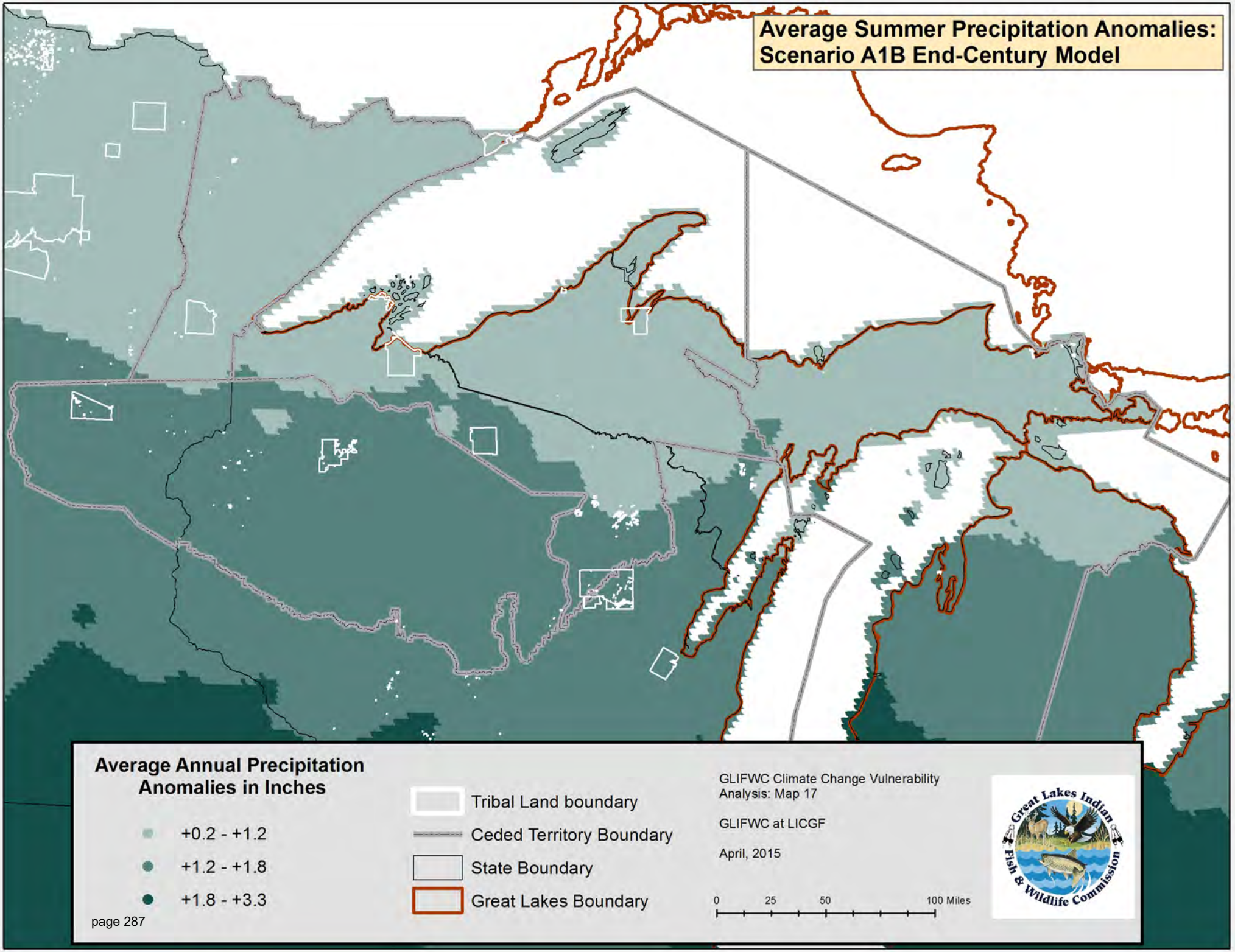
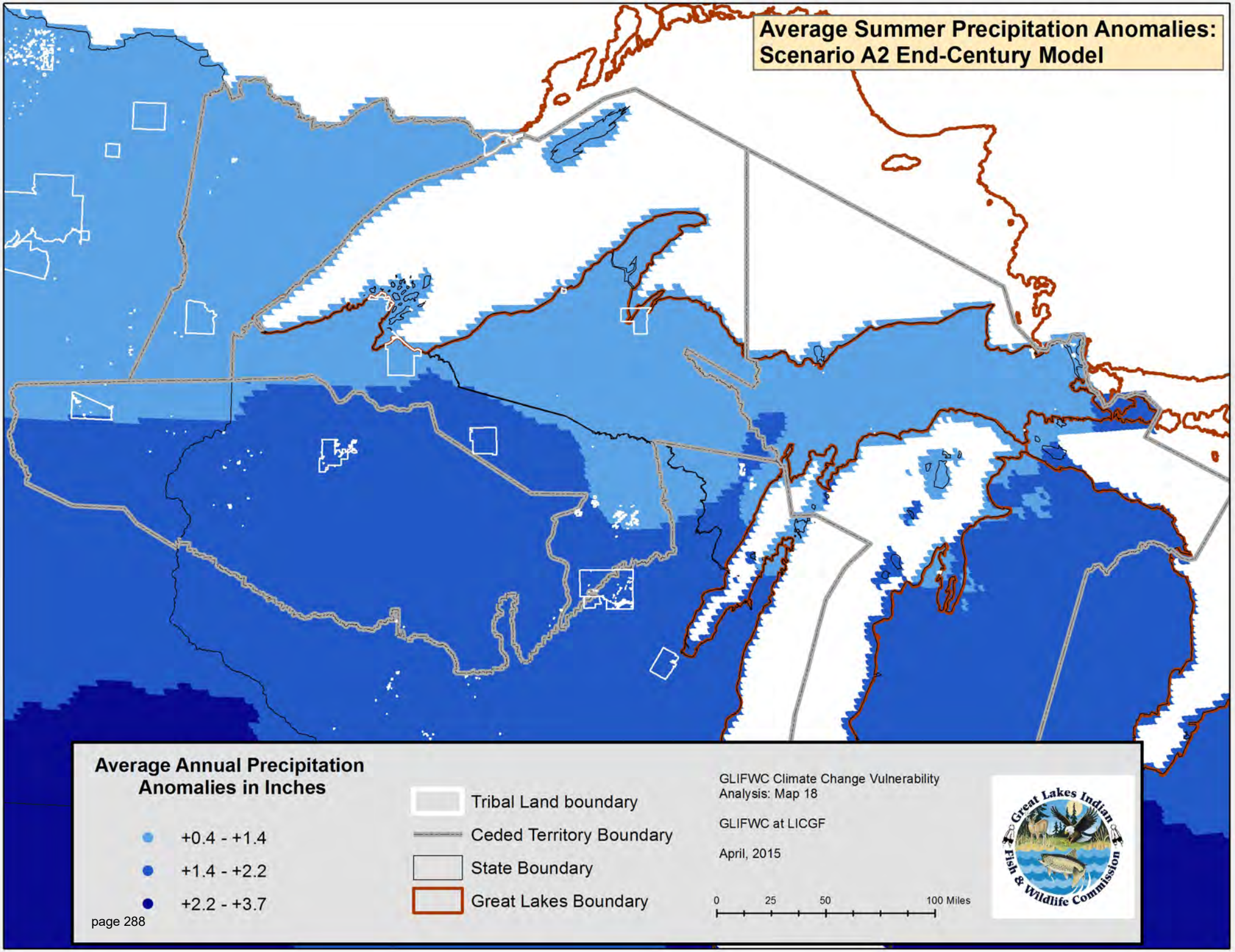
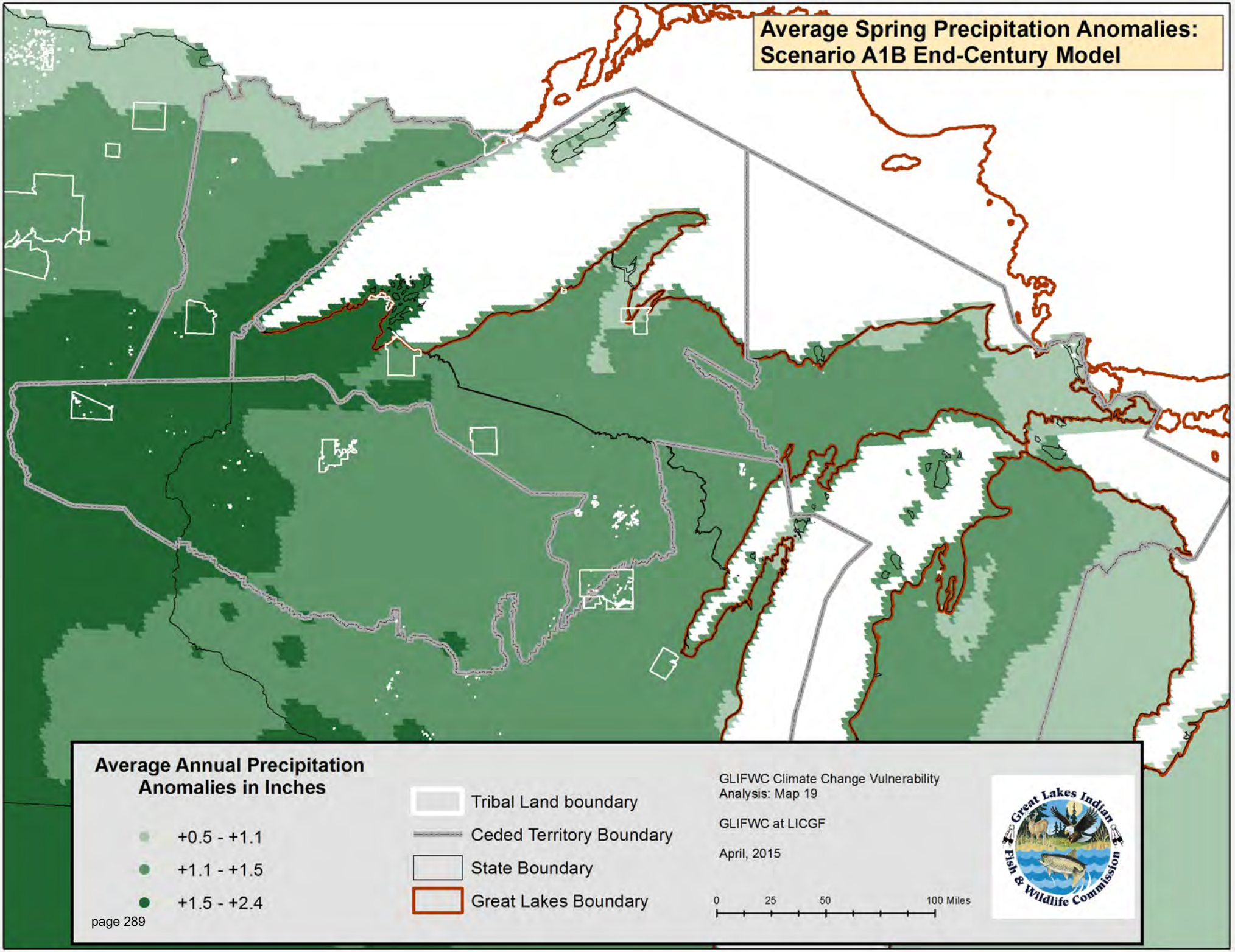
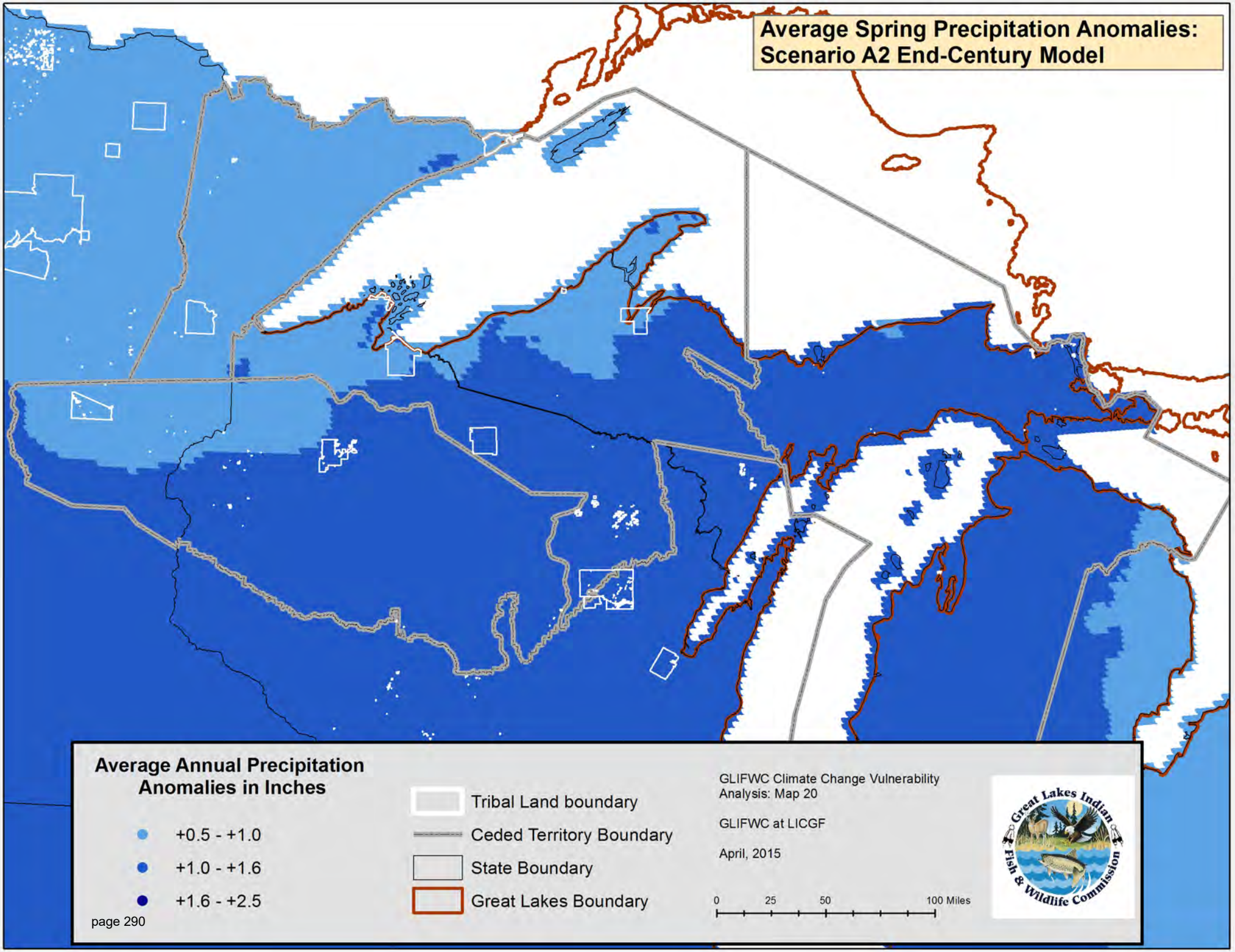
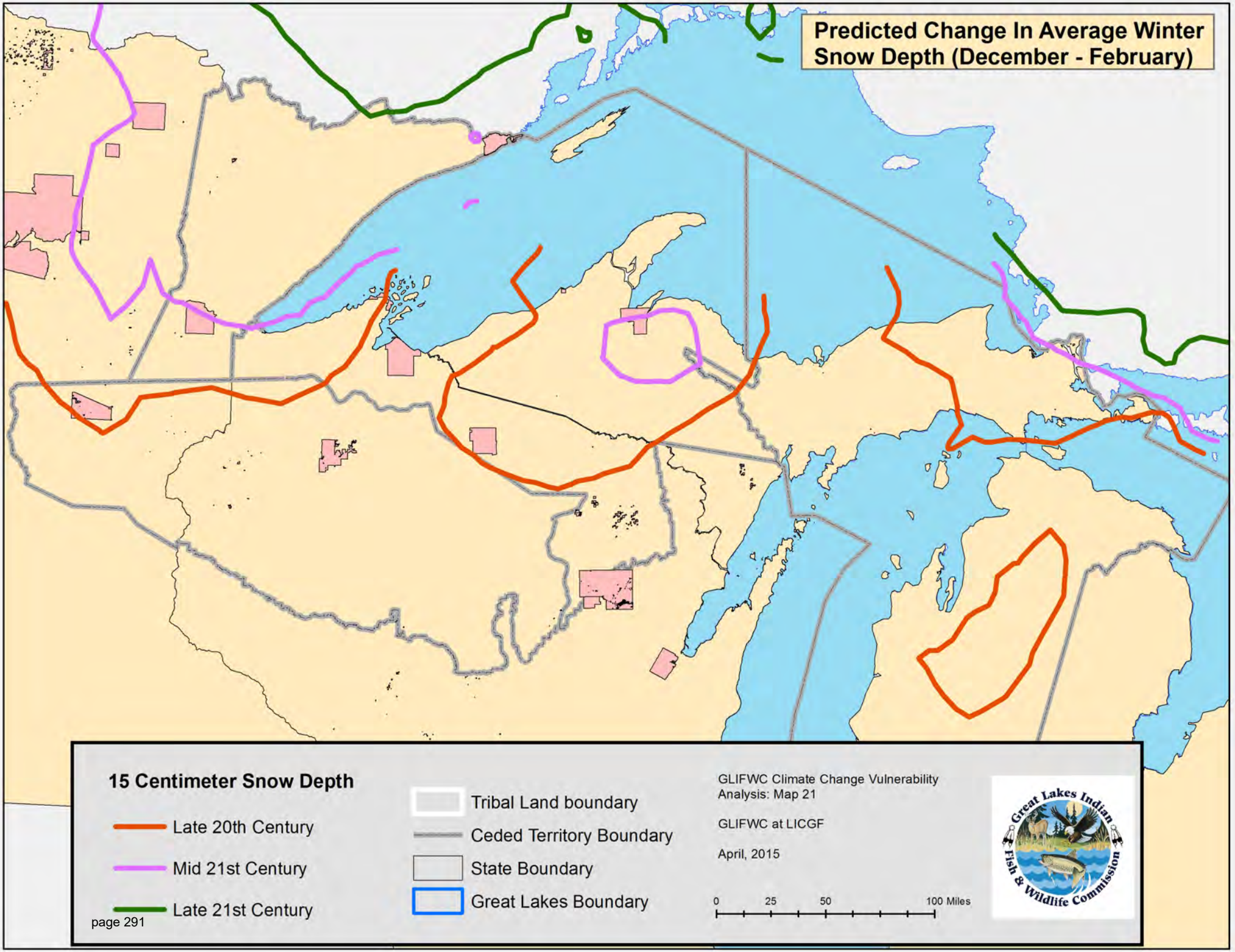
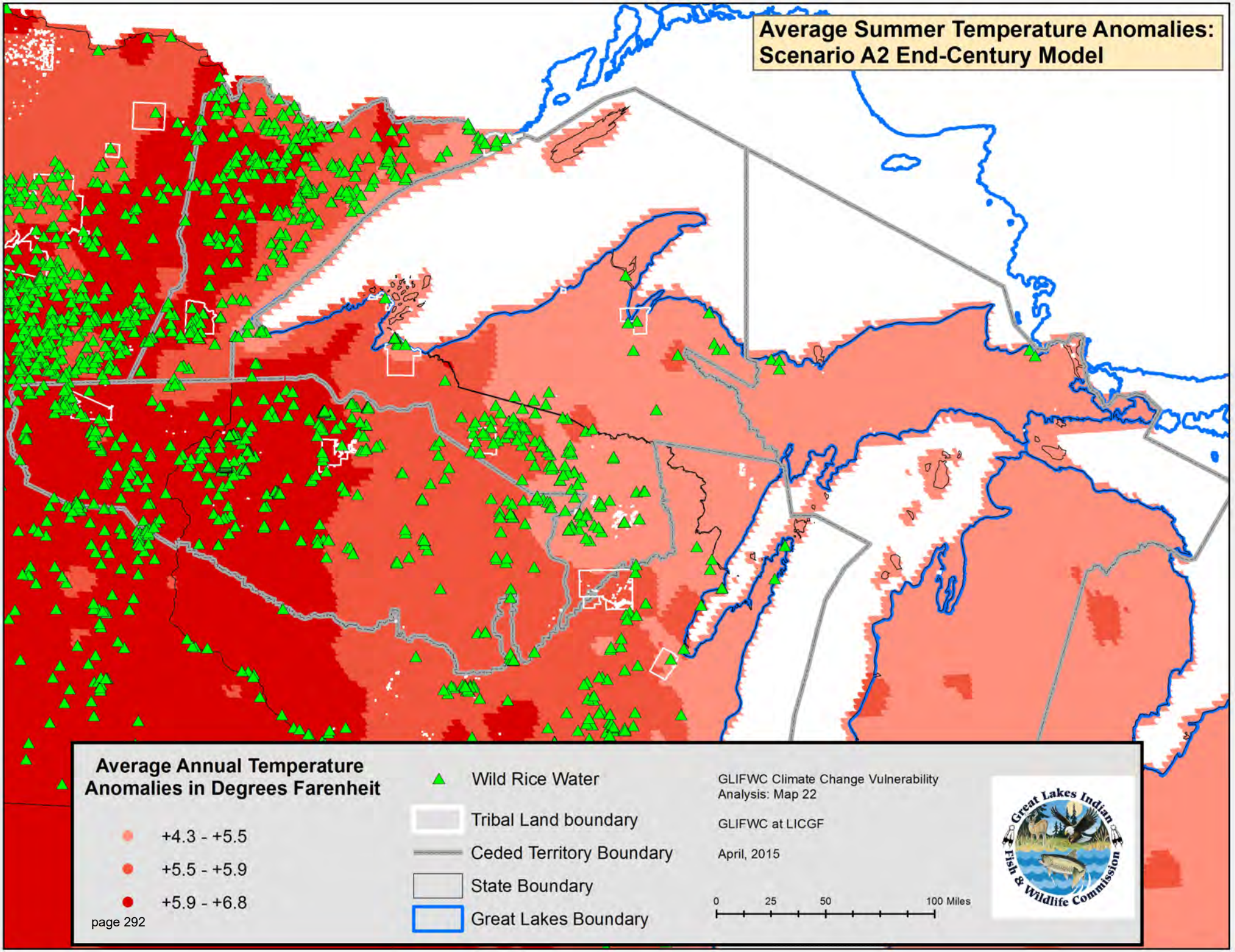

Average Summer Precipitation Anomalies:
Scenario A1B End-Century Model
Average Annual Precipitation Anomalies in Inches
+0.2 - +1.2
+1.2 - +1.8
+1.8 - +3.3
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 17
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

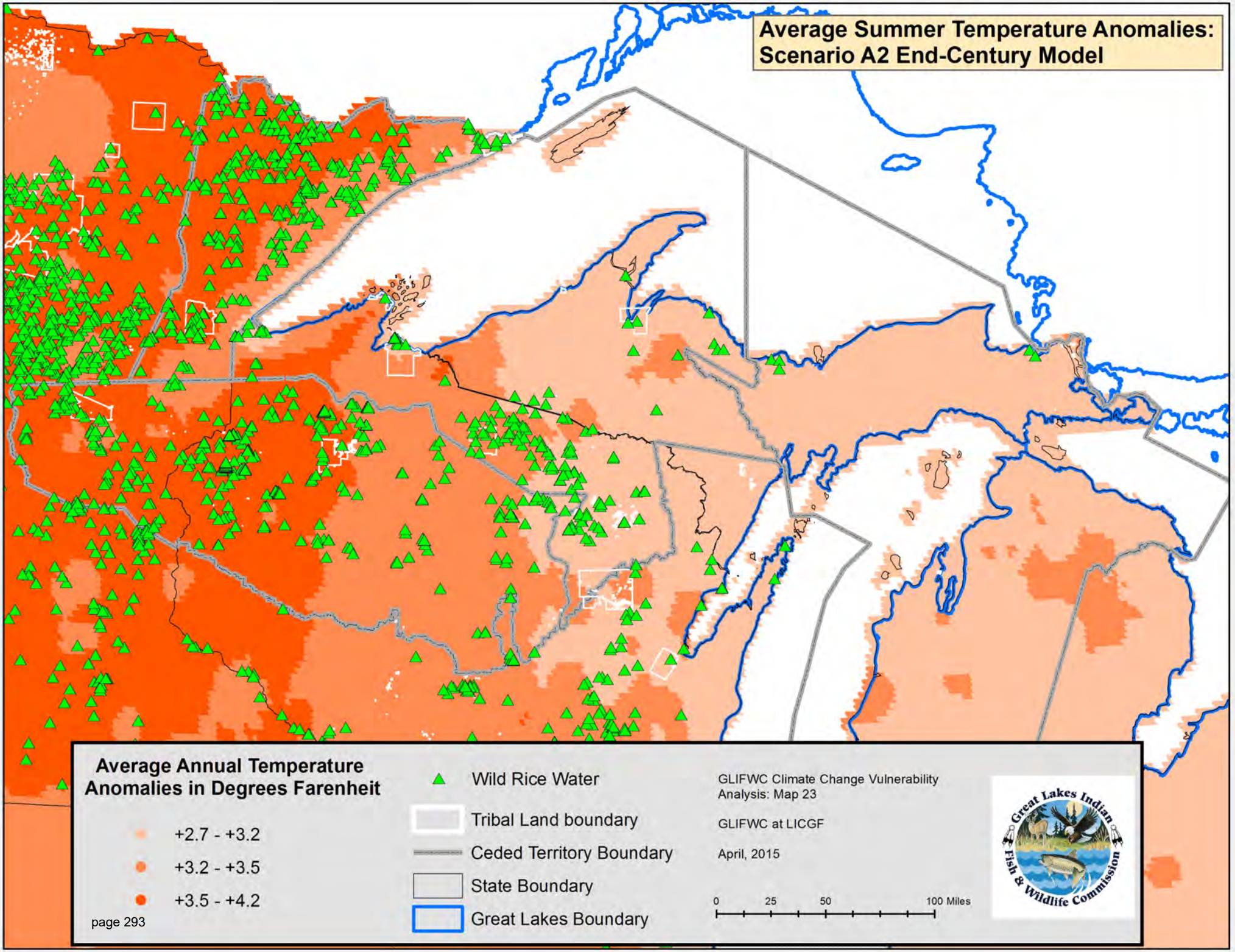

Average Summer Precipitation Anomalies:
Scenario A2 End-Century Model
Average Annual Precipitation Anomalies in Inches
+0.4 - +1.4
+1.4 - +2.2
+2.2 - +3.7
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 18
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

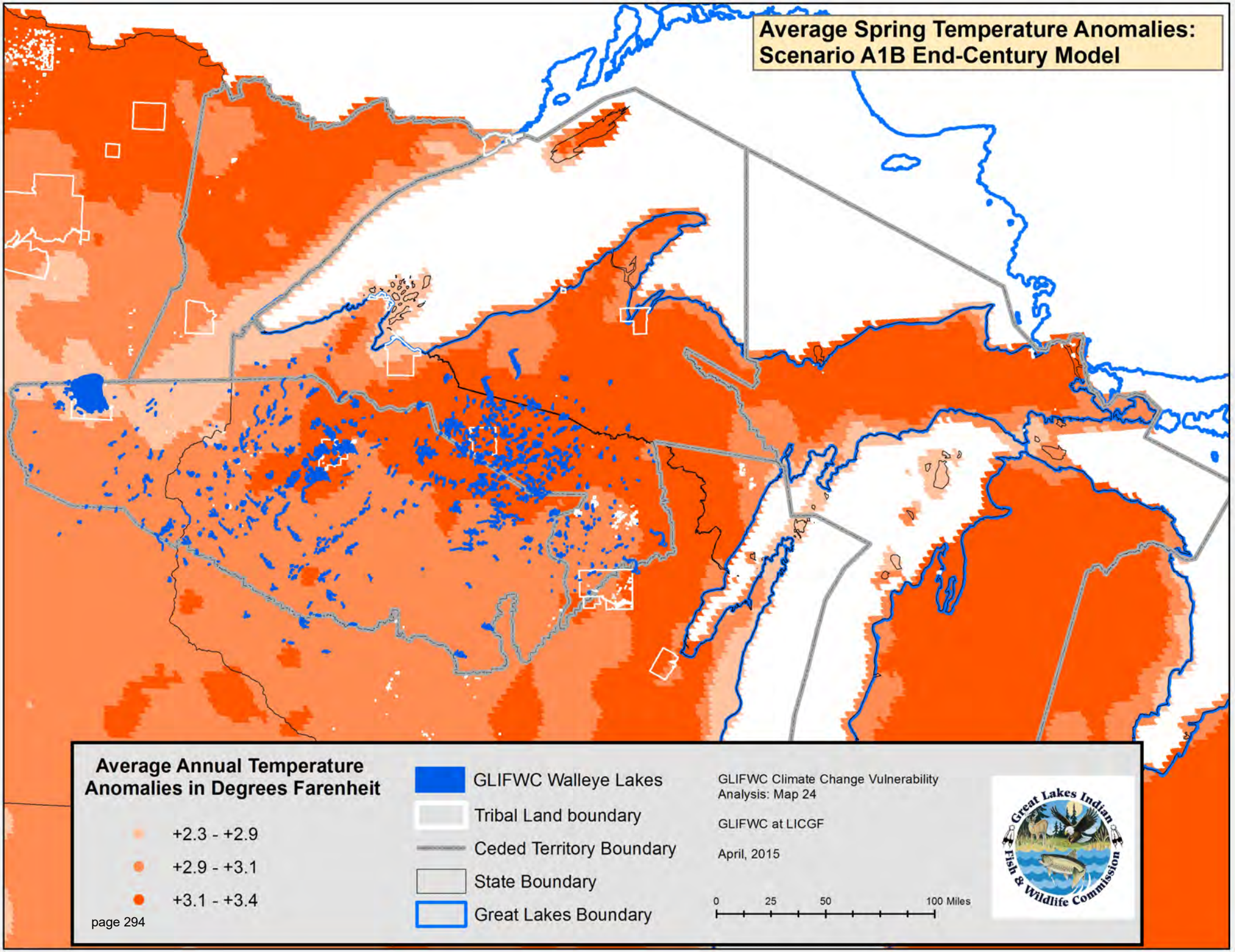

Average Spring Precipitation Anomalies:
Scenario A1B End-Century Model
Average Annual Precipitation Anomalies in Inches
+0.5 - +1.1
+1.1 - +1.5
+1.5 - +2.4
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 19
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

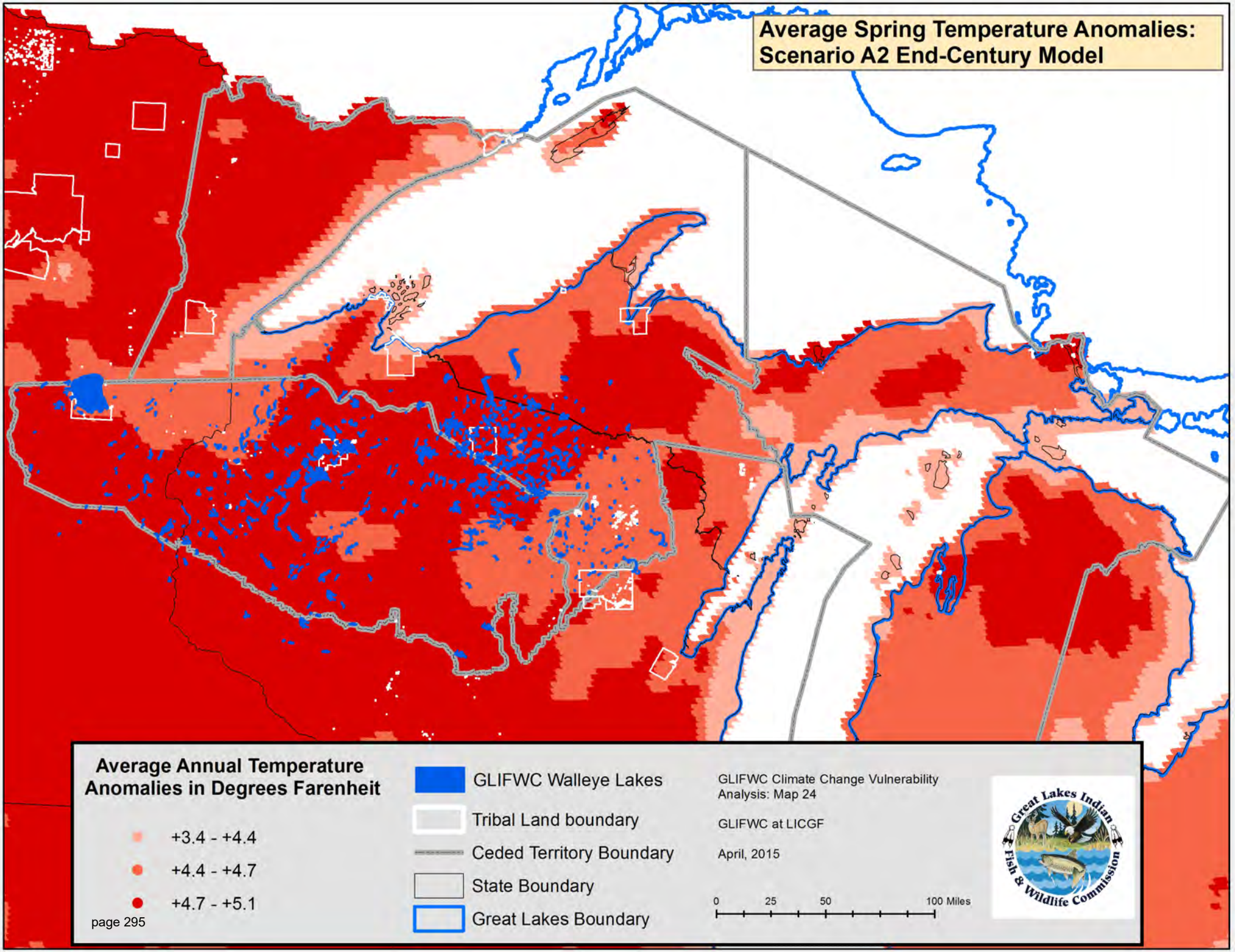

Average Spring Precipitation Anomalies:
Scenario A2 End-Century Model
Average Annual Precipitation Anomalies in Inches
+0.5 - +1.0
+1.0 - +1.6
+1.6 - +2.5
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 20
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

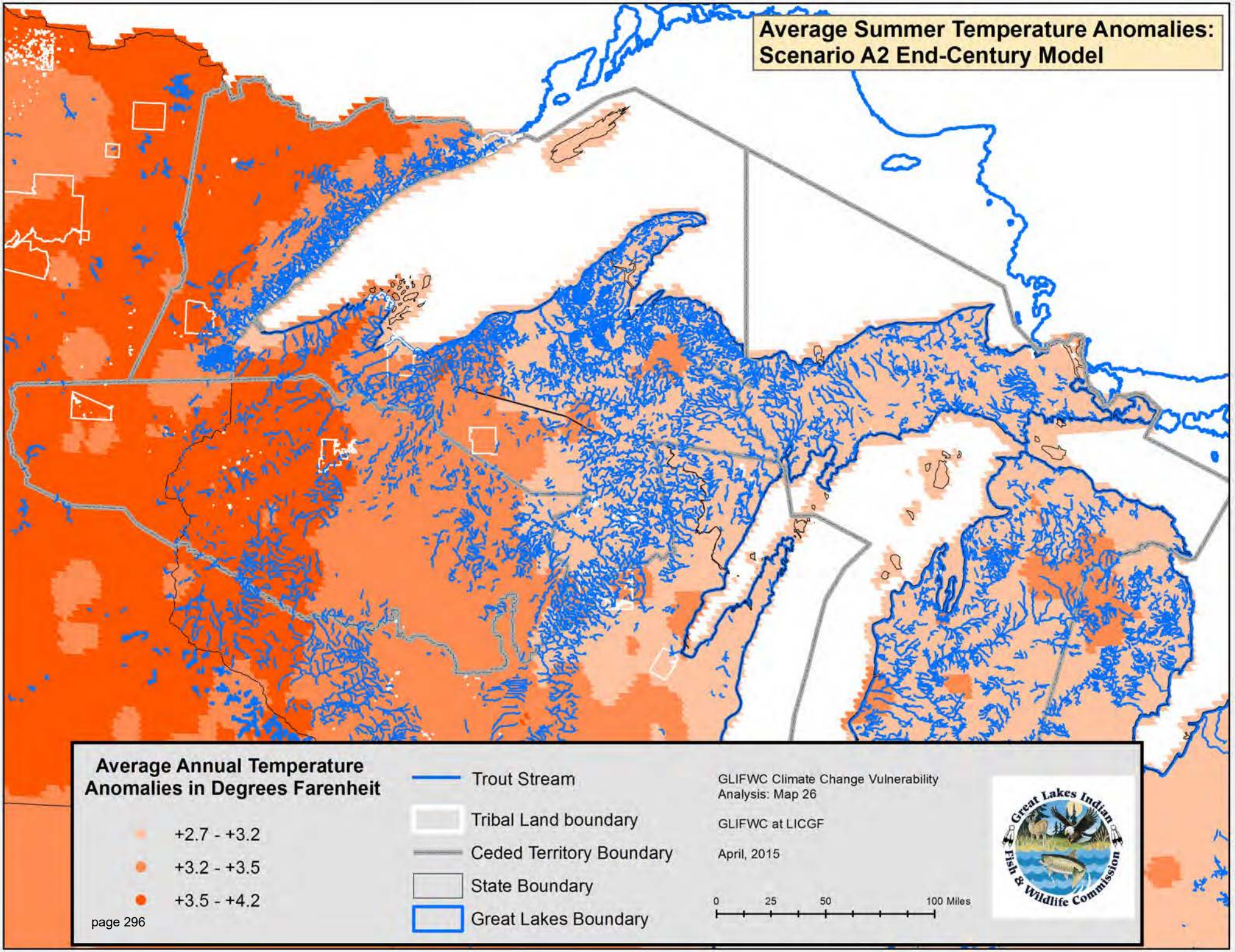

Predicted Change In Average Winter Snow Depth (December - February)
15 Centimeter Snow Depth
Late 20th Century
Mid 21st Century
Late 21st Century
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 21
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

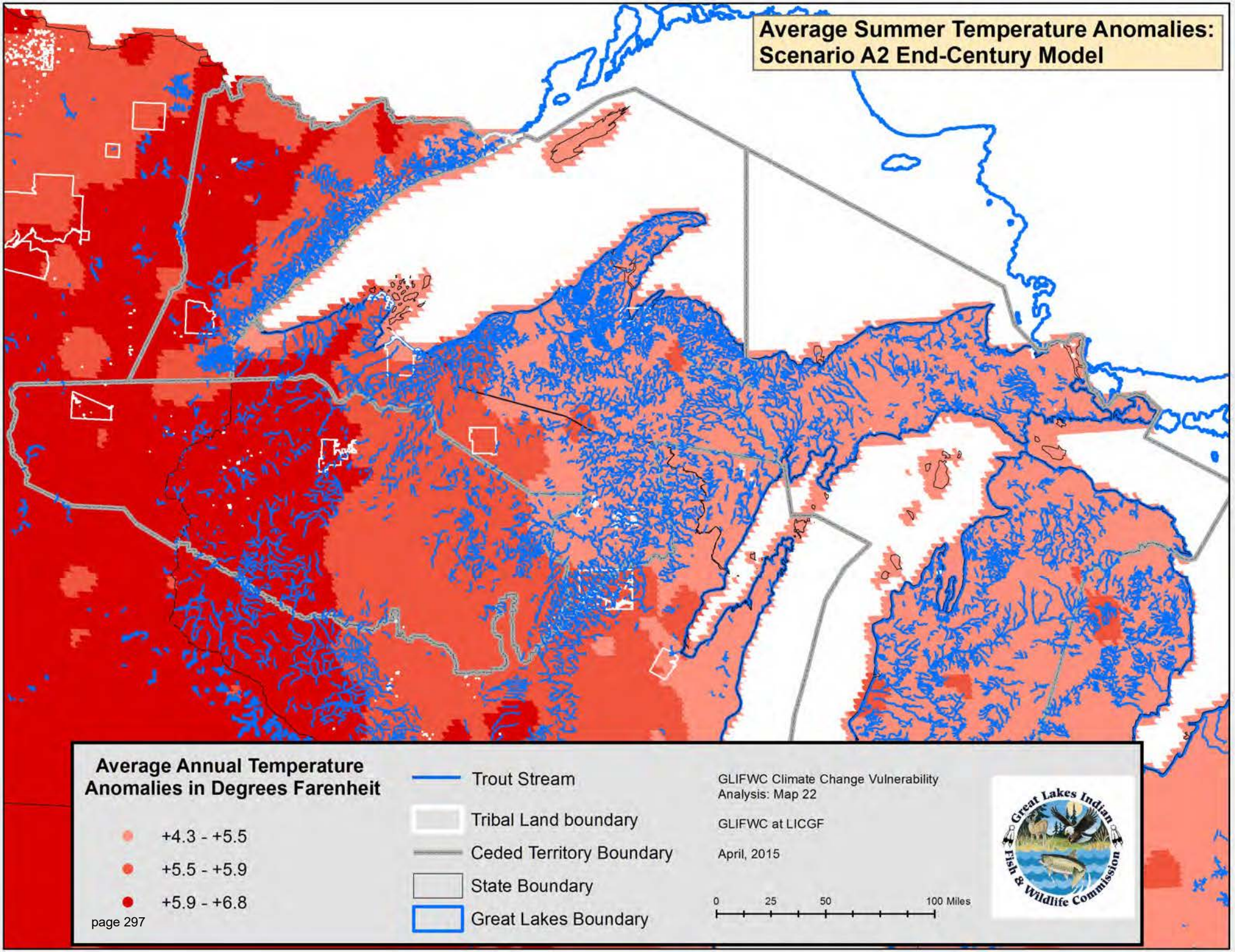

Average Summer Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+4.3 - +5.5
+5.5 - +5.9
+5.9 - +6.8
Wild Rice Water
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 22
GLIFWC at LICGF
April, 2015
0 25 50 100 Miles
Great Lakes Indian Fish & Wildlife Commission

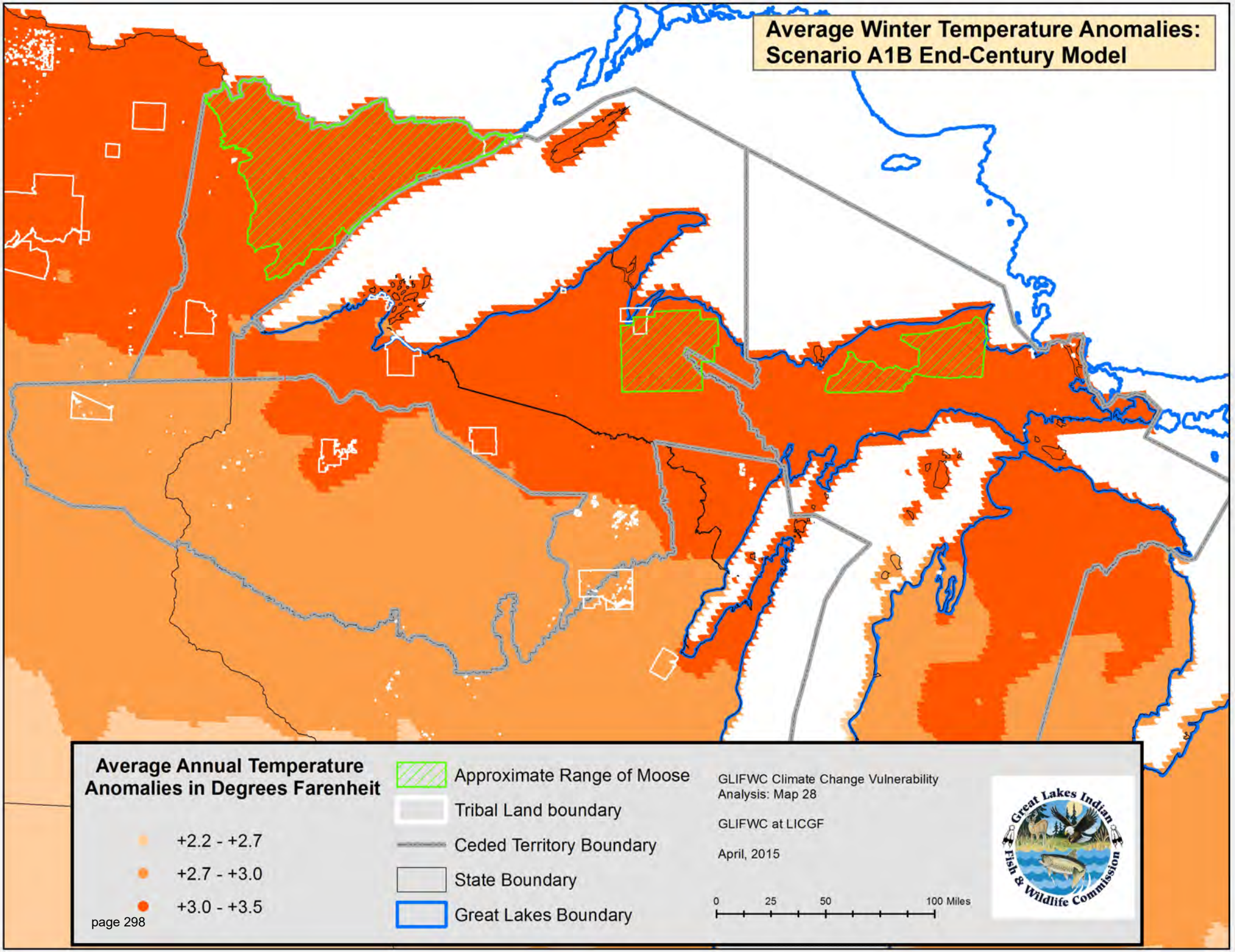

Average Summer Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+2.7 - +3.2
+3.2 - +3.5
+3.5 - +4.2
Wild Rice Water
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 23
GLIFWC at LICGF
April, 2015
0 25 50 100 Miles
Great Lakes Indian Fish & Wildlife Commission

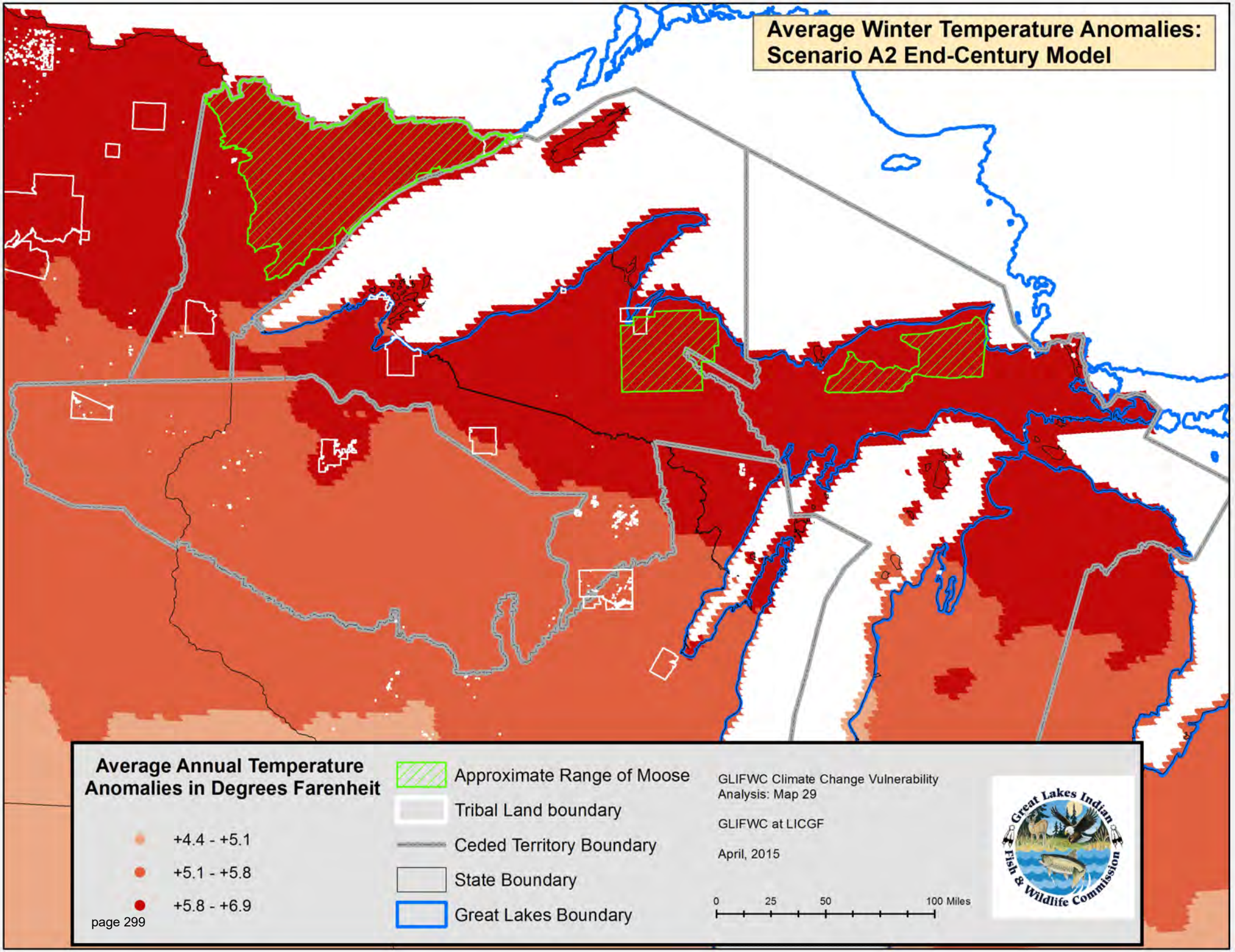

Average Spring Temperature Anomalies:
Scenario A1B End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+2.3 - +2.9
+2.9 - +3.1
+3.1 - +3.4
GLIFWC Walleye Lakes
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 24
GLIFWC at LICGF
April, 2015
0 25 50 100 Miles
Great Lakes Indian Fish & Wildlife Commission

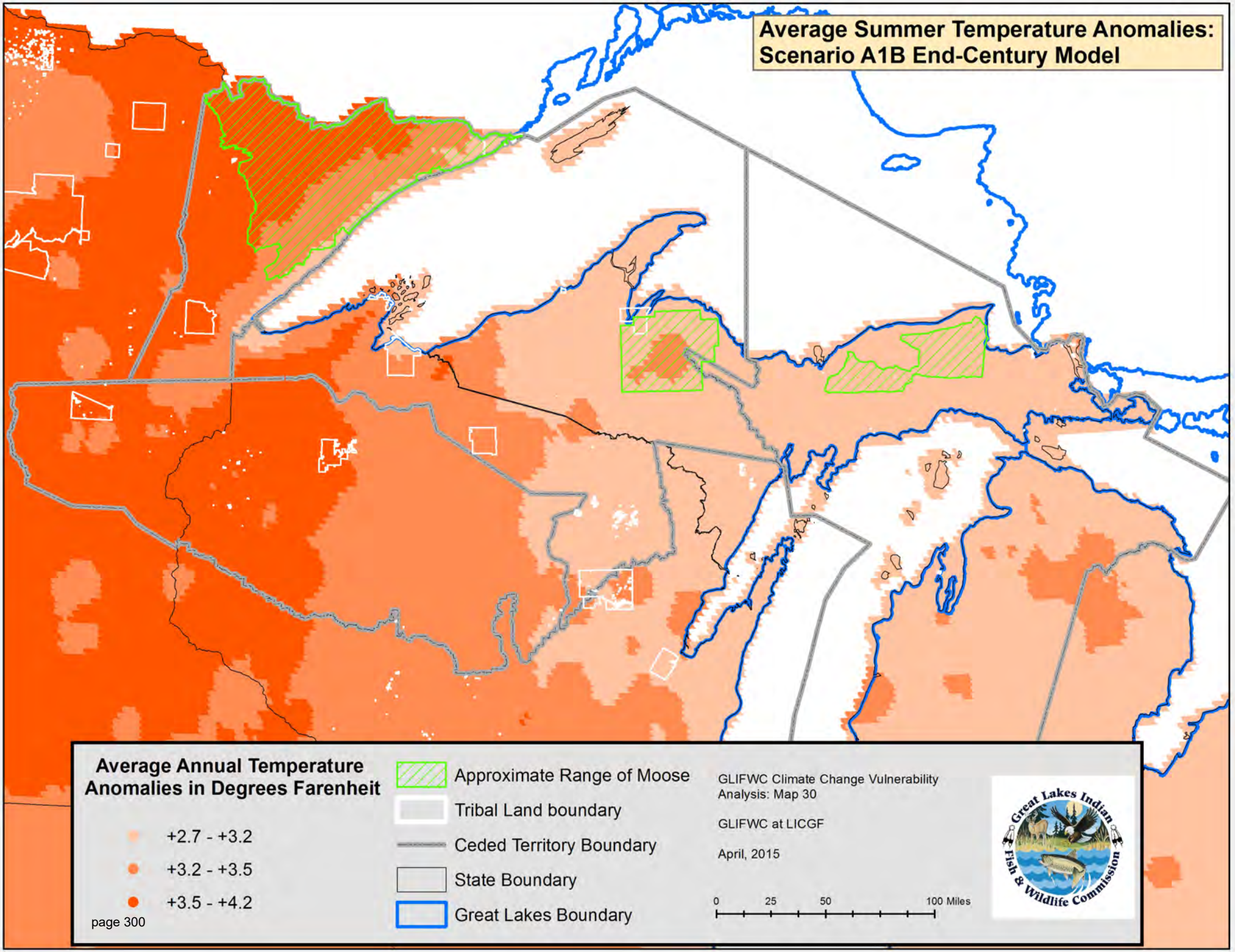

Average Spring Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+3.4 - +4.4
+4.4 - +4.7
+4.7 - +5.1
GLIFWC Walleye Lakes
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 24
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

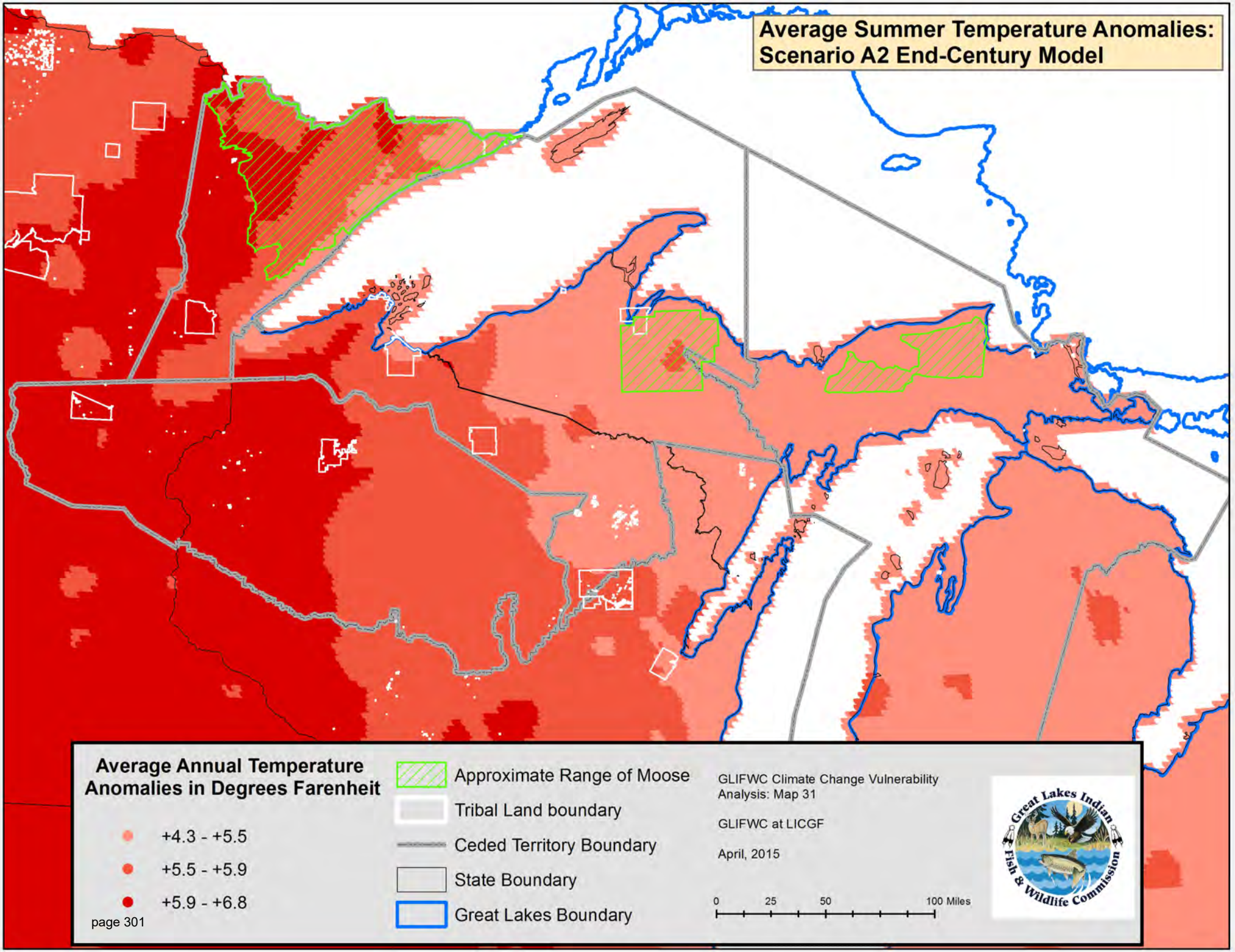

Average Summer Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+2.7 - +3.2
+3.2 - +3.5
+3.5 - +4.2
Trout Stream
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 26
GLIFWC at LICGF
April, 2015
0 25 50 100 Miles
Great Lakes Indian Fish & Wildlife Commission

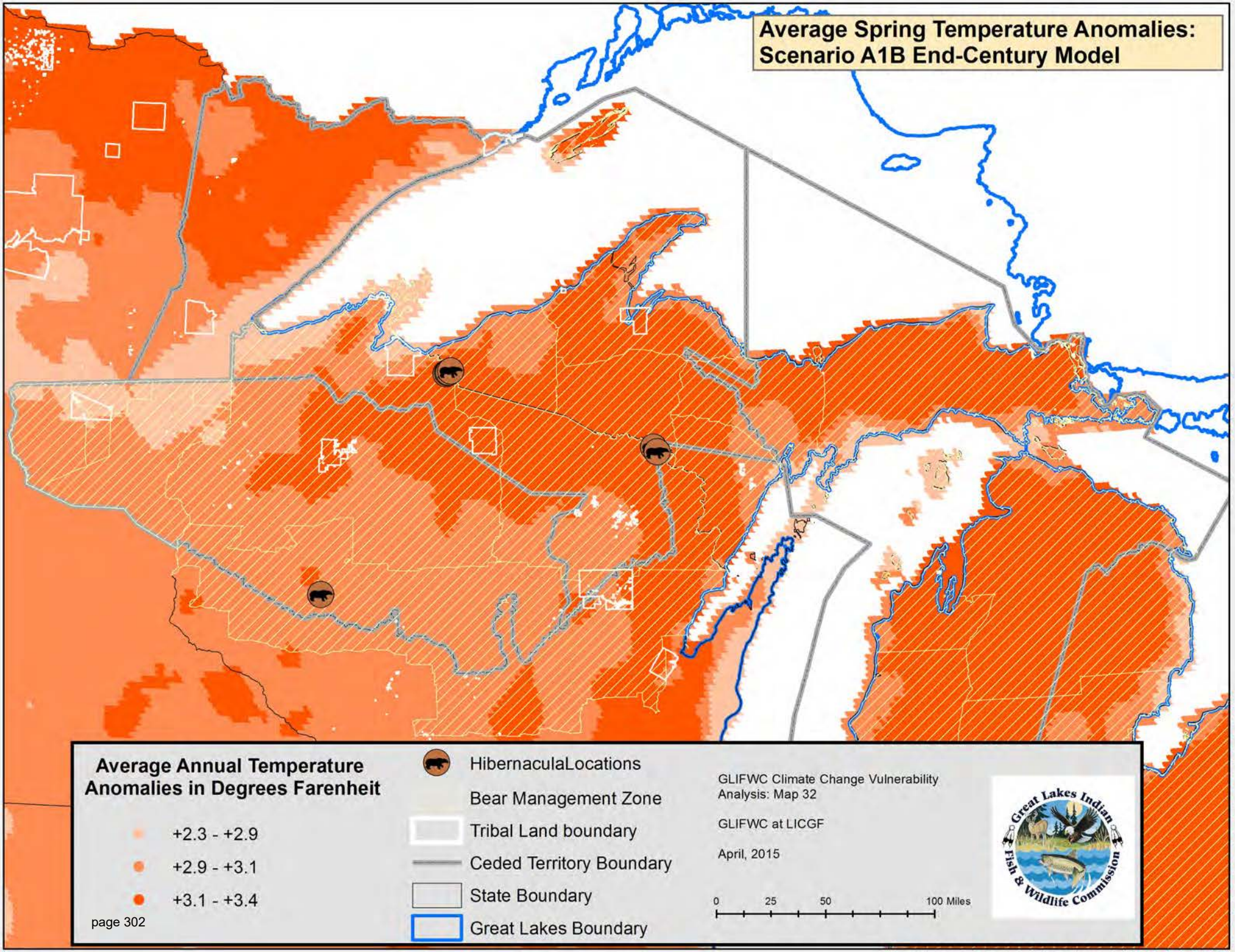

Average Summer Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+4.3 - +5.5
+5.5 - +5.9
+5.9 - +6.8
Trout Stream
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 22
GLIFWC at LICGF
April, 2015
0 25 50 100 Miles
Great Lakes Indian Fish & Wildlife Commission

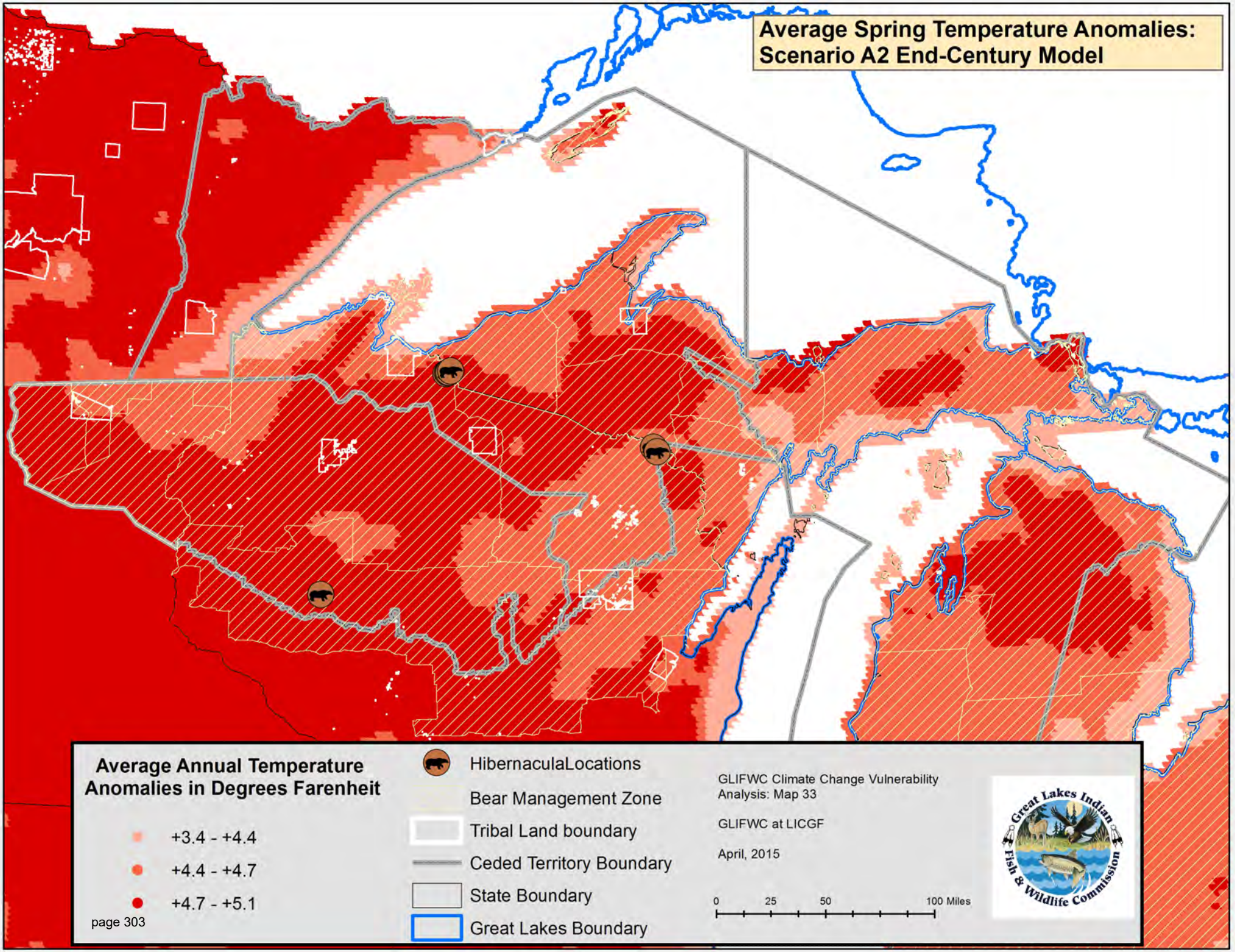

Average Winter Temperature Anomalies:
Scenario A1B End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+2.2 - +2.7
+2.7 - +3.0
+3.0 - +3.5
Approximate Range of Moose
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 28
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission


Average Winter Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+4.4 - +5.1
+5.1 - +5.8
+5.8 - +6.9
Approximate Range of Moose
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 29
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission


Average Summer Temperature Anomalies:
Scenario A1B End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+2.7 - +3.2
+3.2 - +3.5
+3.5 - +4.2
Approximate Range of Moose
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 30
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

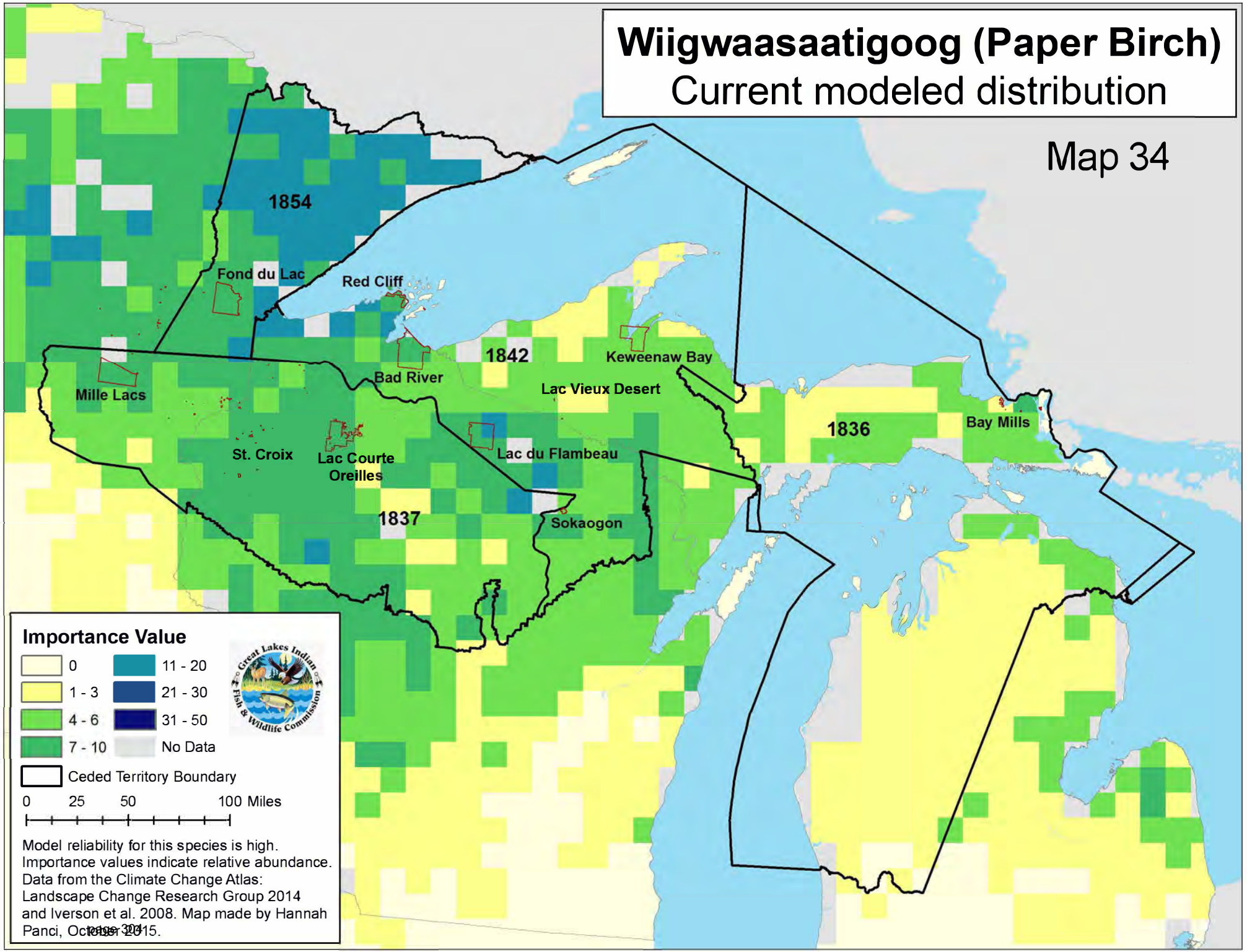

Average Summer Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+4.3 - +5.5
+5.5 - +5.9
+5.9 - +6.8
Approximate Range of Moose
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 31
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

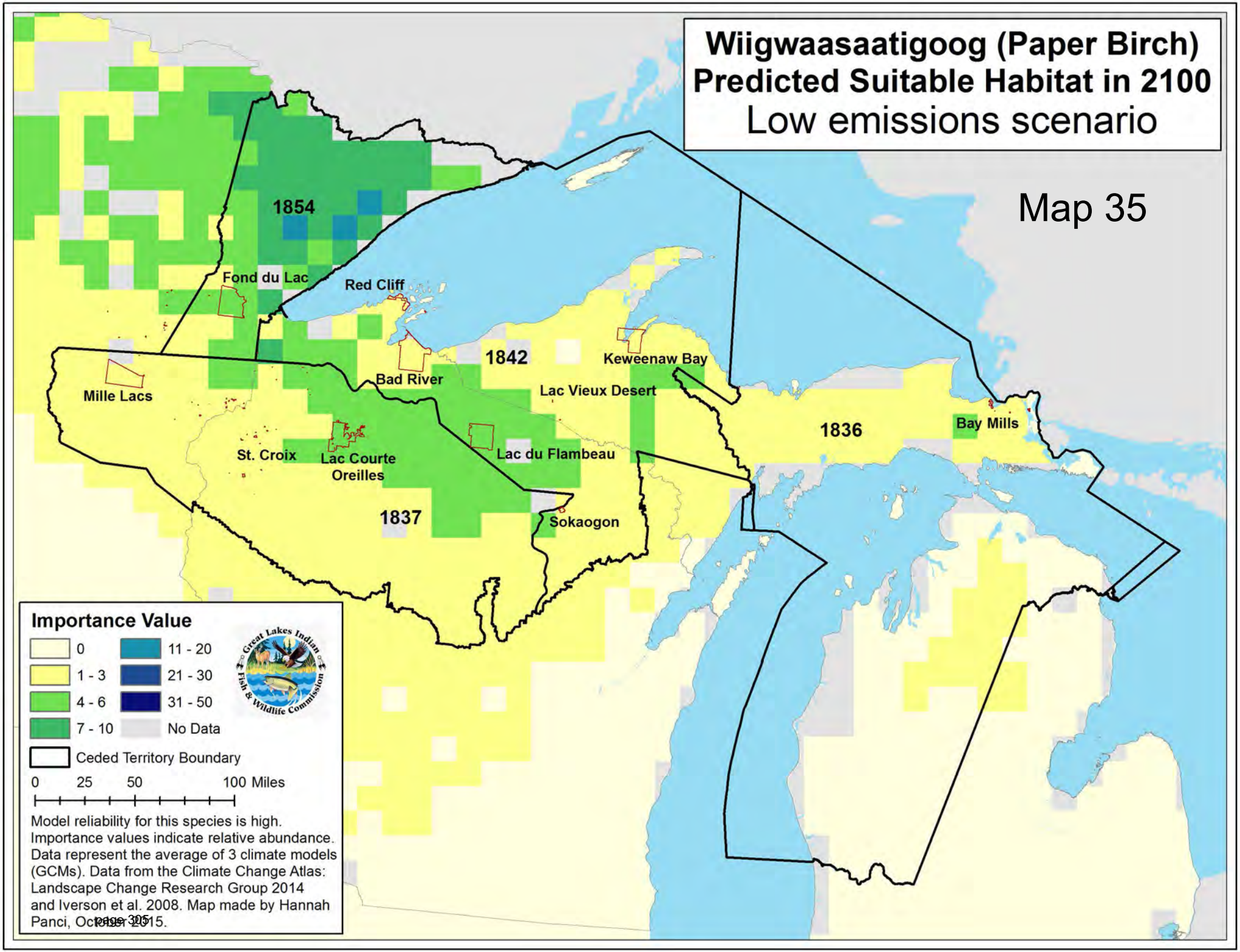

Average Spring Temperature Anomalies:
Scenario A1B End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+2.3 - +2.9
+2.9 - +3.1
+3.1 - +3.4
HibernaculaLocations
Bear Management Zone
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 32
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission


Average Spring Temperature Anomalies:
Scenario A2 End-Century Model
Average Annual Temperature Anomalies in Degrees Farenheit
+3.4 - +4.4
+4.4 - +4.7
+4.7 - +5.1
HibernaculaLocations
Bear Management Zone
Tribal Land boundary
Ceded Territory Boundary
State Boundary
Great Lakes Boundary
GLIFWC Climate Change Vulnerability Analysis: Map 33
GLIFWC at LICGF
April, 2015
0
25
50
100 Miles
Great Lakes Indian Fish & Wildlife Commission

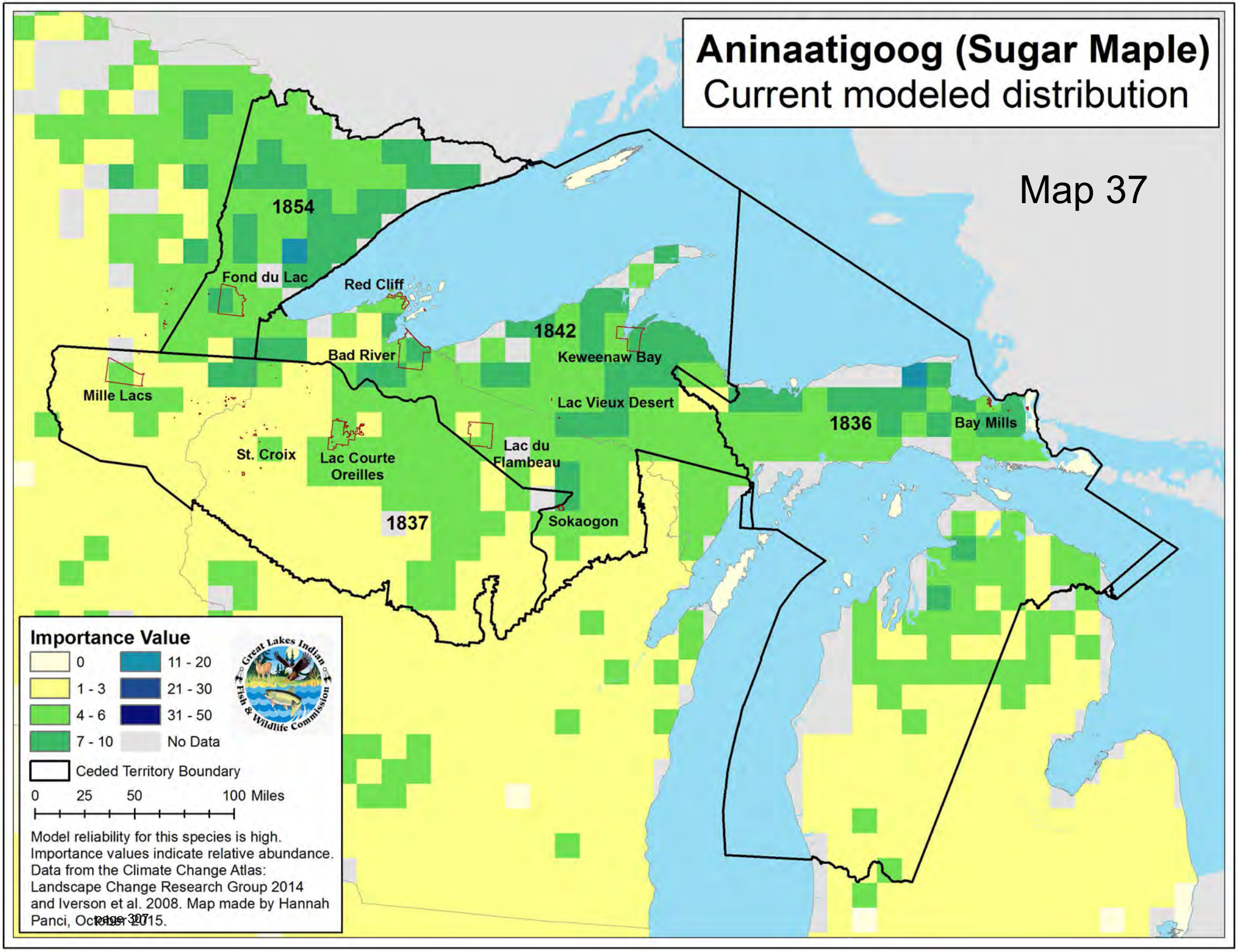
Wiigwaasaatigoog (Paper Birch)
Current modeled distribution

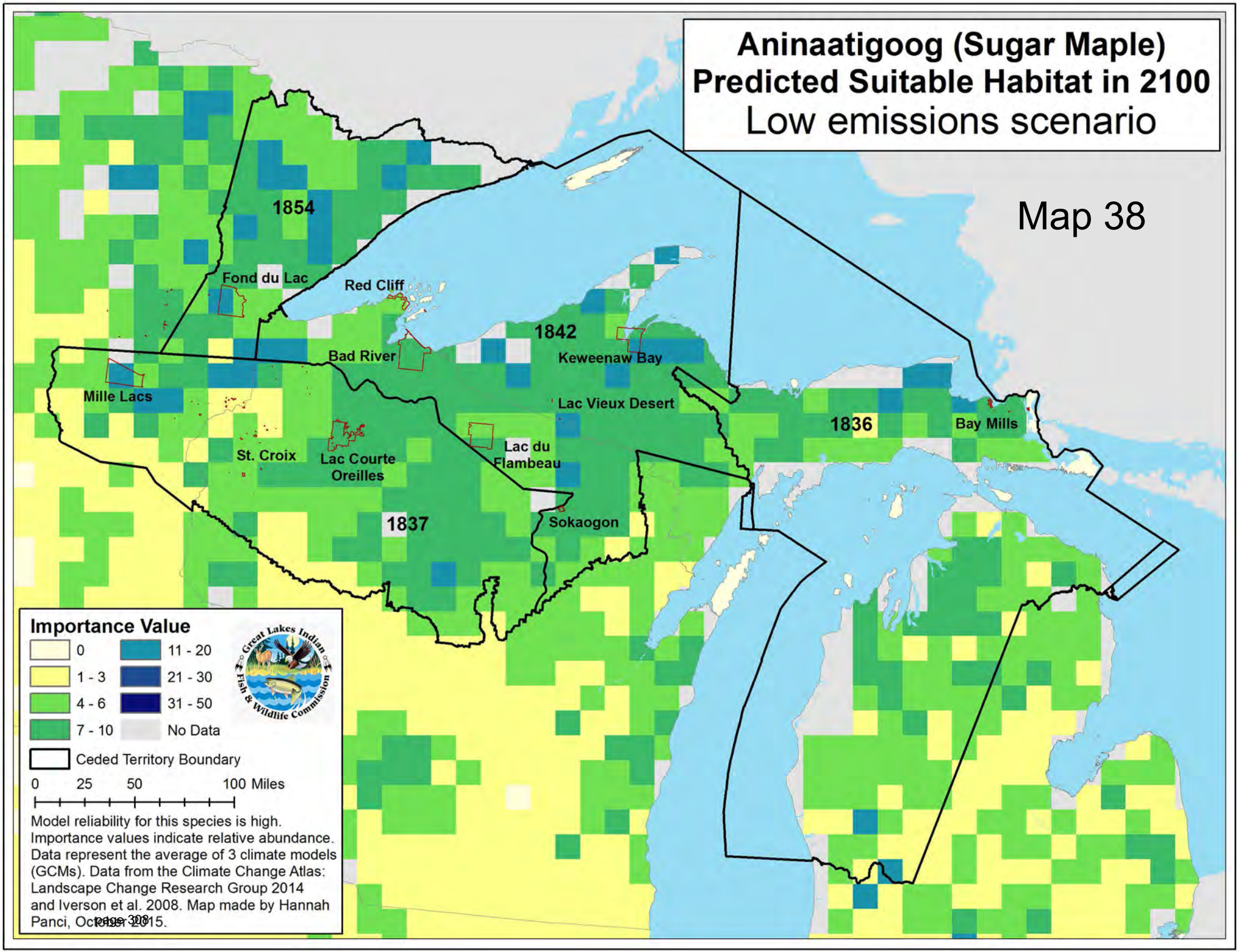
Map 34

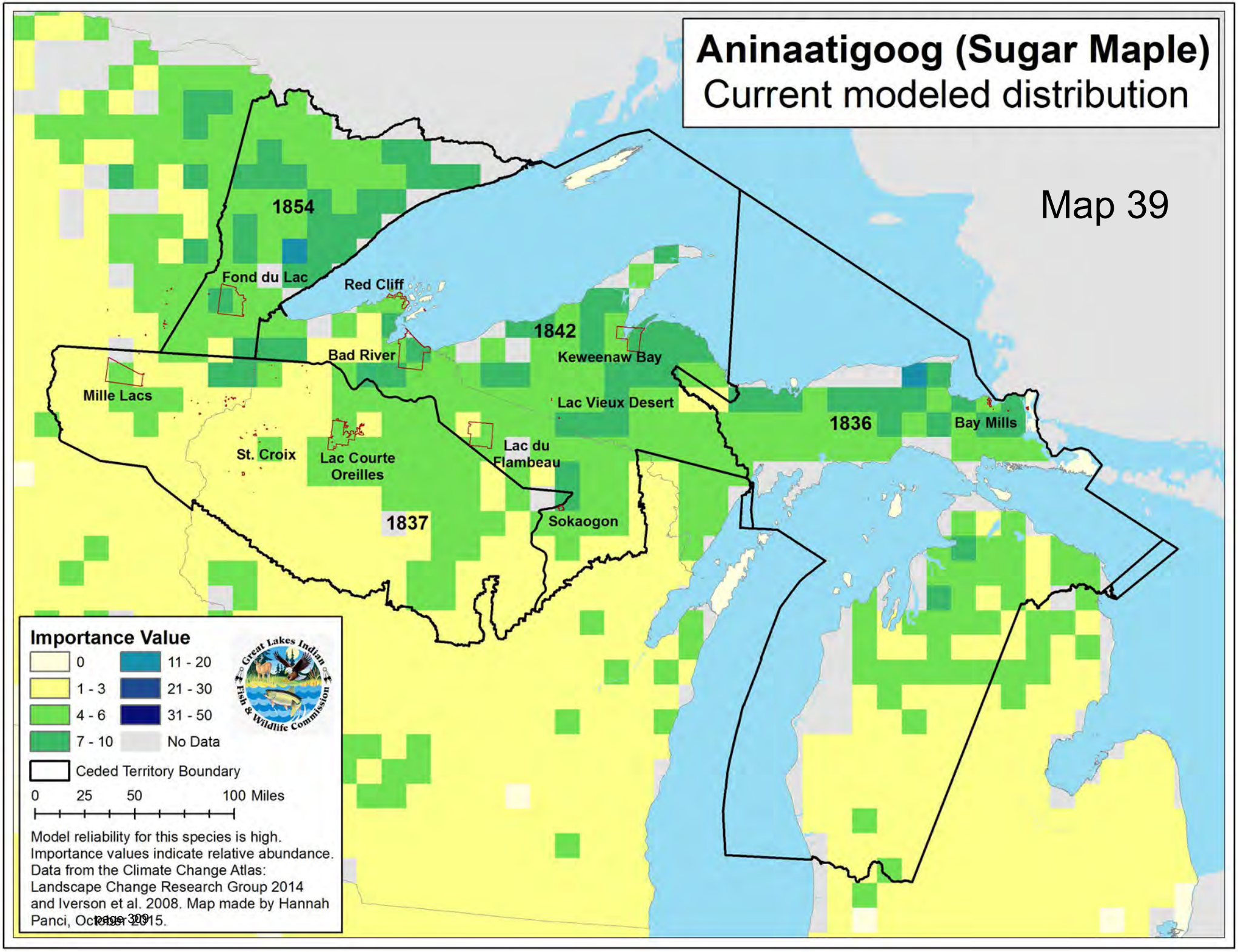



Wiigwaasaatigoog (Paper Birch)
Predicted Suitable Habitat in 2100
Low emissions scenario
Map 35
1854
Fond du Lac
Red Cliff
1842
Keweenaw Bay
Bad River
Lac Vieux Desert
Mille Lacs
1836
Bay Mills
St. Croix
Lac Courte Oreilles
Lac du Flambeau
1837
Sokaogon
Importance Value
0
1 - 3
4 - 6
7 - 10
11 - 20
21 - 30
31 - 50
No Data
Ceded Territory Boundary
0 25 50 100 Miles
Model reliability for this species is high.
Importance values indicate relative abundance.
Data represent the average of 3 climate models (GCMs). Data from the Climate Change Atlas: Landscape Change Research Group 2014 and Iverson et al. 2008. Map made by Hannah Panci, October 2015.


Wiigwaasaatigoog (Paper Birch)
Predicted Suitable Habitat in 2100
High emissions scenario
Map 36
1854
Fond du Lac
Red Cliff
1842
Keweenaw Bay
Bad River
Lac Vieux Desert
Mille Lacs
1836
Bay Mills
St. Croix
Lac Courte Oreilles
Lac du Flambeau
1837
Sokaogon
Importance Value
0
1 - 3
4 - 6
7 - 10
11 - 20
21 - 30
31 - 50
No Data
Ceded Territory Boundary
0 25 50 100 Miles
Model reliability for this species is high.
Importance values indicate relative abundance.
Data represent the average of 3 climate models (GCMs). Data from the Climate Change Atlas: Landscape Change Research Group 2014 and Iverson et al. 2008. Map made by Hannah Panci, October 2015.


Aninaatigoog (Sugar Maple)
Current modeled distribution
Map 37
1854
Fond du Lac
Red Cliff
1842
Bad River
Keweenaw Bay
Mille Lacs
Lac Vieux Desert
1836
Bay Mills
St. Croix
Lac Courte Oreilles
Lac du Flambeau
1837
Sokaogon
Importance Value
0
1 - 3
4 - 6
7 - 10
11 - 20
21 - 30
31 - 50
No Data
Ceded Territory Boundary
0 25 50 100 Miles
Model reliability for this species is high.
Importance values indicate relative abundance.
Data from the Climate Change Atlas:
Landscape Change Research Group 2014
and Iverson et al. 2008. Map made by Hannah
Panci, October 2015.


Aninaatigoog (Sugar Maple)
Predicted Suitable Habitat in 2100
Low emissions scenario
Map 38
1854
Fond du Lac
Red Cliff
1842
Bad River
Keweenaw Bay
Mille Lacs
Lac Vieux Desert
1836
Bay Mills
St. Croix
Lac Courte Oreilles
Lac du Flambeau
1837
Sokaogon
Importance Value
0
1 - 3
4 - 6
7 - 10
11 - 20
21 - 30
31 - 50
No Data
Ceded Territory Boundary
0 25 50 100 Miles
Model reliability for this species is high.
Importance values indicate relative abundance.
Data represent the average of 3 climate models (GCMs). Data from the Climate Change Atlas: Landscape Change Research Group 2014 and Iverson et al. 2008. Map made by Hannah Panci, October 2015.


Aninaatigoog (Sugar Maple)
Current modeled distribution
Map 39
1854
Fond du Lac
Red Cliff
1842
Bad River
Keweenaw Bay
Mille Lacs
Lac Vieux Desert
1836
Bay Mills
St. Croix
Lac Courte Oreilles
Lac du Flambeau
1837
Sokaogon
Importance Value
0
1 - 3
4 - 6
7 - 10
11 - 20
21 - 30
31 - 50
No Data
Ceded Territory Boundary
0 25 50 100 Miles
Model reliability for this species is high.
Importance values indicate relative abundance.
Data from the Climate Change Atlas:
Landscape Change Research Group 2014
and Iverson et al. 2008. Map made by Hannah
Panci, October 2015.
Great Lakes Indian Fish & Wildlife Commission

Annotated Bibliography

Lake Superior Fish

Lake Whitefish: Adikameg

1. Bronte, C.R., Ebener M.P., Schreiner D.R., DeVault D.S., Petzold M.M., Jensen D.A., Richards C., and Lozano S.J. (2003). Fish Community Change in Lake Superior, 1970-2000. *Canadian Journal of Fisheries and Aquatic Sciences,* 60(12), 1552–1574. Available at http://www.fws.gov/midwest/fisheries/scientific-pubs/p-2003-2.pdf

Summary: The Fish Community Change in Lake Superior discusses the changes in Lake Superior's fish communities from 1970 – 2000. In specific it touches on habitat degradation, contaminants, effects of climate warming, phosphorus loading, intentional and unintentional species introductions, as well as other topics. Habitat protection and enhancement to prevent additional damaging effects is needed to further restoration.

Specific pages to note: Pg. 1554: Climate warming is projected to increase thermal habitat; would be for Lake Trout, Lake Whitefish, Northern Pike, where non-indigenous species would benefit. This article focuses on fish species recovery.

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- Bronte, C.R., and Hoff, M.H. 1996. Population status and trends for Lake Superior forage fishes, 1978–95. In Minutes of the 1996 Annual Meeting of the Lake Superior Committee, Great Lakes Fishery Commission. Great Lakes Fishery Commission, Ann Arbor, Mich.
- Bronte, C.R., Schram, S.T., Selgeby, J.H., and Swanson, B.L. 1995. Density independent survival of wild lake trout in the Apostle Islands area of Lake Superior. J. Gt. Lakes Res. 21 (Suppl. 1): 246–252.
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- *Hill, D.K., and Magnuson, J.J. 1990. Potential effects of global climate warming on the growth and prey consumption of Great Lakes fishes. Trans. Am. Fish. Soc. 119: 265–275*.
- *Magnuson, J.J., Meisner J.D., and Hill, D.K. 1990. Potential changes in thermal habitat of Great Lakes fishes due to global climate warming. Trans. Am. Fish. Soc. 119: 254–264*.
- *Mandrak, N.E. 1989. Potential invasion of the Great Lakes by fish species associated with climate warming. J. Gt. Lakes Res. 15:306–316*.
- Selgeby, J.H. 1982. Decline of lake herring (Coregonus artedii) in Lake Superior: an analysis of the Wisconsin herring fishery. Can. J. Fish. Aquat. Sci. 39: 554–563.
- Sinokrot, B.A., Stefan, H.G., McCormick, J.H., and Eaton, J.G. 1995. Modeling of climate change effects on stream temperatures and fish habitats below barrier dams and near groundwater inputs. Clim. Change, 30: 181–200.

2. Great Lakes Area National Park Service U.S. Department of the Interior. 2007. Climate Change: Dying Birch trees, minimal snowpack, and ice-free lakes are just some Impacts of Midwest Warming. Available at http://www.nps.gov/apis/naturescience/upload/2007%20MWR%20Climate%20Change%20Site%20Bulletin%20-%20Great%20Lakes%20FINAL.pdf

Summary: This article, Dying Birch Trees, Minimal Snowpack, and Ice-Free Lakes Are Just Some Impacts of Midwest Warming discusses climate change effects in the Midwest Region. It touches on the science reports by the U.S. Global Change Research Program as well as others and how they show that this is due to greenhouse gases produced by human activities. In specific the article has sections on Temperature and Precipitation, The Ecological Effects, New Faces in New Places, and Recreation, Health and Safety.

Specific pages to note: * Cool tree species are projected to lose habitat in the U.S. Sugar Maple and Paper Birch are expected to shift towards Canada. For the Apostle Island Lakeshore and Michigan Upper peninsula Paper Birch may lose all habitats. *Coldwater fish such as Trout will decrease in abundance. Whitefish spawning areas will be disturbed and Native fish will be threatened.

3. Kling, G.W., K. Hayhoe, L.B. Johnson, J.J. Magnuson, S. Polasky, S.K. Robinson, B.J. Shuter, M.M. Wander, D.J. Wuebbles, and D.R. Zak. 2003. Confronting Climate Change in the Great Lakes Region. A Report of the Union of Concerned Scientists and the Ecological Society of America. Available at

http://www.ucsusa.org/assets/documents/global_warming/greatlakes_final.pdf

Summary: Confronting Climate Change in the Great Lakes Region is a report of The Union of Concerned Scientists and The Ecological Society of America. This report explains that growing evidence suggests that climate change is already affecting the Great Lakes Region: winters are shorter, average temperatures are warmer, lake ice cover is decreasing, and heavy rainstorms are more common. The potential consequences from climate change for the Great Lakes Region are confronted for the economic as well as the environmental impacts.

Specific pages to note: **Pg. 2:** Whitefish reproduction could be threatened with the loss of winter ice [Coldwater fish (Lake Trout, Whitefish, Herring) and Coolwater fish (Northern Pike, Walleye) are likely to decline in abundance]. **Pg. 54-55**: If warmwater fish species expand and increase in number in Lake Superior, this could lead to the extirpation (local extinction) of native minnows. This could have negative impacts on Lake Trout and other Native predators. "Climate warming will greatly reduce the amount of thermally suitable habitat for Lake Trout in many inland lakes." **Pg. 60:** Moose could be harmed by warming: increase in deer populations could carry disease that will stress the moose population.

References Cited to Consider:

- *Hill, D.K., and J.J. Magnuson (1990). Potential effects of global climate warming on the growth and prey consumption of Great Lakes fi sh. Transactions of the American Fisheries Society 119:265–275. American Fisheries Society 119:265–275.*
- Magnuson, J.J., et al. (1997). Potential effects of climate change on aquatic systems: Laurentian Great Lakes and Precambrian Shield Region. In Freshwater Ecosystems and Climate Change in North America: A Regional Assessment. C.E. Cushing, ed. New York: John Wiley & Sons, pp. 7–53.
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Lake Trout: Namegos

1. Betz, C.R., Asplund T., and Hurley J. (2010). Water Resources Working Group Report. *Wisconsin Initiative on Climate Change Impacts.* Available at

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2. Bronte, C.R., Ebener M.P., Schreiner D.R., DeVault D.S., Petzold M.M., Jensen D.A., Richards C., and Lozano S.J. (2003). Fish Community Change in Lake Superior, 1970-2000. *Canadian Journal of Fisheries and Aquatic Sciences,* 60(12), 1552–1574. Available at http://www.fws.gov/midwest/fisheries/scientific-pubs/p-2003-2.pdf

Summary: The Fish Community Change in Lake Superior discusses the changes in Lake Superior's fish communities from 1970 – 2000. In specific it touches on habitat degradation, contaminants, effects of climate warming, phosphorus loading, intentional and unintentional species introductions, as well as other topics. Habitat protection and enhancement to prevent additional damaging effects is needed to further restoration.

Specific pages to note: **Pg. 1554:** Climate warming is projected to increase thermal habitat; would be for Lake Trout, Lake Whitefish, Northern Pike, where non-indigenous species would

benefit. This article focuses on fish species recovery.

References Cited to Consider:

- Bronte, C.R., and Hoff, M.H. 1996. Population status and trends for Lake Superior forage fishes, 1978–95. In Minutes of the 1996 Annual Meeting of the Lake Superior Committee, Great Lakes Fishery Commission. Great Lakes Fishery Commission, Ann Arbor, Mich.
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3. Casselman, J.M. 2002. Effects of temperature, global extremes, and climate change on year-class production of warmwater, coolwater, and coldwater fishes in the Great Lakes basin. Am. Fish. Soc. Symp. 31: 39–60. Available at ftp://142.36.245.139/.virtual/slk6ftp/pub/outgoing/requests/!age_analysis/CD1/Selected%20Age-Growth%20Publications/Climate%20and%20year-class%20production%20of%20fish,%20AFS%20Symposium,%20C.pdf

Summary: The Effects of Temperature, Global Extremes, and Climate Change on Year-Class Production of Warmwater, Coolwater, and Coldwater fishes in the Great Lakes Basin discuss the impacts of global warming on fisheries. For this they explain the effects of temperature change on fish. Global warming will substantially increase the year-class strength of warmwater species. It will also significantly impact the year-class strength and structure of fish communities in the Great Lakes Basin. Notably decreasing amounts of coldwater and coolwater fish species and increasing warrmwater fish species.

Specific pages to note: **Pg. 51:** Increased water temperature could have affected Northern Pike negatively; decreasing their year-class strength. **Pg. 52:** For Lake Trout, temperature increase would affect their spawning success. If the water temperature increases, their successful spawning survival would drastically decrease. *Water temperature increase would alter the food web and prey base. *Increase of water temperature would positively affect warmwater fish.

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- Christie, W. J., and H. A. Regier. 1973. Temperature as a major factor influencing reproductive success of fish—two examples. Rapports et Proces-Verbaux des Reunions Conseil International pour l'Exploration de la Mer 164:208–218
- *Hill, D. K., and J. J. Magnuson. 1990. Potential effects of global climate warming on the growth and prey consumption of Great Lakes fish. Transactions of the American Fisheries Society 119:265–275*.
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4. Great Lakes Area National Park Service U.S. Department of the Interior. 2007. Climate Change: Dying Birch trees, minimal snowpack, and ice-free lakes are just

some Impacts of Midwest Warming. Available at http://www.nps.gov/apis/naturescience/upload/2007%20MWR%20Climate%20Change%20Site%20Bulletin%20-%20Great%20Lakes%20FINAL.pdf

Summary: This article, Dying Birch Trees, Minimal Snowpack, and Ice-Free Lakes Are Just Some Impacts of Midwest Warming discusses climate change effects in the Midwest Region. It touches on the science reports by the U.S. Global Change Research Program as well as others and how they show that this is due to greenhouse gases produced by human activities. In specific the article has sections on Temperature and Precipitation, The Ecological Effects, New Faces in New Places, and Recreation, Health and Safety.

Specific pages to note: * Cool tree species are projected to lose habitat in the U.S. Sugar Maple and Paper Birch are expected to shift towards Canada. For the Apostle Island Lakeshore and Michigan Upper peninsula Paper Birch may lose all habitats. *Coldwater fish such as Trout will decrease in abundance. Whitefish spawning areas will be disturbed and Native fish will be threatened.

5. International Joint Commission (IJC). 2003. Climate Change and Water Quality in the Great Lakes Basin. Available at http://www.ijc.org/rel/pdf/climate_change_2003.pdf.

Summary: Climate Change and Water Quality in the Great Lakes Basin is a report of the Great Lakes Water Quality Board to the International Joint Commission. It discusses how our climate has been changing and will continue to change in the future. Investigations on climate change were undertaken. In the full report it is broken into the Water Quality Board's Advice to the International Joint Commission, Climate Change and Water Quality in the Great Lakes Region – Risks, Opportunities and Responses, Summary of the Climate Change Workshop, and Cross Boarder Tools and Strategies.

Specific pages to note: **Pg. 52:** Lake warming may shorten breeding windows for fish. This could affect both Lake Trout and Northern Pike. These fish species as well as coldwater fish species could potentially lose their habitat area.

References Cited to Consider:

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Specific pages to note: **Pg. 2:** Whitefish reproduction could be threatened with the loss of winter ice [Coldwater fish (Lake Trout, Whitefish, Herring) and Coolwater fish (Northern Pike, Walleye) are likely to decline in abundance]. **Pg. 54-55**: If warmwater fish species expand and increase in number in Lake Superior, this could lead to the extirpation (local extinction) of native minnows. This could have negative impacts on Lake Trout and other Native predators.

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Lake Sturgeon: Name

Lake Herring:

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In land Fish

Walleye: Ogaa

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- *Hill, D.K., and J.J. Magnuson (1990). Potential effects of global climate warming on the growth and prey consumption of Great Lakes fi sh. Transactions of the American Fisheries Society 119:265–275. American Fisheries Society 119:265–275.*
- Magnuson, J.J., et al. (1997). Potential effects of climate change on aquatic systems: Laurentian Great Lakes and Precambrian Shield Region. In Freshwater Ecosystems and Climate Change in North America: A Regional Assessment. C.E. Cushing, ed. New York: John Wiley & Sons, pp. 7–53.

- *Magnuson, J.J., J.D. Meisner, and D.K. Hill (1990). Potential changes in the thermal habitat of Great Lakes fish after global climate warming. Transactions of the American Fisheries Society 119:254–264. American Fisheries Society 119:254–264*
- Shuter, B.J., C.K. Minns, and N. Lester (2002). Climate change, freshwater fi sh and fi sheries: Case studies from Ontario and their use in assessing potential impacts. In Fisheries in a Changing Climate. N.A. McGinn, ed. Bethesda, Md.: American Fisheries Society, pp. 77–88.
- *Stefan, H.G., X. Fang, and J.G. Eaton (2001). Simulated fish habitat changes in North American lakes in response to projected climate warming. Transactions of the American Fisheries Society 130:459–477*.

Northern Pike: Ginoozhe

1. Bronte, C.R., Ebener M.P., Schreiner D.R., DeVault D.S., Petzold M.M., Jensen D.A., Richards C., and Lozano S.J. (2003). Fish Community Change in Lake Superior, 1970-2000. *Canadian Journal of Fisheries and Aquatic Sciences,* 60(12), 1552–1574. Available at http://www.fws.gov/midwest/fisheries/scientific-pubs/p-2003-2.pdf

Summary: The Fish Community Change in Lake Superior discusses the changes in Lake Superior's fish communities from 1970 – 2000. In specific it touches on habitat degradation, contaminants, effects of climate warming, phosphorus loading, intentional and unintentional species introductions, as well as other topics. Habitat protection and enhancement to prevent additional damaging effects is needed to further restoration.

Specific pages to note: **Pg. 1554:** Climate warming is projected to increase thermal habitat; would be for Lake Trout, Lake Whitefish, Northern Pike, where non-indigenous species would benefit. This article focuses on fish species recovery.

References Cited to Consider:

- Bronte, C.R., and Hoff, M.H. 1996. Population status and trends for Lake Superior forage fishes, 1978–95. In Minutes of the 1996 Annual Meeting of the Lake Superior Committee, Great Lakes Fishery Commission. Great Lakes Fishery Commission, Ann Arbor, Mich.
- Bronte, C.R., Schram, S.T., Selgeby, J.H., and Swanson, B.L. 1995. Density independent survival of wild lake trout in the Apostle Islands area of Lake Superior. J. Gt. Lakes Res. 21 (Suppl. 1): 246–252.

- Bronte, C.R., Hesselberg, R.J., Shoesmith, J.A., and Hoff, M.H. 1996. Discrimination among spawning concentrations of Lake Superior lake herring based on trace element profiles in sagittae. Trans. Am. Fish. Soc.125: 852–859.
- Ebener, M.P. 1990. Assessment and mark–recapture of lake whitefish spawning stocks around the Keweenaw Peninsula area of Lake Superior, 1987–1990. Admin. Rep. 90-10, Great Lakes Indian Fish and Wildlife Commission, Odanah, Wis.
- *Hill, D.K., and Magnuson, J.J. 1990. Potential effects of global climate warming on the growth and prey consumption of Great Lakes fishes. Trans. Am. Fish. Soc. 119: 265–275*.
- *Magnuson, J.J., Meisner J.D., and Hill, D.K. 1990. Potential changes in thermal habitat of Great Lakes fishes due to global climate warming. Trans. Am. Fish. Soc. 119: 254–264*.
- *Mandrak, N.E. 1989. Potential invasion of the Great Lakes by fish species associated with climate warming. J. Gt. Lakes Res. 15:306–316*.
- Selgeby, J.H. 1982. Decline of lake herring (Coregonus artedii)in Lake Superior: an analysis of the Wisconsin herring fishery. Can. J. Fish. Aquat. Sci. 39: 554–563.
- Sinokrot, B.A., Stefan, H.G., McCormick, J.H., and Eaton, J.G. 1995. Modeling of climate change effects on stream temperatures and fish habitats below barrier dams and near groundwater inputs. Clim. Change, 30: 181–200.

2. Casselman, J.M. 2002. Effects of temperature, global extremes, and climate change on year-class production of warmwater, coolwater, and coldwater fishes in the Great Lakes basin. Am. Fish. Soc. Symp. 31: 39–60. Available at ftp://142.36.245.139/.virtual/slk6ftp/pub/outgoing/requests/!age_analysis/CD1/Selected%20Age-Growth%20Publications/Climate%20and%20year-class%20production%20of%20fish,%20AFS%20Symposium,%20C.pdf

Summary: The Effects of Temperature, Global Extremes, and Climate Change on Year-Class Production of Warmwater, Coolwater, and Coldwater fishes in the Great Lakes Basin discuss the impacts of global warming on fisheries. For this they explain the effects of temperature change on fish. Global warming will substantially increase the year-class strength of warmwater species. It will also significantly impact the year-class strength and structure of fish communities in the Great Lakes Basin. Notably decreasing amounts of coldwater and coolwater fish species and increasing warrmwater fish species.

Specific pages to note: **Pg. 51:** Increased water temperature could have affected Northern Pike negatively; decreasing their year-class strength. **Pg. 52:** For Lake Trout, temperature increase would affect their spawning success. If the water temperature increases, their successful

spawning survival would drastically decrease. *Water temperature increase would alter the food web and prey base. *Increase of water temperature would positively affect warmwater fish.

References Cited to Consider:

- Christie, W. J., and H. A. Regier. 1973. Temperature as a major factor influencing reproductive success of fish—two examples. Rapports et Proces-Verbaux des Reunions Conseil International pour l'Exploration de la Mer 164:208–218
- *Hill, D. K., and J. J. Magnuson. 1990. Potential effects of global climate warming on the growth and prey consumption of Great Lakes fish. Transactions of the American Fisheries Society 119:265–275*.
- Kawasaki, T. 2001a. Global warming could have a tremendous effect on the world fisheries production. Journal of International Fisheries 4(1):17–21
- King, J. R., B. J. Shuter, and A. P. Zimmerman. 1999b. Empirical links between thermal habitat, fish growth, and climate change. Transactions of the American Fishieries Society 128:656–665.
- *Mandrak, N. E. 1989. Potential invasion of the Great Lakes by fish species associated with climatic warming. Journal of Great Lakes Research 15:306–316*.
- Meisner, J. D., J. L. Goodier, H. A. Regier, B. J. Shuter, and W. J. Christie. 1987. An assessment of the effects of climate warming on Great Lakes Basin fishes. Journal of Great Lakes Research 13:340–352.
- *Stefan, H. G., X. Fang, and J. G. Eaton. 2001. Simulated fish habitat changes in North American lakes in response to projected climate warming. Transactions of the American Fisheries Society 130:459–477*.

3. International Joint Commission (IJC). 2003. Climate Change and Water Quality in the Great Lakes Basin. Available at http://www.ijc.org/rel/pdf/climate_change_2003.pdf.

Summary: Climate Change and Water Quality in the Great Lakes Basin is a report of the Great Lakes Water Quality Board to the International Joint Commission. It discusses how our climate has been changing and will continue to change in the future. Investigations on climate change were undertaken. In the full report it is broken into the Water Quality Board's Advice to the International Joint Commission, Climate Change and Water Quality in the Great Lakes Region – Risks, Opportunities and Responses, Summary of the Climate Change Workshop, and Cross Boarder Tools and Strategies.

Specific pages to note: **Pg. 52:** Lake warming may shorten breeding windows for fish. This could affect both Lake Trout and Northern Pike. These fish species as well as coldwater fish species could potentially lose their habitat area.

References Cited to Consider:

- Brandt, S., D. Mason, M. McCormick, B. Lofgren, and T. Hunter. 2002. "Climate change: implications for fish growth performance in the Great Lakes." American Fisheries Society Symposium 32: 61-76.
- *Casselman, J.M., D.M. Brown, J.A. Hoyle, and T.H. Eckert. 2002. "Effects of climate change and global warming on year-class strength and relative abundance of smallmouth bass in eastern Lake Ontario." American Fisheries Society Symposium 31: 73-9.*
- Cherry, M. 1998. "Genetic implications of climate change." In S. Colombo and L. Buse (eds.) The Impacts of Climate Change on Ontario's Forests. Forest Research Information Paper No. 43. Ontario: Ministry of Natural Resources. ***Mentions Sugar Maple**
- Davis, M., C. Douglas, R. Calcote, K. Cole, M. Green Winkler, and R. Flaknes. 1999. "Holocene climate in the western Great Lakes national parks and lakeshores: implications for future climate change." Conservation Biology 14 (4): 968-983.
- *Hill, D. and J. Magnuson. 1990. "Potential effects of global climate warming on the growth and prey consumption of Great Lakes fish." Transactions of the American Fisheries Society 119: 265-275*.
- Iverson, L. and A. Prasad. 2001. "Potential changes in tree species richness and forest community types following climate change." Ecosystems 4: 186-199.
- Walker, K., M. Davis, and S. Sugita. 2002. "Climate change and shifts in the potential tree species range limits in the Great Lakes region." Journal of Great Lakes Research 28 (4): 555-567.

4. Kling, G.W., K. Hayhoe, L.B. Johnson, J.J. Magnuson, S. Polasky, S.K. Robinson, B.J. Shuter, M.M. Wander, D.J. Wuebbles, and D.R. Zak. 2003. Confronting Climate Change in the Great Lakes Region. A Report of the Union of Concerned Scientists and the Ecological Society of America. Available at http://www.ucsusa.org/assets/documents/global_warming/greatlakes_final.pdf

Summary: Confronting Climate Change in the Great Lakes Region is a report of The Union of Concerned Scientists and The Ecological Society of America. This report explains that growing evidence suggests that climate change is already affecting the Great Lakes Region: winters are shorter, average temperatures are warmer, lake ice cover is decreasing, and heavy rainstorms

are more common. The potential consequences from climate change for the Great Lakes Region are confronted for the economic as well as the environmental impacts.

Specific pages to note: **Pg. 2:** Whitefish reproduction could be threatened with the loss of winter ice [Coldwater fish (Lake Trout, Whitefish, Herring) and Coolwater fish (Northern Pike, Walleye) are likely to decline in abundance]. **Pg. 54-55**: If warmwater fish species expand and increase in number in Lake Superior, this could lead to the extirpation (local extinction) of native minnows. This could have negative impacts on Lake Trout and other Native predators. "Climate warming will greatly reduce the amount of thermally suitable habitat for Lake Trout in many inland lakes." **Pg. 60:** Moose could be harmed by warming: increase in deer populations could carry disease that will stress the moose population.

References Cited to Consider:

- *Hill, D.K., and J.J. Magnuson (1990). Potential effects of global climate warming on the growth and prey consumption of Great Lakes fi sh. Transactions of the American Fisheries Society 119:265–275. American Fisheries Society 119:265–275.*
- Magnuson, J.J., et al. (1997). Potential effects of climate change on aquatic systems: Laurentian Great Lakes and Precambrian Shield Region. In Freshwater Ecosystems and Climate Change in North America: A Regional Assessment. C.E. Cushing, ed. New York: John Wiley & Sons, pp. 7–53.
- *Magnuson, J.J., J.D. Meisner, and D.K. Hill (1990). Potential changes in the thermal habitat of Great Lakes fish after global climate warming. Transactions of the American Fisheries Society 119:254–264. American Fisheries Society 119:254–264*
- Shuter, B.J., C.K. Minns, and N. Lester (2002). Climate change, freshwater fi sh and fi sheries: Case studies from Ontario and their use in assessing potential impacts. In Fisheries in a Changing Climate. N.A. McGinn, ed. Bethesda, Md.: American Fisheries Society, pp. 77–88.
- *Stefan, H.G., X. Fang, and J.G. Eaton (2001). Simulated fish habitat changes in North American lakes in response to projected climate warming. Transactions of the American Fisheries Society 130:459–477*.

Wildlife

Pine Marten (American Marten): Waabizheshi

1. National Wildlife Federation. 2010. Improving the Odds: Using Climate-Readiness Planning to Reduce the Impacts of Climate Change on the Great Lakes Ecosystem. Available at http://www.nwf.org/News-and-Magazines/Media-Center/News-by-

Topic/Global-Warming/2010/10-29-10-Great-Lakes-Adaptation-Report.aspx.

Summary: Improving the Odds was created by the National Wildlife Federation to bring awareness to Climate Change and to reduce the impacts of Climate Change. The report describes and analyzes climate-readiness initiatives in the Great Lakes Region. There are specifically looking at restoration practices that reduce climate impacts, implementing climate ready strategies and others. This is crucial to protect our natural resources, infrastructures, public health, as well as fresh water.

Specific pages to note: **Pg. 31:** It is expected that the Pine Marten will find no suitable habitat in Wisconsin. **Pg. 40:** Increased temperature of Lake Superior would benefit Sea Lamprey. This in turn will negatively affect fish species. Sea Lamprey feed on fish and warmer waters would allow for bigger growing Sea Lamprey. This will negatively affect Lake Trout, Herring, Whitefish as well as other species.

References Cited to Consider:

- Wisconsin Initiative on Climate Change Impacts. 2010. Wildlife Working Group. http://wicci.wisc.edu/workinggroups/wildlife/index.htm
- US Environmental Protection Agency. Climate Change. http://www.epa.gov/climatechange/impacts-adaptation/
- U.S. Department of the Interior National Park Service. 2007. Climate Change and Impacts to Resources around the Great Lakes. August 2007

2. Wisconsin Department of Natural Resources: Bureau of Endangered Resources. 2011. Management and Conservation Plan for American Martens in Wisconsin. Available at http://dnr.wi.gov/files/PDF/pubs/ER/ER0697.pdf

Summary: Management and Conservation Plan For American Martens In Wisconsin was created by the Wisconsin Department of Natural Resources as a plan to update the conservation status of the American Marten to ensure they remain a viable member in Wisconsin today and for generations to come. This plan provides background information on Martens including both the cultural significance and socio-economic importance of the Marten. It also provides past and current status of the Marten's life histories, habitats, and threats. It provides information on current research, management goals, and research needs.

Specific pages to note: **Pg. 20:** Climate change will decrease the amount of snowfall or snow pack. Martens need this snow to help them escape from predators. They will also lose their advantage over fishers and other competitors resulting from climate change or climate

warming.

References Cited to Consider:

- Dumyahn, J.B., P.A. Zollner, and J.H. Gilbert. 2007. Winter home-range characteristics of American marten (Martes americana) in Northern Wisconsin. American Midland Naturalist 158:382-394.
- Proulx, G., K. Aubry, J. Birks, S. Buskirk, C. Fortin, H. Frost, W. Krohn, L. Mayo, V. Monakhov, D. Payer, M. Saeki, M. Santos-Reis, R. Weir, and W. Zielinski. 2004. World distribution and status of the genus Martes in 2000. Pp. 21-76 in in D.J. Harrison, A.K. Fuller, and G. Proulx, eds. Martens and fishers (Martes) in human-altered environments: An international perspective. Springer, New York, NY.
- Woodford, J., C. Eloranta, T. Rinaldi, and B. Kohn. 2005. Inventory, status, and management needs of American Marten in northeast Wisconsin. Wisconsin Department of Natural Resources, Madison, WI. 10pp.
- Wydeven, A.P., J.E. Wiedenhoeft, and J.E. Woodford. 2007. Status of the American marten in Wisconsin. Wisconsin Endangered Resources Report No. 135. Wisconsin Department of Natural Resources, Madison, WI. 9pp.

3. Wisconsin Initiative on Climate Change Impacts. 2011. Wisconsin's Changing Climate: Impacts and Adaptation. Nelson Institute for Environmental Studies, University of Wisconsin- Madison and the Wisconsin Department of Natural Resources. Available at http://www.wicci.wisc.edu/publications.php

Summary: This report was created by the Wisconsin Initiative on Climate Change Impacts. It discusses Wisconsin's changing climate in which we now have a warmer, wetter Wisconsin climate. This change has affected precipitation, air temperatures, the quantity and quality of Wisconsin's water resources, natural habitats, agriculture, as well as others. This report is to provide information so that Wisconsin can adapt to the impacts of climate change and create strategies to adapt successfully to current and future climate change.

Specific pages to note: **Chapter 4:** The marten needs areas underneath the snow. Climate warming will lead to increasing in snow density. This will decrease the amount of thermal insulation which the Marten needs for survival. Climate warming will expose the Marten to the cold weather. Also Climate change will threaten the Marten's food source. Martens will also be threatened by more preditation; there will be fewer areas for the Marten to hide.

Fisher: Ojiig Martes pennanti

1. Olson, L. E., Sauder, J. D., Albrecht, N. M., Vinkey, R. S., Cushman, S. A., & Schwartz, M. K. (2014). Modeling the effects of dispersal and patch size on predicted fisher (Pekania [Martes] pennanti) distribution in the US Rocky Mountains. *Biological Conservation*, *169*, 89-98.

Summary: Modeling the effects of dispersal and patch size on predicted fisher distribution in the US Rocky Mountains is an article discussing the impacts climate change will have on habitats. This article specifically looks at the fisher, an already threatened species. They specifically look at fishers located across western Montana and Northern Idaho.

Specific pages to note: **Pg. 93:**The variables that contribute the most to fisher habitat suitability are 25-20 m canopy height, montane riparian vegetation, topographic positions index and mean annual precipitation. 3.2: Fisher habitat is predicted to increase. Fisher habitat is also predicted to shift north. **Pg. 95:** Fishers were more likely to occur in areas with higher mean annual precipitation, mid-range minimum winter temperatures… across both models. **Pg. 97:** Fishers are predicted to expand under climate warming but if they cannot find suitable habitat to disperse in distance greater than 4km then they will likely decline over time.

References Cited to Consider:

- Chen, I.C., Hill, J.K., Ohlemuller, R., Roy D.B., Thomas C.D., 2011. Rapid range shifts of species associated with high levels of climate warming. Science 333, 1024–1026.
- Early, R., Sax, D.F., 2011. Analysis of climate paths reveals potential limitations on species range shifts. Ecology Letters 14, 1125–1133
- Jones, J.L., Garton, E.O., 1994. Selection of successional stages by fishers in north central Idaho. In: Buskirk, S.W., Harestad, A.S., Raphael, M.G., Powell, R.A. (Eds.), Marten, Sables and Fisher: Biology and Conservation. Cornell University Press, Ithaca, NY.
- *Krohn, W.B., Elowe, K.D., Boone, R.B., 1995. Relations among fishers, snow, and martens: development and evaluation of two hypotheses. The Forestry Chronicle 71, 97–105.*
- Wasserman, T.N., Cushman, S.A., Shirk, A.S., Landguth, E.L., Littell, J.S., 2012. Simulating the effects of climate change on population connectivity of American marten (Martes americana) in the northern Rocky Mountains, USA. Landscape Ecology 27, 211–225.

2. McCamman J. (2010). Report to the California Fish and Game Commission: A Status Review of the Fisher (Martes pennanti) in California. State of California Natural Resources Agency Department of Fish and Game. Available at, https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=27900

Summary: A status Review of the Fisher in California was created to report to the California Fish and Game Commission about the current status of the fisher. This report was designed to give background history on the Fisher and their habits, what is needed for their survival, their distribution and abundance, and potential threats to the Fisher. One threat indicated for the Fisher is the current and projected future climate change.

Specific pages to note: **Pg. 57-60:** Prey and den availability for the Fisher may change. Climate Change may exacerbate wildfires which would have negative impacts on Fishers. Stress caused by unideal temperature conditions may lead Fishers to become more susceptible to disease. Lack of deep snow may allow w the Fisher to inhabit areas otherwise not available (as long as wildfires do not destroy the areas making them unsuitable first).

References Cited to Consider:

- Green, G.A., L.A. Campbell, and D.C. MacFarlane. 2008. Submitted. A conservation assessment for fishers (*Martes pennanti*) in the Sierra Nevada of California. USDA Forest Service, Pacific Southwest Region, Vallejo, California, 72pages.
- Harvell, C. D., C. E. Mitchell, J. R. Ward, S. Altizer, A. P. Dobson, R. S. Ostfeld, and M.D. Samuel. 2002. Climate warming and disease risks for terrestrial and marine biota. Science 296 No. 5576: 2158-2162.
- Heinemeyer, K. S. and J. L. Jones. 1994. Fisher biology and management in the western United States: a literature review and adaptive management strategy. Version 1.1. USDA Forest Service Northern Region and Interagency Forest Carnivore Working Group. 120 pp.
- Moritz, C, J. L. Patton, C. J. Conroy, J. L. Parra, G. C. White, S. R. Beissinger. 2008. Impact of a century of climate change on small mammal communities in Yosemite National Park, USA. Science 322:261-264.
- *Safford, H.D. 2006. Potential impacts of climate change to fisher habitat in California: a preliminary assessment. Unpublished report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA*.

3. Safford, H.D. 2006. Potential impacts of climate change to fisher habitat in California: a preliminary assessment. Unpublished report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. Available at http://www.sierraforestlegacy.org/Resources/Conservation/SierraNevadaWildlife/PacificFisher/PF-Safford06.pdf

Summary: This unpublished article addresses the potential impacts that Climate Change could have on the Fisher. Findings indicate that fire is likely to become much more frequent which

would have negative impacts on the Fisher. Fires are likely to destroy many habitats needed by the Fisher for denning.

Specific pages to note: **Pg. 9:** Fishers will more than likely lose crucial denning habitat due to fire increases. However, Fishers may be enhanced by climate warming as long as precipitation levels stay about what they are currently.

References Cited to Consider:

- Harrison, D. J., A. K. Fuller, and G. Proulx. 2004. Martens and fishers (Martes) in human-altered environments: an international perspective. Springer, New York, New York, USA.
- *Krohn, W. B, W. J. Zielinski, and R. B. Boone. 1997. Relations among fishers, snow, and martens in California: results from small-scale spatial comparisons. Pp. 211-232, in: G. Proulx, H. N. Bryant, and P. M. Woodard (eds). Martes: taxonomy, ecology, techniques, and management. Provincial Museum of Alberta, Edmonton, Canada.*

Bobcat: Gidaagaa – Bizhiw

Moose: Mooz

1. Kling, G.W., K. Hayhoe, L.B. Johnson, J.J. Magnuson, S. Polasky, S.K. Robinson, B.J. Shuter, M.M. Wander, D.J. Wuebbles, and D.R. Zak. 2003. Confronting Climate Change in the Great Lakes Region. A Report of the Union of Concerned Scientists and the Ecological Society of America. Available at http://www.ucsusa.org/assets/documents/global_warming/greatlakes_final.pdf

Summary: Confronting Climate Change in the Great Lakes Region is a report of The Union of Concerned Scientists and The Ecological Society of America. This report explains that growing evidence suggests that climate change is already affecting the Great Lakes Region: winters are shorter, average temperatures are warmer, lake ice cover is decreasing, and heavy rainstorms are more common. The potential consequences from climate change for the Great Lakes Region are confronted for the economic as well as the environmental impacts.

Specific pages to note: **Pg. 2:** Whitefish reproduction could be threatened with the loss of winter ice [Coldwater fish (Lake Trout, Whitefish, Herring) and Coolwater fish (Northern Pike, Walleye) are likely to decline in abundance]. **Pg. 54-55**: If warmwater fish species expand and increase in number in Lake Superior, this could lead to the extirpation (local extinction) of

native minnows. This could have negative impacts on Lake Trout and other Native predators. "Climate warming will greatly reduce the amount of thermally suitable habitat for Lake Trout in many inland lakes." **Pg. 60:** Moose could be harmed by warming: increase in deer populations could carry disease that will stress the moose population.

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- *Hill, D.K., and J.J. Magnuson (1990). Potential effects of global climate warming on the growth and prey consumption of Great Lakes fi sh. Transactions of the American Fisheries Society 119:265–275. American Fisheries Society 119:265–275.*
- Magnuson, J.J., et al. (1997). Potential effects of climate change on aquatic systems: Laurentian Great Lakes and Precambrian Shield Region. In Freshwater Ecosystems and Climate Change in North America: A Regional Assessment. C.E. Cushing, ed. New York: John Wiley & Sons, pp. 7–53.
- *Magnuson, J.J., J.D. Meisner, and D.K. Hill (1990). Potential changes in the thermal habitat of Great Lakes fish after global climate warming. Transactions of the American Fisheries Society 119:254–264. American Fisheries Society 119:254–264*
- Shuter, B.J., C.K. Minns, and N. Lester (2002). Climate change, freshwater fi sh and fi sheries: Case studies from Ontario and their use in assessing potential impacts. In Fisheries in a Changing Climate. N.A. McGinn, ed. Bethesda, Md.: American Fisheries Society, pp. 77–88.
- *Stefan, H.G., X. Fang, and J.G. Eaton (2001). Simulated fish habitat changes in North American lakes in response to projected climate warming. Transactions of the American Fisheries Society 130:459–477*.

2. Lankester, M.W. 2010. Understanding the Impact of Meningeal Worm, Parelaphostrongylus tenuis, on Moose Populations. Alces Vol. 46: 53-70.

Summary: Understanding the Impacts of Meningeal Worm on Moose Populations is an article that explores the declines in moose populations that have occurred during the past century. In general these decreases in moose population are associated with higher deer populations. This inverse relationship is caused by the Meningeal worm, a parasite that white-tailed deer carry and have shown deadly to moose population when stressed. Climate change causing warmer winters is a factor that has caused an increase in deer population in moose habitat.

Specific pages to note: **Pg. 54:** There is a seen inverse relationship between moose and deer density. Less severe winters allow for an increase of deer density that then transmits diseases to the moose populations. *With Climate warming the frequency of less-severe winters would increase. This would allow for an increase in deer density which would negatively affect moose

populations.

References Cited to Consider:

- *Lenarz, M. S., Nelson, M. E., Schrage, M. W., & Edwards, A. J. (2009). Temperature mediated moose survival in northeastern Minnesota. The Journal of Wildlife Management, 73(4), 503-510*.
- *Murray, D. L., Cox, E. W., Ballard, W. B., Whitlaw, H. A., Lenarz, M. S., Custer, T. W., ... & Fuller, T. K. (2006). Pathogens, nutritional deficiency, and climate influences on a declining moose population. Wildlife Monographs, 166(1), 1-30*.

3. Michigan Technical University. 2007. Global Warming Threatens Moose, Wolves. Michigan Tech News/Media, August 15, 2007. Available at http://www.admin.mtu.edu/urel/news/media_relations/592.

Summary: The article Global Warming Threatens Moose, Wolves discusses the fact that if moose and wolves go extinct it will because of humans that make climate change increase at a faster rate. Hot summers exacerbate moose ticks which combined with the heat are detrimental to moose populations. The hot summers and ticks make moose easy prey for wolves to kill. If moose continue to drop in population it will not only affect the moose themselves but wolf population as well.

Specific pages to note: *The heat threatens the Moose. Hot weather causes moose to forage less and rest more. If they forages less it will be less likely that they survive in the winter.

4. Minnesota Department of Natural Resources. 2011. Minnesota Moose Research and Management Plan. Available at http://www.dnr.state.mn.us/moose/index.html.

Summary: The Minnesota Moose Research and Management Plan which was created by the Minnesota Department of Natural Resources because the moose population in Minnesota is currently in decline. Their findings show that moose population decline is associated with increasing summer temperature. This report is recommendations to DNR to better understand what the moose populations need to reverse this decline.

Specific pages to note: **Pg. 30:** Research implies that climate warming is contributing to the high mortality rates of moose. Higher temperatures are contributing to stress on moose, which leave them vulnerable to disease, predators, parasites, etc. There is a link between moose populations and climate warming.

References Cited to Consider:

- *Lenarz, M. S., Nelson, M. E., Schrage, M. W., & Edwards, A. J. (2009). Temperature mediated moose survival in northeastern Minnesota. The Journal of Wildlife Management, 73(4), 503-510*.
- *Murray, D. L., Cox, E. W., Ballard, W. B., Whitlaw, H. A., Lenarz, M. S., Custer, T. W., ... & Fuller, T. K. (2006). Pathogens, nutritional deficiency, and climate influences on a declining moose population. Wildlife Monographs, 166(1), 1-30*.
- Post, E. and N. C. Stenseth. 1998. Large-Scale Climatic Fluctuation and Population Dynamics of Moose and White-Tailed Deer. Journal of Animal Ecology. 67: 537-543.

Plants

Wild Rice: Manoomin

1. Cuffe, S. 2014. Wild Rice and High Water: A Northern Harvest Under Threat. Briarpatch Magazine. Available at: http://briarpatchmagazine.com/articles/view/wild-rice-and-high-water

Summary: An article written to discuss Wild Rice and harvesters in Saskatchewan and Minnesota. Methods to try and control the wild rice while facing the effects of climate change. This article touches on the sensitivity wild rice has to environment change and that climate change can cause stress on the rice. Wild Rice is a traditionally important crop to the Anishinaabe and now there are domesticated hybrids of it, which also bring risks to the natural wild rice.

Specific Pages to Note: Wild rice is very susceptible to water change. If it gets too high at certain times of the year it will drown out the wild rice which, climate change could have an effect on. Strong winds, heavy rains, and hail can cause damage to wild rice crops. This plant also depends on a certain amount of natural water circulation, and is very particular of when, where, and how it grows.

2. Ojibwe Lifeway: Wild Rice Harvesting ("Dagwaagin" – Fall). Gikinoo'wizhiwe Onji Waaban (Guiding For Tomorrow) "G-WOW" Changing Climate, Changing Culture. Available at: http://www.g-wow.org/en-us/wildrice/default.aspx

Summary: Gikinoo'wizhiwe Onji Waaban is a website designed to look at Ojibwe lifeways and how they are affected by climate change. This specific one looks to understand wild rice, the importance of the crop to the Ojibwe people and climate related stressors that have been and

will affect these wild rice crops.

Specific Pages to Note: Climate Related issues: water level has dire consequences to wild rice; it can kill the plants with either too little or too much water. Intense rainfall can also drown wild rice plants or uproot them. Certain invasive species are out competing wild rice crops. Disease and insects that damage wild rice have been increasing noticeable with the warming climate.

3. Hoene, N. 2010. Climate Change, an Ojibwe Perspective. The Seiche. Minnesota Sea Grant, March 2010. Available at http://www.seagrant.umn.edu/newsletter/2010_03.html.

Summary: Climate Change, an Ojibwe Perspective is an article discussing different Tribal members and their observation on the effects of climate change. Wild Rice, Maple Sugar, Birch, Pine, and other elements used in the Ojibwe culture are discussed on how climate change will impact them.

Specific pages to note: **Maple Sugar:** Sap has been running sooner; with a warmer climate it could start to run, and then stop. **Wild Rice:** It cannot stand extreme water level changes. **Coldwater Fish:** They will not stay if the streams warm by even a few degrees. **Tree:** A warmer climate means the loss of Birch, and potentially Sugar Maple if there is an increase in forest fires.

4. Myers, J. 2014. Wild Rice Under the Microscope: Scientists Work Fast to Learn What Sulfate Does to Minnesota's Iconic Natural Food. Minnesota Department of Natural Resources. Available at: http://www.dnr.state.mn.us/volunteer/mayjun13/wild_rice.html

Summary: This is a study conducted by the University of Minnesota on wild rice, specifically on the impact sulfate has on wild rice. It is specifically meant to understand the relationship between sulfate and wild rice. It discusses what wild rice needs for growth and factors could affect its growth. One factor briefly mentioned is climate change.

Specific Pages to Note: If sulfate is placed in the lakes, wild rice will not immediately die; there is a whole ecosystem that has to react which happens over years. Climate warming, floods and droughts also cause problems for wild rice crops. There are seen decreases in the amount of wild rice crops that have been having rice in them.

5. Pember, Mary A. 2012. Climate Change Threatens the Ojibwe's Wild Rice Harvest. Indian Country Today Media Network. Available at: http://indiancountrytodaymedianetwork.com/2012/11/02/climate-change-threatens-ojibwes-wild-rice-harvest-143579

Summary: An article written for Indian Country Today Media Network first discussing the importance of Wild Rice to the Ojibwe stories, mentioning their migration story. It mentions how wild rice crops have seen a total loss in 2012. Finally it goes through how climate change is a factor relating to the decreased amounts of wild rice in the sloughs.

Specific Pages to Note: Wild rice, manoomin favor colder temperatures, climate warming could cause manoomin to shift farther north. It could also have caused higher rates of disease within the crops of manoomin.

6. Yeager, C. Where Food Grows on Water: Environmental and Human Threats to Wisconsin's Wild Rice. 2011. Circle of Blue. Available at: http://www.circleofblue.org/waternews/2011/world/where-food-grows-on-water-environmental-and-human-made-threats-to-wisconsins-wild-rice/

Summary: This article is written on Wisconsin's rice beds and the threats that they face from both humans and the environment. It discusses the various growing stages wild rice goes through. Examples of climate change harming wild rice being water levels in the Great Lakes, storms, and heavy rains. Lastly, the article touches on the importance of Wild Rice to the Anishinaabe with an interview from Joe Rose, Bad River Tribal Elder.

Specific Pages to Note: A warming climate could lead to lower water levels in the Great Lakes; this would have dire impacts on wild rice crops. Increased flooding or heavy rains caused from climate change could drown or uproot wild rice crops especially when it is in its floating leaf stage (a critical and fragile time in the growth cycle). There have been seen changes in wild rice beds caused by climate change in Wisconsin.

Trees

Sugar Maple: Ziinzibaakwadaatig

1. *Frumhoff, P.C.; McCarthy, J.J.; Melillo, J.M.; Moser, S.C.; Wuebbles, D.J. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts and Solutions. Synthesis Report of the Northeast Climate Impacts Assessment (NECIA). Cambridge,*

MA: Union of Concerned Scientists. Available at: http://www.northeastclimateimpacts.org/pdf/confronting-climate-change-in-the-u-s-northeast.pdf

Summary: This report discusses the Northeast and how they experience huge climate diversity within a small area. This area has also experienced drastic climate change since 1970, with a warming rate of almost 0.5 degrees Fahrenheit per decade. With the experienced climate warming there have been seen changes in the environment. This report was created to understand past and future climate change, to understand the potential effects that climate change could bring about.

Specific pages to note: **Pg. 49 & 55:** Projections indicate that male habitat will shift northward under either climate change scenario. Southern species of trees eventually become their replacements in the Northeast. Climate change will also leave the maple tree more susceptible to disease, pests, drought, wildfire, and storm damage. **Pg. 55 & 58:** Sugar maple is expected to lose drastic amounts of suitable habitat. It could have the chance of surviving under climate warming but a warmer winter is expected disrupt the winter pattern sugar maples need for optimal syrup production. **Pg. 59:** With a projected decrease in Maples and the loss of their colorful changing leaves in the fall, tourism could suffer in the Northeast. **Pg. 74:** Maple Syrup has seen a shift in the time it usual is produced, which has caused a decline in the syrup industry. Global warming is one possibility as to why this shift has occurred, and is likely to keep occurring.

References Cited to Consider:

- Belluck, P. 2007. Warm Winters Upset Rhythms of Maple Sugar. The New York Times, March 3. Available at: http://www.nytimes.com/2007/03/03/us/03maple.html?pagewanted=1&ei=5070&en=8309fa4efa4d66b6&ex=1173589200&emc=eta1.
- Case, C.F. 2005. Climate Change Could Sour U.S. Maple Sugaring. The Christian Science Monitor. April 6. Available at: http://www.csmonitor.com/2005/0406/p11s01-sten.html.
- *Clean Air-Cool Planet. 2007. Climate Change and the Northern Forest. Available at:* http://www.cleanair-coolplanet.org/information/factsheets.php.
- *Hayhoe, K., C.P. Wake, B. Anderson, X.-Z. Liang, E. Maurer, J. Zhu, J. Bradbury, A. DeGaetano, A. Hertel, and D. Wuebbles. 2008. Regional Climate Change Projections for the Northeast U.S. Mitigation and Adaptation Strategies for Global Change. In press.*

- *Iverson, L., A. Prasad, and S. Matthews. 2008. Potential Changes in Suitable Habitat for 134 Tree Species in the Northeastern United States. Mitigation and Adaptation Strategies for Global Change. In press.*
- *Mohan, J.E., J.M. Melillo, K. Lenoir, R. Hanifin, J.H. Blanchard, T. Sipe, S. Sistla, P.A. Steudler, F. Bowles, and F.A. Bazzaz. 2007. Shifting Temperate Forest Composition with Soil Warming. Nature. In review.*
- *Ollinger, S.V., C.L. Goodale, K. Hayhoe, and J.P. Jenkins. 2008. Potential Effects of Climate Change and Rising CO_2 on Ecosystem Processes in Northeastern U.S. Forests. Mitigation and Adaptation Strategies for Global Change. In press.*
- Sheehan, J.F., and The Adirondack Council. 1998. Acid rain: A Continuing National Tragedy. Elizabethtown, NY. Available at: http://www.adirondackcouncil.org/acrapub.pdg.

2. Great Lakes Area National Park Service U.S. Department of the Interior. 2007. Climate Change: Dying Birch trees, minimal snowpack, and ice-free lakes are just some Impacts of Midwest Warming. Available at http://www.nps.gov/apis/naturescience/upload/2007%20MWR%20Climate%20Change%20Site%20Bulletin%20-%20Great%20Lakes%20FINAL.pdf

Summary: This article, Dying Birch Trees, Minimal Snowpack, and Ice-Free Lakes Are Just Some Impacts of Midwest Warming discusses climate change effects in the Midwest Region. It touches on the science reports by the U.S. Global Change Research Program as well as others and how they show that this is due to greenhouse gases produced by human activities. In specific the article has sections on Temperature and Precipitation, The Ecological Effects, New Faces in New Places, and Recreation, Health and Safety.

Specific pages to note: * Cool tree species are projected to lose habitat in the U.S. Sugar Maple and Paper Birch are expected to shift towards Canada. For the Apostle Island Lakeshore and Michigan Upper peninsula Paper Birch may lose all habitats. *Coldwater fish such as Trout will decrease in abundance. Whitefish spawning areas will be disturbed and Native fish will be threatened.

3. Hoene, N. 2010. Climate Change, an Ojibwe Perspective. The Seiche. Minnesota Sea Grant, March 2010. Available at http://www.seagrant.umn.edu/newsletter/2010_03.html.

Summary: Climate Change, an Ojibwe Perspective is an article discussing different Tribal members and their observation on the effects of climate change. Wild Rice, Maple Sugar, Birch,

Pine, and other elements used in the Ojibwe culture are discussed on how climate change will impact them.

Specific pages to note: **Maple Sugar:** Sap has been running sooner; with a warmer climate it could start to run, and then stop. **Wild Rice:** It cannot stand extreme water level changes. **Coldwater Fish:** They will not stay if the streams warm by even a few degrees. **Tree:** A warmer climate means the loss of Birch, and potentially Sugar Maple if there is an increase in forest fires.

4. Ojibwe Lifeway: Maple Sugaring and Birch Bark Harvesting ("Ziigwan" – Spring). Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) "G-Wow" Changing Climate, Changing Culture. Available at: http://www.g-wow.org/en-us/maple_birch/default.aspx

Summary: Gikinoo'wizhiwe Onji Waaban is a website designed to look at Ojibwe lifeways and how they are affected by climate change. This specific one looks to understand both sugar maples and birch bark trees. It covers the specific cultural importance of these trees. As well as, includes impacts they face resulting from climate change and possible climate change stressors.

Specific Pages to Note: Climate warming will cause a decrease in suitable habitat for Sugar Maple. Climate warming could also have an impact on soil moisture which will inhibit Sugar Maple's effectiveness to receive water and nutrients. Climate change may also allow for an increase in disease and pests. Lastly, shorter winters may cause stress on the Sugar Maple and allow for greater vulnerability to pests. This in turn will cause a decrease in the Maple Sap production.

5. *Rustad, L., Campbell, J., Dukes, J.S., Huntington, T., Lambert, K.F., Mohan, J., Rodenhouse, N. Changing Climate, Changing Forests: The Impacts of Climate Change on Forests of the Northeastern United States and Eastern Canada. United States Department of Agriculture. 2012. Available at*: http://www.nrs.fs.fed.us/pubs/gtr/gtr_nrs99.pdf

Summary: This was created to study climate change and the effects it poses on forest ecosystems with the goal to provide important insights for forest science, management, and policy. Climate change is predicted to have dire effects on habitat locations of tree species. A decline in suitable habitats is expected with a change in abundance and distribution of wildlife.

Specific pages to note: **Pg. 13**: Tourism would be affected with a shift from Sugar maples to Oaks. **Pg. 17 & 18:** Table 2. Shows that Sugar maple is expected to lose suitable habitat. Maple will lose habitat in either climate change scenario. **Pg. 20:** Sugar maple could decline based on prolonged thaw-freeze events.

References Cited to Consider:

- Bertrand, A.; Robitaille, G.; Nadeau, P.; Boutin, R. 1994. Effects of Soil Freezing and Drought Stress on Abscisic Acid Content of Sugar Maple Sap and Leaves. Tree Physiology. 14(4): 413-425.
- Burton, A.J.; Pregitzer, K.S; Zogg, G.P.; Zak, D.R. 1998. Drought Reduces Rot Respiration in Sugar Maple Forests. Ecological Applications. 8: 771-778.
- *Frumhoff, P.C.; McCarthy, J.J.; Melillo, J.M.; Moser, S.C.; Wuebbles, D.J. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts and Solutions. Synthesis Report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists. 146 p.*
- *Iverson, L.R.; Prasad, A.; Matthews, S. 2008. Modeling Potential Climate Change Impacts on the Trees of the Northeastern United States. Mitigation and Adaptation Strategies for Global Change. 13: 517-540.*
- *Ollinger, S.V.; Goodale, C.L.; Hayhoe, K.; Jenkins, J.P. 2008. Potential Effects of Climate Change and Rising CO_2 on Ecosystem Processes in Northeastern U.S. Forests. Mitigation and Adaptation Strategies for Global Change. 13: 467-485.*
- *Woodall, C.W.; Oswalt, C.M.; Westfall, J.A.; Perry, C.H.; Nelson, M.D.; Finley, A.O. 2009. An Indicator of Tree Migration in Forests of the Eastern United States. Forest Ecology and Management. 257: 1434-1444*.

6. http://www.fs.fed.us/nrs/atlas/tree/241
   http://www.fs.fed.us/nrs/atlas/tree/318
   http://www.fs.fed.us/nrs/atlas/tree/375
   http://www.fs.fed.us/nrs/atlas/tree/543

Summary: These websites show the current distribution of the Northern White Cedar, Sugar Maple, Paper Birch, and Black Ash respectively. They are maps created by the United States Department of Agriculture Forest Service to show the current distribution, projected future habitat, and predictor maps of these tree species. They are interactive maps where you can see climate change affecting the tree species with consideration of specific factors.

Paper Birch: Wiigwaasaatig

1. *Frumhoff, P.C.; McCarthy, J.J.; Melillo, J.M.; Moser, S.C.; Wuebbles, D.J. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts and Solutions. Synthesis Report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists.* Available at: http://www.northeastclimateimpacts.org/pdf/confronting-climate-change-in-the-u-s-northeast.pdf

Summary: This report discusses the Northeast and how they experience huge climate diversity within a small area. This area has also experienced drastic climate change since 1970, with a warming rate of almost 0.5 degrees Fahrenheit per decade. With the experienced climate warming there have been seen changes in the environment. This report was created to understand past and future climate change, to understand the potential effects that climate change could bring about.

Specific pages to note: **Pg. x:** Birch forests are predicted t shift dramatically northward in predicted climate change scenarios. **Pg. 49:** Figure 6. Shows the predicted shift birch is expected to take under two climate change scenarios. **Pg. 55:** Birch is projected to shift northward in either climate change scenario, with oak trees taking over to replace them. Climate change may leave birch more vulnerable to disease, pests, drought, wildfire, and storm damage. **Pg. 59:** The loss of birch with their colorful leaves in the fall could cause a decrease in tourism.

References Cited to Consider:

- *Clean Air-Cool Planet. 2007. Climate Change and the Northern Forest. Available at:* http://www.cleanair-coolplanet.org/information/factsheets.php.
- *Hayhoe, K., C.P. Wake, B. Anderson, X.-Z. Liang, E. Maurer, J. Zhu, J. Bradbury, A. DeGaetano, A. Hertel, and D. Wuebbles. 2008. Regional Climate Change Projections for the Northeast U.S. Mitigation and Adaptation Strategies for Global Change. In press.*
- *Iverson, L., Prasad, and S. Matthews. 2008. Potential Changes in Suitable Habitat for 134 Tree Species in the Northeastern United States. Mitigation and Adaptation Strategies for Global Change. In press*.
- *Mohan, J.E., J.M. Melillo, K. Lenoir, R. Hanifin, J.H. Blanchard, T. Sipe, S. Sistla, P.A. Steudler, F. Bowles, and F.A. Bazzaz. 2007. Shifting Temperate Forest Composition with Soil Warming. Nature. In review.*
- *Ollinger, S.V., C.L. Goodale, K. Hayhoe, and J.P. Jenkins. 2008. Potential Effects of Climate Change and Rising CO_2 on Ecosystem Processes in Northeastern U.S. Forests. Mitigation and Adaptation Strategies for Global Change. In press.*

2. Great Lakes Area National Park Service U.S. Department of the Interior. 2007. Climate Change: Dying Birch trees, minimal snowpack, and ice-free lakes are just some Impacts of Midwest Warming. Available at http://www.nps.gov/apis/naturescience/upload/2007%20MWR%20Climate%20Change%20Site%20Bulletin%20-%20Great%20Lakes%20FINAL.pdf

Summary: This article, Dying Birch Trees, Minimal Snowpack, and Ice-Free Lakes Are Just Some Impacts of Midwest Warming discusses climate change effects in the Midwest Region. It touches on the science reports by the U.S. Global Change Research Program as well as others and how they show that this is due to greenhouse gases produced by human activities. In specific the article has sections on Temperature and Precipitation, The Ecological Effects, New Faces in New Places, and Recreation, Health and Safety.

Specific pages to note: * Cool tree species are projected to lose habitat in the U.S. Sugar Maple and Paper Birch are expected to shift towards Canada. For the Apostle Island Lakeshore and Michigan Upper peninsula Paper Birch may lose all habitats. *Coldwater fish such as Trout will decrease in abundance. Whitefish spawning areas will be disturbed and Native fish will be threatened.

3. Hoene, N. 2010. Climate Change, an Ojibwe Perspective. The Seiche. Minnesota Sea Grant, March 2010. Available at http://www.seagrant.umn.edu/newsletter/2010_03.html.

Summary: Climate Change, an Ojibwe Perspective is an article discussing different Tribal members and their observation on the effects of climate change. Wild Rice, Maple Sugar, Birch, Pine, and other elements used in the Ojibwe culture are discussed on how climate change will impact them.

Specific pages to note: **Maple Sugar:** Sap has been running sooner; with a warmer climate it could start to run, and then stop. **Wild Rice:** It cannot stand extreme water level changes. **Coldwater Fish:** They will not stay if the streams warm by even a few degrees. **Tree:** A warmer climate means the loss of Birch, and potentially Sugar Maple if there is an increase in forest fires.

4. Iverson, L., A.M. Prasad, S.N. Matthews, M. Peters. 2008. Estimating Potential Habitat for 134 Eastern US Tree Species Under Six Climate Scenarios. Forest Ecology and Management 254: 390-406.

Summary: This article is a map of 134 tree species selected from random forests to study their responses to climate change. It is to show the current as well as potential future habitats of these species according to two emission scenarios with three climate models. Generally most specie habitats move northeast, with it being more drastically in a higher emission scenario. Generally there are quite a lot of species predicted to lose suitable habitat areas.

Specific Pages to Note: **Pg. 401:** Birch can sustain some habitat under low emissions but once under high emissions, it is eliminated. **Pg. 404:** Forests are expected to lose habitat under either scenarios.

References Cited to Consider:

- Chaing, J., Iverson, L.R., Prasad, A.M., Brown, K., 2006. Interactions of Changing Climate and Shifts in Forest Composition on Stand Carbon Balance. In: Ecological Society of America, 91st Annual Meetings, Memphis, TN.
- DeHayes, D.H., Jacobson, G.L., Schaber, P.G., Bongarten, B., Iverson, L.R., Dieffenbacker-Krall, A., 2000. Forest Responses to Changing Climate: Lessons From the Past and Uncertainty for the Future. In: Mickler, R.A., Birdsey, R.A., Horn, J.L. (Eds.), Responses of Northern Forests to Environmental Change. Springer- Verlag, New York, NY, (ecological studies series), pp. 495-540.
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- Schwartz, M.W., Iverson, L.R., Prasad, A.M., Matthews, S.N., O'Connor, R.J., 2006. Predicting extinctions as a result of climate change. Ecology 87 (7), 1611–1615.
- Thuiller, W., Lavorel, S., Sykes, M.T., Araujo, M.B., 2006. Using niche-based modelling to assess the impact of climate change on tree functional diversity in Europe. Divers. Distrib. 12, 49–60.

5. Ojibwe Lifeway: Maple Sugaring and Birch Bark Harvesting ("Ziigwan" – Spring). Gikinoo'wizhiwe Onji Waaban (Guiding for Tomorrow) "G-Wow" Changing Climate, Changing Culture. Available at: http://www.g-wow.org/en-us/maple_birch/default.aspx

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Specific Pages to Note: Climate warming will cause a decrease in suitable habitat for Paper Birch. Climate warming could also have an impact on soil moisture which will inhibit birch effectiveness to receive water and nutrients. Climate change may also allow for an increase in disease and pests. Lastly, shorter winters may cause stress on the paper birch and allow for greater vulnerability to pests.

6. *Rustad, L., Campbell, J., Dukes, J.S., Huntington, T., Lambert, K.F., Mohan, J., Rodenhouse, N. Changing Climate, Changing Forests: The Impacts of Climate Change on Forests of the Northeastern United States and Eastern Canada. United States Department of Agriculture. 2012. Available at*: http://www.nrs.fs.fed.us/pubs/gtr/gtr_nrs99.pdf

Summary: This was created to study climate change and the effects it poses on forest ecosystems with the goal to provide important insights for forest science, management, and policy. Climate change is predicted to have dire effects on habitat locations of tree species. A decline in suitable habitats is expected with a change in abundance and distribution of wildlife.

Specific pages to note: **Pg. 17:** Graph shows that Paper birch will experience a (87%) loss in suitable habitat under predicted climate change scenarios. **Pg. 18:** Under either climate change scenario, birch habitat experiences habitat loses out to oak and hickory habitats. **Pg. 20** Birch experiences habitat loss due to extended winter thaw cycles.

References Cited to Consider:

- Balch, R.E. 1944. The Dieback of Birch in the Maritime Region. Contribution No. 3. Fredericton, NB: Dominion of Canada, Department of Agriculture, Division of Entomology.

- Bourque, C.P.A.; Cox, R.M.; Allen, D.J.; Arp, P.A.; Meng, F.R. 2005. Spatial Extent of Winter Thaw Events in Eastern North America: Historical Weather Records in Relation to Yellow Birch Decline. Climate Change Biology. 11: 1477-1492.
- Braathe, P. 1995. Birch Dieback Caused by Prolonged Early Spring Thaws and Subsequent Frost. Norwegian Journal of Agricultural Science. 20 (Suppl.): 50-109.
- *Frumhoff, P.C.; McCarthy, J.J.; Melillo, J.M.; Moser, S.C.; Wuebbles, D.J. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts and Solutions. Synthesis Report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists. 146 p.*
- *Iverson, L.R.; Prasad, A.; Matthews, S. 2008. Modeling Potential Climate Change Impacts on the Trees of the Northeastern United States. Mitigation and Adaptation Strategies for Global Change. 13: 517-540.*
- *Ollinger, S.V.; Goodale, C.L.; Hayhoe, K.; Jenkins, J.P. 2008. Potential Effects of Climate Change and Rising CO_2 on Ecosystem Processes in Northeastern U.S. Forests. Mitigation and Adaptation Strategies for Global Change. 13: 467-485.*
- *Woodall, C.W.; Oswalt, C.M.; Westfall, J.A.; Perry, C.H.; Nelson, M.D.; Finley, A.O. 2009. An Indicator of Tree Migration in Forests of the Eastern United States. Forest Ecology and Management. 257: 1434-1444*.

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http://www.fs.fed.us/nrs/atlas/tree/318
http://www.fs.fed.us/nrs/atlas/tree/375
http://www.fs.fed.us/nrs/atlas/tree/543

Summary: These websites show the current distribution of the Northern White Cedar, Sugar Maple, Paper Birch, and Black Ash respectively. They are maps created by the United States Department of Agriculture Forest Service to show the current distribution, projected future habitat, and predictor maps of these tree species. They are interactive maps where you can see climate change affecting the tree species with consideration of specific factors.

Northern White Cedar: Nookomis Giizhik

1. *Rustad, L., Campbell, J., Dukes, J.S., Huntington, T., Lambert, K.F., Mohan, J., Rodenhouse, N. Changing Climate, Changing Forests: The Impacts of Climate Change on Forests of the Northeastern United States and Eastern Canada. United States Department of Agriculture. 2012. Available at*:
http://www.nrs.fs.fed.us/pubs/gtr/gtr_nrs99.pdf

Summary: This was created to study climate change and the effects it poses on forest ecosystems with the goal to provide important insights for forest science, management, and policy. Climate change is predicted to have dire effects on habitat locations of tree species. A decline in suitable habitats is expected with a change in abundance and distribution of wildlife.

Specific pages to note: **Pg. 17:** Graph shows a decrease in Northern White Cedar is expected to have a (73%) decrease in suitable habitat.

References Cited to Consider:

- *Frumhoff, P.C.; McCarthy, J.J.; Melillo, J.M.; Moser, S.C.; Wuebbles, D.J. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts and Solutions. Synthesis Report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists. 146 p.*
- *Iverson, L.R.; Prasad, A.; Matthews, S. 2008. Modeling Potential Climate Change Impacts on the Trees of the Northeastern United States. Mitigation and Adaptation Strategies for Global Change. 13: 517-540.*
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- *Woodall, C.W.; Oswalt, C.M.; Westfall, J.A.; Perry, C.H.; Nelson, M.D.; Finley, A.O. 2009. An Indicator of Tree Migration in Forests of the Eastern United States. Forest Ecology and Management. 257: 1434-1444*.

2. United States Department of Agriculture. 2014. Michigan Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the Northwoods Climate Change Response Framework Project. Available at: http://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs129.pdf

Summary: This report was created by the United States Department of Agriculture to explain how the forests in northern Michigan will be affected by Climate Change. It specifically discusses the forests in the eastern and northern parts of the Upper Peninsula. It identifies major forest trends and stressors that are currently threatening Michigan forests. Using climate projections they identified the potential future impacts of climate change on forests.

Specific pages to note: **Pg. 96:** Table 17. Northern White Cedar decreases in both climate change scenarios. **Pg. 101:** Northern White Cedar experienced increased climate stress in both scenarios of climate change. As the climate warms it is expected to face increasing climate

related stress. **Pg. 121 & 128 & 134:** Northern White Cedar is expected to lose suitable habitat for survival. **Pg. 134:** Deer will inhibit the regeneration ability of Northern White Cedar which will add the future climate related stress. **Pg. 157:** Native American Tribes are likely to face decreased availability of culturally important tree species such as the Northern White Cedar.

References Cited to Consider:

- Chhin, J.M.; Iverson, L.R.; Prasad, A.; Brown, K.J. 2008. Effects of Climate Change and Shifts in Forest Composition on Forest Net Primary Production. Journal of Integrative Plant Biology. 50(11): 1426-1439.
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Summary: This article is on Climate Change of the forests and forest habitats in Vermont. They have the projected climate change impacts that Vermont's forests in the south will experience including temperature, drought, lack of snow cover, and wildfire. The article gets over the current challenges that Vermont is facing and how they are trying to manage the impacts from climate change.

Specific Pages to Note: **Pg. 2 & 3:** Cedar seedling have a high mortality is greatest at temperatures above 90 degrees F, global warming could impact the mortality rate of cedar seedling. **Pg. 3:** Drought may have negative impacts on white cedar's regeneration abilities.

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4. http://www.fs.fed.us/nrs/atlas/tree/241
   http://www.fs.fed.us/nrs/atlas/tree/318
   http://www.fs.fed.us/nrs/atlas/tree/375
   http://www.fs.fed.us/nrs/atlas/tree/543

Summary: These websites show the current distribution of the Northern White Cedar, Sugar Maple, Paper Birch, and Black Ash respectively. They are maps created by the United States Department of Agriculture Forest Service to show the current distribution, projected future habitat, and predictor maps of these tree species. They are interactive maps where you can see climate change affecting the tree species with consideration of specific factors.

Black Ash: Baapaagimaak

1. http://www.fs.fed.us/nrs/atlas/tree/241
   http://www.fs.fed.us/nrs/atlas/tree/318
   http://www.fs.fed.us/nrs/atlas/tree/375
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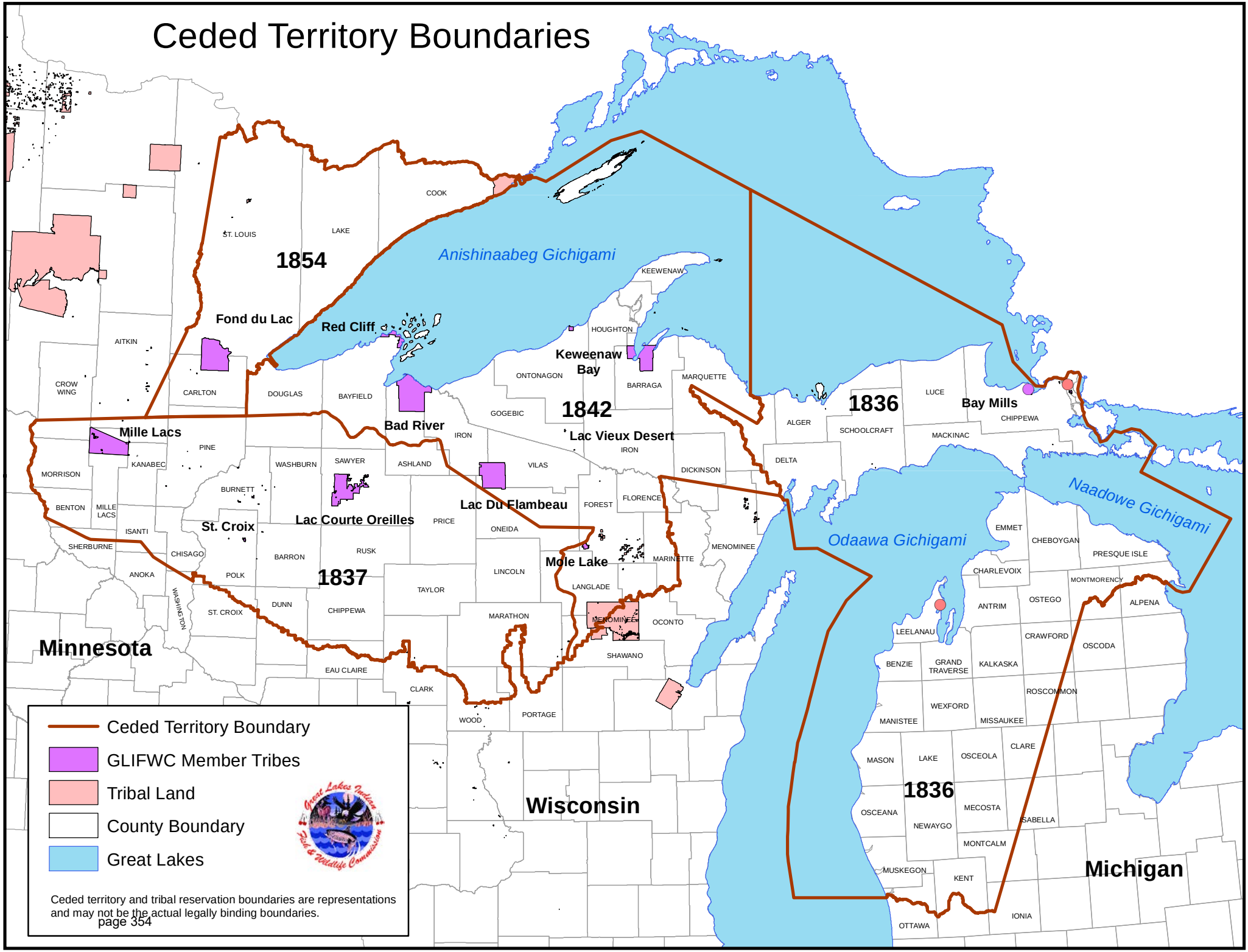
Summary: These websites show the current distribution of the Northern White Cedar, Sugar Maple, Paper Birch, and Black Ash respectively. They are maps created by the United States Department of Agriculture Forest Service to show the current distribution, projected future habitat, and predictor maps of these tree species. They are interactive maps where you can see climate change affecting the tree species with consideration of specific factors.

Ceded Territory Boundaries



Ceded territory and tribal reservation boundaries are representations and may not be the actual legally binding boundaries.

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

Beverly Jones Heydinger	Chair
David C. Boyd	Commissioner
Nancy Lange	Commissioner
J. Dennis O'Brien	Commissioner
Betsy Wergin	Commissioner

In the Matter of the Application of North Dakota Pipeline Company LLC for a Pipeline Routing Permit for the Sandpiper Pipeline Project in Minnesota

DOCKET NO. PL-6668/PPL-13-474

HONOR THE EARTH'S
MEMORANDUM OF LAW IN SUPPORT OF LACK OF JURISDICTION FOR USUFRUCTUARY PROPERTY RIGHTS PROTECTED BY FEDERAL TREATIES

To: Administrative Law Judge Eric L. Lipman, Minnesota Department of Commerce and Applicant Enbridge

Pursuant to verbal order of Administrative Law Judge Eric L. Lipman for jurisdictional briefing, *Honor the Earth* does now serve its initial Memorandum of Law.

INTRODUCTION

Before there was a United States of America, it was understood by the new human immigrants to Turtle Island (North America) that

> We hold these truths to be self-evident, that ***all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness***. That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed.[1]

By 1787, nine of thirteen colonies (states) voted to adopt the U.S Constitution, which

[1] Declaration of Independence, July 4, 1776. *Remember also* Dr. Martin Luther King, Jr. championing civil rights nearly 200 years later.

recognized Indians as separate and apart and that "[t]he Congress shall have Power [t]o ...regulate Commerce...with the Indian Tribes[2]. . ." and that Treaties are the Supreme law of the land

> and the Laws of the United States which shall be made in pursuance thereof; *and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land;* **and the judges in every state shall be bound thereby,** anything in the constitution or laws of any state to the contrary notwithstanding.[3]

(Emphasis added).

In *Minnesota v. Mille Lacs Band of Chippewa Indians*, 526 U.S. 172 (1999), the Supreme Court unanimously held that, by guaranteeing Anishinabe (Chippewa) rights to hunt, fish and gather in the 1837 Treaty in which the Chippewa ceded formal title to a small portion of Minnesota, and a larger area of Wisconsin, U.S. treaty negotiators severed the right to use the land for subsistence, usufructuary property rights, from formal title to the land in the same way a utilities easement, or mineral rights, might be severed from fee simple title. This was the choice of the United States government, which negotiated other treaties, with other native peoples, before and after 1837 that did not have these characteristics, as the *Milles Lacs* majority pointed out.

The *Mille Lacs* majority and dissent differed only as to whether these Treaty-guaranteed usufructuary property rights had been abrogated by certain subsequent events. The opinion was unanimous in the Court's analysis of Treaty acknowledged and guaranteed usufructuary property rights that are not extinguished by transfer of title to

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[2] U.S. Const., Art. 1, Sec. 8, Cl. 3
[3] Id. See Art. 6, Cl. 2.

land to the United States, since "title" was a meaningless concept to the Chippewa and "use for subsistence" was understood as continuing without interruption.[4]

TREATY HISTORY

In 1795, The Treaty of Greenville expressly reserved to "[t]he said tribes of Indians, parties to this treaty, shall be at liberty to hunt within the territory and lands which they have now ceded to the United States." This was a treaty of perpetual peace between the United States of America, and the tribes of Indians called the Wyandots, Delawares, Shawanees, Ottawas, ***Chippewas***, Pattawatimas, Miamis, Eel Rivers, Weas, Kickapoos, Piankeshaws, and Kaskaskias.

The Treaty of Prairie du Chien[5] of 1825 was the first Chippewa treaty to deal directly with land in Minnesota. The treaty created an east west boundary to separate the Chippewa and the Sioux and it was

> understood by all the tribes, parties hereto, that no tribe shall hunt within the acknowledged limits of any other without their assent . . . the Chiefs of all the tribes have expressed a determination, cheerfully to allow a reciprocal *right of hunting on the lands of one another, permission being first asked and obtained*, as before provided for.[6]

(Emphasis added).

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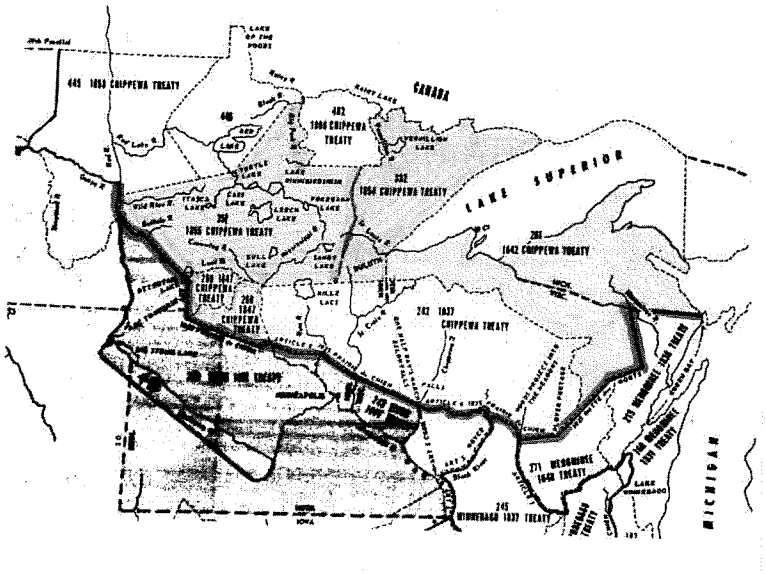
[4] *Minnesota v. the Mille Lacs Band of Chippewa Indians: 19th Century Treaty-Created Usufructuary Property Interests, the Foundation for 21st Century Indigenous Sovereignty*, by Peter Erlinder, Professor, William Mitchell College of Law and Director, International Humanitarian Law Institute, article currently invited for Law Review publication spring 2014. (See copy attached as Exhibit C).

[5] TREATY WITH THE SIOUX, ETC., August 19, 1825, Proclamation. Feb. 6, 1826., 7 Stat., 272. *Treaty with the Sioux and Chippewa, Sacs and Fox, Menominie, Ioway, Sioux, Winnebago, and a portion of the Ottawa, Chippewa, Potawattomie, Tribes.*

[6] Id. Article 13.



Here the red line is the Prairie du Chien boundary between the Chippewa and Sioux. Due to

> [t]he Chippewa tribe being dispersed over a great extent of country, and the Chiefs of that tribe having requested, that such portion of them as may be thought proper, by the Government of the United States, may be assembled in 1826, upon some part of Lake Superior, that the objects and advantages of this treaty may be fully explained to them, so that the stipulations thereof may be observed by the warriors. The Commissioners of the United States assent thereto, and it is therefore agreed that a council shall accordingly be held for these purposes.[7]

The 1826 Treaty, a conformation treaty for the 1825 Treaty, was conducted at Fond du Lac of the Michigan Territory, now Duluth, recognized that "this grant [from the Chippewa] ***is not to affect the title of the land, nor the existing jurisdiction over it.***[8] (Emphasis added).

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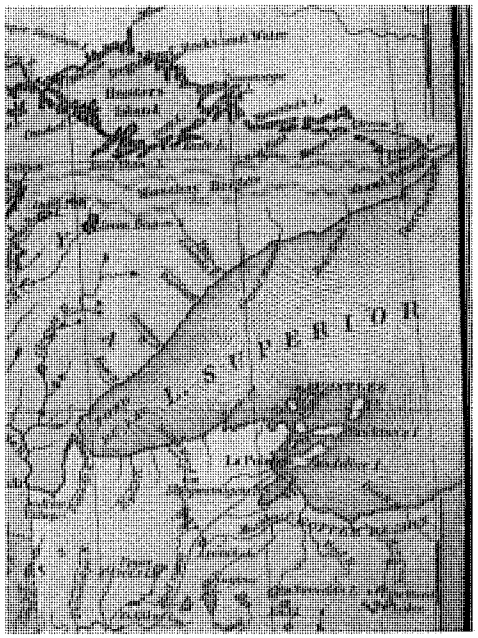
[7] Id. Art. 12.

[8] 1826 TREATY WITH THE CHIPPEWA, Aug. 5, 1826., Stat. 7,290, Proclamation, Feb. 7, 1827, Art. 3. Signed at *Fond du Lac* Michigan Territory, presently Duluth, Minnesota.



An important turn of the century U.S. Supreme Court case, Johnson v Geralds involved the consumption and sale of intoxicating liquors in the 1855 ceded territory, which the relevant treaty provided for liquor ban "and citizens of the city of Bemidji, Beltrami county, Minnesota, and at the time of the filing [. . .] were, and for a considerable time had been, engaged in business there as saloon keepers, selling at retail spirituous, vinous, and malt liquors at their respective places" in violation of federal law.[9] State citizens sued trying to argue the treaty protections only applied to Indian held lands but the Supreme Court held that

> it is unreasonable to give such a construction to the stipulation contained in the second portion of article 7 as would defeat its object, by removing the restriction from scattered parcels of land whenever it should come to pass that the Indian title therein was extinguished. The restriction would be of little force unless it covered the entire ceded area *en bloc*, so that no change in the situation of the reservations by way of extinguishing the residue of Indian title or otherwise should operate to limit its effect. And so, upon the whole, we deem it manifest that the second clause of article 7 dealt with the

[9] Johnson v Geralds, 234 U.S. 422, 424, 34 S. Ct. 794, 795 (1914).

> entire ceded country, including the reservations, as country proper to be subjected to the laws relating to the introduction, etc., of liquor into the Indian country ***until otherwise provided by Congress. It was evidently contemplated that the bands of Indians, while making their permanent homes within the reservations, would be at liberty to roam and to hunt throughout the entire country, as before.*** The purpose was to guard them from all temptation to use intoxicating liquors.[10]

(Emphasis added). This is the same, ceded, territory-wide protection the Chippewa also possess as a property interest to protect the environment against future oil spill contamination in perpetuity as we will "*be at liberty to roam and to hunt throughout the entire country, as before.*"

Conceivably, this prohibition on alcohol continued until the 21t Amendment in 1933 for most citizens of the United States. However, it was not until June 11, 1934 that for the Chippewa that

> the treaty of February 22, 1855 (10 Stat. L. 1165), between the United States and the Mississippi Bands of Chippewa Indians, shall no longer be considered as "Indian country" for the purposes of article 7 of said treaties . . .[11]

which involved the health, safety and welfare rights of the Chippewa throughout the ceded territories, in Minnesota, in this case for the 1854 and 1855 Treaties.

Consequently, unless Minnesota or Applicant Enbridge can show a similar Act of Congress to abrogate the usufructruary property rights of the Chippewa to hunt, fish and gather, in similar plain language, scope and breadth as above, and show compensation for

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[10] Id. at 438.

[11] An Act To modify the effect of certain Chippewa Indian treaties on areas in Minnesota, June 11, 1934. [S. 2980.] 48 Stat., 927.

the taking of the usufructuary property rights under US. v. Dion[12] and Minnesota v. Mille Lacs, the 1854 and 1855 ceded territories are Indian Country for all other purposes. Otherwise, Minnesota would have to show a grant of authority from Congress to exercise state jurisdiction over federally protected treaty rights.

Public Law 280

In 1953, Congress adopted what became known as Public Law 280, which gave certain states *criminal*[13] jurisdiction and limited *civil*[14] jurisdiction over tribal members, in several states including Minnesota. However, Congress specifically exempted from its *criminal* grant in clearly stated and unambiguous language that

> (b) Nothing in this section shall authorize the alienation, encumbrance, or taxation of any real or personal property, including water rights, ***belonging to any Indian or any Indian tribe***, band, or community that is held in trust by the United States or is subject to a restriction against alienation imposed by the United States; ***or shall authorize regulation of the use of such property in a manner inconsistent with any Federal treaty, agreement, or statute or with any regulation made pursuant thereto; or shall deprive any Indian or any Indian tribe, band, or community of any right, privilege, or immunity afforded under Federal treaty, agreement, or statute with respect to hunting, trapping, or fishing or the control, licensing, or regulation thereof.***

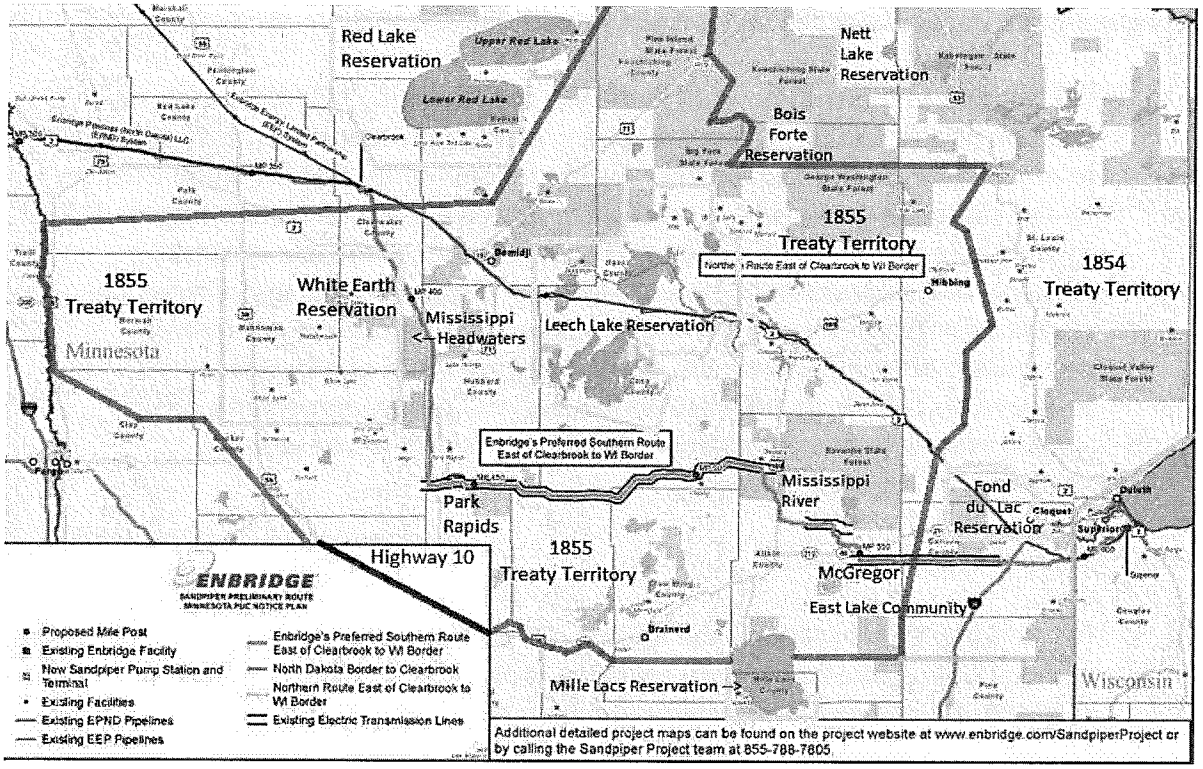
The *civil* grant also provides that

> (b) Nothing in this section shall authorize the alienation, encumbrance, or taxation of any real or personal property, including water rights, ***belonging to any Indian or any Indian tribe***, band, or community that is held in trust by the United States or is subject to a restriction against alienation imposed by the United States; ***or shall authorize regulation of the use of such property in a manner inconsistent with any Federal treaty, agreement, or statute or with any regulation made pursuant thereto***; or shall confer

[12] United States v. Dion, 476 U.S. 734, 738 (1986).
[13] 18 U.S.C. § 1162.
[14] 28 U.S.C. § 1360

> jurisdiction upon the State to adjudicate, in probate proceedings or otherwise, the ownership or right to possession of such property or any interest therein.

Clearly, Congress did not grant the State of Minnesota any authority or jurisdiction to decide matters related to treaty rights, federal agreement or statutes and which includes the present Public Utilities Commission proceedings considering the Application by Enbridge for a Routing Permit across the ceded territories, which in this case is primarily across the 1855 ceded territory.



The PUC should consider the Supreme Court's analysis in Chevron where

> [t]he Court, in an opinion by Justice John Paul Stevens, upheld the EPA's interpretation. A two-part analysis was born from the *Chevron* decision (called the "*Chevron* two-step test"), where a reviewing court determines:

> (1) First, always, is the question whether Congress has spoken directly to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court as well as the agency must give effect to the unambiguously expressed intent of Congress.
>
> If the Court determines Congress has not directly addressed the precise question at issue, the court does not simply impose its own construction of the statute . . . Rather,
>
> (2) [I]f the statute is silent or ambiguous with respect to the specific question, the issue for the court is whether the agency's answer is based on a permissible construction of the statute.[15]

Here, the PUC is not even a *federal* agency with any delegation from Congress, and the U.S. Constitution spells out the federal relationship with Indians.

In light of the usufructuary property rights analysis unanimously adopted by Supreme Court in Minnesota v. Mille Lacs Band of Chippewa Indians, which builds upon the analysis in the earlier Lac Courte Oreilles cases in the Seventh Circuit, *Honor the Earth* provides further legal analysis for a previously unrecognized sources of Treaty-guaranteed usufructuary property rights across all of northern Minnesota, both on and off reservations.

Minnesota is without authority when it comes to federal rights in Indian country, and there is no apparent effort by Applicant Enbridge or Minnesota law to respect our unique federal protections and usufructuary property rights.

A. The *usufructuary* property rights, created by U.S. treaty negotiators in 1825, 1826, 1837, 1854, as well as in 1855, which the Supreme Court of the United States unanimously recognized in *Minnesota v. Milles Lacs Band of Chippewa Indians* in 1999, determines due process rights of the Chippewa today.

[15] Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984).

The modern, seminal case establishing the foundation for interpreting treaty issues in Minnesota is *Minnesota v. Milles Lacs*[16], wherein several post-1855 treaties and Executive Orders, which the majority of the *Milles Lacs* Court held did not abrogate treaties agreed to with the Chippewa in 1855 and before, with a specific focus on the 1837 Treaty. In specific, the *Mille Lacs* majority and dissenting opinions were unanimous in finding that the "bundle of rights" which the U.S. treaty negotiators could retain or bargain away included "usufructuary property" rights, *i.e.* the right to "live off the land" irrespective of "fee ownership." This is a Roman Law concept, well known to U.S. treaty negotiators, who wrote such provisions out of treaties negotiated at about the same time. *See, generally,* O'Connor, J. *Minnesota v. Milles Lacs.*

Essentially, in many ways the *Minnesota v. Mille Lacs* opinion from 1999 made all prior cases obsolete with respect to understanding the genesis of usufructuary property rights recognized in U.S. courts. This is demonstrated in the 1854 Chippewa ceded territory, where the LCO cases from the Seventh Circuit helped the State of Minnesota recognize and compensate for off-reservation Ojibwe usufructuary property rights in the Arrowhead for more than 20-years. But that $15 million bi-annual compensation is only for tribal members to not exercise treaty rights, off-reservation in the 1854 ceded territory. What is the time value of money, today, for the loss of perpetual harvest rights and loss of the environment that supports that ecosystem? Priceless?

B. Prior to 1855, rights held by the Chippewa west of the 1854 Treaty Boundary were NOT "aboriginal title", but the more highly protected Treaty-

[16] Minnesota v. Mille Lacs Band of Chippewa Indians (Mille Lacs), 526 U.S. 172, 175–76 (1999).

guaranteed usufructuary property rights that were, and are, individually exercised.

Sections of the Treaty of 1825, 1826 and 1854 plainly state that the U.S. government recognized that the Chippewa were sovereign in the territory from which the 1837 Treaty territory had been ceded, and from which the 1855 territory would eventually be ceded.[17] But this was not "aboriginal title" at all. Rather the "usufructuary property right" to hunt-fish-and gather was recognized in treaties of 1825/26 then encompassed all of Minnesota Territory north of the boundary with the Lakota (Sioux) Nation, this division was ratified by Congress and recognized as a place to which Chippewa should return if they were to be removed from the 1837 ceded territory. This right was exercised individually in the geographical area the U.S. recognized as sovereign up to 1855.

This distinction makes a significant difference because the terms of the 1825-26 and 1854 Treaties describe with specificity the agreements that pre-existed the 1855 Treaty and those that followed. The territory west of the 1854 Treaty boundary was not vacant, nor was it without treaty guarantees that preceded the 1855 Treaty.

Further, because usufructuary property rights include "the right to modest living," environmental protection to maintain the long-term value of these property rights will have significant long term off-reservation land-use and wildlife

[17] The Court in U.S. v. Herbst, 334 F. Supp. 1001, 1006 (D. Minn 1971) made the same factual error. The Leech Lake Band (however defined) like all other Chippewa in Minnesota have Treaty-guaranteed usufructuary rights to hunt-fish-and gather dating to 1825-26, as sovereign people, and confirmed in the 1854 Treaty with the Chippewa of the Mississippi. This is *not inchoate and indistinct* "aboriginal title."

management implications for tribal governments and tribal members. Similarly, recent federal prosecutions of tribal members for violations of the federal Lacey Act for wildlife violations, predicated on tribal members violation of tribal game regulations are direct violations of the sovereignty explicitly guaranteed in the exercise usufructuary property rights in the heart of "Indian Country."[18] At least some of these prosecutions have been dismissed by federal district court judges who recognized the usufructuary rights established by treaties between sovereigns may be abrogated by Congress with a clear intention to do so, in language understood by both parties to accomplish that result, but cannot be set aside as merely incident to a federal statute.[19]

Another example from Supreme Court treaty analysis demonstrating that treaty-created usufructuary property rights must extend beyond the existence of any particular tribal government is Menominee v. United States in which Congress dissolved a Reservation which became Menominee County of the State of Wisconsin. The Court held that even though the entire reservation no longer existed, the usufructuary property rights created by the treaty which Congress had not specifically extinguished still

[18] For discussion of "Operation Squarehook" undercover "sting" operation, see Doug Smith and Dennis Anderson, *3-year Walleye-poaching Probe Nets More Charges in Minnesota*, STAR TRIBUNE, April 15, 2013, http://www.startribune.com/local/203006351.html

[19] United States v. Lyon, Case No. 13-68 and 13-70, Order of Judge John Tunheim, November 25, 2013, a*vailable at* http://turtletalk.files.wordpress.com/2013/11/90-dct-order-rejecting-mj-rr.pdf

remained to be exercised individually by members of the Menominee[20]. The usufructuary treaty rights were created by Congress for descendants of the signatories within the area covered by the Treaty. Individual ownership of all survival rights associated with the bundle of usufructruary rights and the right to earn a modest living[21] from and with the earth's creatures and resources, are held by the living people, reserved by prior living people in perpetuity for those Anishinabe (Chippewa) to come.

Likewise, the required *due process* for taking away individual property rights as described by US Attorney for Minnesota Renner[22] in 1971 (See Exhibit A, p. 6, item 10), would also be required for taking of a federally protected, conservation right-of-way belonging to the Chippewa. Therefore, the State's law violates all U.S. Constitutional protections and Chippewa treaty protected rights, and must be held invalid and consequently subject matter jurisdiction for the Minnesota Public Utilities Commission for the full, final and complete legal authority to grant a pipeline route permit does not independently and unilaterally exist.

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[20] The Menominee are signatories to the same 1825 Treaty with the Sioux, Menominee and Chippewa.

[21] See *Treaty-Guaranteed Usufructuary Rights: Minnesota v. Mille Lacs Band of Chippewa Indians Ten Years On* by Peter Erlinder, 41 ELR 10922, 10-2011. (See copy attached as Exhibit B).

[22] See United States v. State of Minnesota, Answers to Defendant's, State of Minnesota, Interrogatories, U.S. District Court of Minnesota, January 20, 1971, submitted by U.S. Attorney Robert G. Renner (No. 3-70 Civil 228). Attached as Exhibit A.

Respectfully submitted April 7, 2014.

/s/ Frank Bibeau

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May 26, 2016

Comments on Draft Scoping Document for the Environmental Impact Statement for the proposed Sandpiper/Line 3 crude oil pipeline projects

Sandpiper PUC Docket Number PL-6668/CN-13-473 & PL-6668/PPL-13-474
Line 3 PUC Docket Number PL-9/CN-14-916 & PL-9/PPL-15-137

Honor the Earth hereby submits the following comments on the draft scoping documents for the proposed Sandpiper and Line 3 crude oil pipeline projects. We contend that the scoping document is grossly inadequate and will fail to produce an EIS that will enable the State of Minnesota to protect the environment and prevent significant human harm. We object to geographic, jurisdictional, and project boundaries set in the draft scoping document. We object to the parameters of the scoping process. We object to the proposed timeline for the EIS, which does not provide enough time for adequate field work and research to evaluate sites and potential impacts on human health, natural resources, and cultural resources. Lastly, we object to the exclusion of many significant impact considerations, especially those at the point of extraction or refinement, the climate implications of downstream emissions, the human health impacts concentrated disproportionately on our already distressed Native communities, archaeological and cultural impacts, and impacts from the proposed abandonment of the existing Line 3 pipeline.

Because of these shortcomings, the current scoping parameters undermine the goals of the National Environmental Policy Act (NEPA) and the Minnesota Environmental Policy Act (MEPA). We also assert that the Department of Commerce remains unqualified to oversee the EIS and hostile to a robust process and the unique interests of our tribal Nations. We continue to call for an integrated federal, state, and tribal EIS that acknowledges the unique knowledge and expertise that tribal governments offer in regards to the natural and cultural resources of the area, and consistent with Governor Dayton's Executive Order 13-10, which outlines a high standard of govemment-to-govemment consultation with Indian tribes. The State of Minnesota's Environmental Quality Board's denial of its citizens request to transfer control of the EIS to the state's environmental agencies, in which we have invested many billions of dollars to develop environmental stewardship capacity, was grossly negligent. This is one of the largest fossil fuel projects the State of Minnesota has ever seen; we must ensure it is evaluated properly. To date, we are getting it wrong and are on a path to further litigation.

Our response is organized into the following sections:
1) High-Level Scoping and Process Issues
2) Economic Analysis
3) Well to Wheels Impact Analysis
4) Indigenous Human Health Impacts
5) Indigenous Cultural Impacts
6) Abandonment
7) Spill Modeling and Response

1) HIGH-LEVEL SCOPING AND PROCESS ISSUES

On January 11, 2016, the PUC — the RGU for this EIS — issued an order authorizing DOC-EERA staff to prepare a combined EIS for the CN and the Route Permit. The order also requested DOC-EERA administer the EIS process in consultation with the PUC's Executive Secretary, the MDNR, and the MPCA in order to meet the requirements of the MEPA and Chapter 4410 of the Minnesota Rules.

The Minnesota Environmental Policy Act (MEPA) states: "[w]here there is potential for significant environmental effects resulting from any major governmental action, the action shall be preceded by a detailed environmental impact statement prepared by the responsible governmental unit."[1]

According to the Minnesota Rules, the purpose of the scoping process is "to reduce the scope and bulk of an EIS before the preparation of the EIS, identifying only those potentially significant issues relevant to the proposed project, define the form, level of detail, content, alternatives, timetable for preparation and preparers of the EIS, and to determine the permits for which information will be developed concurrently with the EIS."[2] "All projects requiring an EIS must have an EAW [Environmental Assessment Worksheet] filed with the RGU [Responsible Governmental Unit]. The EAW shall be the basis for the scoping process."[3]

The Minnesota Rules being used to reduce the scope of the EAW and/or EIS directly undercuts the law and policy goals of the National Environmental Policy Act (NEPA) and the Minnesota Environmental Policy Act (MEPA). These two laws are designed to ensure that new projects consider and protect human safety and the environment, and do not violate existing environmental laws. To simply grant the Department of Commerce full authority to reduce the scope of the review to "potentially significant issues relevant to the proposed project" without exploring other issues and without any process of accountability for those scoping decisions violates NEPA and MEPA requirements. Within the current parameters, the promise to the citizens of Minnesota that a complete and comprehensive EIS would be undertaken for the Sandpiper and Line 3 pipelines will not happen. We must address these problems.

First, there must be a clear definition of what constitutes an issue "significantly relevant to the proposed project." This should include the criteria of how a determination is made, who makes the determination, and what factual information is relied upon to make that determination. It must be guaranteed that the proper level of data analysis required to indicate a significant issue is used.

Second, an issue found to not be "significantly relevant to the proposed project" must be published, with a public comment period established, in order to allow the public to engage in that decision and supplement the record with additional information and materials.

The timeline and methodology for data analysis are also inadequate. Section *4.3 Data and Analysis* states that field work on the preferred route has been completed by the Applicant. The scoping document lacks a full disclosure of the practices, methods, and standards used by the Applicant to complete this field work. The scoping document should include a plan for random inspection of site work completed on the preferred route to ensure it meets the applicable standards necessary for the project. The present scoping document does not provide enough time to do this field work in order to evaluate the sites that will be adversely affected by the project. By the time the public is aware of what sites have been identified, it will be mid-winter and there will be little opportunity to review or provide information about the impact. Therefore, the time frame for the EIS must be increased in order to allow for adequate review of potential sites.

Incorrect and Non-Existent Definitions of Project Purpose

The entire draft scoping document and scoping process for the EIS are based on a false premise. The draft scoping document is drafted around a "project purpose" defined as transporting oil from the Bakken region of North Dakota to Superior, Wisconsin. For a long time, the DOC defined the project purpose as moving oil from Clearbrook to Superior, but our persistent advocacy forced a partial correction. There is still another correction to make. Transporting a product to Superior is not a viable "public purpose" for the project, especially from the point of view of Minnesota residents who stand to have their land condemned through eminent domain. That is a "private purpose," according to Enbridge's whimsical desires and bottom line. Because Minnesota Rule 4410.2300(G) states an alternative route may be excluded from analysis in the EIS if it "would not meet the underlying purpose of the project," defining the project purpose in this way precludes many alternative routes that may transport product from the Bakken to Midwest refineries and coastal ports with far less social, environmental, and economic risk. The

[1] Minnesota Statue § 116D.04, subpart 2a

[2] Minnesota Regulation 4410.2100, subpart 1

[3] Minnesota Regulation 4420.2100, subpart 2

current purpose statement is improper if not illegal in that it limits alternative routes on the basis of project cost increase alone. The scope should not assume that the criteria for route evaluation include any intermediate through-points (Clearbrook or Superior).

At the thirteen DOC scoping meetings, the public was asked to comment on a project with a purpose defined as getting oil to Superior, WI, but the giant maps on display included alternative routes that don't go to Superior. Are those routes included or not? No one knows. When it was pointed out to the Cardno Project Manager how confusing that was for the public, she stated it was likely incorrect and cited a lack of time and being rushed, and further that Governor Dayton denied their request for an extension. Several attendees pointed out the issues with the project purpose to the DOC, and received a variety of responses, depending on which day the response was provided. At one point, the DOC stated there would eventually be two Environmental Impact Statements, each with different purpose definitions, but that the documents would change in the final draft. This constitutes a reckless and negligent process. It has been stated that the Line 3 project's purpose is to address the safety and integrity concerns of the existing Line 3 pipeline. As such, replacement (in place) or complete removal from service need to be considered as alternatives. Holding public scoping meetings without disclosing these different purpose definitions clear to the public, is a violation of the duty owed to Minnesota's residents and counter to the intent of the environmental laws at issue. The public participation component of the scoping process is now complete, with most people lack clarity on whether there is one EIS or two, and without anyone being clear on what the definitions of the project or projects actually are, or what the criteria are for alternative routes to be considered or not. Despite lacking this critical information, these are projects that supposedly warrant condemnation of private land through eminent domain.

Honor the Earth also challenges the categorization of the new Line 3 pipeline as a "replacement," and objects to the faulty reasoning that as a replacement, its purpose can indeed be defined as reaching Superior, Wisconsin, even if Sandpiper pipeline cannot. The Line 3 project is not a replacement, it is a new line. It is located in a new corridor, it is larger in diameter (36 inch diameter vs. 34 inch = 12% larger by volume), and it has greater capacity (760,000 bpd vs. 880,000 bpd = 16% capacity increase). It therefore must have a new U.S. State Department approval. In the 1991 Presidential Permit for Line 3, Article 2 clearly states that one condition of the permit is "The operation and maintenance of the facilities shall be in all material respects as described in permittee's application of October 23, 1991, for a permit pursuant to Executive Order 11423."

An accurate project purpose definition for Sandpiper is transporting product from the Bakken to refineries and ports. The project purpose definition for Line 3 is transporting product from Hardisty to refineries and ports.

Enbridge's stated purpose of the Line 3 project is to "address safety and integrity concerns of the existing Line 3 pipeline." We agree that is a noble purpose, but we disagree that the way to address those safety and integrity concerns is by building a new pipeline. Realistically, building a new Line 3 will only double those concerns. Local residents are concerned about contamination along the existing corridor. Instead of building a new pipeline, we find that the best way to address safety and integrity concerns of the existing Line 3 pipeline is to dismantle it and clean up the mess underneath it. The State of Minnesota should immediately undertake a comprehensive survey of the existing corridor to identify any and all sites of contamination, and establish a regulatory code to oversee the responsible decommissioning of the line, according to scientific consultation and in accordance with the wishes of tribal nations and individual landowners that otherwise would retain the liability when the Enbridge company walks away. The section below entitled "Abandonment" outlines these concerns in detail.

Each separate EIS will have to address the other pipeline project as a "phased action" of the other. According to the Minnesota Rules, "phased actions" are defined as: "two or more projects by the same proposer that an RGU determines will have environmental effects on the same geographic area and are substantially certain to be undertaken sequentially over a limited period of time." (4410.0200, subpart 60). This definition involves three components: same proposer, same area affected, and timing. Only one and not all of a group of owners need be involved in both projects if that owner's stake is substantial. The same geographic area is affected if the effects of any potentially significant impacts overlap. The project sites do not need to be adjacent, or even nearby, if the impact zone is large.

Incorrect Geographic Boundaries for Impact Scope

The Sandpiper and Line 3 pipeline projects are perhaps the largest infrastructure proposals to be considered in recent years in the State of Minnesota. They are not just Minnesota projects, or U.S. projects, but transnational projects with global impacts. These projects require a diligent assessment that acknowledges the local, regional, and global contexts. We cannot simply assess the limited local impacts of construction. We cannot pretend that our actions in one "state" do not affect our neighbors, our descendants and the globe as a whole. The scope of the EIS should include the entirety of the project from beginning to end; from the Bakken and the Tar Sands of Alberta to the Midwest, East Coast, and Gulf Coast refineries and ports. There must be a full disclosure of where the oil is being transported in order for states, federal agencies, and tribal nations to properly coordinate and select the route that makes sense for the public and the environment across the region and across the US.

The document defines the scope of the EIS to ignore all impacts outside the state boundaries. This is ludicrous. Bureaucratic fragmentation is a primary method of regulatory agencies giving up their power in favor of industry. Each state puts on blinders and ignores everything occurring outside the imaginary lines, and assumptions are never questioned. Infrastructure impact analysis should start at the oil well and finish at the gas tank, plain and simple. In the section below entitled, "Well to Wheels Impact Analysis," we address elements in a comprehensive assessment.

Regarding geographic scope bounded by impacts, see "cumulative potential effects" in Mn Rule 4410.0200, Subp. 11a. Cumulative potential effects. "Cumulative potential effects" refers to environment impacts that result from the incremental effects of a project, in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects. According to these parameters, other major pipeline projects, mining projects and foreseeable climate impacts should be included within the scope of the EIS.

Incorrect Jurisdictional Boundaries for Project Scope

The State of Minnesota refuses to acknowledge environmental review in neighboring states (Wisconsin, Iowa, and potentially Michigan) and by federal units of government (especially USCOE and USFWS) for the same projects or projects that can be deemed "connected actions" induced by and/or dependant on these projects. Again, voluntary blindness precludes interstate coordination and any rational approach to route selection in order to meet the public purpose of transporting oil from the Bakken to refineries and ports while minimizing risk. Wisconsin is already rubber stamping their EIS for the 14-mile stretch of the route, despite requests to stand down and wait for MN.

Federal agencies, including the USGS, Fish and Wildlife, EPA, and the Corps of Engineers should be active in the development of the EIS along with the affected Chippewa Bands of Minnesota and their agencies such as the 1855 Treaty Authority.

Pipelines added or expanded by increased crude oil delivered to Wisconsin are "connected actions" and must be included in this EIS - this includes Enbridge's Line 61 expansion and Line 66 projects. These projects have cumulative impacts as "reasonably foreseeable future actions" under MEPA rules, which outline three types of relationship between projects, any one of which qualifies the projects as connected actions (part 4410.0200, subpart 9b):

- One induces the other;
- One is a prerequisite for the other and is not justified by itself (the first occurring previously or simultaneously);
- Neither is justified by itself; that is, the two projects are interdependent parts of a larger whole.

Whenever two or more projects have any of these relationships, they must be considered one project, regardless of ownership or timing (parts 4410.1000 and 4410.2000, subparts 4). See also "Cumulative Impacts" defined in 4410.0200: Subp. 11. (note the difference from "Cumulative Potential Effects above). "Cumulative Impact" refers to the impact on the environment resulting from incremental effects of the project in addition to other past, present, and reasonably foreseeable future projects regardless of what person undertakes the other projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

EQB Guidance goes on to explain that Cumulative impacts must be included. From the EQB Guide to Environmental Rules: "Directives that cumulative potential effects be analyzed in EAWs, EISs, and AUARs. Although it has long been the practice to include such impacts to some extent in review documents, the rules formerly did not explicitly include requirements to do so. The directives appear at rule parts 4410.1200, 4410.2300, item H, which states: "Environmental, economic, employment, and sociological impacts: for the proposed project and each major alternative there shall be a thorough but succinct discussion of potentially significant adverse or beneficial effects generated, be they direct, indirect, or cumulative."

Regarding Project Segmentation, the EQB's Guidance for Environmental Review states "Network projects such as highways, utility systems and pipelines may be divided for review if "logical in relation to the design of the total system or network and must not be made merely to divide up a large system into exempted segments" (parts 4410.1000 and 4410.2000, subparts 4).."

Inadequate Public Process for EIS Scoping Comments

The DOC scheduled thirteen meetings along the Enbridge preferred new route from Clearbrook to Park Rapids to Superior, Wisconsin, with zero meetings about rebuilding Line 3 pipeline or abandoning it along the 150+ mile US Highway 2 corridor. It was an irresponsible process that thwarted public participation. In fact, the word 'abandonment' does not appear in the DOC Notice at all. Enbridge wants to create more environmental messes in Minnesota without cleaning up the old ones, and DOC is helping them. The hearing schedule was rushed, with meetings across northern Minnesota before the Governor's Fishing Opener, the customary start of the season in the affected lakes region. Children were still in school, summer residents had not returned to the lakes, Ojibwe tribal elections were being held, the State Legislature was in session, and resort owners were preparing for summer tourism. There were no meetings in the Pine River and Whitefish Chain watersheds, the areas with the most dense populations, the most resources, and the most access to the process.

The DOC Remains Unqualified to Oversee this EIS Process

The Department of Commerce conducting an Environmental Impact Statement is entirely inappropriate. That agency has no capacity or expertise and the people of Minnesota deserve better. It is baffling that Minnesota would waste its recent multi-billion dollar investments in the Pollution Control Agency by assigning such an important environmental process to a non-environmental agency. The State of Minnesota's Environmental Quality Board's denial of the citizen request to transfer control of the EIS to the state's environmental agencies, which clearly have the greater expertise, was grossly negligent if not outright illegal. A robust public record was built during the EQB's process for addressing the citizen request to change the RGU, in which hundreds of community members, organizations, elected officials, and advocates documented the case against the DOC and the clear rationale for transferring the EIS into the hands of the PCA or DNR. The largest fossil fuel infrastructure mega-project the State of Minnesota has ever seen should not be in the hands of the Department of Commerce.

Both the PUC and DOC have been consistently hostile to the concept of tribal consultation, and have resisted their duty to conduct thorough environmental review for these projects. They have ignored comments by the PCA and DNR about the extreme environmental risks associated with the proposed route and the need to consider alternative routes. The DOC does not have the structure or the capacity to uphold the state's responsibility to enter into formal government-to-government relationships with the tribes or to navigate the protection of constitutionally protected treaty resources and the complicated legal issues governing usufructuary property rights in ceded territory. The DNR and PCA have much greater expertise in analyzing the potential impacts of the project. The DOC does not have the intimate knowledge base of all of the disciplines along the entire corridor like DNR and PCA, with field offices throughout MN and relationships in place with the reservations. The DNR has field hydrologists, hydro-geologists, biologists, fisheries and wildlife managers, and ecologists who know the issues and resources intimately. DOC is a metro-based agency focused on accomplishing Enbridge's pipeline goals under Minnesota law.

Illegitimate Contract with Cardno

The contractual relationship between the DOC and the consulting firm hired to conduct the EIS, Cardno, was established prematurely and perhaps illegally. It is highly improper that the consulting firm was chosen before the

EIS had been scoped. The purpose of scoping process is to determine the special expertise necessary for the EIS. Cardno may or may not have that expertise; it was premature and negligent to select Cardno as a consultant. This selection makes clear that DOC never intended for the public participation in scoping process to meaningfully inform the scope of the EIS.

Joe Plummer, legal counsel for the White Earth Band of Ojibwe, addressed this issue in a December 2015 motion. Friends of the Headwaters also addressed it in its March 2016 motion. Both were ignored. It was handed off to the Administrative Law Judge (ALJ). By the time an ALJ can do anything about it, an inadequate EIS will already have been conducted. This is unacceptable and an example of the problems with the regulatory structure for oversight of the EIS. The DOC makes decisions arbitrarily, without consulting MPCA or MDNR, and in clear service of the pipeline company.

To properly follow MEPA procedures, the DOC should have released an official RFP (Request For Proposal) and submitted it to the docket for public review. Transparency would have allowed the public to weigh in on the necessary company qualifications, issues of company integrity, conflict of interest, etc. Instead, the DOC simply renegotiated an existing contract they already had with Cardno, which was based on Cardno's winning the RFP for the Sandpiper Route Permit Scoping CEA, ordered by the PUC on June 5, 2015 after voting 5-0 approving the Certificate of Need. The FOH/MCEA Appellate Court victory overturned that decision and ruled that the CEA was a violation of the MEPA. When the PUC was forced to order an EIS at their December 2015 hearing, the PUC threw out Deb Pile's Sandpiper Route Permit scope decision document. At that point, the DOC/Cardno contract should have been null and void. Instead, it was simply revised, which is a clear indication that the DOC intends to continue with the previous work Cardno performed on Pile's Sandpiper RP and carry that scoping decision forward into this EIS. That document should not be used because it is based on PUC CEA rules, not EIS MEPA rules.

Cardno is unqualified for the task at hand -- it is the company responsible for the first EIS on the proposed Keystone XL pipeline, a study which was thrown out for inadequacy.

Learning from Canada's National Energy Board

While various US permitting bodies are considering the Line 3 replacement project, the Canadian National Energy Board (NEB) has also been considering the project. The permitting and oversight process is much different in Canada, with the NEB serving as the national body responsible for pipelines over their entire lifecycle: from design, through construction and operation, to decommissioning and eventual abandonment. The NEB is a stronger and more robust regulatory body than those in the United States. The NEB's role does not end when a project is approved: the Board requires that people and the environment be protected throughout the entire pipeline lifecycle. The NEB imposes safety and environmental requirements on pipeline companies through a variety of means, including regulations and project-specific conditions.[4] Once the NEB makes its recommendations on a project, the final approval goes to the Canadian national government. Recently, the NEB granted conditional approval for the Line 3 replacement project. The approval document has many recommendations that the MN PUC should also consider, Including many suggestions on how to make their process more comprehensive. Since there is no similar body in the United States, the responsibility falls to the individual state permitting bodies. A thorough review of the NEB's recommendations should be included in the EIS. Documents can be found here:
https://docs.neb-one.gc.ca/ll-eng/llisapi.dll?func=ll&objId=2949686&objAction=browse

There is a significant difference between the Line 3 project in Canada and the project in Minnesota: in Canada, the project is not a greenfield project and primarily follows the existing mainline corridor. This results in very different environmental impacts in either country, which should be taken into account when reviewing the NEB recommendations.

2) ECONOMIC ANALYSIS

[4] http://bit.ly/1WJ5Pkl

Because all environmental stewardship and all environmental impacts occur within the context of specific economic conditions, the EIS should include a thorough economic analysis of the project. For example, if the project is not economically viable, or will not be in 10 years, that is an enormous liability concern for the people and tribes of Minnesota.

Local and Regional Economic Impacts

Enbridge and other proponents of these proposed pipelines often tout the anticipated property tax revenue for the poor counties proposed to receive the infrastructure. However, what is too often overlooked in Enbridge's recent and current lawsuits against several MN counties for refunds on property taxes already paid.[5] This information must be included in the EIS so that low-revenue counties have a clear understanding of the resources they stand to gain from the project compared to their financial risk.

This analysis must also include a comprehensive analysis of the economic impacts of these pipelines on the fishing, wildlife, agriculture, and tourism industries.

Enbridge Energy predicts its $2.6 billion Sandpiper construction project will create 3,000 construction jobs. However, Enbridge only hopes to give half of those jobs, about 1,500 of them, to Minnesota and North Dakota residents — there is no policy in place to guarantee a single one. More importantly, these are temporary jobs. These jobs never will trigger the additional indirect job creation that typically accompanies longer-term investments, and will disappear after one year. That is not long-lasting economic development.

Consider an alternative strategy of investment in water and sewer infrastructure, systems that actually benefit the people of Minnesota instead of the profits of a Canadian corporation. In 2007, the Environmental Protection Agency estimated Minnesota needs to invest more than $6 billion to improve drinking water systems over the next 20 years. In 2010, the Minnesota Pollution Control Agency estimated Minnesota needs to invest an additional $5.7 billion to improve wastewater systems. A steady investment in these essential services would create an estimated 11,560 jobs for Minnesota's workers every year for the next 20 years.

Economic Viability and Need

Simple math shows that the Sandpiper pipeline is not an economically viable project. The North Dakota Pipeline Authority says current pipeline export capacity from North Dakota is 739,000 bpd, and that total refinery capacity is 88,000 bpd, making total takeaway capacity 827,000 bpd. Construction is now starting on the Dakota Access pipeline, with an initial capacity of 450,000 bpd and an ultimate capacity of about 590,000 bpd. Sandpiper would have an initial capacity of 365,000 bpd. Together that means there is a proposed final total takeaway capacity of almost 1.7 million bpd, minus any inefficiencies. But total current North Dakota production peaked at around 1,160,000 bpd, plateaued, and is now at 1,000,000 and dropping, with no end in sight for these low oil prices. Plus, rail transport capacity from ND is over 2 million bpd, and rail is needed to reach East Coast refineries. This shows that there is no economic basis for the Sandpiper; the numbers do not add up. There is no public need for this project, and it is clear that the project is an investment in what will soon be a stranded asset. The EIS should include an assessment of what will become of such stranded assets, especially given the liability concerns of pipeline abandonment. Even if drilling in the Bakken continues, current estimates show they will be depleted in 20 years.

The EIS should include a full economic analysis of need for additional oil transportation through Minnesota. Minnesota's crude oil consumption is declining, despite population growth, so this additional infrastructure is not for us. And with oil prices remaining at historic lows, Bakken drillers are going bankrupt.[6] There were only 28 active rigs in May 2016, down from over 220 just a few years ago.[7] Most major players in the Alberta Tar Sands have either delayed, put on hold, and some firms, such as Stadtoil, have pulled out of the Tar Sands altogether.

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5 http://www.grandforksherald.com/news/business/3826004-pipeline-company-seeks-reduce-their-hubbard-county-property-taxes-336892

6 http://fuelfix.com/blog/2016/02/03/eagle-ford-bakken-shale-production-on-the-decline/

7 https://www.dmr.nd.gov/oilgas/riglist.asp

Marathon as Anchor Shipper

The proposed Sandpiper pipeline is a joint venture between Enbridge Energy and Marathon Petroleum Corporation. Marathon is the "anchor shipper" that makes the project economically viable by committing to use the pipeline to transport oil they extract in North Dakota. Marathon plans to pay 37.5% of the Sandpiper's construction costs in exchange for a 27% ownership interest in the project. The MN PUC issued a Certificate of Need for the Sandpiper based on Marathon's interest and "need." But Marathon doesn't need this pipeline. At its peak, Marathon had 7 active rigs in the Bakken, but as of April 2016, they have ZERO. Marathon Petroleum Corporation's stock prices have dropped more than 50% from recent highs in 2015. Marathon Oil Corporation, the sister subsidiary that does all the drilling, saw their prices drop more than 75% from recent highs. Last year they posted $2.2 billion in losses, cut their capital investments in half, and laid off over 10% of their employees. This is not a sound investment for the State of Minnesota.

Ecological Costs

Another element of the economic analysis should be the carbon and ecosystem costs of the proposed projects. Enbridge likes to tout the job creation and economic need of these projects, but the costs to the environment are never addressed. The science of ecological cost accounting is rapidly developing and it's methodologies should be used to account for the full costs of these projects.

Carbon Costs:

The American Physics Society has estimated that it costs $600 per metric ton to remove carbon from the atmosphere. If we convert the volume of oil moving through the Sandpiper and Line 3 into metric tons of carbon released, we can get an estimate of the cost to remove that carbon.

Sandpiper: 355,000 barrels of Bakken oil daily[8] (Enbridge Number) x 365.25 days a year= 129,663,750 barrels annually x .43 metric tons of carbon per barrel[9] = 55,755,412 metric tons of carbon annually

Line 3: 675,000 barrels of dilbit daily[10] x 365.25 days a year = 246,643,750 barrels annually x .51 metric tons of carbon per barrel[11] = 125,737,313 metric tons of carbon annually.

Ecosystem Costs:

As the science of climate change improves, more attention is being paid to the role key ecosystems play in the maintenance of the global climate. Ecosystems can absorb and store carbon, while providing flood control and other benefits to society. These benefits can be monetized in a process known as ecosystem services valuation. The Canadian boreal forests - where tar sands are mined - is one of the best stores of carbon on the planet. Wetlands are also valuable carbon sinks, and very important for flood control. To estimate the amount of boreal forests destroyed, we used the amount of tailings (mining waste) created per barrel extracted. Tailings are stored in pits for at least 40 years while they settle and compact. The volume of these tailings, converted to area represent the annual area of boreal forest lost from tar sands extraction.[12] The only available numbers for the worth of the boreal forest is $160/hectare[13], which is a low estimate.

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[8] Enbridge number

[9] US EPA estimates

[10] Enbridge number

[11] from Extract

[12] These estimates are based of the article "Waste Streams of Mined Oil Sands: Characteristics and Remediation" by Kim L. Kasperski and Randy J. Mikula printed in *Elements*, Dec 2011 vol 7 pp 387-392. These estimates- of the amount of land impacted by the oil sands are probably extremely low and will be updated as more studies are conducted.

[13] http://www.eurekalert.org/pub_releases/2006-09/cfc-ccw091806.php

Line 3 (new proposed route): 675,000 barrels of dilbit daily[14] x 365.25 days a year = 246,643,750 barrels annually x .00026544[15] = 654,69.117 hectares annually.

To estimate the worth of the wetlands impacted by the Enbridge expansion, we used the value of wetlands from the Earth Economics report: "The Value of Nature's Benefits in the St. Louis River Watershed". The value Earth Economics came up with is $5,625/year. Honor the Earth estimated the area of wetlands impacted by approximating the amount of wetlands destroyed during the construction of the new corridor. Since Enbridge's plans do not include restoring wetlands after construction, it is fair to assume these areas will be permanently lost.

Sandpiper (proposed route): 257,129 ft of wetlands x 95 ft of construction area = 24,427,255 sq ft = 560.77 acres.

Summary:

DESCRIPTION (Annual use)	QUANTITY metric tons	UNIT PRICE	AMOUNT
Sandpiper- Carbon (metric ton)	55,755,412.00	$600.00	$33,453,247,200.00
Line 3- Carbon (metric ton)	125,737,313.00	$600.00	$75,442,387,800.00
Line 3- boreal forest (hectare)	65,469.12	$160.00	$10,475,058.72
Clipper- boreal forest (hectare)	77,508.48	$160.00	$12,401,356.80
Sandpiper- wetland (acres- US)	560.77	$5,625.00	$3,154,331.25
		Per month cost	$108,921,665,455
			12
	Annual Cost		**$307,059,988,940**

3) WELL TO WHEELS IMPACT ANALYSIS

Infrastructure impact analysis should start at the oil well and finish at the gas tank, including all social and ecological costs associated with the extraction, transportation, refining, and combustion processes. The EIS for the Keystone XL pipeline considered carbon emissions at all of these stages.[16] The Sandpiper and Line 3 projects are much larger in scope, their impacts must also be understood in a larger scope. Impacts on the communities at the extractions points, refining points and combustions points should be examined. The global impacts of the project should be examined as well, including the well to wheels increase in greenhouse gases.

Social and Ecological Costs of Extraction

Extensive testimony was presented by Honor the Earth in previous hearings on the impact of the oil extraction in the Bakken on groundwater, human health and methane emissions. In short, we do not have a full picture of the impact of fracking in the Bakken because the increase occurred rapidly without proper oversight. What we do know is since the boom in the Bakken, there has been an increase in drilling waste, water usage, and spills and leaks, many of which have gone unreported.[17] A recent study from Duke University found widespread and persistent contamination from fracking, which will affect the area for millennia to come.[18] Reports have shown that methane emissions are much

[14] Enbridge number

[15] Each barrel of tar sands creates 16.9 barrels of tailings, converting this to a hectare, we get approximately .00026544 hectares tailings per barrel of tar sands.

[16] Final Supplemental Environmental Impact Statement; Keystone XL Project; Dept. of State. Accessed online at: https://keystonepipeline-xl.state.gov/documents/organization/221190.pdf

[17] http://serc.carleton.edu/NAGTWorkshops/health/case_studies/hydrofracking_w.html

[18] "Brine Spills Associated with Unconventional Oil Development in North Dakota". Lauer, Nancy E., Harkness, Jennifer S., and Vengosh, Avner. *Environ. Sci. Technol.*

larger than previously suspected, with 275,000 tons leaked annually.[19] The third major greenhouse gas, ethane, is also on the rise (after a decades long decrease) specifically because of the oil boom Bakken, which is the third largest emitter of ethane on the planet.[20] Communities and workers in the oil patch are being exposed to known carcinogens, endocrine disruptors and other toxic chemicals.[21]

Much of the extraction in the Bakken takes place on Mandan, Hidatsa, and Arikara territory, on and near the Ft. Berthold Reservation. This is "fracked" oil, extracted by blasting millions of gallons of water and a slurry of toxic chemicals deep into the bedrock of Mother Earth. It is extreme extraction, proven to cause earthquakes and poison aquifers, and has been banned in a long list of cities, states, provinces, and countries around the world. Our relatives in the Three Affiliated Tribes are facing epidemics of health problems, drug and sex trafficking, violent crime, and traffic deaths.[22]

Social and Ecological Costs of Refinement

Marathon also operates a refinery in Detroit that is poisoning the surrounding neighborhoods. The refinery processes both light sweet crude and tar sands oil, and this is where some of the oil from the Sandpiper and Line 3 projects would end up. Its emissions are causing serious health problems in the African-American neighborhood of Boynton. The Marathon refinery in Detroit is located in zip code 48217, the most polluted in the state, where the Michigan Department of Health has documented consistently elevated rates of cancer, respiratory disease, and kidney failure. Emma Lockridge, a nearby resident, says "We don't live next to the refinery, we live IN the refinery…it is just horrific. We are a sick community." A reporter asked her what tar sands smell like, and she said "it smells like death. And that's what it is."

In 2012, Marathon Oil completed a $2.2 billion upgrade on their 81-year-old Detroit facility to process tar sands bitumen into oil. When the refinery switched from conventional oil to tar sands, Marathon bought the homes of approximately 275 people in the mostly white neighborhood of Oakwood Heights, which is not directly in the prevailing path of emissions, unlike the mostly black neighborhood of Boynton. Marathon has left the people of color in Boynton to suffer, consistently denying their requests for buyouts and emergency evacuation. Lockridge says: "There's 10 empty houses on my block...people don't even want the houses. We can't even get squatters." She says the message from Marathon and state regulators is clear: "Walk away or die…at the end of the day, they're killing us." There's an orange and black soot on her white house, from the refinery discharge. "I have had kidney failure. Neighbor died of dialysis. Neighbor next door with dialysis. Neighbor across the street has kidney failure. The chemicals in our pipelines and are in our water will be the same chemicals that come through your land and can break and contaminate. We have cancer, we have autoimmune illnesses, we have MS, we have chemicals that have come up into our homes through the sewer. Those are from the companies, they end up in the public water and sewer system... They are poisoning us. "When you step outside now, it feels as if you strike a match the air will explode. The chemicals come into our homes, come into our basements and we smell it all the time. Don't let them put that pipeline here. I mean, it has always been bad, but not this bad," says Emma Lockridge. "The air is just unbearable. It's like living inside a refinery."

Marathon recently received a controversial permit from the MI Department of Environmental Quality to increase emissions even more, in order to produce cleaner-burning vehicle fuel as required by new federal standards. In other words, this neighborhood is being further sacrificed in order to reduce pollution elsewhere. The permit was issued despite a threatened lawsuit from Detroit Mayor Mike Duggan and a statement from a coalition of state senators

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[19] http://phys.org/news/2016-05-bakken-oil-field-leaks-tons.html

[20] https://www.minnpost.com/earth-journal/2016/05/bakken-wells-drove-sudden-reversal-global-decline-ethane-emissions

[21] http://www.eesi.org/articles/view/new-research-documents-frackings-health-effects-on-workers-and-communities, Colborn T, Kwiatkowski C, Schultz K and Bachran M. 2011. Natural Gas Operations from a Public Health Perspective. Hum Eco Risk Asses: an Inter Jorn. Available at: http://www.tandfonline.com/doi/abs/10.1080/10807039.2011.605662#preview

[22] http://earthfirstjournal.org/newswire/2014/05/26/sexual-assault-in-the-bakken-shale-man-camps, *Gilbertson, Lydia. Letter: End Human Trafficking Wherever It's Happening. Bakken News, May 23, 2014.* *http://bakken.com/news/id/182654/letter-end-human-trafficking-wherever-happening/,* McLaughlin, Shaymus. "Rise in Sex Trafficking on Bakken Oil Patch Poses New Challenges,: Minnesota Public Radio Interview with Bryan Lockerby, Administrator of the State's Department of Criminal Investigation. May 2014.

calling on them to reject it, comparing the situation to the poisoned water crisis in Flint. Residents filed a class-action lawsuit against Marathon in US District Court on February 23, 2016.

Climate Change Impacts

The current scoping document narrows the scope of climate change impacts considered in the EIS to only those emissions caused by pipeline construction or power plant generation of electricity to run the pumping stations. This is completely absurd. The document states: "*The air quality impacts analysis will include a review and estimate of the emission inventory of all criteria pollutant, greenhouse gas and hazardous air pollutant emissions related to construction and operation of the proposed project.*" By only looking at emissions from construction equipment and pumping stations, major sources of greenhouse gasses from the projects are ignored.

The cumulative effects outlined in Section 4.7 of the draft scope should include the amount of carbon that will be released into the atmosphere if these two pipelines are built. The effects should be combined with an analysis of air quality impacts in Minnesota. The analysis should also include the overall impact of the carbon release, including the estimated cost to remove it from the atmosphere and an assessment of who gains and loses economically.

As noted before, the Environmental Impact Statement for the Keystone XL pipeline included emissions from production, refining, and combustion.. The report states:

"The total annual lifecycle emissions associated with production, refining, and combustion of 830,000 barrels per day (bpd) of oil sands crude oil transported through the proposed Project, as determined through this assessment, are approximately 147 to 168 MMTCO$_2$e. The equivalent annual lifecycle GHG emissions from 830,000 bpd of the four reference crudes (representing crude oils currently refined in Gulf Coast area refineries) examined in this section are estimated to be 124 to 159 MMTCO$_2$e. The range of incremental GHG emissions (i.e., the amount by which the emissions would be greater than the reference crudes) for crude oil that would be transported by the proposed Project is estimated to be 1.3 to 27.4 MMTCO2e annually. This is equivalent to annual GHG emissions from combusting fuels in approximately 270,833 to 5,708,333 passenger vehicles, the CO$_2$ emissions from combusting fuels used to provide the energy consumed by approximately 64,935 to 1,368,631 homes for 1 year, or the annual CO2 emissions of 0.4 to 7.8 coal fired power plants."[23]

A robust analysis is especially important for these two projects, as the Bakken fields are a major source of both methane and ethane, and the tar sands of Alberta are one of the most carbon-intensive fuels on the planet. Methane and ethane are greenhouse gases that also cause climate change.

"Pound for pound, the comparative impact of CH$_4$ (methane) on climate change is more than 25 times greater than CO$_2$ over a 100-year period…..Because gas is often found alongside petroleum, the production, refinement, transportation, and storage of crude oil is also a source of CH$_4$ emissions."[24]

Methane flaring: Fracking has exposed poor infrastructure in the state, which leads drillers to burn or "flare" much of the gas that cannot be captured or shipped. In a single month of 2014, gas wells burned 10.3 billion cubic feet of natural gas. The burning released millions of metric tons of CO_2 into the atmosphere, contributing to climate change. In 2012, burned gas added 4.5 million metric tons of CO_2 to the atmosphere, which was roughly the equivalent of adding one million cars to U.S. highways. It has also been shown that methane leaking is much greater in the Bakken than previously reported, and that drilling in the Bakken has reversed a global decline in ethane emissions.[25]

Oil sands are also one of the dirtiest fuel sources on the planet, and have caused leading scientists to call for a moratorium on further tar sands development, including infrastructure projects.[26] Over 100 scientists have signed on

[23] Ibid, pg 4.14-4 (footnotes omitted)
[24] https://www3.epa.gov/climatechange/ghgemissions/gases/ch4.html
[25] http://phys.org/news/2016-05-bakken-oil-field-leaks-tons.html
https://www.minnpost.com/earth-journal/2016/05/bakken-wells-drove-sudden-reversal-global-decline-ethane-emissions
[26] http://www.oilsandsmoratorium.org/

the call, all of whom are leaders in climate change research, economics, geophysicists and biology. They have cited the following ten reasons as evidence for the need of a moratorium[27]:

1. Continued expansion of oil sands and similar unconventional fuels in Canada and beyond is incompatible with limiting climate warming to a level that society can handle without widespread harm.
2. Oil sands should be one of the first fuel sources we avoid using as society moves to non-polluting forms of energy, not the next carbon-intensive source we exploit. Extracting, refining, transporting, and burning oil-sands energy produces among the most greenhouse gases of any transport fuel per unit energy delivered (Brandt 2011, Gordon et al. 2015). Expansion of oil sands production will exacerbate the problem of carbon pollution and slow the transition to cleaner energy (Unruh 2000).
3. Current oil sands environmental protections and baseline data are largely lacking, and protections that exist are too seldom enforced. Too often, the development of the oil sands is presented as inevitable, while protections for human health and the environment are treated as optional.
4. Contaminants from oil sands development permeate the land, water and air of the Canadian boreal landscape, and many of these impacts are difficult to mitigate. Independent studies have demonstrated that mining and processing Albertan oil sands releases carcinogenic and toxic pollutants (e.g., heavy metals, polycyclic aromatic compounds) to the atmosphere from smoke stacks and evaporation, and to groundwater from leaching of tailings ponds. This pollution harms terrestrial and aquatic ecosystems and the species within them (Pollet and Bendell-Young 2000, Gurney et al. 2005, Nero et al. 2006, Gentes et al. 2007, Kelly et al. 2009, Kelly et al. 2010, Landis et al. 2012, Rooney et al. 2012, Kurek et al. 2013, Andrishak and Hicks 2011, Hebert et al. 2013, Galarneau et al. 2014, Parajulee and Wania 2014, Schindler 2014, Schwalb et al. 2015).
5. Less than 0.2% of the area affected by Canadian oil sands mining has been reclaimed, and none restored to its original state (Government of Alberta 2014).
6. Development and transport of oil sands is inconsistent with the title and rights of many Aboriginal Peoples of North America. Rapid expansion of the oil sands in Canada violates or puts at risk nation-to-nation agreements with Aboriginal peoples. In Alberta, oil sands mining is contributing to the degradation and erosion of treaty and constitutionally protected rights by disrupting ecological landscapes critical to the survival of Aboriginal culture, activities, livelihoods, and lifeways (Passelac-Ross and Potes 2007, Foote 2012, ACFN). In the US, proposed infrastructure projects threaten to undermine Treaty agreements between the federal government and Native American tribes (Mufson 2012, Hart 2014). In both countries, contamination of sacred lands and waters, disruption of cultural sites, lack of consultation, and long-term effects of climate change undermine sustainable social, ecological, and economic initiatives involving Aboriginal peoples across the continent and constitute violations of Native sovereignty (Passelac-Ross and Potes 2007, Foote 2012, Mufson 2012, Hart 2014, Irvine et al. 2014, McLachlan 2014, Wohlberg 2014, Athabasca Chipewyan First Nation, Tsleil-Waututh Nation).
7. What happens in North America will set a precedent for efforts to reduce carbon pollution and address climate warming elsewhere. The choices we make about the oil sands will reverberate globally, as other countries decide whether or how to develop their own large unconventional oil deposits (Balouga 2012). Strong North American leadership is needed now, because the impacts of current decisions will be felt for decades and centuries.
8. Controlling carbon pollution will not derail the economy. Most leading economists now agree that limits on carbon pollution – using mechanisms such as carbon taxes, cap-and-trade systems, or regulations – can facilitate a transition over several decades to low-emission energy without a dramatic reduction in global economic growth (Global Energy Assessment 2012, IPCC 2014, Nordhaus 2014).
9. Debates about individual pipeline proposals underestimate the full social costs of the oil sands, and existing policies ignore cumulative impacts. These are not simply business decisions. Responsible policies should address the interwoven, system-wide impacts of oil sands development, from mines and refineries, to pipelines, rail and tanker traffic, to impacts on economies and the global climate system. Current laws, regulations, and policies are not designed to assess cumulative impacts (Johnson and Miyanishi 2008, Office of the Auditor General of Canada 2011). When oil sands development is viewed as an integrated whole, the costs and benefits of individual decisions can be evaluated responsibly (Chan et al. 2014). Land use and

[27] http://www.oilsandsmoratorium.org/wp-content/uploads/2015/06/Oil-Sands-Moratorium-Message.pdf

regulatory decisions are considered lease-by-lease with no single agency responsible for oversight, accounting of cumulative impacts, or information flow. For example, decisions regarding mineral rights are made by Alberta Energy, those for timber by Alberta Sustainable Resource Development, while Alberta Environment decides on water and air impacts, and the National Energy Board decides on pipeline and rail transport of oil sands products (Johnson and Miyanishi 2008).

10. A majority of North Americans want their leaders to address climate change, and they are willing to pay more for energy to help make that happen.

Climate change is not an event in the future. Climate change was 30 years ago, we are living in climate chaos right now. We are seeing unprecedented human conflict and natural disaster. We are watching upwards of 200 species go extinct every day. A major contributor to climate change is the use of petroleum and petroleum bi-products. Many of the assumptions of need for this set of pipelines are based on a projected need for continued consumption of fossil fuels. But there is now international consensus, as illustrated in the Paris Climate Accord, that we need to rapidly shift away from fossil fuels. The U.S. energy system is extremely inefficient, wasting 61-86% of available energy.[28] The U.S. transportation system, with its heavy reliance on personal automobiles, powered by inefficient internal combustion engines is a perfect example of this. Not only are the better ways to move people (mass transit, bicycles, walking) but there are more efficient engine designs.[29] The time is now to say no to more dirty oil infrastructure.

Wildfires are an indicator very close to home. In the last two decades, North America has seen a dramatic increase in the number of wildfires and the total number of acres burning each year, as a result of climate change. In 2015, there were over 10 million acres burned by wildfire in the United States alone, approximately 67% more than the average for a given year.[30] According to the National Interagency Fire Center, 9 of the 10 worst years for acres burned in the U.S. have occurred since 2000.[31] The International Panel on Climate Change (IPCC) determined this increase will continue to accelerate. Wildfires, which already burn more than 350 million hectares globally causing an estimated 340,000 deaths, will double in number in the near future, leading forest-fire experts have warned. The early May 2016 wildfires that destroyed most of the town of Ft. McMurry, Alberta, was perhaps the most significant wildfire in North American history, in terms of human impact. It also destroyed tar sands industry infrastructure.[32] That massive fire has been raging out of control for nearly a month and is still going. It caused significant air quality concerns all across the region and resulted in a significant decline of tar sands production.[33] Experts say fires such as these will be a continuing reality in our new global climate, and will also increase in intensity.[34]

4) INDIGENOUS HUMAN HEALTH IMPACTS

The EIS must also address the unique human health concerns of the Native nations directly impacted by this project. The potential impacts of human health as a result of these projects are vastly underestimated in the scoping document. Native people are already under severe duress. Native peoples are already disproportionately impacted and suffering from structural racism due to unjust social and economic conditions. Throughout the scoping document, High Consequence Areas (HCA) are discussed. In human terms, these areas are defined by concentration of population. In general, Native communities are not considered HCAs. The EIS should factor this unique situation into the definition of an HCA, as pockets of poverty and concentrated environmental injustice should be included to consider oppressed communities equally.

Subpart 4.4.1.5 Environmental Justice is inadequate to address the issues of environmental justice associated with this project. The scope should include a detailed explanation of how the State of Minnesota will assess

[28] http://cleantechnica.com/2013/08/26/us-wastes-61-86-of-its-energy/
[29] https://www.fueleconomy.gov/feg/atv-ev.shtml
[30] https://www.nifc.gov/fireInfo/nfn.htm
[31] http://www.usatoday.com/story/weather/2016/01/06/wildfires-burned-record-10-million-acres/78362786/
[32] http://www.wsj.com/articles/canada-wildfire-prompts-new-evacuation-of-oil-sands-workers-in-northern-alberta-1463473452
[33] http://www.nytimes.com/2016/05/06/world/americas/canadian-wildfires-curtail-oil-sands-production.html?_r=0
[34] Toronto Globe and Mail February l9,2012

environmental justice concerns, how it will address the findings of environmental justice inquiry, and how it will provide additional protections and insurance for communities and people subject to disparate impacts.

In the section above titled "Well to Wheels Impact Analysis," we outline the significant human health impacts on the Indigenous people in the Bakken region.

Risk and Tribal Health Impacts in Minnesota

Tribal communities, in both the United States and Canada are already at-risk communities, as evidenced by their high-rates of suicide and persistent poverty.[35] Numerous studies and reports have linked these conditions directly to historic trauma, the history of colonization, and negative impacts of mega-projects.[36] The largest pipelines in North America, and the tar sands and fracked oil extraction they support, are undoubtedly mega-projects. Studies have also shown that impacts on Tribal communities are consistently underestimated, as the methodologies used to analyze risk are based on healthy white-males, not at-risk peoples that live off the land. Recently, suicide crises have hit First Nations communities in Canada, with a direct link being drawn between large infrastructure projects and their impacts on the communities[37].

Ojibwe socio-economic conditions place our community at high health risks. The Amherst Wilder Foundation report on health inequities in Minnesota found that American Indians suffered from structural racism with regards to health disparities, and are a high risk population. "The evidence strongly suggests that social and economic conditions and structural racism contribute significantly to the relatively poor health outcomes of the American Indian population in Minnesota. "Therefore, we feel that policy makers should take these critical factors into account in a systematic and transparent way when making decisions that potentially have wide ranging impacts..."[38] In the 2014 Advancing Health Equity report, the Minnesota Department of Health found the "years of potential life lost" as a result of heart disease and stroke is 165 percent higher for American Indians than for whites in Minnesota.[39] The report also highlighted structural racism as a key contributor to health inequities in our state:

"Structural racism — the normalization of historical, cultural, institutional and interpersonal dynamics that routinely advantage white people while producing cumulative and chronic adverse outcomes for people of color and American Indians — is rarely talked about. Revealing where structural racism is operating and where its effects are being felt is essential for figuring out where policies and programs can make the greatest improvements".[40]

International studies indicate that adding mega projects to stressed communities significantly increases negative health impacts. Without any spills, the proposed pipelines will add significant duress to tribal communities. Studies from previous oil spills have shown a marked decrease in traditional practices following a spill due to perceived contamination.[41]

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[35] http://www.mcgilldaily.com/2016/03/reactive-measures-not-a-solution-to-cross-lake-suicide-crisis/
http://www.theglobeandmail.com/news/national/attawapiskat-four-things-to-help-understand-the-suicidecrisis/article29583059/

[36] Luginaah et al (2010). Surrounded by Chemical Valley and 'living in a bubble': the case of the Aamjiwnaang First Nation, Ontario. Journal of Environmental Planning and Management, 53(3) 2010.
Tobias, J., Richmond, C., Luginaah, I. (2014) "That Land Means Everything to us". Environmental Dispossession and Resilience on the North Shore of Lake Superior. Health and Place (29), 26-33.
McDoweel, G. (2014). The socio ecological dimensions of hydrocarbon development in the disko bay region of Greenland: opportunities, risks, and trade- offs. Applied Geography, 46. 98.

[37] http://www.theglobeandmail.com/news/national/manitoba-premier-apologizes-to-first-nation-for-damage-done-by-dam/article22541829/

[38] Wilder Letter June 4, 2015

[39] Minnesota Department of Health (2014): Advancing Health Equity. Retrieved from: http://www.health.state.mn.us/divs/chs/healthequity/aheexecutivesummary.pdf

[40] Advancing Health Equity in Minnesota: Report to the Legislature, February 1, 2014: Health's Commissioner's Office.

[41] Gill DA, Picou JS, Ritchie LA. 2012. The Exxon Valdex and BP Oil Spills: A Comparison of Intial Social and Psychological Impacts. Amer Beh Sci 56: 3-23.
Miraglia R. 2002. The Cultural and Behaviour Impact of the Exxon Valdez Oil Spill on the Natives Peoples of Prince William Sound, Alaska. Spill Sci & Tech Bull 7: 75-87.

The communities of Rice Lake and East Lake, which are most directly impacted by the proposed Sandpiper, are already experiencing these statistics and are now facing the addition of the proposed pipelines. These projects are placing significant additional stress on these communities, which will only increase health inequities and cause additional harm. At both the Rice Lake and McGregor meetings, emotional verbal comments addressed the community address associated with the prospect of these projects. In the case of Rice Lake and East Lake, the larger territory would be impacted by the proposed pipeline project, and in the case of East Lake, the community has not only the prospect of a pipeline, but also the proposed Tamarac Copper mine. The cumulative impacts of these pipeline projects, and other proposed or planned projects should be considered as part of this EIS process. In the case of both White Earth and Mille Lacs reservation, suicides are already much higher than the state average, along with many other health conditions. Reservations across North America are also suffering from major drug and suicide epidemics. The health impacts of the proposed Sandpiper and Line 3 damage to Ojibwe communities will be significant, and the full, cumulative human consequences must be considered. These consequences are not limited to the populous Twin Cities, but are spread across Native communities from Alberta, North Dakota, and here in Minnesota. As we have stated before, the front line communities in Alberta and North Dakota are suffering from increased sexual violence, exposure to toxic chemicals, and a loss of community and ecology.

In the recent suicide epidemics in northern Canadian Indigenous nations- Pimicikimak (Cross Lake Manitoba) and Attawapiskat (Ontario), there has been a link made between long term duress, historic trauma, colonialism and ***most recently, mega projects***.

"...The Pimicikamak Cree Nation in Manitoba, also known as Cross Lake, declared a state of emergency on March 9, in the wake of six suicides over the past two months and over 140 attempts in the community of 8,365 in the last two weeks alone... The suicide crisis, however, cannot be resolved without considering the other hardships affecting Cross Lake, including the destruction of its land by a Manitoba Hydro station and a lack of economic security with an 80 per cent unemployment rate. In order to seriously confront Cross Lake's suicide crisis, the government must, in consultation with the Nation, address the systemic roots of this crisis…."

"Aboriginal youth in Canada have a suicide rate 50 times higher than the general population. Attawapiskat, another Cree community in the north has a suicide epidemic… In both cases, Pimicikamik Cree and Attawapiskat Cree, the background of colonialism, and injustice -whether in health access or housing access is foundational to the present suicide crisis. The crisis is worsened significantly by the destruction of the primary territory by the dam projects."

McGill Daily (Canada April 5 2016)

Climate Refugees

Climate refugees are people who must leave their homes and communities because of the effects of climate change and global warming.[42] In 2013, there were an estimated 22 million people displaced by natural disaster.[43] There is consensus that these numbers will continue to rise.[44] Domestically, we have already seen the phenomena unfold as the Isle de Jean Charles Tribal community in Southern Louisiana has been forced to relocate.[45] The northwestern Alaskan village of Kivalina is perched on a remote and narrow strip of sand next to the frigid waters of the Chukchi sea. Its 400 residents are Iñupiat. The U.S. Army Corps of Engineers predicts that Kivalina will be completely uninhabitable by 2025, a victim of melting ice, coastal erosion and rising sea levels. This village is just one of three Inuit settlements that scientists believe will be destroyed by the effects of climate change. At least eight more are at serious risk.[46] Indigenous peoples on a worldwide scale are significantly impacted as climate change refugees. This is in part due to our majority population in the Arctic and the islands in the oceans, which are the most heavily impacted by climate change. The over l80,000,000 metric tons annually of additional carbon dioxide associated with the Sandpiper and Line 3 as well as the significant metric tonnage of methane gas from the Sandpiper front end is directly related to these human health impacts. The impacts of these projects are too much for the planet to take, and will result in more drastic climate change, and disparate negative impacts on Indigenous communities.

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[42] http://nationalgeographic.org/encyclopedia/climate-refugee/

[43] http://www.internal-displacement.org/publications/2014/global-estimates-2014-people-displaced-by-disasters/

[44] http://www.unhcr.org/pages/49e4a5096.html

[45] http://www.theguardian.com/environment/2016/mar/15/louisiana-isle-de-jean-charles-island-sea-level-resettlement

[46] New York Daily News July 30, 2013 Carolyne Kuruvilla

5) INDIGENOUS CULTURAL IMPACTS

In Minnesota, the majority of these projects run through the 1855 Treaty area, lands on which tribal people continue to harvest a significant amount of the food necessary for the well-being and survival of our people. The Anishinaabeg carry out ceremonies throughout that territory, as they have since time immemorial. Through an EPA Technical Assistance for Communities contract (submitted in hard copy at the Rice Lake EIS scoping meeting in May 2016), researchers identified significant areas of traditional cultural use and sacred sites directly within the pipeline impact zone. At least 280 of these sites were identified and are subject to the archaeological assessment requirements of the State of Minnesota's Indian Affairs Council, as well as federal requirements under the National Historic Preservation Act, the Executive Order on the Protection of Sacred Sites, and the United Nations Declaration on the Rights of Indigenous Peoples.

In subpart 4.4.4 Cultural Resources, we believe that Minnesota law requires an evaluation by the Minnesota Indian Affairs archaeological staff. The MIA staff is properly trained and qualified to identify and evaluate indigenous cultural sites. Destruction of religion and tradition due to a failure to understand such concepts is unacceptable and a loss for all peoples; adequate training is a must in this situation. The structure and applicable standards of a review by this staff should be included in the scope. All Cultural Resources identification will require MIA staff and any work performed should be completed in accord to their well-researched, established standards.

In subpart 4.4.4.2 Archaeological, Historical and Cultural Resources we find the use of spatial analysis within ArcGIS inadequate to protect archaeological sites. Again, this review should be completed by Minnesota Indian Affairs archaeological staff and their developed standards to provide protection of known and unknown sites. An overseeing agency must be able to properly analyze the resources at hand to fully understand what is at stake. The scoping document should include MIA staff authority and expertise in ensuring adequate protection of archaeological sites.

In subpart 4.4.5.4 Wild Rice and other Tribal Resources. The scoping document needs to be amended to describe how it is going to protect 'other Tribal Resources' and what is encompassed within that term. The scoping document fails to identify how it will identify, evaluate and protect other Tribal Resources and deals only with wild rice.

Throughout the NEB document on the Line 3 Replacement Project cited above, there is a focus on the inclusion of Indigenous communities in the process of monitoring and analyzing this project.[47] This includes utilizing Indigenous Knowledge and Science. The MN PUC should require the same level of inclusion. As part of the conditional approval for the project in Canada, the NEB made several requirements for Indigenous involvement including:

- The development of *consultation plans for Aboriginal groups going forward... developed in consultation with Aboriginal groups and are to reflect a collaborative and coordinated consultation approach, as opposed to only information sharing. ... Enbridge must demonstrably respond to and address concerns raised where reasonable. The plans should also respect the cultural interests of Aboriginal groups regardless of the nature of the land use in the Project area (for example, unoccupied Crown land, occupied Crown land, or privately owned land). Enbridge and participating Aboriginal groups are encouraged to be innovative in order to enhance the way consultation will occur during the operation of the Line 3 Replacement Pipeline, and after the Existing Line 3 Pipeline has been decommissioned.*
- The development of *an Aboriginal Monitoring Plan for the construction phase of the Line 3 Replacement Pipeline, and specifically for the construction of pipeline facilities... The Board appreciates Enbridge's concern that it cannot hire approximately 150 Aboriginal monitors for the Project while ensuring safety and efficiency. This will be taken into account when the Board reviews the Plan. While the Board does not expect Enbridge to hire 150 monitors, there is a reasonable middle ground. The Board expects Enbridge to make efforts to accommodate active monitoring where desired by an Aboriginal group and where reasonable and safe, although observational site visits may be a component of the Plan. If an Aboriginal group wishes to participate in monitoring and Enbridge cannot reasonably accommodate the request, Enbridge will be expected to provide an explanation to the Board as to why*

[47] https://docs.neb-one.gc.ca/ll-eng/llisapi.dll?func=ll&objId=2949686&objAction=browse

Furthermore, it was recommended that *"the NEB, the pipeline industry, and Aboriginal groups work together to create a set of principles, objectives or a framework approach that can be used to assist the development of Aboriginal monitoring programs for large pipeline projects."*

At the federal level, Section 106 of the National Historic Preservation Act [NHPA] mandates tribal consultation and respect for tribal sovereignty with an undertaking that could affect tribal lands and historic properties. This legislation complements the intent and purpose of the National Environmental Policy Act. The proposed projects at hand will pass through treaty territories of the Anishinaabe people, and carry the potential for permanently destroying the ability of tribal nations to engage in their treaty-protected rights to harvest wild rice, hunt, and fish. Proper consultation with all affected tribal nations must take place, and there must be a detailed analysis of the cultural impacts of these projects at the federal and state levels. The potential for harm is high -- destruction of culture and sacred sites cannot be easily, if ever, undone.

The United States is one of numerous countries that supports the United Nations Declaration on the Rights of Indigenous Peoples. The UNDRIP is an international instrument that contains many protections for Indigenous communities, who are so often subject to abuses and unjust treatment. Among the provisions are a right to practice cultural beliefs and practices.[48] Contamination from these pipeline projects would wipe out the practice of harvesting wild rice and all associated religious ceremonies. Wild rice is an intrinsic, identity-forming aspect of Anishinaabe life -- to lose access to these wild rice beds would devastate and permanently harm our culture.

The UNDRIP also contains provisions mandating free and informed consent from an affected tribal nation by the state.[49] In this case, the state of Minnesota has failed to properly consult or even adequately consider the impacts of these projects on the indigenous peoples of the region. The damages that will result from these projects cannot be undone, nor can they be measurable in terms of losing an entire culture that has existed prior to the formation of the United States. A fossil fuel project should not be considered without fully examining cultural impacts and the potential losses that will occur if spills occur, which is a mathematical certainty.

6) ABANDONMENT

Every day, over 2.5 million barrels of crude oil flow through MN in eight oil pipelines, and 4 of those lines, Enbridge's old Lakehead system, are ancient and full of holes, likely leaking crude oil throughout their length. They were built in the 50's and 60's before the more abrasive dilbit was being extracted. As such, these pipelines were not designed to handle the crude that now flows through them. States, tribes, and the federal government were not well informed of the risks and very few environmental regulations were in place. At many points, those pipes were never buried, and are sitting above ground, corroding, with their protective coating, single wrap of Polyken 960-13 polyethylene tape with an adhesive backing, peeling off. This peeling has been shown over and over again to cause ruptures. It's what caused the Kalamazoo rupture, the largest inland spill in US history (replacing the previous record holder, the 1979 Bemidji spill).[50] It has been 6 years and $1.2 billion has been spent, and that spill is still not cleaned up. The community near the spill has been suffering negative health effects, and it has been shown that Enbridge knew about the crack, but did nothing about it. We do not want this risk in our pristine waterways and sacred rice beds. These lines are catastrophes waiting to happen. Allowing Enbridge to abandon Line 3 without a sufficient review process will set a dangerous precedent.

The following are photos were taken by our staff member, Thane Maxwell of Line 4 and Line 1, on Enbridge's Mainline Corridor where it runs across the Fond du Lac reservation near Ditchbank Road.

[48] http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf

[49] *Id*.

[50] http://www.ntsb.gov/investigations/AccidentReports/Pages/PAR1201.aspx

The next two photos are of Line 4, taken by John Ratzloff in the same location.

Over time, soil movement causes wear and tear on this coating and it breaks down, causing pipes to corrode. In section 1.7.1, the NTSB report for the Kalamazoo incident states:

"Corrosion was observed beneath the areas where the adhesive bond between the pipe and its protective tape coating had deteriorated. In the areas of disbondment, metal loss was found around and below the longitudinal seam in the upstream and downstream sections of pipe. Because the tape had become disbonded, the pipeline's cathodic protection was prevented from reaching the pipe; it no longer prevented corrosion from occurring. External corrosion was observed along the length of the pipe in areas where the coating had disbonded."

All of this is when the pipes are buried below the frost line. It is required to bury pipelines below the frost line, so we must wonder why these pipes are sitting above ground, exposed as they are. Fond du Lac Band members and

employees raised concerns about these exposed pipes in MN Public Utilities Commission proceedings regarding Enbridge's pipeline route restoration practices in 2008, but to no avail.[51]

This polyethylene tape was also documented in the TSB of Canada's incident report as a cause of the rupture that spilled near Hardisty, Alberta in 2001.[52] It was also documented as a major cause of corrosion on Enbridge's Line 9 pipeline, during their recent application to the TSB of Canada to reverse the direction of that line.[53] Enbridge's spokesperson Lorraine Little has also cited it as the cause of the corrosion motivating Enbridge to propose abandonment of their existing Line 3 pipeline, so that they can build a new one in the Sandpiper corridor.[54]

Line 3 is the 34" line that Enbridge wants to abandon and build anew, in the new corridor, so that they don't have to deal with the 900 "structural anomalies" they've found in it. Line 4, the exposed one in the pictures is a strange one, with 28 different segments of different sizes and lengths and product types, many of which are "loops" that work in combination with Line 3 and were added on in multiple stages over the years. Many governmental reports and newspaper articles refer to Lines 3 and 4 as a single unit. Together they are responsible for Minnesota's largest spill near Grand Rapids in 1991; the spill near Cohasset, MN, in 2002; the explosion in Clearbrook in 2007 that killed two workers; a spill in Regina, Alberta in December 2014; and countless other ruptures and spills. In other words, these are Minnesota's problem child pipelines - ticking time bombs. That risk falls disproportionately on Anishinaabe people. The real opportunity to create jobs lies in maintaining, cleaning up, and dismantling these old lines.

Honor the Earth agrees that the current Line 3 needs to be removed from service. However, we do not believe that Enbridge should be allowed to walk away from existing contamination and other issues. Enbridge has indicated that the current Line 3 has over 900 "integrity anomalies", while we have not seen a classification of the level of these anomalies, we know they can developed into ruptures, spills, or leaks. Enbridge knows this as well, which is why they are proposing to abandon this structurally impaired line in place and build a brand new one. This abandonment allows Enbridge to avoid opening the ground and potentially discovering contamination their "pigs" (pipeline inspection gauge) have not disclosed (or that has not been reported). There are also reports that there are several places where the existing pipe has been exposed, and other areas where invasive species have encroached on harvesting areas as a direct result of ROW maintenance activities. If Enbridge is not required to remove the pipeline and restore the damaged ecosystems, there may never be a full accounting of the contamination surrounding the pipeline. This contamination would become the responsibility of nearby landowners. Additionally, Enbridge has stated they plan to fill the pipelines with nitrogen. This would constitute an underground storage tank according to Minnesota statute Minnesota Statute § 103I.681[55]

Article 5 of Enbridge's 1991 Presidential Permit for the operation of Line 3 clearly states that they are responsible for removal of the line:[56]

[51] concerns about these exposed pipes in MN Public Utilities Commission proceedings regarding Enbridge's pipeline route restoration practices in 2008

[52] http://www.bst-tsb.gc.ca/eng/rapports-reports/pipeline/2001/p01h0004/p01h0004.pdf
[53] http://www.landownerassociation.ca/rsrcs/OPLAFinalArgument_May24_2012.pdf
[54] http://www.startribune.com/enbridge-files-to-replace-problem-pipeline-in-minnesota/280528652/
[55] https://www.revisor.mn.gov/statutes/?id=103I.681
[56] http://mn.gov/commerce/energyfacilities/documents/34079/Appendix%20A%20-%201991%20Presidential%20Permit.pdf

Article 5. Upon the termination, revocation, or surrender of this permit, the United States facilities in the immediate vicinity of the international boundary line shall be removed by and at the expense of the permittee within such time as the Secretary of State of the United States or his delegate may specify, and upon failure of the permittee to remove this portion of the United States facilities as ordered, the Secretary of State of the United States or his delegate may direct that possession of such facilities be taken and that they be removed at the expense of the permittee; and the permittee shall have no claim for damages by reason of such possession or removal.

Enbridge promises to maintain the pipelines in perpetuity, but no one believes this. No infrastructure from 50 years ago is still in existence now without ongoing maintenance. In the NEB report. the Canadian government found that there was a very real risk that pipeline companies would not have money available forever and would eventually stop maintenance with the result that some landowner in the future would be stuck with a decaying pipeline causing drainage, subsidence, erosion and contamination, and no way to get the oil industry to pay for its mess.[57] The State of Minnesota needs to develop a set of abandonment regulations to avoid passing on this incredible liability to our future generations.

Realizing these issues, the NEB has made several recommendations directly related to the long-term oversight of the abandoned Line 3[58]:

- ***In the Panel's view, the Board's policy and regulatory framework needs to be responsive to the evolving statutory context and the likelihood of additional large decommissioning and abandonment applications in the future.***

- *Enbridge will be required to make additional filings with the Board before commencing decommissioning activities. These include a detailed Final Decommissioning Plan and a Minimally-Invasive Procedure Evaluation Report.*

- *Due to the uncertainty regarding the long-term impacts of decommissioning the Existing Line 3 Pipeline in-place... it is important that a robust monitoring plan be in place to ensure that remedial actions and adaptive management measures will be taken if required. Board-imposed conditions include the filing by Enbridge of a Decommissioning Treatment Monitoring Program and reporting by Enbridge of the monitoring results to the Board and stakeholders. Enbridge will also be required to notify the Board or obtain Board approval in the event that certain remedial actions or adaptive management measures are required after the Existing Line 3 Pipeline has been decommissioned*

- *There is a current restriction (other operating pipelines) on Enbridge's ability to complete some of the remaining steps in the lifecycle of the Existing Line 3 Pipeline, such as removal of above-ground facilities at shared facility sites. Enbridge suggested that the Board could require it to file a proposed plan to complete these remaining activities at the time of abandonment of the last operating pipeline in the corridor. The Board agrees that it should assess and approve these remaining activities before they are carried out. However, in the Board's view, this should be accomplished by way of a future abandonment application, not merely through the approval of a plan. A future abandonment application will address any and all remaining activities*

57 https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/92263/2404881/2545522/2955931/2949686/Volume_I_-_Our_Decisions_and_Recommendations_-_OH-001-2015_-_A4Z5U2.pdf?nodeid=2949922&vernum=-2

58 https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/92263/2404881/2545522/2955931/2949686/Volume_I_-_Our_Decisions_and_Recommendations_-_OH-001-2015_-_A4Z5U2.pdf?nodeid=2949922&vernum=-2

in the lifecycle of the Existing Line 3 Pipeline, including those that may be required due to circumstances that exist at that time. This is consistent with current Board guidance in Guide K to the Filing Manual and its amended Decommissioning Guidance Notes, which are clear that all decommissioned pipelines will require an application to the Board for abandonment.

- *The Board therefore imposes a condition requiring Enbridge to file an abandonment application once the remaining steps in the lifecycle of the Existing Line 3 Pipeline can be carried out (excluding ongoing monitoring), or if the Board directs Enbridge to do so for all or any part of the pipeline. The Board also imposes a condition requiring Enbridge, after the Existing Line 3 Pipeline has been decommissioned, to report every five years on the status of the corridor. This information will help the Board regularly assess the ongoing status of the corridor, including the continued appropriateness of the Existing Line 3 Pipeline remaining in-place.*

These conditions were designed to mitigate some of the potential long-term consequences of abandonment, including:

- Long-term financial liability of pipeline[59]
- Drainage or sinkhole issues, including the creation of water conduits
- Corrosion issues[60]
- Subsidence
- Potential soil and groundwater contamination

Additionally the NEB has ordered Enbridge to set aside nearly $1 billion to pay for future abandonment of its pipelines in Canada. In the US, the responsibility to protect landowners and the public from the risks created by abandoned pipelines is on the states.

The State of Minnesota has the power to regulate abandoned pipelines. In particular, the Public Utilities Commission (PUC) has discretion to decide what actions a pipeline company takes to minimize risks posed by old pipelines, particularly when it approves a replacement. Since Line 3 is the first major crude oil pipeline to be abandoned in the state, there is a risk that the PUC will avoid this responsibility. Enbridge should be required to do a survey of Line 3 now to identify possible spill locations and investigate them, because that should be addressed now while the costs can still be passed on to the industry. Landowners need to clarify their right to control their own land by requiring Enbridge to remove or otherwise mitigate the pipeline, otherwise, if a conflict arises their only option may be to bring Enbridge to court.

Elements of an abandonment plan should include:
1) Clarifying landowner control over what happens to abandoned pipe so they don't have to sue Enbridge;
2) Landowner education about the full range of mitigation options available to landowners, including removal, plugging, and filling abandoned pipe;
3) A survey for contamination and remediation plan
4) To the degree that landowners want to put off the decision about what to do with the pipe, the should seek the creation of a trust fund to ensure that money is always available should future problems arise.

7) SPILL MODELING AND RESPONSE

The bottom line is that for a given pipeline in any 10-year period, there is a 57% chance of a major spill, as documented by USDOT study using PHMSA data.[61] So it's not a question of *if* these pipelines will poison our sacred

[59] From: http://www.pipelineandgasjournal.com/who-owns-abandoned-pipelines
[60] https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90463/501473/501488/501198/515103/A1F2Z4_-_TNS_Tech_Guidelines_on_Abandonment_(r12)_April_10_07_JKK.pdf?_gc_lang=en&nodeid=515104&vernum=0&redirect=3
[61] http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_4A77C7A89CAA18E285898295888E3DB9C5924400/filenam

waters and destroy our way of life, but *when*. The EIS must include a thorough analysis of spill risk and response. The current scope is insufficient.

Incorrect Spill Modeling Methodology

The EIS should include spill modeling under both average and worst case weather conditions on river crossings as well nearby lakes, streams and wetlands. It should also include all of the High Consequence Areas (HCA). The original Sandpiper RP scope prepared by Deborah Pile contained 7 locations for oil spill risk assessment and analysis. However, it is not clear in the new scoping document where these locations are. As it currently stands, DOC seems to have chosen locations that are "low consequence areas" rather than high consequence areas (HCA). Upper Rice Lake is not included despite the fact that it is one of the premier wild rice lakes. Other HCA's that should be included include Hay Creek, the Straight River aquifer, the Pine River, the Whitefish Chain, Spire Valley, the Mississippi River and Big Sandy River crossings, the Kettle River, the western tributary to the St. Croix National Scenic Riverway, and of course, Lake Superior.

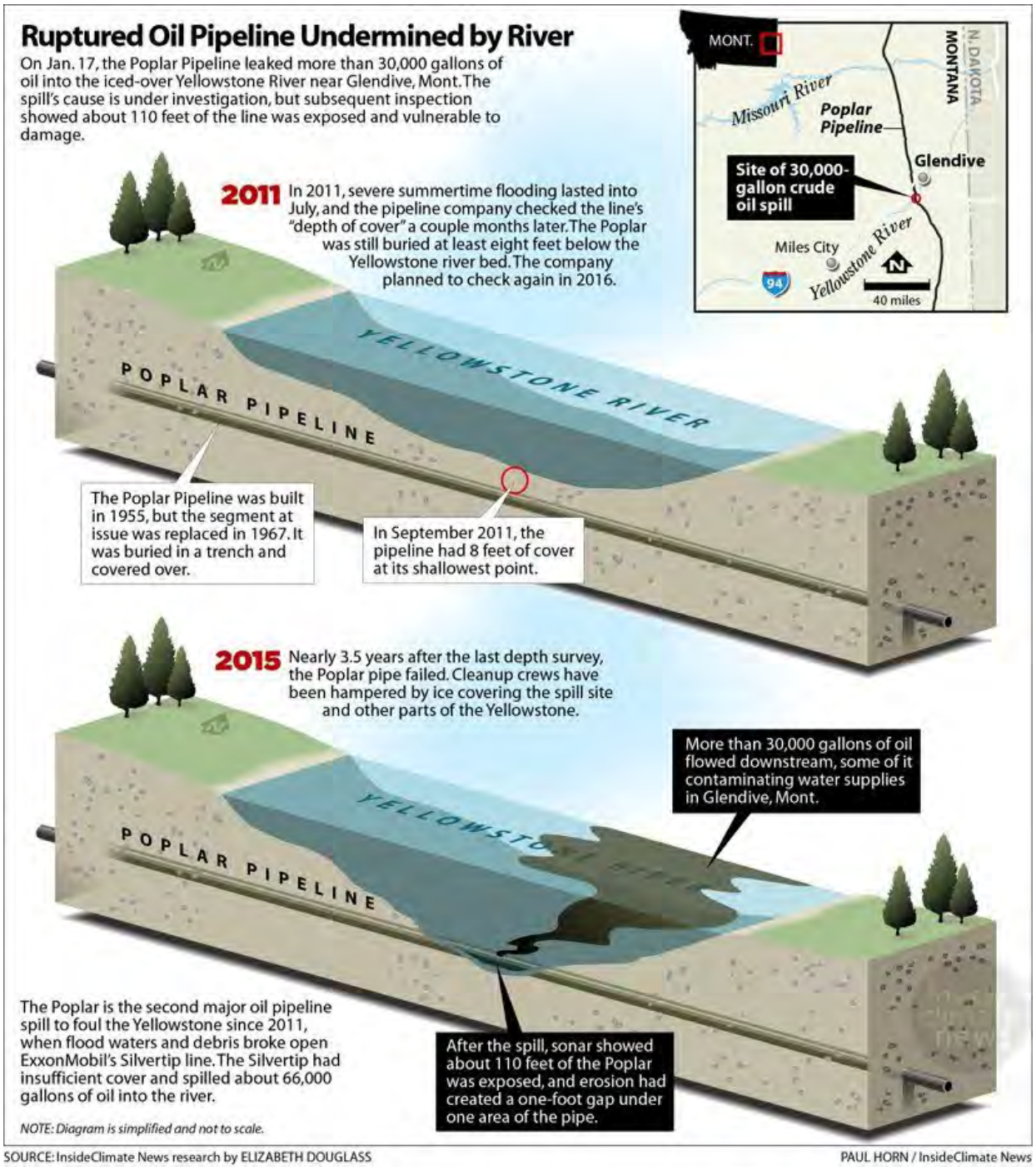
The draft scoping document relies on maximum spill data from Enbridge. As Enbridge is known to under-represent their spills, independent verification of maximum potential spills should be conducted. Relying on Enbridge's data for spill modeling results thwarts public participation in the process and prevents us from commenting on the methodology being employed to protect our precious resources.

Also, if Enbridge's offical response time is anywhere from 1 hour to 3 days, then a 24 hr modeling of a spill or leak is insufficient. The duration of the model runs should be determined by emergency spill response time from moment of release to fully deployed containment. Downstream impacts must also track dissolved fractions and submerged fractions of the product that defeat containment designed to collect floating fractions. These downstream models should predict the ultimate fate of all fractions that are subject to attenuation of any kind and to the remaining components including heavy metals that do not attenuate by any other means with exception of dilution. Heavy metals like mercury would have to be modeled through natural methylation in aquatic environments and eventual uptake into the food chain including fish, predators and humans. Dilbit and other dense, nonaqueous phase liquids (DNAPLs) are exceedingly hard to clean up from groundwater and sensitive wetlands, the exact environments the prefered route runs through.

River Crossings

Crude oil pipeline river crossings pose unique and significant risks to our freshwater resources. The Yellowstone River spill in 2015 showed how unpredictable river beds can be, and how impossible it is to cross a river safely. In that case, the Poplar Pipeline had been monitored in 2011 and measured to be more than 8 feet below the river bed at its shallowest point. In 2015, it was all of a sudden entirely exposed to the river's current for more than 100 feet along its length.[62] It actually had a foot of river water flowing underneath the pipe. It ruptured, spilling more than 30,000 gallons into the river.

[62] http://insideclimatenews.org/news/06022015/yellowstone-oil-spills-expose-threat-pipelines-under-rivers-nationwide



In 2014, an MPR report showed that 3 of the 6 Enbridge crude oil pipelines crossing Minnesota's Tamarac River were exposed by floodwater erosion years beforehand, but were still exposed.[63] None of the pipes had failed at that point, but one was being propped up by steel legs.

A study last year by the Pipeline and Hazardous Materials Safety Administration found "depletion of cover" was a factor in 16 significant pipeline spills at river crossings since 1991.[64]

[63] http://www.mprnews.org/story/2014/07/29/enbridge-pipelines-exposed

[64] http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Rep_to_Congr_on_Res_of_Haz_Liq_Incid_at_Cert_In_Wat_Cross_Stu_Final_8_27_13.pdf

Exposed Enbridge crude oil pipeline in the Tamarac River in Marshall County, MN. (Photo: Dan Gunderson/MPR News)

The exposed pipes run the risk of pipelines being damaged, but no law requires Enbridge to rebury them. Risks increase the longer a line is exposed, but determining the level of risk is up to Enbridge, not the Office of Pipeline Safety. Although federal regulations specify how deep pipelines must be buried, the rules only apply during initial construction, and there is absolutely no law to require Enbridge to rebury the pipe.[65]

River crossing issues will continue to grow as the climate continues to change. Flood events and alterations of waterway dynamics, changes in freeze/thaw cycles are all elements of climate change. The rapidly shifting climate can increase scour in river beds, and increase the likelihood of a spill at river crossings.

Spill Response

The EIS should include a thorough analysis of Enbridge's performance history in responding to spills. According to the Wall Street Journal, an estimated 80% of spills are actually detected by civilians, despite pipeline companies enormous investments in state of the art detection systems.[66]

A federal audit of Enbridge's 2010 spill in Marshall, MI, showed that Enbridge was unable to stop leaks on aging pipelines, and still does not know the best way to completely clean up after a catastrophic spill. The audit showed that Enbridge could not prove that it knew how to monitor and repair pipeline cracks forming from corrosion - the key factor that had led to two major Enbridge oil spill disasters in 2007 and 2010 in Glenavon, Saskatchewan and Marshall, Michigan.[67] As it were, Enbridge lobbied hard to demand the NEB remove the most incriminating parts of that report, and covered up two secret environmental documents.

In fact, Enbridge has lobbied aggressively against responsible spill response regulations in Minnesota. In an October 2014 letter to the Environmental Quality Board, a number of Minnesota legislators pointed out Enbridge's resistance and determination to thwart any safety regulations by the state of Minnesota. The letter, from Minnesota Senators Steve Dribble, John Marty and Representatives Frank Hornstein and Jean Wagenius, stated:

[65] Jon Wolfgram, chief engineer for the Minnesota Office of Pipeline Safety
[66] http://thinkprogress.org/climate/2014/01/21/3186261/pipeline-spills-discovered-people/
[67] http://www.nationalobserver.com/2016/05/02/news/heres-how-enbridge-edited-federal-pipeline-audit

" Enbridge and the pipeline industry were **unwilling to agree** to: Provide a qualified company employee to advise public sector incident commander by telephone within one hour of a major pipeline oil discharge;

- Provide monitoring equipment within three hours of a discharge, or to develop an annual plan to deliver monitoring equipment to a discharge site to comply with the provision;
- Provide qualified personnel to advise incident commanders at the discharge site within three hours of a major spill;
- Provide containment booms from land across sewer outfalls, creeks, ditches and other places where oil and other hazardous substances may drain in order to contain leaked material before it reaches those resources;
- To have capability to deliver containment booms, boats, oil recovery equipment and trained staff within eight hours of a confirmed discharge to recover 10% of a worst case discharge, including protection of listed sensitive areas and potable water intakes within one mile of a discharge site
- Deliver equipment to protect sensitive environmental areas and drinking water intakes, within 60 hours of a major spill
- Provide updated disaster prevention and response plans to the Pollution Control Agency every three years ..."

National Academy of Sciences Report on Diluted Bitumen Spills

A recently released National Academy of Sciences Report[68] document shows how uniquely dangerous the transportation of tar sands oil is for water-rich regions. The report, entitled "Spills of Diluted Bitumen from Pipelines: A Comparative Study of Environmental Fate, Effects, and Response," provides unprecedented data documenting the grave environmental, economic, and public health impacts of diluted bitumen or "dilbit" spills, especially in places with abundant freshwater resources such as Wisconsin and Minnesota. The relevant conclusions of that report are too many to list here, but the overall insight is that tar sands oil spills constitute a COMPLETELY different animal than that of any other type of crude oil, with uniquely devastating ecological effects when interacting with water. The study documents in detail how, in comparison to other commonly transported crude oils, many of the chemical and physical properties of diluted bitumen, especially those relevant to environmental impacts, differ substantially from other types of crude oil. The key differences are in the exceptionally high density, viscosity, and adhesion properties of the bitumen component of the diluted bitumen that dictate environmental behavior as the crude oil is subjected to weathering (physical and chemical changes of spilled oil over time). The report also documents the utter lack of methodology for cleaning up dilbit spills. In other words, we are entirely unprepared for what's coming our way.

CONCLUSIONS

These two projects, the Sandpiper and Line 3 Replacement, represent an enormous investment in dirty oil infrastructure that the world does not need. The existing scoping document downplays the enormity of the task at hand and recklessly narrows the scope of impacts being considered, to the detriment of the public, especially the Anishinaabeg. The scoping document is grossly inadequate and will fail to produce an EIS that will enable the State of Minnesota to protect the environment and prevent significant human harm. Residents of the State of Minnesota, acting as global citizens, demand a comprehensive and transparent EIS process. Honor the Earth has outlined a number of ways to improve the scope of the EIS including: correct project purpose definitions; changes to geographic and jurisdictional scope; a new regulatory structure; appropriate research methodology; an extended timeline; a critical economic review; a well to wheels assessment of emissions and climate impacts; an analysis of human health impacts in at-risk communities; a comprehensive investigation into cultural sites impacts; and a comprehensive spill modeling/response review. These changes are necessary to uphold the National Environmental Policy Act (NEPA) and the Minnesota Environmental Policy Act (MEPA).

[68] National Academies Press, http://www.nap.edu/21834

TREATY RIGHTS AND OIL PIPELINES:
What You Need To Know

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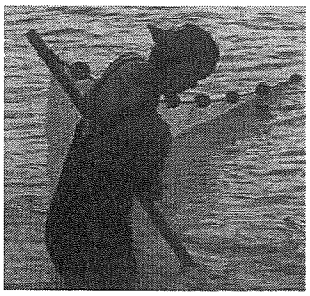
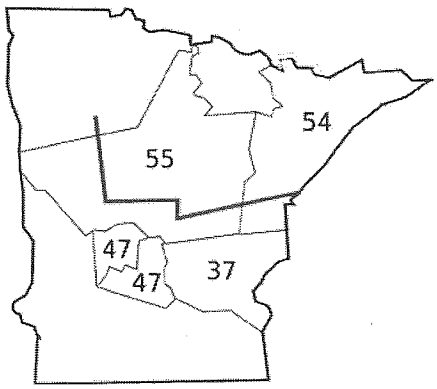
SUMMARY:
Even on ceded territory (off-reservation), Ojibwe tribal members retain certain property rights that allow them to "make a modest living from the land." These use-rights are called usufructuary rights, and are guaranteed by the treaties between Ojibwe bands and the US government, protected by the US Constitution, and affirmed by the US Supreme Court. They include the rights to hunt, fish, gather medicinal plants, harvest and cultivate wild rice, and preserve sacred or culturally significant sites.



The proposed new oil pipelines in northern MN violate the treaty rights of the Anishinaabeg by endangering critical natural resources in the 1854, 1855, and 1867 treaty areas. All pipelines leak, and catastrophes like Enbridge's 1 million gallon spill in 2010 on the Kalamazoo River are not unlikely. The pipelines threaten the culture, way of life, and physical survival of the Ojibwe people. Where there is wild rice, there are Anishinaabeg, and where there are Anishinaabeg, there is wild rice. It is our sacred food. Without it we will die. It's that simple.

HISTORY:

• **1837 White Pine Treaty** (aka Treaty of St. Peters) – July 29, 1837 at Fort Snelling.
The Ojibwe nations ceded to the US a large tract of modern-day MN and WI (east of the Mississippi River and south of Lake Superior). The purpose was to exploit the region's lumber resources, especially giant white pines, for use in the construction boom across the country. The United States bought millions of acres for about $24,000. In turn, Article 5 granted the signatory Ojibwe bands usufructuary rights to hunt, fish and gather within the ceded territory. An Ojibwe chief from Leech Lake known as Eshkibagikoonzhe (Flat Mouth) demanded that his people retain the right to "get their living from the lakes and rivers" because "we cannot live, deprived of our lakes and rivers."



• **1855 Treaty with the Chippewa** – February 22, 1855 in Washington DC.
The Ojibwe ceded 10 million acres of northern Minnesota lake country, including the headwaters of the Mississippi River, and the US government established 9 small reservations.

• **The Voigt Decision (1983)** - In the 1970s, the Lac Court Orielles Band of Ojibwe challenged Wisconsin's efforts to regulate their hunting and fishing off-reservation. The conflict started when 2 Ojibwe men were arrested for harvesting fish with spears, and charged with poaching. In 1983, the US 7th Circuit Court of Appeals delivered the "Voigt Decision" in *LCO Band of Chippewa Indians v. Lester P. Voigt, et al*, affirming Ojibwe rights to hunt and fish anywhere on ceded territory, even on privately owned land. Over the next 8 years, which were marked by civil unrest and racial conflict as white sport fishermen protested tribal members' exercising of treaty rights, the US District Court rejected repeated appeals by the State of Wisconsin. The US Supreme Court refused to hear the case, and the Voigt decision still stands today.

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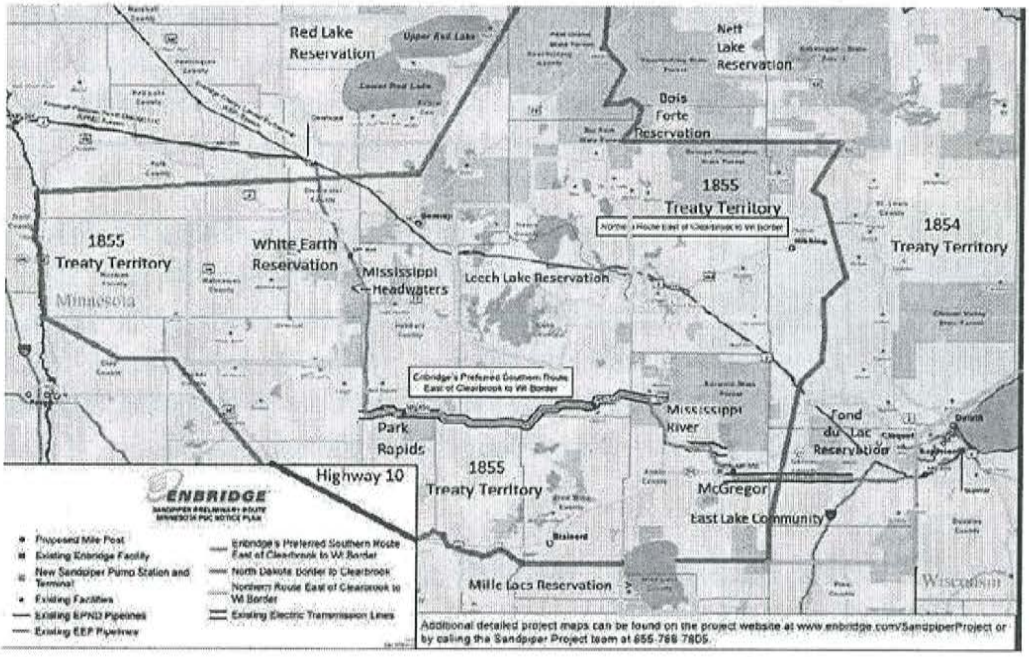
• 1999 Supreme Court Decision - Minnesota v. Mille Lacs Band of Chippewa Indians

This is the landmark decision. During the 70s and 80s, Ojibwe tribal members in Minnesota were repeatedly arrested and harassed for asserting their fishing rights. This led to a series of protracted legal battles, culminating in the 1999 U.S. Supreme Court decision *Minnesota v. Mille Lacs*. The Court ruled that the Ojibwe retained hunting, fishing, and gathering rights on the lands it had ceded to the federal government in the 1837 White Pine Treaty and that the state governments of MI, MN, and WI, had unfairly asserted authority of hunting and fishing rights without regard for treaty rights guaranteed to the Ojibwe before those states were even formed. The Court also concluded that the same protections survived in the 1855 Treaty, even though it did not explicitly outline usufructuary rights, because the Chippewa delegates that signed it clearly did not believe they were relinquishing such rights.

• 2015 Squarehook case

Operation Squarehook was a large multi-year state and federal investigation into black market walleye. On Feb. 10, 2015, the 8th Circuit U.S. Court of Appeals ruled that the federal government could not prosecute 4 Ojibwe men for netting walleye on Leech Lake Reservation and selling them. This upheld the 2013 US District Court decision to toss the cases. The men were accused of selling hundreds of thousands of dollars' worth of netted fish and charged with wildlife trafficking under the Lacey Act. The court upheld the rights guaranteed by the 1837 White Pine Treaty as the same rights the signatory Chiefs would have understood in 1855, even though the 1855 treaty did not directly apply because the Leech Lake Reservation did not exist yet. In its decision, the court repeatedly referenced the Supreme Court's landmark 1999 Mille Lacs decision. It effectively ended Operation Squarehook.



TRIBAL INTERVENTION AGAINST THE SANDPIPER/LINE 3 CORRIDOR:

Tribal nations have federally protected property rights in the treaty areas, yet have not even been consulted about the Sandpiper/Line 3 corridor. The PUC bluntly denied requests for public hearings on the reservations. So in June 2015, the White Earth and Mille Lacs Bands each held their own public hearings to document public sentiment and expert testimony on potential impacts. The bands also wrote letters to the PUC asking for a stay on the permitting process until tribes could be property consulted, and letters to Governor Mark Dayton asking him to fulfill his responsibilities for cooperation with tribal governments as outlined in Executive Order 13-10. Approval of this pipeline corridor is a declaration of war against the Anishinaabeg, a slap in the face of tribal governments, and a threat to the precious fresh water of Minnesota. Tribal governments are now exploring options for intervention at the federal level and expect a long and protracted legal and regulatory battle over the coming years.

LOVE WATER NOT OIL

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THE CASE AGAINST MARATHON

Withdraw from the Sandpiper Pipeline!

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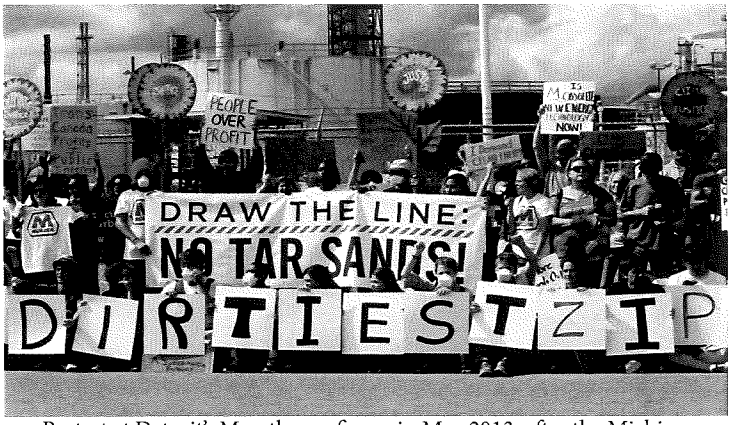
BACKGROUND:

The proposed Sandpiper pipeline is a joint venture between Enbridge Energy and Marathon Petroleum Corporation. Marathon is the "anchor shipper" that makes the project economically viable by committing to use the pipeline to transport oil they extract in North Dakota. Marathon plans to pay 37.5% of the Sandpiper's construction costs in exchange for a 27% ownership interest in the project. The MN PUC issued a Certificate of Need for the Sandpiper based on Marathon's interest and "need." But Marathon doesn't need this pipeline. None of us need this pipeline. It's time for Marathon to witrhdraw from the Sandpiper because it is a losing project - financially, and for all of us.

RISKY BUSINESS FOR MARATHON:

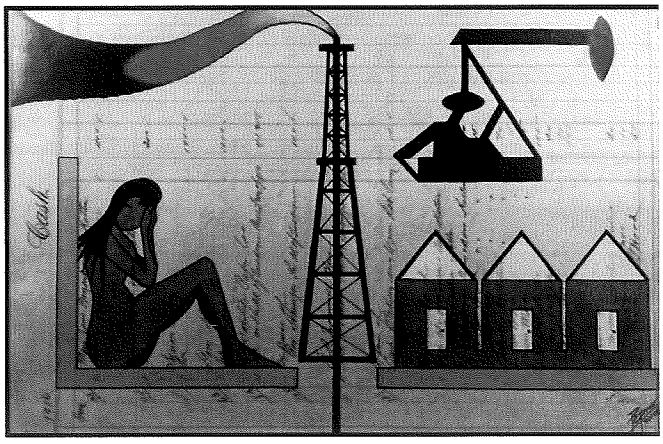
Marathon should withdraw from the Sandpiper because it is financially disastrous for them. With oil prices remaining at historic lows, Bakken drillers are going bankrupt. There were only 29 active rigs in April 2016, down from over 220 just a few years ago. Marathon recently had 7 active rigs in the Bakken, but as of April 2016, they have ZERO. Continued delays on the Sandpiper/Line 3 corridor are increasing project costs, and Minnesota's regulatory agencies are still debating how to proceed. It is not clear that the project will move forward. And Marathon is not in a position to make mistakes. Marathon Petroleum Corporation's stock prices have dropped more than 50% from recent highs in 2015. Marathon Oil Corporation, the sister subsidiary that does all the drilling, saw their prices drop more than 75% from recent highs. Last year they posted $2.2 billion in losses, cut their capital investments in half, and laid off over 10% of their employees.



Protest at Detroit's Marathon refinery in May 2013, after the Michigan OSHA announced it was giving Marathon a safety award, one week after the refinery had an explosion. (Photo by Emma Lockridge)

A "WELLS TO WHEELS" VIEW OF IMPACT:

Infrastructure impact analysis should start at the oil well and finish at the gas tank. Marathon has been one of the major drillers in the Bakken, in Mandan, Hidatsa, and Arikara territory. Their wells are located mostly around the sacred waters of Lake Sakakawea, on and near the Ft. Berthold Reservation. This is "fracked" oil, extracted by blasting millions of gallons of water and a slurry of toxic chemicals deep into the bedrock of Mother Earth. It's "Extreme Extraction," proven to cause earthquakes and poison aquifers, and has been banned outright in a long list of cities, states, provinces, and countries around the world. Our relatives in the Three Affiliated Tribes are facing epidemics of health problems, drug and sex trafficking, violent crime, and traffic deaths. Oil companies should be responsible for the damages their extraction causes to our communiites. Marathon is responsible for the major diesel spill on the Wabash River in April 2016 - not a drop of the 50,000 gallons was recovered. Marathon also operates a refinery in Detroit that is poisoning the surrounding neighborhoods. The refinery processes tar sands oil, one of the dirtiest fuels on the planet, and its emissions are causing serious health problems in the African-American neighborhood of Boynton (see reverse for details).



"Woman Lost in Man Camp," John Isaiah Pepion.

TAKING ACTION:

As our opposition to the Sandpiper continues to grow, we ask you to join us in calling on Marathon to withdraw from the project. The Mille Lacs Band of Ojibwe has terminated the leases at all 3 of its Marathon gas stations. And we are contacting Marathon station owners in MN and asking them to switch to a more responsible alternative that supports the local economy and avoids these blatant human rights violations.

Marathon should not poison the people of Boynton at their Detroit refinery. They should buy those people out. Marathon should not be fracking in the Bakken. And they should not push that volatile Bakken crude oil throgh our territory and through the Great Lakes. The Sandpiper would be too destructive to our water, our wild rice, our climate, and our way of life as Anishinaabe. We have enough fossil fuel infrastructure, and it is time to transition to a new economy.

WHAT YOU CAN DO:

1. Contact Marathon and ask them to withdraw from the proposed Sandpiper pipeline project:
   Gary Heminger, CEO, Marathon Petroleum Corporation, 539 South Main St., Findlay, OH 45840
2. Help us tell people the truth about Marathon's projects - share our literature and images broadly.
3. Support our work by donating thru our website, or signing up for a monthly contribution.

ENVIRONMENTAL INJUSTICE IN DETROIT

The Marathon refinery in Detroit is located in zip code 48217, the most polluted in the state, where the MI Department of Health has documented consistently elevated rates of cancer, respiratory disease, and kidney failure. Emma Lockridge, a nearby resident, says "We don't live next to the refinery, we live IN the refinery...it is just horrific. We are a sick community." When the refinery switched from conventional oil to tar sands, Marathon bought the homes of about 200 people in the mostly white neighborhood of Oakwood Heights, which is not even directly in the prevailing path of emissions, as the mostly black neighborhood of Boynton is. They've left the black folks in Boynton there to suffer, consistently denying their requests for buyouts and emergency evacuation. Lockridge, a leader in the resistance movement, says: "There's 10 empty houses on my block...people don't even want the houses. We can't even get squatters." She says the message from Marathon and state regulators is clear: "Walk away or die...at the end of the day, they're killing us." Marathon is now applying for permits to increase emissions even more, in order to produce cleaner-burning vehicle fuel as required by new federal standards. In other words, this neighborhood is being further sacrificed in order to reduce pollution elsewhere. The MI Department of Environmental Quality says it is "poised to approve the project," despite a threatened lawsuit from Detroit Mayor Mike Duggan and a a statement from a coalition of state senators calling on them to reject it, comparing the situation to the poisoned water crisis in Flint. Residents filed a class-action lawsuit against Marathon in US District Court on February 23, 2016.

Emma Lockridge, neigborhood resident and activist demanding a buyout from Marathon in order to evacuate the Detroit refinery area.

LOVE WATER NOT OIL

VISIT OUR WEBSITE FOR RESOURCES AND WAYS TO TAKE ACTION TODAY!

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LINE 3 PIPELINE ABANDONMENT:
What You Need To Know

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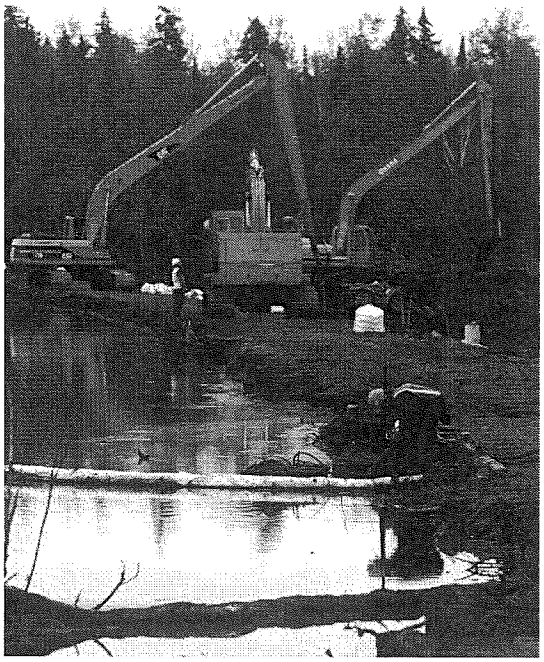
SUMMARY:
Enbridge's Line 3 Pipeline ships Tar Sands crude from Alberta to Superior, WI, spanning over 300 miles across Northern Minnesota, crossing the Red Lake, Leech Lake and Fond du Lac reservations and the 1855 and 1842 treaty areas. Line 3 was built in 1961 and now has significant structural integrity problems. Enbridge's latest public estimates indicate over 900 integrity "anomalies" in the pipeline. Instead of fixing it or removing it, they want simply to abandon the pipeline and build a new one, the Line 3 Replacement, in the Sandpiper corridor. The State of Minnesota has absolutely no regulatory guidelines for pipeline abandonment. Although Enbridge receives powers of eminent domain to build its pipelines, they are not required to assume any responsibility for them when they die. They are allowed to leave behind what is likely a superfund site. Tribal members, homeowners, local businesses, and people across the north are standing up to say no, and demand a state ordinance and regulatory process, as well as an insurance requirement.

DEATH OF A PIPELINE:
Enbridge has gathered extensive integrity data on Line 3 throughout its operation. The data shows a high number of integrity anomalies – specifically, corrosion and long seam cracking. As a result of these anomalies, Line 3 has experienced a number of failures during its 54 years of history. As a result, Line 3 requires a high level of integrity monitoring and an extensive on-going integrity dig and repair program to maintain safe operation. Approximately 4,000 integrity digs in the US alone are currently forecasted for Line 3 over the next 15 years, just to maintain its current level of operation. This would result in repeated impacts to landowners and the environment.



REGULATORY FAILURE (AGAIN):
At the state level, there are no abandonment guidelines or definitions for intrastate gas, liquids, or oil pipelines. Any mention of abandonment of pipeline procedures follows the federal guidelines for disconnecting from active gas service and purging of any hazardous substance. If Enbridge is not required to remove the pipeline and restore the damaged ecosystems, there may never be a full accounting of the on-going and future contamination surrounding the pipeline. All those "structural anomalies" mean there is likely a lot of oil in the soil now. This contamination would become the responsibility of nearby landowners, if discovered.

PIPELINE ABANDONMENT IN CANADA:
The US has vague and inadequate laws on pipeline abandonment, but the Canadian Energy Board has a pipeline abandonment guidance document. It includes info on pipeline corrossion and soil subsidence, reccommending any pipeline owner/operator considering the abandonment of a pipeline to conduct a professional, site-specific analysis to evaluate potential impact. Potential sources of soil and groundwater contamination include:

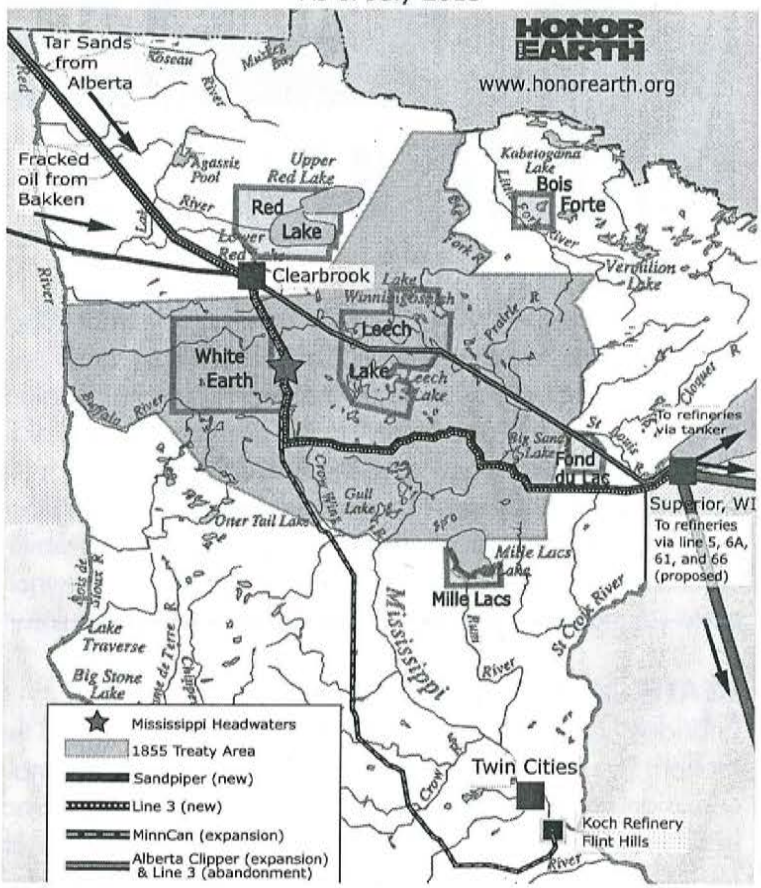
- substances produced in the reservoir and deposited on the walls of the pipeline;
- treatment chemicals in the pipeline;
- the line pipe and associated facilities;
- pipeline coatings and their degradation products;

- historical leaks and spills;
- possible PCB contamination, from lubricants.

The document also discusses the enormous hydrological impact of abandoning a pipeline, which can transform over time into water conduits. Eventually, corrosion allows water to enter the pipe, which leads to unnatural drainage of areas such as muskegs, sloughs, or marshes, affecting the natural balance of the ecosystem and increasing the risk of soil and water contamination, especially in wetlands. Any water that infiltrates the pipeline is likely to carry residual contaminants left in the abandoned pipeline as it flows.

MINNESOTA OIL PIPELINE PROPOSALS

As of July 2015



PUBLIC HEARINGS ON LINE 3:

There is no regulatory process for the proposed abandonment of Line 3, so the public should voice their concerns at the MN Public Utilities Commission's public hearings on the new Line 3 construction permit, and recorded in that docket. Public hearings will be held in August 11-26, in 11 different towns across Northern Minnesota. See our website for details (honorearth.org/events) or the PUC website (mn.gov/puc). The Certificate of Need docket is CN-14-916 and the Route Permit docket is PPL-15-137. Comments are accepted through September 30, 2015. Always Include docket numbers! There are 4 ways to submit:

1. Online: mn.gov/commerce/energyfacilities/#comment
2. Email to jamie.macalister@state.mn.us
3. Fax to 651-539-0109
4. mail to: Jamie MacAlister, Environmental Review Manager, Minnesota Department of Commerce 85 7th Place East, Suite 500, St. Paul MN 55101

Tribal governments, environmental organizations, and citizens continue to intervene in the Sandpiper/Line 3 corridor. We expect federal intervention and a protracted legal and regulatory battle over the coming years.

OTHER WAYS TO TAKE ACTION:

1. Stay informed. Follow us on facebook + our website, come to our events this summer, contact us.
2. Speak out: Contact your tribal leaders, your City Councilmembers, County Commissioners, and especially Governor Mark Dayton (651-201-3400). Tell them they have a responsibility to protect Minnesota's precious resources, honor our treaties, and work with tribal governments.
3. Connect with your local environmental groups or faith communities.
4. Support our work by donating thru our website,, or signing up for a monthly contribution.

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