	1	4
LOWER CLAM L	SAWYER	2	4
MASON L	SAWYER	2	8
MILLE LACS	MILLE LACS	2	8
MOOSE L	SAWYER	0	2
NELSON L	SAWYER	1	4
OTTER L	CHIPPEWA	1	4
POTATO L	RUSK	1	4
PULASKI L	RUSK	0	2
RICE L	BARRON	Not Enough Information	
ROUND L	SAWYER	2	8
SAND L	RUSK	0	2
SAND L	SAWYER	1	4
SISSABAGAMA L	SAWYER	2	4
SLIM L	WASHBURN	Not Enough Information	
SMITH L	SAWYER	1	4
SPIDER	SAWYER	1	4
SPRING L	SAWYER	Not Enough Information	
STONE L	WASHBURN	1	4
TEAL L	SAWYER	2	4
THORNAPPLE FL	RUSK	Not Enough Information	
TIGER CAT FL	SAWYER	1	4
WHITEFISH L	SAWYER	2	4
WINDFALL L	SAWYER	2	4
WINDIGO L	SAWYER	0	2

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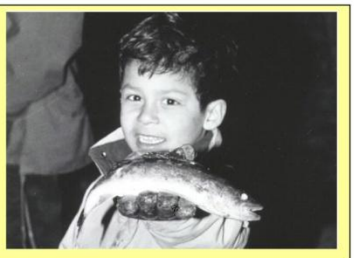

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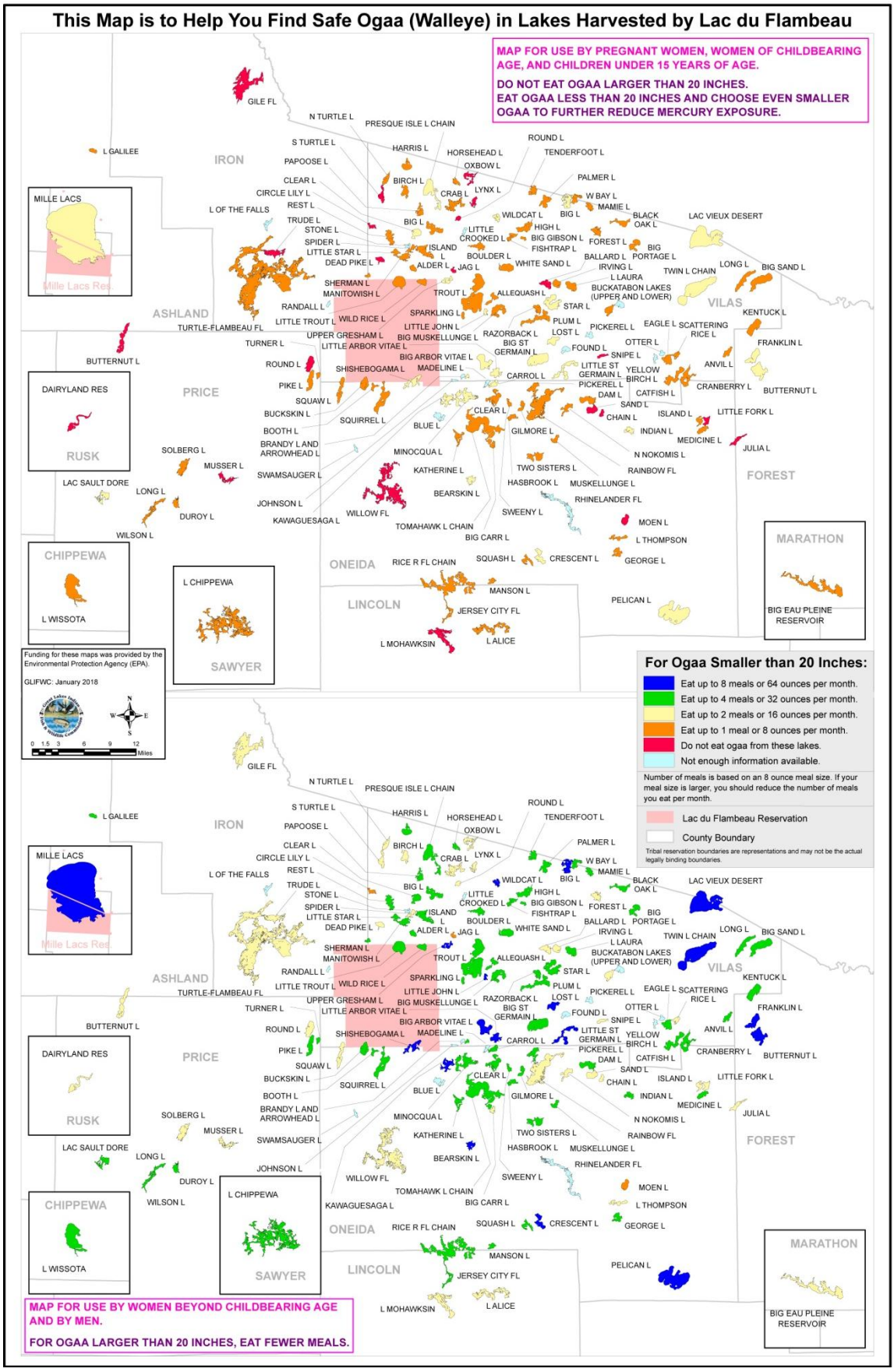
Lac du Flambeau (http://www.glifwc.org/Mercury/LDF_2018.pdf)



Lac du Flambeau (http://www.glifwc.org/Mercury/LDF_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Lakes Harvested by Lac Du Flambeau

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

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- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

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LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
ALDER L	VILAS	1	4
ALLEQUASH L	VILAS	1	4
ANVIL L	VILAS	1	4
ARROWHEAD L	VILAS	2	4
BALLARD L	VILAS	0	2
BEARSKIN L	ONEIDA	2	8
BIG ARBOR VITAE L	VILAS	2	8
BIG CARR L	ONEIDA	1	2
BIG EAU PLEINE RES	MARATHON	1	2
BIG GIBSON L	VILAS	1	4
BIG L (BOULDER JCT)	VILAS	1	4
BIG L (MI BORDER)	VILAS	2	8
BIG MUSKELLUNGE L	VILAS	1	4
BIG PORTAGE L	VILAS	1	4
BIG SAND L	VILAS	1	4
BIG ST GERMAINE L	VILAS	2	4
BIRCH L	VILAS	1	2
BLACK OAK L	VILAS	1	4
BLUE L	ONEIDA	Not Enough Information	
BOOTH L	ONEIDA	1	4
BOULDER L	VILAS	1	4
BRANDY L	VILAS	Not Enough Information	
BUCKSKIN L	ONEIDA	1	4
BUTTERNUT L	FOREST	2	8
BUTTERNUT L	PRICE	0	2
CARROL L	ONEIDA	2	4
CATFISH L	VILAS	1	4
CHAIN L	ONEIDA	0	2
CIRCLE LILY L	VILAS	0	1
CLEAR L	ONEIDA	1	4
CLEAR L	VILAS	2	8
CRAB L	VILAS	1	2
CRANBERRY L	VILAS	1	4
CRESCENT L	ONEIDA	2	8
DAIRYLAND RES	RUSK	0	2
DAM L	ONEIDA	1	4
DEAD PIKE L	VILAS	0	2
DUROY L	PRICE	1	4
EAGLE L	VILAS	1	4
FISHTRAP L	VILAS	1	4
FOREST L	VILAS	1	2
FOUND L	VILAS	Not Enough Information	
FRANKLIN L	FOREST	2	8
GEORGE L	ONEIDA	1	4
GILE FL	IRON	0	2
GILMORE L	ONEIDA	1	4
HARRIS L	VILAS	1	4
HASBROOK L	ONEIDA	1	4
HIGH L	VILAS	1	4
HORSEHEAD L	VILAS	1	4
INDIAN L	ONEIDA	2	4
IRVING L	VILAS	1	2
ISLAND L	ONEIDA	1	2
ISLAND L	VILAS	1	4
JAG L	VILAS	0	1
JERSEY CITY FL	LINCOLN	1	4
JOHNSON L	VILAS	Not Enough Information	
JULIA L (THREE LAKES)	ONEIDA	0	2
KATHERINE L	ONEIDA	1	4
KAWAGUESAGA L	ONEIDA	2	8
KENTUCK L	VILAS	1	4
L ALICE	LINCOLN	1	2
L CHIPPEWA	SAWYER	1	4
L GALILEE	ASHLAND	1	4
L LAURA	VILAS	1	4
L MOHAWKSIN	LINCOLN	0	2
L OF THE FALLS	IRON	Not Enough Information	
L THOMPSON	ONEIDA	1	2
L WISSOTA	CHIPPEWA	1	4
LAC SAULT DORE	PRICE	2	4
LAC VIEUX DESERT	VILAS	2	8
LITTLE ARBOR VITAE L	VILAS	2	8
LITTLE CROOKED L	VILAS	Not Enough Information	

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
LITTLE FORK L	ONEIDA	0	2
LITTLE JOHN L	VILAS	2	8
LITTLE ST GERMAIN L	VILAS	2	8
LITTLE STAR L	VILAS	1	4
LITTLE TROUT L	VILAS	1	4
LONG L	PRICE	1	4
LONG L	VILAS	1	4
LOST L	VILAS	2	8
LOWER BUCKATABON L	VILAS	Not Enough Information	
LYNX L	VILAS	0	2
MADELINE L	ONEIDA	Not Enough Information	
MAMIE L	VILAS	1	4
MANITOWISH L	VILAS	1	4
MANSON L	ONEIDA	1	4
MEDICINE L	ONEIDA	1	4
MILLE LACS	MILLE LACS	2	8
MINOCQUA L	ONEIDA	2	4
MOEN L	ONEIDA	0	1
MUSKELLUNGE L	ONEIDA	1	4
MUSSER L	PRICE	0	2
N NOKOMIS L	ONEIDA	1	2
N TURTLE L	VILAS	1	2
OTTER L	VILAS	Not Enough Information	
OXBOW L	VILAS	0	2
PALMER L	VILAS	1	4
PAPOOSE L	VILAS	1	4
PELICAN L	ONEIDA	2	8
PICKEREL L	ONEIDA	1	4
PICKEREL L	VILAS	Not Enough Information	
PIKE L	PRICE	1	4
PLUM L	VILAS	1	4
PRESQUE ISLE L CHAIN	VILAS	2	4
RAINBOW FL	ONEIDA	1	2
RANDALL L	IRON	Not Enough Information	
RAZORBACK L	VILAS	1	4
REST L	VILAS	1	4
RHINELANDER FL	ONEIDA	Not Enough Information	
RICE R FL CHAIN	LINCOLN	1	4
ROUND L	PRICE	0	2
ROUND L	VILAS	0	2
S TURTLE L	VILAS	0	2
SAND L	ONEIDA	0	2
SCATTERING RICE L	VILAS	1	2
SHERMAN L	VILAS	1	4
SHISHEBOGAMA L	ONEIDA	2	8
SNIPE L	VILAS	0	2
SOLBERG L	PRICE	1	2
SPARKLING L	VILAS	1	4
SPIDER L	VILAS	1	2
SQUASH L	ONEIDA	1	4
SQUAW L	VILAS	1	2
SQUIRREL L	ONEIDA	1	4
STAR L	VILAS	2	4
STONE L	VILAS	Not Enough Information	
SWAMSAUGER L	ONEIDA	Not Enough Information	
SWEENY L	ONEIDA	1	4
TENDERFOOT L	VILAS	1	4
TOMAHAWK L CHAIN	ONEIDA	1	4
TROUT L	VILAS	1	4
TRUDE L	IRON	0	2
TURNER L	PRICE	1	4
TURTLE-FLAMBEAU L	IRON	1	2
TWIN L CHAIN	VILAS	2	8
TWO SISTERS L	ONEIDA	1	4
UPPER BUCKATABON L	VILAS	1	2
UPPER GRESHAM L	VILAS	2	8
W BAY L	VILAS	1	4
WHITE SAND L	VILAS	1	4
WILD RICE L	VILAS	1	4
WILDCAT L	VILAS	2	8
WILLOW FL	ONEIDA	0	2
WILSON L	PRICE	1	4
YELLOW BIRCH L	VILAS	Not Enough Information	

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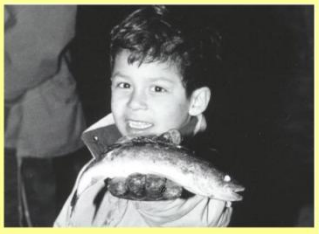

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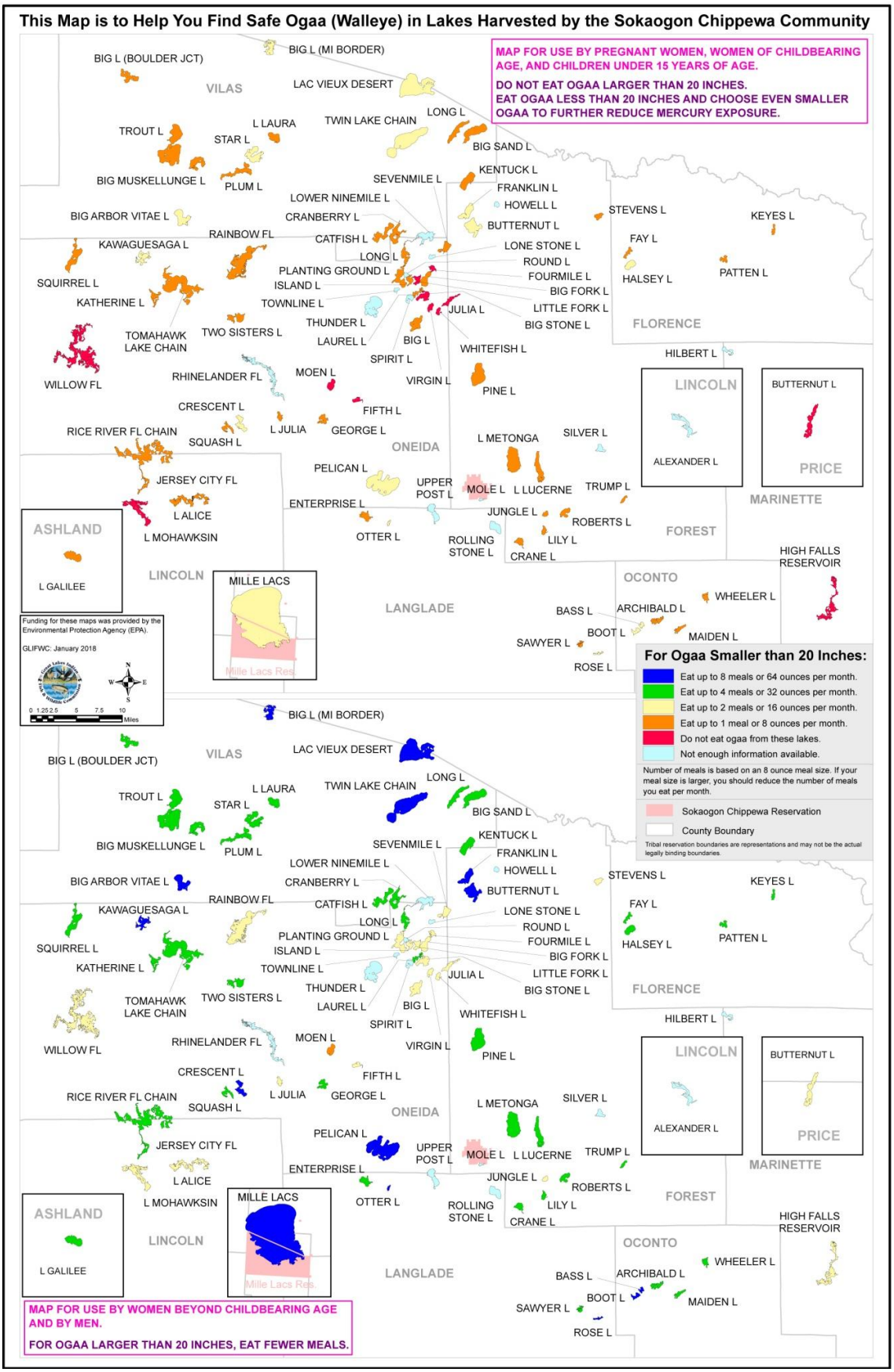
Mole Lake (http://www.glifwc.org/Mercury/Mole_Lake_2018.pdf)



Mole Lake (http://www.glifwc.org/Mercury/Mole_Lake_2018.pdf)

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ALEXANDER L	LINCOLN	Not Enough Information	
ARCHIBALD L	OCONTO	1	4
BASS L	OCONTO	2	8
BIG ARBOR VITAE L	VILAS	2	8
BIG FORK L	ONEIDA	1	2
BIG L	ONEIDA	1	2
BIG L (BOULDER JCT)	VILAS	1	4
BIG L (MI BORDER)	VILAS	2	8
BIG MUSKELLUNGE L	VILAS	1	4
BIG SAND L	VILAS	1	4
BIG STONE L	ONEIDA	0	2
BOOT L	OCONTO	2	8
BUTTERNUT L	FOREST	2	8
BUTTERNUT L	PRICE	0	2
CATFISH L	VILAS	1	4
CRANBERRY L	VILAS	1	4
CRANE L	FOREST	1	4
CRESCENT L	ONEIDA	2	8
ENTERPRISE L	LANGLADE	1	4
FAY L	FLORENCE	1	4
FIFTH L	ONEIDA	0	2
FOURMILE L	ONEIDA	0	2
FRANKLIN L	FOREST	2	8
GEORGE L	ONEIDA	1	4
HALSEY L	FLORENCE	2	4
HIGH FALLS RES	MARINETTE	0	2
HILBERT L	MARINETTE	Not Enough Information	
HOWELL L	FOREST	Not Enough Information	
ISLAND L	ONEIDA	1	2
JERSEY CIY FL	LINCOLN	1	4
JULIA L (THREE LAKES)	ONEIDA	0	2
JUNGLE L	FOREST	1	2
KATHERINE L	ONEIDA	1	4
KAWAGUESAGA L	ONEIDA	2	8
KENTUCK L	VILAS	1	4
KEYES L	FLORENCE	1	4
L ALICE	LINCOLN	1	2
L GALILEE	ASHLAND	1	4
L JULIA (RHINELANDER)	ONEIDA	1	2
L LAURA	VILAS	1	4
L LUCERNE	FOREST	1	4
L METONGA	FOREST	1	4
L MOHAWKSIN	LINCOLN	0	2
LAC VIEUX DESERT	VILAS	2	8

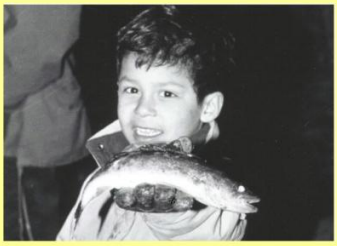
LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
LAUREL L	ONEIDA	1	4
LILY L	FOREST	1	4
LITTLE FORK L	ONEIDA	0	2
LONE STONE L	ONEIDA	Not Enough Information	
LONG L	ONEIDA	1	4
LONG L	VILAS	1	4
LOWER NINEMILE L	ONEIDA	Not Enough Information	
MAIDEN L	OCONTO	1	4
MILLE LACS	MILLE LACS	2	8
MOEN L	ONEIDA	0	1
MOLE L	FOREST	Not Enough Information	
OTTER L	LANGLADE	2	8
PATTEN L	FLORENCE	1	4
PELICAN L	ONEIDA	2	8
PINE L	FOREST	1	4
PLANTING GROUND L	ONEIDA	1	2
PLUM L	VILAS	1	4
RAINBOW FL	ONEIDA	1	2
RHINELANDER FL	ONEIDA	Not Enough Information	
RICE R FL CHAIN	LINCOLN	1	4
ROBERTS L	FOREST	1	4
ROLLING STONE L	LANGLADE	Not Enough Information	
ROSE L	LANGLADE	2	8
ROUND L	ONEIDA	Not Enough Information	
SAWYER L	LANGLADE	1	4
SEVENMILE L	ONEIDA	1	2
SILVER L	FOREST	Not Enough Information	
SPIRIT L	ONEIDA	Not Enough Information	
SQUASH L	ONEIDA	1	4
SQUIRREL L	ONEIDA	1	4
STAR L	VILAS	2	4
STEVENS L	FOREST	1	2
THUNDER L	ONEIDA	Not Enough Information	
TOMAHAWK L CHAIN	ONEIDA	1	4
TOWNLINE L	ONEIDA	Not Enough Information	
TROUT L	VILAS	1	4
TRUMP L	FOREST	1	4
TWIN L CHAIN	VILAS	2	8
TWO SISTERS L	ONEIDA	1	4
UPPER POST L	LANGLADE	Not Enough Information	
VIRGIN L	ONEIDA	0	2
WHEELER L	OCONTO	1	4
WHITEFISH L	ONEIDA	0	2
WILLOW FL	ONEIDA	0	2

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

RISKS AND BENEFITS

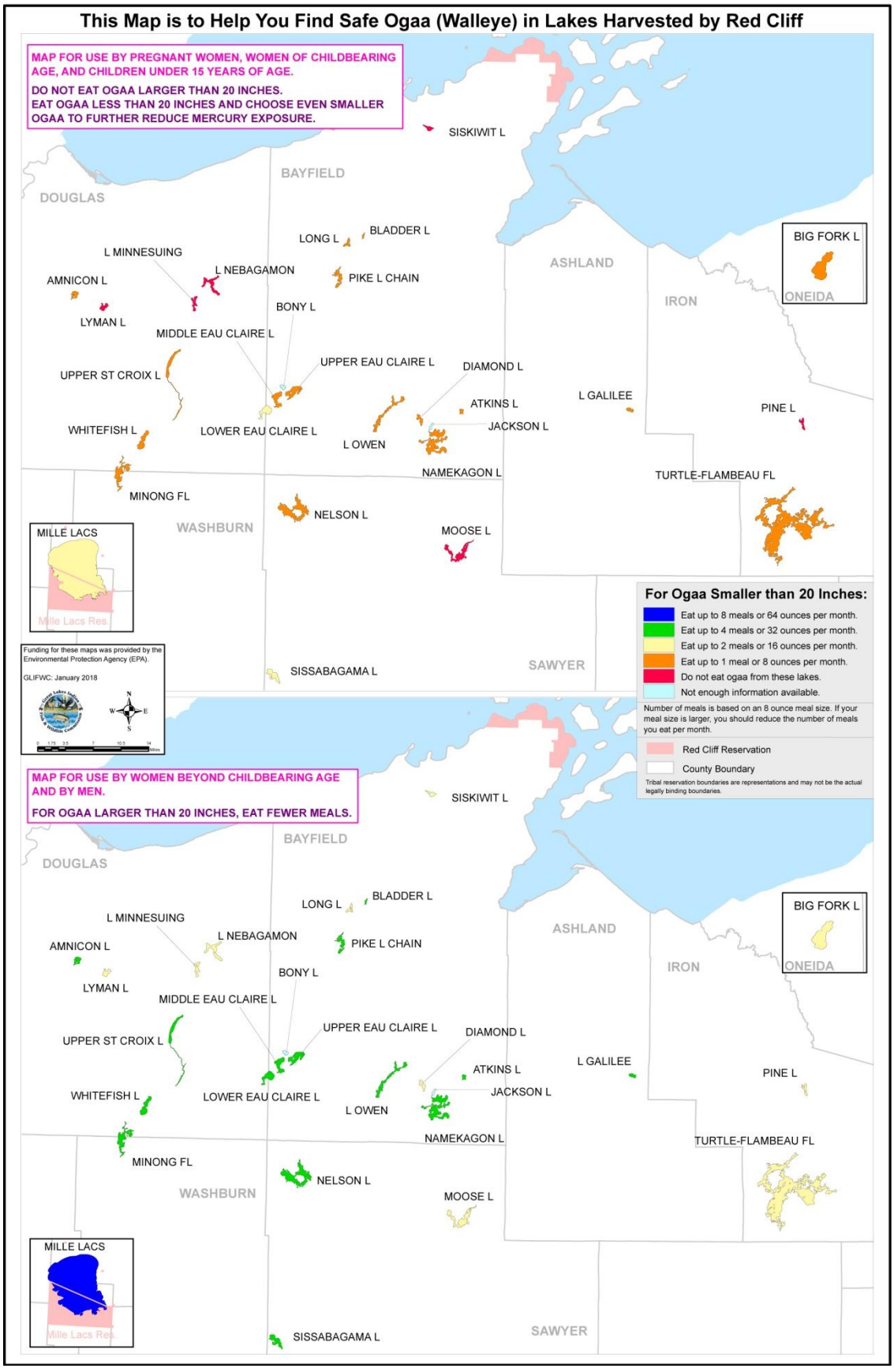
Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.



If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

Red Cliff (http://www.glifwc.org/Mercury/Red_Cliff_2018.pdf)



Red Cliff (http://www.glifwc.org/Mercury/Red_Cliff_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Lakes Harvested by Red Cliff

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

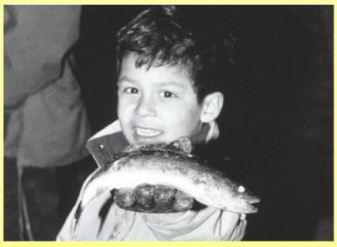
Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

		Women of childbearing age and children less than 15	Women beyond childbearing years and men 15 and older
LAKE	COUNTY	Maximum number of meals per month	Maximum number of meals per month
AMNICON L	DOUGLAS	1	4
ATKINS L	BAYFIELD	1	4
BIG FORK L	ONEIDA	1	2
BLADDER L	BAYFIELD	1	4
BONY L	BAYFIELD	Not Enough Information	
DIAMOND L	BAYFIELD	1	2
JACKSON L	BAYFIELD	Not Enough Information	
L GALILEE	ASHLAND	1	4
L MINNESUING	DOUGLAS	0	2
L NEBAGAMON	DOUGLAS	0	2
L OWEN	BAYFIELD	1	4
LONG L	BAYFIELD	1	2
LOWER EAU CLAIRE L	DOUGLAS	2	4
LYMAN L	DOUGLAS	0	2
MIDDLE EAU CLAIRE L	BAYFIELD	1	4
MILLE LACS	MILLE LACS	2	8
MINONG FL	WASHBURN	1	4
MOOSE L	SAWYER	0	2
NAMEKAGON L	BAYFIELD	1	4
NELSON L	SAWYER	1	4
PIKE L CHAIN	BAYFIELD	1	4
PINE L	IRON	0	2
SISKIWIT L	BAYFIELD	0	2
SISSABAGAMA L	SAWYER	2	4
TURTLE-FLAMBEAU FL	IRON	1	2
UPPER EAU CLAIRE L	BAYFIELD	1	4
UPPER ST CROIX	DOUGLAS	1	4
WHITEFISH L	DOUGLAS	1	4

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.



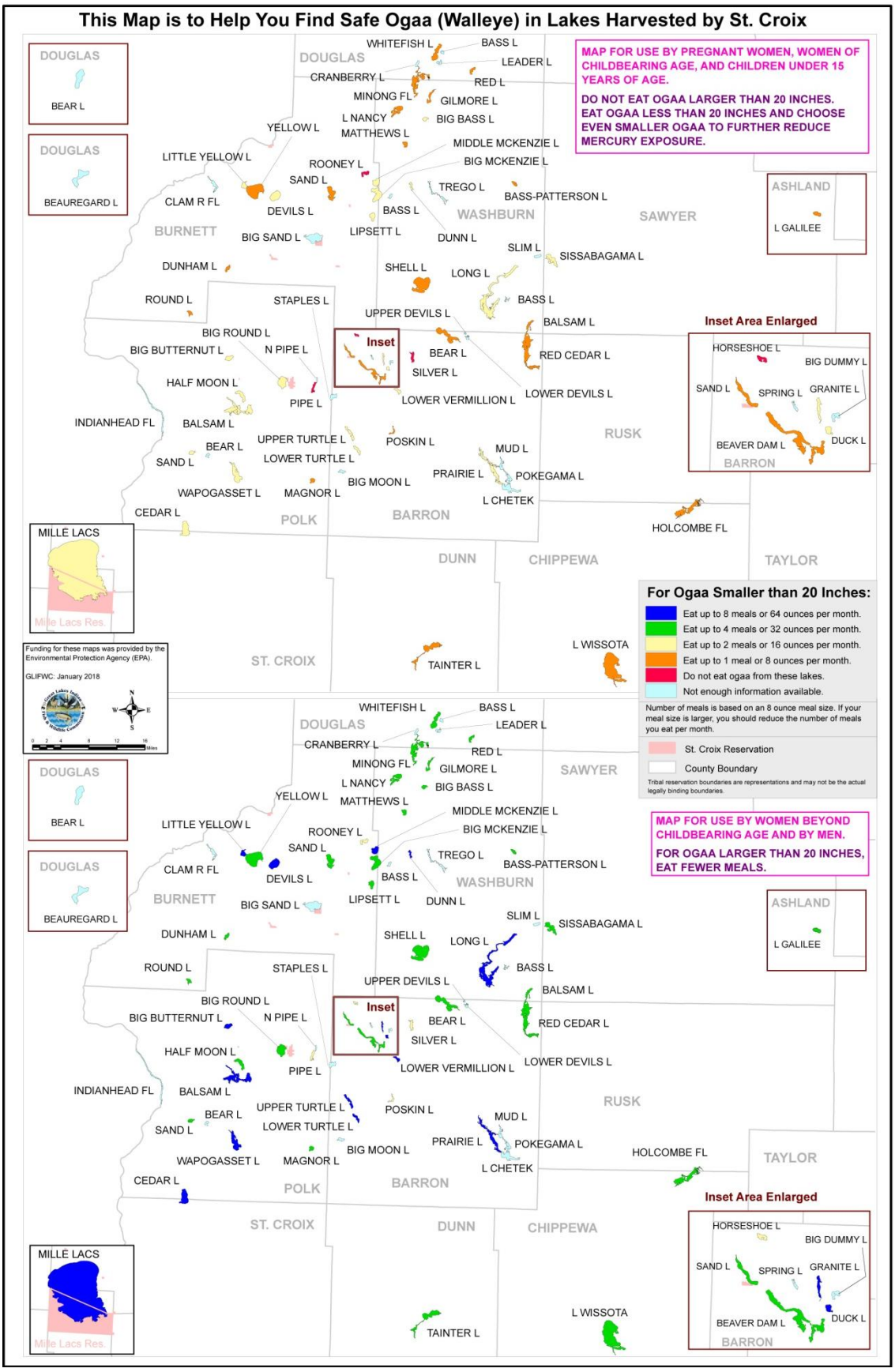
RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

St. Croix (http://www.glifwc.org/Mercury/St_Croix_2018.pdf)



St. Croix (http://www.glifwc.org/Mercury/St_Croix_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Lakes Harvested by St Croix

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
BALSAM L	POLK	2	8
BALSAM L	WASHBURN	1	4
BASS L	DOUGLAS	Not Enough Information	
BASS L	WASHBURN	Not Enough Information	
BASS L	WASHBURN	Not Enough Information	
BASS-PATTERSON L	WASHBURN	1	4
BEAR L	BARRON	1	4
BEAR L	DOUGLAS	Not Enough Information	
BEAR L	POLK	Not Enough Information	
BEAUREGARD L	DOUGLAS	Not Enough Information	
BEAVER DAM L	BARRON	1	4
BIG BASS L	WASHBURN	2	4
BIG BUTTERNUT L	POLK	2	8
BIG DUMMY L	BARRON	Not Enough Information	
BIG MCKENZIE L	BURNETT	2	4
BIG MOON L	BARRON	Not Enough Information	
BIG ROUND L	POLK	2	4
BIG SAND L	BURNETT	Not Enough Information	
CEDAR L	ST CROIX	2	8
CLAM R FL	BURNETT	Not Enough Information	
CRANBERRY L	DOUGLAS	Not Enough Information	
DEVILS L	BURNETT	2	8
DUCK L	BARRON	2	8
DUNHAM L	BURNETT	1	4
DUNN L	WASHBURN	2	8
GILMORE L	WASHBURN	1	4
GRANITE L	BARRON	2	8
HALF MOON L	POLK	2	4
HOLCOMBE FL	CHIPPEWA	1	4
HORSESHOE L	BARRON	0	2
INDIANHEAD FL	POLK	Not Enough Information	
L CHETEK	BARRON	Not Enough Information	
L GALILEE	ASHLAND	1	4
L NANCY	WASHBURN	1	4
L WISSOTA	CHIPPEWA	1	4
LEADER L	DOUGLAS	Not Enough Information	
LIPSETT L	BURNETT	2	4

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
LITTLE YELLOW L	BURNETT	2	8
LONG L	WASHBURN	2	8
LOWER DEVILS L	BARRON	Not Enough Information	
LOWER TURTLE L	BARRON	2	8
LOWER VERMILLION L	BARRON	2	8
MAGNOR L	POLK	1	4
MATTHEWS L	WASHBURN	1	4
MIDDLE MCKENZIE L	WASHBURN	2	8
MILLE LACS	MILLE LACS	2	8
MINONG FL	WASHBURN	1	4
MUD L	BARRON	Not Enough Information	
N PIPE L	POLK	Not Enough Information	
PIPE L	POLK	0	2
POKEGAMA L	BARRON	Not Enough Information	
POSKIN L	BARRON	1	2
PRAIRIE L	BARRON	2	8
RED CEDAR L	BARRON	1	4
RED L	DOUGLAS	1	4
ROONEY L	BURNETT	0	2
ROUND L	BURNETT	1	4
SAND L	BARRON	1	4
SAND L	BURNETT	1	4
SAND L	POLK	2	4
SHELL L	WASHBURN	1	4
SILVER L	BARRON	0	2
SISSABAGAMA L	SAWYER	2	4
SLIM L	WASHBURN	Not Enough Information	
SPRING L	BARRON	Not Enough Information	
STAPLES L	BARRON	Not Enough Information	
TAINTER L	DUNN	1	4
TREGO L	WASHBURN	Not Enough Information	
UPPER DEVILS L	BARRON	Not Enough Information	
UPPER TURTLE L	BARRON	2	8
WAPOGASSET L	POLK	2	8
WHITEFISH L	DOUGLAS	1	4
YELLOW L	BURNETT	1	4

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

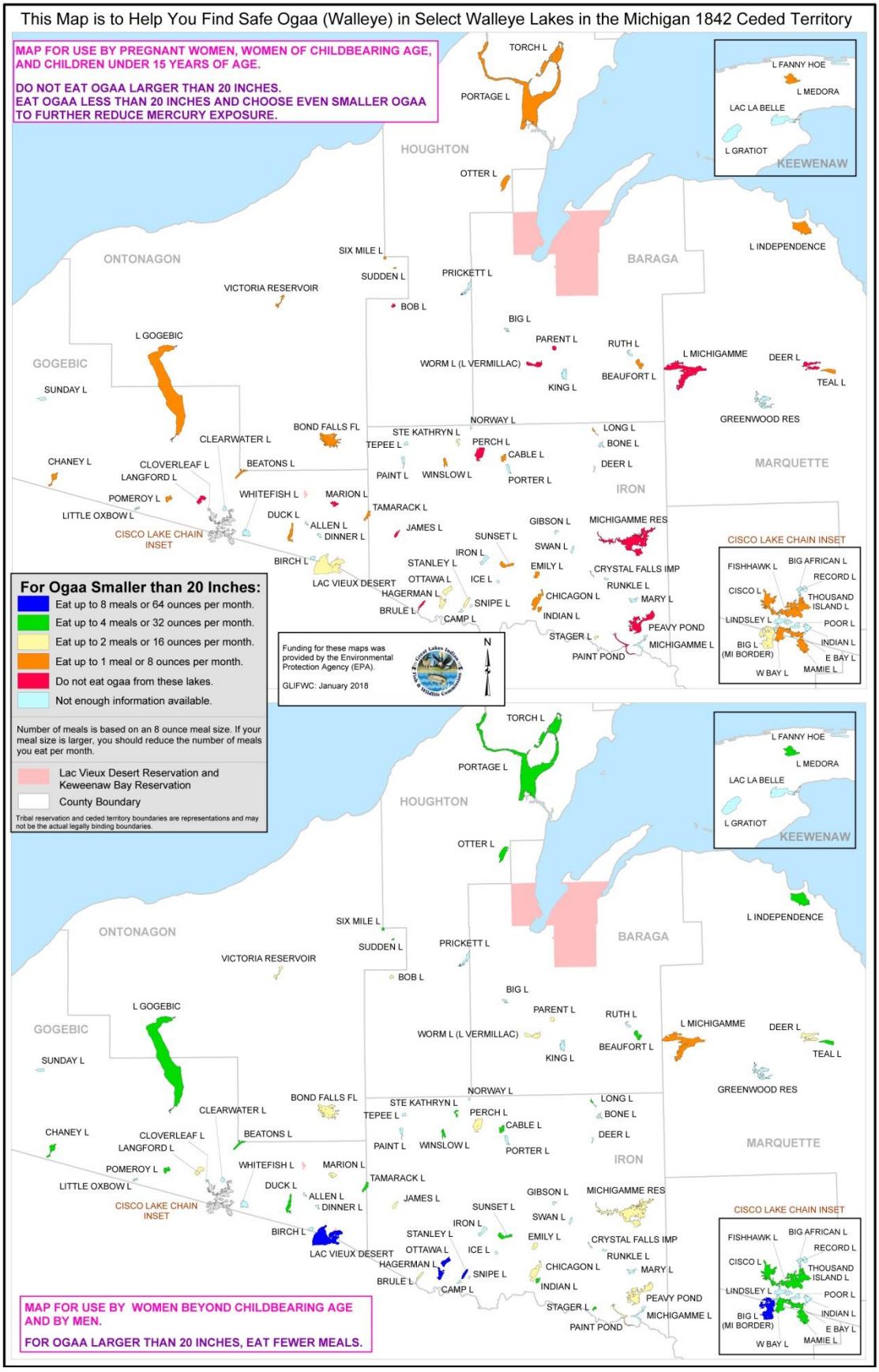
RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

Michigan (http://www.glifwc.org/Mercury/Michigan_2018.pdf)



Michigan (http://www.glifwc.org/Mercury/Michigan_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Select Walleye Lakes in the Michigan 1842 Ceded Territory

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
ALLEN L	GOGEBIC	Not Enough Information	
BEATONS L	GOGEBIC	1	4
BEAUFORT L	BARAGA	1	4
BIG AFRICAN L	GOGEBIC	Not Enough Information	
BIG L	BARAGA	Not Enough Information	
BIG L (MI BORDER)	GOGEBIC	2	8
BIRCH L	GOGEBIC	Not Enough Information	
BOB L	HOUGHTON	0	2
BOND FALLS FL	ONTONAGON	1	2
BONE L	IRON	Not Enough Information	
BRULE L	IRON	0	2
CABLE L	IRON	1	4
CAMP L	IRON	Not Enough Information	
CHANEY L	GOGEBIC	1	4
CHICAGON L	IRON	1	2
CISCO L	GOGEBIC	1	4
CLEARWATER L	GOGEBIC	Not Enough Information	
CLOVERLEAF L	GOGEBIC	Not Enough Information	
CRYSTAL FALLS IMP	IRON	Not Enough Information	
DEER L	IRON	Not Enough Information	
DEER L	MARQUETTE	0	2
DINNER L	GOGEBIC	Not Enough Information	
DUCK L	GOGEBIC	1	4
EAST BAY L	GOGEBIC	1	4
EMILY L	IRON	1	2
FISHHAWK L	GOGEBIC	Not Enough Information	
GIBSON L	IRON	Not Enough Information	
GREENWOOD RES	MARQUETTE	Not Enough Information	
HAGERMAN L	IRON	2	8
ICE L	IRON	Not Enough Information	
INDIAN L	GOGEBIC	Not Enough Information	
INDIAN L	IRON	1	4
IRON L	IRON	Not Enough Information	
JAMES L	IRON	0	2
KING L	BARAGA	Not Enough Information	
L FANNY HOE	KEWEENAW	Not Enough Information	
L GOGEBIC	GOGEBIC	1	4
L GRATIOT	KEWEENAW	Not Enough Information	
L INDEPENDENCE	MARQUETTE	1	4
L MEDORA	KEWEENAW	1	4
L MICHIGAMME	MARQUETTE	0	1
LAC LA BELLE	KEWEENAW	Not Enough Information	
LAC VIEUX DESERT	GOGEBIC	2	8
LANGFORD L	GOGEBIC	0	2

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
LINDSLEY L	GOGEBIC	Not Enough Information	
LITTLE OXBOW L	GOGEBIC	Not Enough Information	
LONG L	IRON	1	4
MAMIE L	GOGEBIC	1	4
MARION L	GOGEBIC	0	2
MARY L	IRON	Not Enough Information	
MICHIGAMME L	IRON	Not Enough Information	
MICHIGAMME RES	IRON	0	2
NORWAY L	IRON	Not Enough Information	
OTTAWA L	IRON	2	8
OTTER L	HOUGHTON	1	4
PAINT L	IRON	Not Enough Information	
PAINT POND	IRON	0	2
PARENT L	BARAGA	0	2
PEAVY POND	IRON	0	2
PERCH L	IRON	0	2
POMEROY L	GOGEBIC	1	4
POOR L	GOGEBIC	Not Enough Information	
PORTAGE L	HOUGHTON	1	4
PORTER L	IRON	Not Enough Information	
PRICKETT L	HOUGHTON	Not Enough Information	
RECORD L	GOGEBIC	Not Enough Information	
RUNKLE L	IRON	Not Enough Information	
RUTH L	BARAGA	Not Enough Information	
SIX MILE L	ONTONAGON	1	4
SNIPE L	IRON	Not Enough Information	
STAGER L	IRON	2	4
STANLEY L	IRON	2	8
STE KATHRYN L	IRON	2	4
SUDDEN L	ONTONAGON	1	4
SUNDAY L	GOGEBIC	Not Enough Information	
SUNSET L	IRON	1	4
SWAN L	IRON	Not Enough Information	
TAMARACK L	GOGEBIC	1	4
TEAL L	MARQUETTE	1	4
TEPEE L	IRON	Not Enough Information	
THOUSAND ISLAND L	GOGEBIC	1	4
TORCH L	HOUGHTON	1	4
VICTORIA RES	ONTONAGON	1	2
WEST BAY L	GOGEBIC	1	4
WHITEFISH L	GOGEBIC	Not Enough Information	
WINSLOW L	IRON	1	4
WORM L (L VERMILLAC)	BARAGA	0	2

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

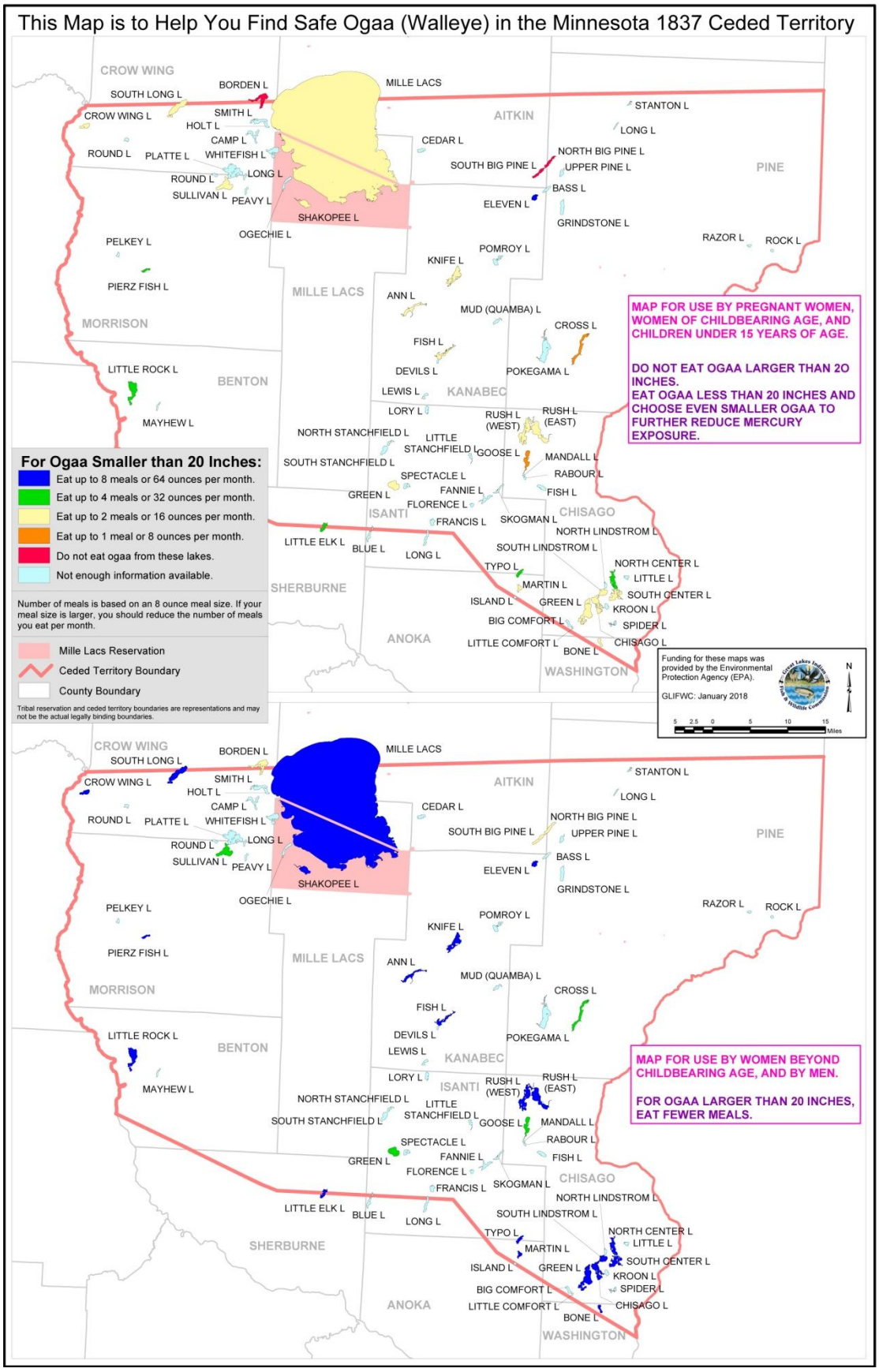
RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

Minnesota (http://www.glifwc.org/Mercury/Minnesota_2018.pdf)



Minnesota (http://www.glifwc.org/Mercury/Minnesota_2018.pdf)

Recommended Maximum Number of Ogaa Meals per Month for Walleye Lakes in the Minnesota 1837 Ceded Territory

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
ANN L	KANABEC	2	8
BASS L	PINE	Not Enough Information	
BIG COMFORT L	CHISAGO	Not Enough Information	
BLUE L	ISANTI	Not Enough Information	
BONE L	WASHINGTON	2	8
BORDEN L	CROW WING	0	2
CAMP L	CROW WING	Not Enough Information	
CEDAR L	AITKIN	Not Enough Information	
CHISAGO L	CHISAGO	2	8
CROSS L	PINE	1	4
CROW WING L	CROW WING	2	8
DEVILS L	KANABEC	Not Enough Information	
ELEVEN L	KANABEC	8	8
FANNIE L	ISANTI	Not Enough Information	
FISH L	CHISAGO	Not Enough Information	
FISH L	KANABEC	2	8
FLORENCE L	ISANTI	Not Enough Information	
FRANCIS L	ISANTI	Not Enough Information	
GOOSE L	CHISAGO	1	4
GREEN L	CHISAGO	2	8
GREEN L	ISANTI	2	4
GRINDSTONE L	PINE	Not Enough Information	
HOLT L	CROW WING	Not Enough Information	
ISLAND L	ANOKA	Not Enough Information	
KNIFE L	KANABEC	2	8
KROON L	CHISAGO	Not Enough Information	
LEWIS L	KANABEC	Not Enough Information	
LITTLE COMFORT L	CHISAGO	Not Enough Information	
LITTLE ELK L	SHERBURNE	4	8
LITTLE L	CHISAGO	Not Enough Information	
LITTLE ROCK L	BENTON	4	8
LITTLE STANCHFIELD L	ISANTI	Not Enough Information	
LONG L	ISANTI	Not Enough Information	
LONG L	MORRISON	Not Enough Information	
LONG L	PINE	Not Enough Information	
LORY L	ISANTI	Not Enough Information	
MANDALL L	CHISAGO	Not Enough Information	

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
MARTIN L	ANOKA	2	8
MAYHEW L	BENTON	Not Enough Information	
MILLE LACS	MILLE LACS	2	8
MUD (QUAMBA) L	KANABEC	Not Enough Information	
NORTH BIG PINE L	PINE	0	2
NORTH CENTER L	CHISAGO	4	8
NORTH LINDSTROM L	CHISAGO	Not Enough Information	
NORTH STANCHFIELD L	ISANTI	Not Enough Information	
OGECHIE L	MILLE LACS	Not Enough Information	
PEAVY L	MORRISON	Not Enough Information	
PELKEY L	MORRISON	Not Enough Information	
PIERZ FISH L	MORRISON	4	8
PLATTE L	CROW WING	Not Enough Information	
POKEGAMA L	PINE	Not Enough Information	
POMROY L	KANABEC	Not Enough Information	
RABOUR L	CHISAGO	Not Enough Information	
RAZOR L	PINE	Not Enough Information	
ROCK L	PINE	Not Enough Information	
ROUND L	CROW WING	Not Enough Information	
ROUND L	MORRISON	Not Enough Information	
RUSH L (EAST)	CHISAGO	2	8
RUSH L (WEST)	CHISAGO	2	8
SHAKOPEE L	MILLE LACS	2	8
SKOGMAN L	ISANTI	Not Enough Information	
SMITH L	CROW WING	Not Enough Information	
SOUTH BIG PINE L	AITKIN	0	2
SOUTH CENTER L	CHISAGO	2	8
SOUTH LINDSTROM L	CHISAGO	2	8
SOUTH LONG L	CROW WING	2	8
SOUTH STANCHFIELD L	ISANTI	Not Enough Information	
SPECTACLE L	ISANTI	Not Enough Information	
SPIDER L	CHISAGO	Not Enough Information	
STANTON L	PINE	Not Enough Information	
SULLIVAN L	MORRISON	2	4
TYPO L	ISANTI	4	8
UPPER PINE L	PINE	Not Enough Information	
WHITEFISH L	CROW WING	Not Enough Information	

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

EPA News

ECOTOX 5.0 Improves Search for Environmental Chemical Toxicity Data

On March 13, 2018, the U.S. Environmental Protection Agency (EPA) announced that ECOTOX was updated. ECOTOX is EPA's premier publicly available application providing environmental chemical toxicity data to assess the effects that chemical exposures have on aquatic life, terrestrial plants, and wildlife. The update helps EPA to meet the legislative requirements of the Frank Lautenberg Chemical Safety for the 21st Century Act, and to respond to the needs of current users. In addition, ECOTOX is the primary source of toxicity data used by EPA regulatory programs to develop chemical assessments that meet the requirements of the Clean Water Act (CWA); Federal Insecticide, Fungicide, and Rodenticide Act; and Comprehensive Environmental Response, Compensation, and Liability Act.

ECOTOX 5.0 includes more advanced data and search capabilities, a default output focusing on critical data, new graphical data visualization tools, and direct linkages to other EPA chemical knowledgebases. These updates will help regulated industries, regulators, researchers, and others to more rapidly and easily search for data of interest, and to identify the most critical data from outputs in response to data queries.

ECOTOX 5.0 is now available in beta version, offering an opportunity, particularly for external current users, to provide feedback before this updated version becomes final and replaces the current version 4.0. So, tell EPA what you think!

Source: https://www.epa.gov/sciencematters/ecotox-update-improves-search-environmental-chemical-toxicity-data

Alaska Tribal Fish Consumption Surveys

On February 14, 2018, the results of two studies assessing current seafood consumption rates for Alaska tribes were presented at the Alaska Forum on the Environment.

EPA Region 10 has been working with tribes in Southcentral Alaska to build technical capacities to develop water quality protection programs through the Indian Environmental General Assistance Program. The first Alaska tribal fish consumption survey, an Assessment of Cook Inlet Tribes' Subsistence Consumption, was conducted by Seldovia Village Tribe in 2012-2013. Modeled after the Columbia River Inter-Tribal Fish Commission survey, this study showed that for all fish and shellfish species consumed, the overall mean consumption rate (n=76) was 106.8 grams per day (g/d) and the 95th percentile consumption rate was 267.1 g/d.

A second Alaska tribal fish consumption survey, an Assessment of Kodiak Island Tribes' Seafood Consumption, was conducted by the Sun'aq Tribe of Kodiak in 2015-2016. Modeled after the Cook Inlet and Idaho Tribal surveys, this study showed that for all fish, shellfish, and marine mammal species consumed, the overall mean consumption rate (n=326) was 232.8 g/d and the 95th percentile consumption rate was 764.4 g/d.

Both studies utilized in-person interviews and food frequency questionnaires. The results have been provided to the Alaska Department of Environmental Conservation for consideration in updating the state's human health criteria for water quality standards, currently based on a fish consumption rate of 6.5 g/d. Led by the Central Council of the Tlingit & Haida, planning is underway to conduct a third Alaska tribal fish consumption survey assessing Southeast Alaska Tribes' seafood consumption.

For more information, contact Katherine Brown, EPA Region 10 Tribal Coordinator, at 206-553-7263 or Brown.Katherine@epa.gov.

Other News

Lower Elwha Monitors Chinook Population After Dam Removal

The Lower Elwha Klallam Tribe, in cooperation with the Washington Department of Fish and Wildlife (WDFW) and Olympic National Park, is determining how many hatchery-origin and natural-origin Chinook salmon are returning to the Elwha River since two fish-blocking dams were removed.

The tribe and its partners have been counting returning Chinook adults from summer through early fall, and surveying Chinook redds (egg nests) and collecting ear bones from salmon carcasses in mid-to-late September.

When an ear bone, or otolith, is removed from a carcass and placed under a microscope at the state's lab, scientists look for a mark on the bone that indicates the fish is from a hatchery.

"When the fish are in the state hatchery, the water temperature is held at a certain degree for a certain period of time, resulting in marking a ring on the ear bone, which can be seen as a growth ring, like on a tree," said Mike McHenry, the tribe's habitat program manager.

"We used an otolith mark to indicate hatchery origin, rather than the standard adipose fin clip, in order to reduce mortality in mark-selective fisheries and maximize the number returning to recolonize habit at the Elwha River," said Joe Anderson, a WDFW research scientist.

The tribe also uses a sonar system in the lower river to determine how many fish are returning between June and September. However, the sonar can't decipher the type of fish, so the tribe nets the river at the same time to identify fish, then correlates the data with the sonar data.

Heidi Hugunin, a National Park Service fish technician, helps tribal fisheries consultant Keith Denton measure a Chinook salmon in the Elwha River. *(Image courtesy of T. Royal of Northwest Treaty Tribes magazine)*

"We have seen a dip in the numbers of returning adult Chinook over the last two years – about 2,500 fish compared to the previous three years of about 4,500," said Keith Denton, a consultant overseeing the tribe's sonar program. "This is most likely caused by the fact that returning adults from the last two years were juveniles in the river four and five years ago, and experienced the brunt of the sediment impacts from dam removal during a delicate part of their life."

Nevertheless, the number of adults returning the past two years is still about equal to the 20-year average, and the fish seemed to have dealt with any short-term negative impacts from dam removal remarkably well.

The late summer Chinook redd surveys assess where fish are going in the watershed. "Chinook are showing good signs already," McHenry said. "They want to move upstream and have occupied natural habitat on their own."

While salmon spawning in the river during dam removal from 2013-2015 didn't fare as well because of the drastically changing river, there was an uptick in the out-migration of natural Chinook smolts in 2017.

"I expect when those fish return as 3-, 4- and 5-year olds, we'll see the contribution of natural-origin Chinook increase," McHenry said, "But for now, basically, 90 percent of the returning Chinook adults are still hatchery-origin."

For more information, contact the NWIFC at 360-438-1180.

Source: https://nwtreatytribes.org/download/13956/

Toxins Detected Before Shellfish Are Afflicted

The Skokomish Tribe is measuring the amount of toxins in harmful algal blooms in Hood Canal in the state of Washington as part of an early warning system for shellfish poisoning.

While the tribe is part of the SoundToxins program to monitor shellfish and algae, it also is adding another level of precaution.

"The concept is to quantify the toxins in the water and algae before they get into shellfish tissues so we can share that information with the researchers at the Washington State Department of Health (DOH) and SoundToxins and say, 'Hey, look for this in your samples,' " said Seth Book, the tribe's environmental biologist.

Toxins associated with algal blooms can cause sickness and even death when contaminated shellfish are eaten.

During the first year of the tribe's program, samples were taken weekly from 13 locations between the Hood Canal Bridge and Belfair from May to September. Bloom events and associated toxins in Hood Canal were identified and categorized.

The tribe hired Dr. Sang Seon Yun to use the tribe's newly developed water quality lab to analyze the samples on site instead of sending them away for testing.

The biggest success so far has been seeing the tribe's testing methods work, since they were able to find toxins as low as parts per billion, Book said.

"Although the levels we found were extremely low, shellfish concentrate these toxins in their flesh," he said.

If a harmful algal bloom occurs in Hood Canal, the tribe's lab immediately will be able to analyze samples, said Ron Figlar-Barnes, the tribe's lab manager.

The tribe looks for eight main toxins, including domoic acid, which causes amnesic shellfish poisoning and can result in permanent loss of short-term memory, or even death in severe cases. Other algal toxins of interest to the researchers are toxins associated with diarrhetic and paralytic shellfish poisoning.

Skokomish Tribe intern Aaron Bentson-Royal takes water samples from Hood Canal last summer as part of the tribe's harmful algal bloom monitoring. *(Image courtesy of T. Royal of Northwest Treaty Tribes magazine)*

These toxins are often associated with the term "red tide," which occurs when certain phytoplankton species with reddish pigments bloom.

"Not all harmful algae are colored red though, and not every algae bloom is harmful, but it is still a mystery what triggers algae to produce the neurotoxin," Figlar-Barnes said. "When the toxin occurs, the poisonings can affect sea animals, birds, and humans."

For more information, contact the NWIFC at 360-438-1180.

Source: https://nwtreatytribes.org/download/13956/

How Much Tire Residue Does it Take to Kill a Fish?

After six years of learning how coho and chum salmon are affected by runoff from urban streets, scientists are narrowing down which pollutant is most responsible for killing fish.

This year's annual pre-spawning mortality study at Suquamish Tribe's Grovers Creek Hatchery in Poulsbo, Washington, has been focused on how tire residue affects juvenile and adult coho and chum salmon.

"We want to figure out which concentration of the tire residue in the water will kill fish and how long after exposure do the fish become sick and die," said Jen McIntyre, aquatic ecotoxicologist for Washington State University, who has overseen the last few years of the project. Other partners include U.S. Fish and Wildlife Service, University of Washington, and National Oceanic and Atmospheric Administration (NOAA).

Fish are exposed to the polluted water for 24 hours or less, and then pulled from the tank and observed for normal or abnormal behavior. Fish that appear to be dying have their blood and organ tissues sampled.

Scientists also are observing how the polluted water affects chum and coho differently. In the past, chum haven't been fazed by polluted water, but coho have died within hours.

"Chemicals that leach from tire particles are part of the complex chemical mixture of urban runoff," McIntyre said.

The yearly work at Grovers Creek is part of a larger effort to understand the causes and consequences of coho pre-spawn mortality in urban watersheds.

Other regionwide studies have included a land-use analysis of stormwater runoff using data from stream surveys collected from 2000-2011 by the Suquamish and Stillaguamish tribes, and other private groups and federal agencies, including Wild Fish Conservancy.

"A major take-home of the work is that it looks like the chemicals causing the most problems are coming from motor vehicles," said Nat Scholz, lead for the ecotoxicology program at NOAA's Northwest Fisheries Science Center. "The greater the traffic density within a given geographic area, the stronger the association with the mortality syndrome."

For more information, contact the NWIFC at (360) 438-1180.

Source: https://nwtreatytribes.org/download/14101/

Recently Awarded Research

EPA Awards Pacific Northwest Tribes Just Over $2 Million for Water Quality Protection and Restoration

On December 12, 2017, EPA awarded $1,039,686 to support 32 tribes with their nonpoint source pollution programs. Ten of the tribes received an additional $975,548 under EPA's competitive grant program for specific restoration and protection projects. Overall, these funds boost tribal water quality programs across three Northwest states to help protect people's health and the environment.

These grant funds are distributed to tribes through the Section 319 Nonpoint Source Program of the CWA, aimed at fostering environmental programs that address nonpoint source pollution in surface and groundwater so tribes can restore and protect their waters in Indian country.

The base funding of $1,039,686 was distributed to Northwest tribes that demonstrated interest, capacity, and authority to run nonpoint pollution prevention programs within their reservation boundaries. Those tribes were:

- Coeur D'Alene Tribe
- Confederated Tribes of the Colville Reservation
- Coos, Lower Umpqua, and Confederated Tribes of the Siuslaw Indians
- Coquille Indian Tribe
- Cow Creek Band of Umpqua Tribe of Indians
- Grand Ronde Confederated Tribes
- Jamestown S'Klallam Tribe
- Kalispel Indian Community
- Klamath Tribe
- Lummi Indian Nation Makah Indian Tribe
- Nez Perce Tribe
- Nooksack Indian Tribe
- Puyallup Tribe
- Quileute Tribe
- Quinault Indian Nation
- Samish Indian Nation
- Sauk-Suiattle Indian Tribe
- Shoalwater Bay Tribe
- Snoqualmie Indian Tribe
- Spokane Tribe
- Squaxin Island Tribe
- Confederated Tribes of the Siletz Indians
- Skokomish Indian Tribe Stillaguamish Tribe
- Suquamish Indian Tribe of the Port Madison Reservation
- Swinomish Tribe
- Tulalip Tribes
- Confederated Tribes of the Umatilla Indian Reservation
- Upper Skagit Indian Tribe
- Yakama Nation
- Confederated Tribes of the Warm Springs Reservation

Under the competitive program, EPA selected ten Pacific Northwest proposals from the following tribes: Coeur d'Alene, Colville, Lummi, Nez Perce, Quinault, Siletz, Spokane, Umatilla, Upper Skagit, and Makah.

Projects will include:

- Reducing sediment from forest roads.
- Controlling invasive species in degraded riparian areas.
- Reducing a creek's water temperature by restoring the stream channel.
- Replacing culverts to enable fish passage.
- Increasing groundwater recharge by constructing artificial beaver dams.
- Creating stream channel stability by planting 35 acres of floodplain.
- Improving salmon habitat through installation of engineered logjams.

Some Project Highlights:

Controlling Invasive Species to Improve Water Quality

The Quinault Indian Nation will focus on improving the quality of the reservation's waters through implementation of a holistic invasive species removal program, which will include following up on treated areas to ensure that the invasive species have been eradicated, conducting initial treatment in untreated areas on the Lower Quinault River, revegetating treated riparian areas to prevent invasive species from growing back, and developing a native plant watershed-based stewardship plan. ($100,000)

Restoration of the Historic Hangman Creek Stream Channels

Resources from this grant will go to the Coeur d'Alene Tribe to support the reduction of sediment and turbidity in Hangman Creek, a stream with recognized water quality impairment. The tribe is reestablishing flows within a former creek channel and reconnecting the creek to its floodplain. This project will contribute to that larger project by revegetating the restored channels and floodplains and planting over 35 acres to ensure the long-term stability of the stream. ($87,907)

Reducing Hydrologic and Habitat Modifications in the Siletz River Basin

The Confederated Tribes of the Siletz Indians will use grant funds to create four (of a total of 17) in-stream large wood and boulder structures to enhance salmonid and larval lamprey rearing habitats in the Siletz River. These structures will reduce stream velocities and increase channel habitat complexity, improving water quality and beneficial uses. ($100,000)

Background on Section 319 of the Clean Water Act

Contributions of nonpoint source pollution encompass a wide range of sources that are not always subject to federal or state regulation. These sources include agricultural runoff, unpermitted urban runoff, abandoned mine drainage, failing onsite disposal systems, and pollution caused by changes to natural stream channels.

Congress enacted Section 319 of the CWA in 1987, establishing a national program to control nonpoint sources of water pollution. Through Section 319, the EPA provides states, territories, and tribes with guidance and grant funding to implement their nonpoint source programs and to support local watershed projects to improve water quality. Collectively this work has restored over 6,000 miles of streams and over 164,000 acres of lakes since 2006. Hundreds of additional projects are underway across the country.

For more information about the tribal awards, contact Mark MacIntyre at Macintyre.mark@epa.gov or 206-553-7302.

For more information on EPA's Tribal 319 grant program, visit https://www.epa.gov/nps/tribal-319-grant-program

Source: https://www.epa.gov/newsreleases/epa-awards-pacific-northwest-tribes-just-over-2-million-water-quality-protection

Recent Publications

Journal Articles

The list below provides a selection of research articles focusing on Tribal issues.

- Dietary and genetic influences on hemostasis in a Yup'ik Alaska Native population
  Au N.T., M. Reyes, B.B. Boyer, S.E. Hopkins, J. Black, and D. O'Brien, et al. 2017. Dietary and genetic influences on hemostasis in a Yup'ik Alaska Native population. *PLoS ONE* 12(4): e0173616.

- Exposure to polybrominated diphenyl ethers and perfluoroalkyl substances in a remote population of Alaska Natives
  Byrne, S., S. Seguinot-Medina, P. Miller, V. Waghiyi, F.A. von Hippel, C.L. Buck, and D.O. Carpenter. 2017. Exposure to polybrominated diphenyl ethers and perfluoroalkyl substances in a remote population of Alaska Natives. *Environmental Pollution* 231:387-395.

- Offshore ocean dispersal of adult Dolly Varden *Salvelinus malma* in the Beaufort Sea
  Courtney M.B., B. Scanlon, R.J. Brown, A.H. Rikardsen, C.P. Gallagher, et al. 2018. Offshore ocean dispersal of adult Dolly Varden *Salvelinus malma* in the Beaufort Sea. *Polar Biology* 41(4):817-825.

- Incorporating public priorities in the Ocean Health Index: Canada as a case study
  Daigle, R.M., P. Archambault, B.S. Halpern, J.S. Stewart Lowndes, and I.M. Côté. 2017. Incorporating public priorities in the Ocean Health Index: Canada as a case study. *PLoS ONE* 12(5): e0178044.

- Fatty acids in ten species of fish commonly consumed by the Anishinaabe of the upper Great Lakes
  Dellinger, M.J., J.T. Olson, B.J. Holub, and M.P. Ripley. 2018. Fatty acids in ten species of fish commonly consumed by the Anishinaabe of the upper Great Lakes. *Journal of Great Lakes Research* (In Press).

- "Everything revolves around the herring": The Heiltsuk–herring relationship through time
  Gauvreau, A.M., D. Lepofsky, M. Rutherford, and M. Reid. 2017. "Everything revolves around the herring": the Heiltsuk–herring relationship through time. *Ecology and Society* 22(2):10.

- On food security and access to fish in the Saugeen Ojibway Nation, Lake Huron, Canada
  Lowitt, K., D. Johnston-Weiser, R. Lauzon, and G.M. Hickey. 2018. On food security and access to fish in the Saugeen Ojibway Nation, Lake Huron, Canada. *Journal of the Great Lakes* 44(1):174-183.

- Traditional ecological knowledge reveals the extent of sympatric lake trout diversity and habitat preferences
  Marin, K., A. Coon, and D. J. Fraser. 2017. Traditional ecological knowledge reveals the extent of sympatric lake trout diversity and habitat preferences. *Ecology and Society* 22(2):20.

- The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada
  Morton, A., R. Routledge, S. Hrushowy, M. Kibenge, and F. Kibenge. 2017. The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada. *PLoS One* 12(12): e0188793.

- The incorporation of traditional knowledge into Alaska federal fisheries management
  Raymond-Yakoubian, J., B. Raymond-Yakoubian, and C. Moncrieff. 2017. The incorporation of traditional knowledge into Alaska federal fisheries management. *Marine Policy* 78: 132-142.

- The influence of persistent organic pollutants in the traditional Inuit diet on markers of inflammation
  Schæbel L.K., E.C. Bonefeld-Jørgensen, H. Vestergaard, and S. Andersen. 2017. The influence of persistent organic pollutants in the traditional Inuit diet on markers of inflammation. *PLoS ONE* 12(5): e0177781.

- Results of a national survey of high-frequency fish consumers in the United States
  von Stackelberg, K., M. Li, and E. Sunderland. 2017. Results of a national survey of high-frequency fish consumers in the United States. *Environmental Research* 158:126-136.

Upcoming Meetings and Conferences

36th Annual Native American Fish and Wildlife Society National Conference
May 8-10, 2018
Warwick, Rhode Island

11th Global Summit on Aquaculture and Fisheries
May 24-25, 2018
Osaka, Japan

International Association for Great Lakes Research 61st Annual Conference
June 18–22, 2018
Toronto, Ontario

72nd Annual Pacific Coast Shellfish Growers Association Shellfish Conference and Tradeshow
September 18-20, 2018
Blaine, Washington

2018 International Conference on River Connectivity (Fish Passage 2018)
December 10-14, 2018
Albury, New South Wales, Australia

10th International Abalone Symposium
May 8-12, 2018
Xiamen, China

SeaWeb Seafood Summit
June 18-21, 2018
Barcelona, Spain

148th Annual Meeting of the American Fisheries Society - Communicating the Science of Fisheries to Diverse Audiences
August 19-23, 2018
Atlantic City, New Jersey

Organization of Fish and Wildlife Information Managers Annual Conference and Business Meeting
November 4-8, 2018
Hood River, Oregon

Additional Information

This monthly newsletter highlights current information about fish and shellfish.

For more information about specific advisories within the state, territory, or tribe, contact the appropriate state agency listed on EPA's National Listing of Fish Advisories website at https://fishadvisoryonline.epa.gov/Contacts.aspx.

For more information about this newsletter, contact Sharon Frey (Frey.Sharon@epa.gov, 202-566-1480).