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ANGLERS OF THE AU SABLE

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To: House Natural Resources and Agriculture Committees
From: Anglers of the Au Sable
Date: February 3, 2016

Re: HB 5255, and HB 5166, 5167 and 5168

Negative Economic Effects of Grayling Fish Farm on the Local Economy, Jobs, Property Values and Property Taxes

This is submitted by the Anglers of the Au Sable, an all-volunteer 501(c)(3) organization whose mission is to preserve, protect and enhance the Au Sable River. The Anglers of the Au Sable supports HB 5255, with the urgent request that it be expanded to include strong regulation of flow-through aquaculture facilities on rivers and streams. We oppose HB 5166, 5167 and 5168 for reasons to numerous to list here.

Due to the extremely short notice of these committee hearings, we have not had time to reduce our entire testimony to writing. In reviewing these bills, however, we urge consideration of the attached studies when assessing the economic costs associated with poorly regulated aquacultural operations in Michigan. While these studies relate specifically to the Crawford County area and the proposed Grayling fish farm, the concepts are generally applicable throughout the state.

Assessment of Economic Effects of Increased Production at the Grayling Trout Hatchery
Frank Lupi, Ph.D., November 2015

Dr. Lupi is a conservation economist at Michigan State University. He was retained as an expert witness in the Matter of The Permit issued to Harrietta-Grayling Fish Hatchery, NPDES Permit MI0059209, litigation contesting the pollution discharge permit issued by the Michigan Department of Environmental Quality for the proposed Grayling fish farm. That facility is located just upstream from the famed Holy Waters of the Au Sable River. The fly fishing on the Au Sable is world famous. It is major tourist destination for fishing and watersports recreation users. Dr. Lupi concluded:

1. The anticipated reduction in water quality from the fish farm will "generate significant total reductions in property values" and "correspondingly, reductions in property values will reduce property tax receipts." (p. 3)

2. Recreational fishing will be negatively affected by degradation of water quality and a reduction in trout biomass. Losses "in recreational value to recreational anglers [will be] about $250,000 to $645,000 per year," and "lost impacts to the regional economy [will be] about $1.77 to $4.6 million per year." (p. 7)

3. Water sports will also be reduced, e.g., canoeing, kayaking, and floating, with "losses in economic value to watersport recreation users of about $420,000 per year," and "lost impacts to the regional economy of about $880,000 per year." (p. 9)

4. As a result, based on conservative estimates, between 26 and 50 jobs will be lost in the area. (Tables 1 and 2, pp. 4 and 8)

5. The economic justifications put forth in favor of the fish farm (e.g., it will create 2½ FTE jobs) are either without merit or totally outweighed by its negative economic effects. (pp. 11-14)

Northern Michigan Property Values: The Significance of Riverfront Property
Public Sector Consultants, August 2013

Public Sector Consultants is a public issue research organization focused on Michigan issues. We retained PSC to compare the property value and property taxes levied on riverfront properties compared to all properties in Crawford, Kalkaska, Lake, Manistee, Otsego and Roscommon counties. The study concluded:

1. Riverfront properties are valued higher than non-riverfront properties. (p. 7)

2. Riverfront properties pay a proportionally higher amount of taxes. (p. 7)

3. In Crawford County, riverfront parcels comprise 11% of all parcels, but contribute 23% of property taxes and 26% of SEV. (pp. 4, 7)

While these studies are focused on the Grayling fish farm and the Au Sable River, the concerns they raise are generally applicable to similar situations around the state. Flow-through systems on rivers and net pens in the Great Lakes are a net negative for local economies and the state as a whole. Banning them, and encouraging recirculating systems would be wise, would avoid their negative effects – environmental, economic and social – and would encourage safe, sustainable aquaculture in Michigan.

Respectfully submitted,

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Assessment of Economic Effects of Increased Production at the Grayling Trout Hatchery

November 23, 2015

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Introduction

There are many effects that conduct under the NPDES permit issued to Harrietta Hills Trout Farm could have on the local economy and on the people that benefit from unimpaired quality of the Au Sable River. For example, increased phosphorus and possible increases in whirling disease threaten to decrease the amount of fish in the river. The degradations to water quality are also expected to increase algae.

The public interest: From an economic perspective, the public has an interest in natural resources because they provide people with well-being and hence provide economic values and support business activities. Some of these economic values are reflected in market transactions. These are called market values. Other values for natural resources are referred to as non-market values because they are for environmental goods or services not directly traded in markets. There is also a public and private distinction to be made.

For example, consider growing fish in a river for later sale. The value of the fish that are sold would be a privately captured market value whereas the value of public recreational uses of the river would be a nonmarket good (river use is not directly sold in a market and does not have a readily observed price). Economists and the public are familiar with the idea of values for market goods. The field of environmental and natural resource economics has developed well-established techniques for valuing non-market values for natural resources.

Types of economic values and impacts: This summary presents two distinct economic concepts that relate to the issue of impairments to the Au Sable: (1) economic impacts and (2) economic values. Economic impacts measure changes in regional economic activity such as economic output (e.g., sales), incomes, and jobs (Watson et al., 2007). Broadly speaking, economic values accrue to people and businesses and reflect their well-being net of their costs, whereas economic impacts are the total effects on the economy. Notably, the two types of economic measures are not always directly comparable (i.e., care is required if both types of measures are to be used in a benefit-cost analysis that is conducted following economic standards). However, both types are directly relevant to the permit at issue since they are standard approaches for measuring changes in public well-being (i.e., people's welfare) and measuring economic importance.

1. Property values:

Based on a Public Sector Consultants report (PSC, 2013), there are a large number of properties along the river (11%) and these properties hold a disproportionately large share of the total value of property in Crawford County (26%). Consequently, the properties pay a large relative share of property tax (11% of parcels pay 23% of property taxes).

It is well established in the real estate and economics literature that proximity to amenities, especially water, increases property values. Although no specific study is available to link water quality and fishing quality to property values surrounding the Au Sable River, such relationships are well known in the literature. For example, the literature on factors affecting property values routinely demonstrates the increased property values associated with proximity to lakes and rivers (Olmstead 2010; Muller 2009). The relationship between property values and water quality has also been widely documented (Leggett & Bockstael 2000; Michael et al, 2000; Epp and Al-Ani, 1979; Poor et al. 2007).

As a premier trout stream, the literature suggests that proximity and access to the river would influence property values, and hence any changes in the quality of the fishery would affect property values. Anecdotally, a search of rental properties along the river reveals that several dozen advertise their proximity to the Au Sable for its fishing, floating, and aesthetic offerings.

In sum, the published literature shows a range of impacts that water quality can have on property values, but it consistently shows that lower water quality adversely affects property values. Considering the value and economic significance of riparian property in Crawford County, taking percentage declines in property value from the existing literature that are on the low end of the published amounts and applying these percentage declines to affected properties would generate significant total reductions in property values due to lower water quality. Correspondingly, reductions in property value will reduce property tax receipts.

2. Recreation:

The increased pollution associated with the lowering of water quality is expected to have several effects, including increased phosphorus, increased dissolved solids, increased organic matter, increases in algae, and potential increases in whirling disease, among others. Any of these could have deleterious effects on water-based recreation. I focus in this section on the impacts of increased P on fishing followed by a discussion of the impacts of degraded water quality on water sports (canoeing, kayaking, and floating).

2.1 Recreational Fishing

The Au Sable River is a premier trout fishing destination and numerous businesses support the fishing-related activities. A decrease in water quality is expected to result in fewer trips, and hence a loss in economic value to the recreational anglers and a corresponding loss in economic impacts to the region. Table 1 summarizes my estimated losses for recreational fishing. The text that follows provides details of the derivations.

Table 1. Estimated high and low range of losses of recreational fishing days, lost value to anglers, and lost economic impacts associated with increased phosphorous in the Au Sable River.

	Fishing	
	Low*	High**
Days	17,425	45,291
Effect of pollution (% trip decline)	69%	69%
Lost days	11,981	31,142
Value per lost day	$20.70	$20.70
Lost value to recreation users	$248,022	$644,660
Spending per day	$82.75	$82.75
Lost Spending (direct)	$991,452	$2,576,988
Multiplier	1.78	1.78
Lost Economic Impact	$1,764,537	$4,586,397
Annual full-time jobs lost	14.6	37.9

* extrapolated from creel studies
** derived from NSFHWAR MI (2011) data combined with Klatt (2014)

Effect of Phosphorus on Fish:

The first step in connecting recreational fishing to phosphorus (P) is to relate fish abundance to P levels. Key sport fish in the East Branch and in the Au Sable River are Brook Trout and Brown Trout. Trout are known from the literature and from nutrient criteria for Michigan to be sensitive to high P levels (Stevenson et al, 2006). A recent peer-reviewed publication utilizes available data from the Michigan DNR's fish sampling stream surveys to develop statistical models of fish biomass in Michigan rivers. The amounts of fish are related to summer baseflow P loading. Models for brook and for brown trout confirm these species are particularly sensitive to small increases in P. Figure 1 shows graphs of the response of trout biomass to levels of P. As Esselman et al (2015) note, the decrease in brook trout biomass when µg/l TP increases from 13 to 20 was sharp and statistically significant ($P < 0.05$). Similarly, brown trout had a stress response to increased TP concentrations, with biomass showing a declining trend as TP concentrations increased.

Note from figure 1 the pronounced predicted decrease in both species' biomass as TP increases from 13 to 25 mg/l.

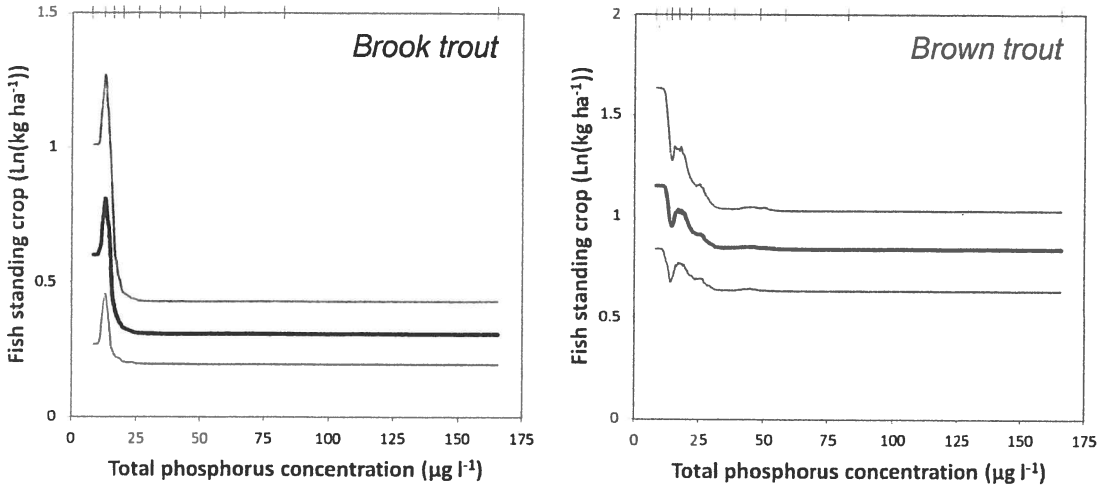

Figure 1. Plots showing the predicted response (black line) of target fisheries to total phosphorus concentrations with 95% confidence interval (gray lines). *[Excerpt from author's pre-publication copy of Figure 4, Esselman et al, 2015].*

Linking Fishing Trips and Values to Fish Biomass:

The next step in connecting recreational fishing to phosphorus (P) is to relate fish biomass to the locations where recreational anglers choose to go fishing. This is done using an economic demand model. Such models are well-established methods for estimating the economic demand and values of users, and can relate both of these to the features of a site such as fish biomass. A recent peer-reviewed publication presents such a model for river fishing in Michigan (Melstrom et al, 2015). The model shows that biomass of brook and brown trout (as estimated by the Esselman et al biomass models) are significant predictors of where anglers go fishing (i.e., angler demand for fishing sites). Thus, reductions in fish biomass at a site will reduce trips to the site and will reduce the economic value anglers receive from fishing.

To proceed with the estimation of losses, we need estimates of the number of fishing trips in the baseline without any increase in P. Two separate estimates are derived to give an idea of the range of results. The first is derived from information in Table 27 of Zorn et al (2001), which reports average results from past creel studies of the Au Sable River from Grayling to Wakeley Bridge. For fishing, they report an average of 3290 hours per river mile. This can be expanded to days for the river segment by multiplying by the 14.3 miles of river in this segment and dividing by an estimate of hours fished per day. Studies of angling on other trout rivers report values of 1.7 hours per day in Wisconsin and 2.7 hours per trip in Pennsylvania. I also made calculations for hours per trips using Michigan DNR Creel data for the Au Sable just downstream of Mio (DNR 2015). Since that segment of the river is larger and includes a significant boat fishery, I used the shore fishing data, which across the four zones sampled averaged 2.68 hours per trip. Thus, to convert the hours to trips I used 2.7 hours per day. This translates into an estimated 17,425 days fished per year.

For comparison, I provide another approach to estimating the baseline number of trips. The U.S. Census provides bi-decadal surveys that estimate fishing in each state (NSFHWAR MI 2011). The data reveals an estimated 23.37 million fishing days in Michigan. Using data from Klatt (2104), 25% of fishing in Michigan is at rivers, and using data from Melstrom et al, 0.78% of river fishing in Michigan is to the affected stretch of the Au Sable. Combining these yields an estimated 45,291 days fished per year.

The Melstrom et al model is used to map changes in fish biomass into estimates of the lost number of fishing trips. Using the percentage changes in biomass derived from Figure 1 for a change in TP from 13 mg/l to 25 mg/l TP results in a predicted decline in trips to the upper portions of the Au Sable River and East Branch of 69%.

The Melstrom et al model is also used to derive the economic value to anglers of these lost trips. The estimate is that lost trips were worth $20.70 in net economic value to the anglers. Since this value is smaller than the values estimated in many other river fishing studies of economic value, the value can be considered conservative relative to the use of other studies.

Combining the lost trips with the value per day yields a total lost value to anglers of $248,022 to $644,660 depending on which estimate of baseline trips is used. Either way the losses are significant and are likely conservative since single day trip values are used in place of multiple day trip values.

Lost Economic Impacts:
In addition to the losses in economic values to the recreational anglers, the reduction in biomass has an associated loss of economic impacts due to the lost trips. To derive this, spending data for trout fishing in rivers comes from a survey conducted by Knoche (2014), which gives spending on trout fishing trips to rivers of $70 on single day trips and $278 on multiple day trips. These are converted to a day equivalent of $82.75 using information from Klatt (2014) on the statewide share of single and multiple day trips in Michigan. Note that this spending figure is for the portion of trip expenditures that occurs within 35 miles of the fishing site so it is a contribution to the local economy and does not include money spend outside the region.

The estimates of lost fishing days are combined with the spending per day to develop a range of lost spending. The literature provides a multiplier on fishing trip expenditures of 1.78 (Southwick 2007). Combining the lost spending with the multiplier yields a range of estimated economic impacts on the economy of about $1.7 to $4.6 million per year, depending on the baseline estimate of trips.

Note too that these are for impacts from tourists. Ninety-four percent of the anglers fishing this reach are from outside of Crawford County, with 74% being from other counties in Michigan, and 20% from other states and Canada (author's calculations from data in Gigliotti and Peyton, 1993). Moreover, most river fishing trips come from outside the local area of a fishing site; even for day trips 95% are from greater than 35 miles away from the fishing locations (author's calculations from data in Melstrom et al, 2015). The economic model in Melstrom et al (2015) does not include multiple day trips and does not include trips by non-residents. Thus, for visitors that are not Michigan residents, I assumed their trip lengths and spending per day is the same as for residents. This almost certainly underestimates spending and associated economic impacts given the greater distances these people would need to travel and the usual observation that people that travel farther distances tend to spend more time on-site and spend more; data suggests that 20% of the fishing trips to this part of the river are made by non-residents (author's calculations from data on page 494, Gigliotti and Peyton, 1993). Thus failing to account for these added on-resident expenditures leads to smaller estimated economic impacts.

In summary, recreational fishing is expected to be affected by degradation in water quality with increased P and thereby decreased brook and brown trout biomass. Two estimates of baseline trips for the Au Sable were used to derive estimates of losses in economic value *to recreational anglers* of about $250,000 to $645,000 per year and *lost impacts to the regional economy* of about $1.77 to $4.6 million per year.

2.2 Water Sports: Canoeing, Kayaking, Floating

The Au Sable River is a desired destination for water sports and numerous businesses support these activities. A decrease in water quality is expected to result in fewer trips and hence a loss in economic value to the recreational users and a corresponding loss in economic impacts to the region. Table 2 summarizes my estimated losses for water sports. The text that follows proves details of the derivations.

Table 2. Estimated losses of recreational watersports days, lost value to recreational users, and lost economic impacts associated with decreased water quality in the Au Sable River.

	Watersports
Days	31,460
Effect of pollution (% trip decline)	50%
Lost days	16,359
Value per lost day	$25.81
Lost value to recreation users	$422,173
Spending per day	$37.87
Lost Spending (direct)	$619,481
Multiplier	1.42
Lost Economic Impact	$879,664
Annual full-time jobs lost	12.1

This section provides the details of the derivations in Table 2 for watersports.

Lost Value for the Users:
The literature reports values per trip for canoeing of $20 to $50 dollars per day in 2015 dollars (Boxall et al 1996; Englin et al, 1996). Another study yields values per trip of $25.81 in 2015 dollars for boating activities that include canoeing, kayaking, floating and tubing (Parsons et al, 2004). The latter study is most appropriate for our application since it better matches the range of activities on the Au Sable and it also relates trips to levels of water quality. The study used three water quality levels: high, medium and low, where high water quality was characterized by high levels of dissolved oxygen and low levels of suspended solids. In their study, a change in water quality reduces the value of a trip by about 50%. They do not report demand elasticities (i.e., how trips respond to quality changes), but in my experience they tend to be proportional to value changes. Thus, the trip change that corresponds with this change in value is a 50% reduction in trips. Table 1 uses the Parsons

et al (2004) value per day and trip response. This is the best matching estimate from the literature on how water-sports would change in response to a change in water quality similar to that expected in the Au Sable.

The baseline trips in Table 1 are derived from information in Table 27 of Zorn et al (2001), which reports average results from past creel studies of the Au Sable River from Grayling to Wakeley Bridge. For pleasure boating (canoeing, kayaking, and floating), they report an average of 8800 hours per mile. This can be expanded to days for the river segment by multiplying by the 14.3 miles of river in this segment and assuming 4 hours per day. The result is an estimated 31,460 days.

Combining the estimated baseline days for water sports with the 50% reduction in trips yields 16,359 lost trips. The resulting lost benefits to recreational users are about $422,000. This is my best estimate of the economic costs incurred by those engaging in water sports due to a reduction of water quality on this segment of the Au Sable River from a high level to a medium level of water quality.

Lost Economic Impacts:

In addition to the losses in economic values to the recreational users, the reduction in water quality has an associated loss of economic impacts due to the lost trips. To derive this, estimates of spending per day are computed from available literature. Using data from Stynes for canoeing in Michigan, I derive a spending per day of $37.87. This is computed by converting Stynes' estimate for spending per party per trip into a spending per day and applying his reduction for trips that are not for the primary purpose of canoeing and excluding the portion of spending that is not in the area of the site. This result is in the range of estimates from other states, if not lower. In a multi-state study, Southwick and Bergstrom (2007) report paddle-sport spending of $60 per person per day trip, and Pollock et al (2007) report expenditures of $25 for day visitors and $186 for overnight visitors.

To get the relevant multiplier to convert spending changes into total changes in economic impact, I also rely on Stynes, whose results imply a multiplier of 1.42, which is consistent with the multiplier for canoeing of 1.5 that can be derived from Southwick (2012).

Note too that for the watersport recreational uses of the river, we can infer that, like fishing, the vast majority of visitors are non-locals. In a study on the Manistee River, MI, Nelson and Valentine (2002) found about 93% of those camping and 86% of others visiting the river were from outside their 3-county study area. Similarly, data from a national study of river recreation shows that for 75% of trips the primary purpose for visiting was using the river and that 85% of visits were from 35 miles away or more (Cole 2014).

In summary, water sports of canoeing, kayaking and floating are expected to be affected by degradation in water quality. The best matching study from the literature was applied to trip information for the Au Sable to derive estimates of losses in economic value to watersport recreation users of about $422,000 per year and lost impacts to the regional economy of about $880,000 per year. Alternative ways of linking algae or other water quality declines to this recreational activity might yield different results for predicted lost

trips, but the values at risk are well aligned with what is found in the literature on recreational values and impacts.

2.3. Other pathways of effects on recreation

Above, evidence was presented on likely effects decreased water quality would have on recreational fishing and on water sports. There are other pathways of possible effects that have not yet been quantified. For example, the increased pollution could lead to increased whirling disease in trout, which is known to adversely affect trout populations. It was established above that decreased trout biomass can have significant affects on trips, angler wellbeing, and the local economy. While this potential also exists via whirling disease, estimates of economic effects would require linking the increased risk of disease to risks of biomass declines. Though not quantified, the risk remains.

3. Other economic effects

There are a variety of other ways that reduced water quality in the Au Sable River can harm the public interest and affect well-being. Better documentation of these is an area of ongoing investigation. An example of as yet undocumented harms would be trail uses and camping along the Au Sable. Not all visitors engage in the recreation activates examined above. Some of these visitors would be adversely affected by reductions in water quality and increases in algae.

Another area of possible harm that this report has not attempted to quantify are the non-use values Michigan citizens might have for natural resource quality of the Au Sable. For example, members of the public that will likely never make use of the resource might still have a willingness to pay to avoid any degradation in a renowned pristine river. Such nonuse values are valid for natural resource damage assessment cases (e.g., in oil spill damage recoveries) and are recognized as appropriate for inclusion in Federal benefit-cost analyses (BCA) that follow Office of Management and Budget economic guidelines for BCA.

4. Anti-degradation:

The Antidegradation Demonstration of the permittee and the associated Responsiveness Summary claim that a lowering of water quality is necessary to support important social and economic development in the area. The documents mention types of benefits which I paraphrase and regroup as follows:

A. Economic contributions from fish production: Preserve current employment and economic activity and allow increases (possibly 2 full time and two part time positions), allow for increases in related businesses, and help supply demands of Michigan food industry for Michigan-branded product.

B. Hatchery tourism: Maintaining the summer tourism and interpretation center, increased rate of tourism since permittee began managing the facility, preserving the associated local expenditures of tourism visits.

C. Youth exposure to fishing: Introducing children to fishing which might ultimately increase license sales and contribute to the fishing industry.

D. Abandonment and preservation: Prevent the facility from being abandoned and preserve the improvements that were made.

I will discuss these items in turn.

A. Economic contributions from fish production:

The economic contributions likely to stem from production expansion are uncertain and likely to be small for many reasons.

First, as noted in the antidegradation documentation, the expansion will add few jobs to the regional economy and the bulk of the economic gains from the use of the public resource will accrue to a handful of private individuals.

Second, the size of the likely amount of economic activity related to the expanded facility will depend in part on its profitability, which depends in turn on the prices it can receive for trout. It appears from the company's website and sales of fish caught on site that the prices currently received for their trout are significantly above the national prices. This likely reflects the niche markets in which the products are being sold, but such prices are more difficult to sustain with larger production volumes because the national prices for trout filets are low. For example, the National Agricultural Statistics Service of USDA maintains a well-regraded and reliable database on regional and national agricultural production and prices. The average national average prices for trout were $1.08 in 2005 and $1.63 in the 2013 (NASS 2015). However, the NASS database also reports a lone price of $3.39 specific to Michigan for 2013. It is possible that Michigan prices in NASS reflect niche markets (otherwise we would expect them to converge on the national price levels) and because the

2013 NASS data indicate only 13 Michigan producers reporting sales of trout for food fish (only 171,000 pounds were reported sold by Michigan producers out of 58 million pounds nationally). One possibility is that the trends in consumer preferences for local foods could be exploited to maintain prices above the national average (as alluded to in the Responsiveness Summary), but the possibility of capturing a price premium for being locally grown must be weighed against risks to this branding and pricing strategy that result from consumer awareness of the harms from expanded operations. Thus, it is unlikely higher prices can be sustained that are significantly above the national average at dramatically larger production volumes, especially in light of the small role Michigan suppliers play in this food chain. Lower retail prices for the increased production will dampen profitability and reduce any impacts on the broader regional economy.

Third, a recent peer-reviewed study has shown a limited market for fresh trout grown in the Midwest. Specifically, the published study shows limited local retailer willingness to pay any price premium for Midwestern (fresh on ice) fish, further suggesting the market may not support a price well above the national average. The study found 57% of retailers would not pay a price premium for fresh trout and the resulting overall mean price premium for was $0.29 for Midwestern-grown fresh trout. The study concludes there "is no room" to capture price premiums from retailers for fresh trout from Midwestern producers (Gvillo et al. 2013).

Thus, expanded production is likely to be beneficial for a few people and several connected businesses, but the above factors suggest the overall economic impacts for the broader community are likely limited.

B. Hatchery tourism:

The tourism impact of hatchery is likely limited. Why?

Regarding the above mentioned benefits of preserving the benefits of tourism visits, I begin by setting aside questions about the size of these benefits and consider the following question: Is an increase in production (a lowering in water quality) necessary to support these benefits? The antidegradation argument suggests that the only way to maintain any such benefits is to increase production (lower water quality). To the extent there are some tourism benefits to the local economy (and some benefits from introducing youth to angling), these benefits exist equally at the current production levels and at the proposed higher productions levels. Providing these benefits does not require expanded production and the accompanying pollution.

Second, public representatives have determined these tourism benefits are not worth it. News reports suggest the county was losing money operating the facility to produce these benefits, thereby suggesting that from the perspective of Crawford County administrators, the contributions the facility makes to Crawford County are not worth the costs of operating the facility. Regardless, if these benefits were deemed to be significant enough to warrant sustaining them, then there should be a willingness to pay to provide them from some source, and they can be provided without added pollution.

Third, the economic impact of the hatchery "tourism" is likely small. All else being equal, economic impacts from tourism will be larger for activities that attract non-local visitors who bring "outside" dollars into the community. To fully assess this would require data on the origins of the clientele of the fish farm, and data for the non-local visitors on their spending patterns, length of stay in the community, and primary purpose for their visits. However, given experiences with other types for recreation, I expect that for hatchery a nontrivial portion of visits are from local residents, and experts agree that local residents should be excluded from properly conducted economic impact analyses of tourism as their visits do not bringing new money into the region. Moreover, the activities at the hatchery, e.g., fish feeding or catching fish at the hatchery, are unlikely to be the primary purpose for a large number of visitors from outside of the Grayling area. For example, the downtown market plan notes that many visitors to Grayling "usually continue on to other attractions in Traverse City, Mackinac Island, or the Upper Peninsula" (p48, Vokes et al, 2004). Similarly, most of the visits to the hatchery likely constitute what tourism economists sometimes consider "stopover" or "side-trip" visits, that is, visits that are "along the way" or are part of a trip with another primary purpose. As such, only a small portion of the spending for these trips counts as a net economic impact to the area. (Alternatively, fishing and canoeing/floating are almost all non-local visitors and mainly for the primary purpose of that activity, so most of the spending factors into net economic impacts.)

C. Youth exposure to fishing:

The argument in the documents was that the hatchery introduces children to fishing, which might ultimately increase license sales and contribute to the fishing industry. As above, this may well be a benefit of hatchery visitation, but this benefit can be provided without expanding production and degrading water quality.

Note too that one could make a comparable argument associated with impairments to the fishery. That is, due to the degradation of water quality which affects fishing success and results in fewer trips, there will likely be (1) reduced purchases of fishing gear and reduced license sales from some current anglers, and (2) reduced exposure of youth to angling thereby reducing future license sales and fishing expenditures. In the above documented potential economic impacts due to decreased fishing, such impacts were not included (only the trip-spending in the vicinity of fishing sites was used to determine impacts).

Thus, while this type of future beneficial effect of exposing youth to fishing is possible as an outcome of hatchery visitation, I expect it is easily outweighed by the effect decreased water quality has on drop-off of current anglers (1 above) or future anglers (2 above).

D. Abandonment and preservation:

The point that was made here was that increased production would prevent the facility from being abandoned and preserve the improvements that were made. As with some of the other anti-degradation arguments, there would be other ways to accomplish this. Regarding

the preservation of improvements, while understandable, economists typically calculate benefits and costs with respect to current and future actions. Effort and money spent to make these improvements are not irrelevant, but they are considered sunk costs (costs that were already incurred). From the standpoint of making more efficient current and future decisions, sunk costs are typically excluded.

5. Conclusions

The available evidence and related economics literature suggests that with increased production by the permittee there is the potential for significant losses to recreational anglers, to those engaged in recreational water sports, and to riparian and nearby property owners. In addition, associated reductions in trips would significantly affect the local economy. Alternatively, the likely economic impacts of the fish farm are modest relative to the likely costs. Many of the benefits laid out in the antidegradation documents can be sustained without altering the production amounts or increasing pollution. As such, the benefits of increased production accrue to a few people and businesses, whereas a comparatively large and dispersed number of others will bear the costs of reduced water quality.

I reserve the right to revise this report.

Frank Lupi, Ph.D.

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Northern Michigan Property Values:

The Significance of Riverfront Properties

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Introduction and Background

Given the number of lakes and rivers and the expansive Great Lakes shoreline in Michigan, waterfront property is abundant throughout the state and region. The property values of these waterfront parcels are often higher than similar non-waterfront properties in the same region, and the location, availability, and quality of the waterbody associated with the property greatly affects its value. Contrary to popular belief, waterfront properties are assessed at the same level as every other type of property located within a municipality. In spite of a dip during the housing crisis that began in 2008, waterfront property values in Michigan have increased at a significantly higher rate than properties in other local city and town locations over the last 15 to 20 years, due to a relatively smaller supply and an ever-increasing demand. This increase in market value comes about as a result of a higher assessed value. In Michigan, taxing authorities capture additional tax revenue based on these increased valuations when a parcel is sold and changes hands. Otherwise, there is a limit on annual tax increases in Michigan because of Proposal A that passed in 1994.

The Anglers of the Au Sable, a 600-member, 501(c)(3) environmental conservation organization, hired Public Sector Consultants (PSC) to conduct an analysis of the local tax revenue and significance of riverfront parcels in the northern Michigan counties of Crawford, Kalkaska, Lake, Manistee, Roscommon, Ogemaw and Otsego. These counties were selected primarily because of high-quality angling and other water recreation activities (e.g., canoeing) on rivers within those counties.

The Anglers club is interested in determining the equalized property value and the property taxes levied on riverfront properties compared to all properties within each of the respective counties in order to highlight the significance of riverfront property tax revenue to local government operations.

Crawford, Kalkaska, Lake, Manistee, and Roscommon counties were able to provide necessary data to complete the analysis. Otsego County was able to provide limited information. Ogemaw County does not have parcel data available in an electronic format that would enable the analysis to be conducted.

Methodology

PSC coordinated with staff from each of the counties included in the analysis to collect relevant data. Each county maintains property information slightly differently but the following process was generally applied in each county:

1. Riverfront parcels were identified by the county equalization or GIS department.
2. The State Equalized Value (SEV) was identified by the equalization department for each parcel in the county. Some of the county equalization departments were able to parse out the SEV for riverfront parcels and non-riverfront parcels. The SEV was selected for use in this analysis rather than Taxable Value or Assessed Value because the SEV is more standardized among counties to allow for better comparison.
3. Levied taxes were identified by the treasurer's office or the equalization department.
4. Some counties provided separate datasets for riverfront properties, SEV for all parcels, and the levied taxes for all parcels. For these counties PSC compiled the information using database software to synthesize the figures for each parcel based on the parcel identification number, which is unique to each property.
5. The SEV and levied taxes for riverfront properties and all properties within each county were totaled and compared.

Results

Riverfront property information provided by Crawford, Kalkaska, Lake, Manistee, Otsego, and Roscommon counties is summarized in Exhibits 1 and 2.

EXHIBIT 1. Riverfront Property Information, by County

	Riverfront Properties			County Wide (all parcels)			Riverfront/County (%)		
County	Parcels	Total SEV	Taxes (2012)	Parcels	SEV	Taxes (2012)	Parcels along a river	SEV from riverfront properties	Taxes from riverfront properties
Crawford	1,926	$137,421,300	$3,332,256	17,145	$535,296,087	$14,828,850	11.2%	25.7%	22.5%
Kalkaska	555	$37,524,275	$907,061	20,310	$841,476,315	$24,921,426	2.7%	4.5%	3.6%
Lake	1,330	$82,529,050	$2,076,249	32,949	$720,586,056	$24,136,783	4.0%	11.5%	8.6%
Manistee	492	$31,898,000	$789,523	25,383	$1,292,570,037	$37,539,629	1.9%	2.5%	2.1%
Otsego	225	$28,585,500	NA	NA	$1,315,512,485	NA	NA	2.2%	NA
Roscommon	266	$10,856,800	$280,021	35,751	$1,368,730,016	$40,813,572	0.7%	0.8%	0.7%

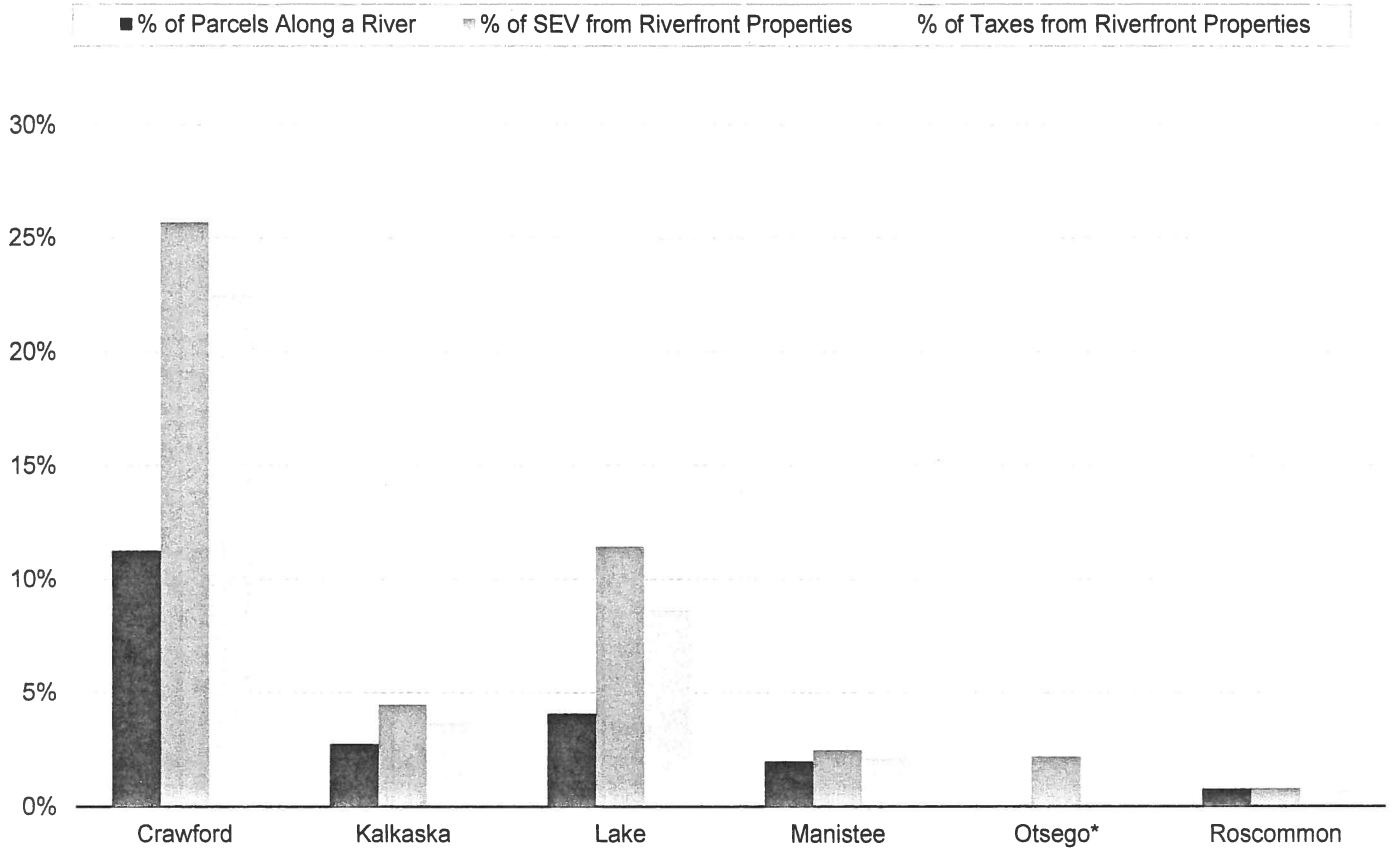
NOTE: All figures are rounded to the nearest dollar.
NA = Not Available
SOURCE: PSC using data from Crawford, Kalkaska, Lake, Manistee, Otsego, and Roscommon Counties.

About the Analysis

A few factors should be considered when interpreting this analysis:

- The percentage of riverfront parcels represents the total number of riverfront parcels as a proportion of all parcels within each county and does not consider the length of frontage along a river or the acreage of the parcel.
- The analysis is focused on the main stems of rivers within the counties and only includes real property. Personal property was excluded from the analysis.
- Many of the counties included in this analysis have a relatively high proportion of properties held in public ownership by the state and federal government. These parcels are not subject to local property taxes, which may affect the results.
- The analysis does not draw a distinction between lakefront properties and other non-riverfront parcels.
- The analysis compares riverfront parcels to all parcels within the county. The figures could change somewhat if riverfront parcels were compared to non-riverfront parcels.
- The analysis is based on parcel data provided by the counties. If there were errors in this data or missing information it may be reflected in this analysis.

EXHIBIT 2. Riverfront Property Value Proportions, by County



*Otsego County was unable to provide all requested information necessary to calculate the percentage of riverfront properties and percentage of levied taxies on riverfront properties.
SOURCE: PSC using data from Crawford, Kalkaska, Lake, Manistee, Otsego, and Roscommon counties.

Northern Michigan County Property Information

The counties included in this study provided property information that enabled PSC to determine the relative significance of riverfront properties to the local tax base and total equalized property value in the counties. Property value information for Crawford, Kalkaska, Lake, Manistee, Otsego, and Roscommon counties is summarized by county below.

Crawford County

Located in the central northern Lower Peninsula, Crawford County contains the headwaters to the Au Sable River and portions of the headwaters to the Big Manistee River.

Information provided by the county indicates that of the 17,145 parcels within the entire county, about 11 percent (1,926) are along a river. The property taxes levied on riverfront parcels in 2012 total $3,332,256 which represents approximately 23 percent of the $14,828,850 of total property taxes levied within the county. Similarly, the SEV of riverfront parcels totals $137,421,300, or 26 percent of the $535,296,087 SEV of all parcels in the county (see Exhibit 3).

EXHIBIT 3. Crawford County Equalized Property Values

Parcels	Riverfront	1,926
	All	17,145
	Percentage riverfront	11.2%
Taxes	Riverfront property (2012)	$3,332,256
	All property (2012)	$14,828,850
	Percentage riverfront	22.5%
SEV	Riverfront	$137,421,300
	All parcels	$535,296,087
	Percentage riverfront	25.7%

SOURCE: PSC using data from Crawford County.

Kalkaska County

Located in the northwestern Lower Peninsula, Kalkaska County contains the headwaters of the Boardman River and a portion of the Big Manistee River.

Information provided by the county indicates that of the 20,310 parcels within the entire county, about 3 percent (555) are along a river. The property taxes levied on riverfront parcels in 2012 total $907,061 which represents approximately 4 percent of the $24,921,426 of total property taxes levied within the county. Similarly, the SEV of riverfront parcels totals $37,524,275, or 5 percent of the $841,476,315 SEV of all parcels in the county (see Exhibit 4).

EXHIBIT 4. Kalkaska County Equalized Property Values

Parcels	Riverfront	555
	All	20,310
	Percentage riverfront	2.7%
Taxes	Riverfront property (2012)	$907,061
	All property (2012)	$24,921,426
	Percentage riverfront	3.6%
SEV	Riverfront	$37,524,275
	All parcels	$841,476,315
	Percentage riverfront	4.5%

SOURCE: PSC using data from Kalkaska County.

Lake County

Located in the northwest portion of Michigan's Lower Peninsula, Lake County contains portions of the Pere Marquette River, Little Manistee River, the Pine River, and the Baldwin River.

Information provided by the county indicates that of the 32,949 parcels within the entire county, 4 percent (1,330) are along a river. The property taxes levied on riverfront parcels in 2012 total $2,076,249 which represents about 9 percent of the $24,136,783 of total property taxes levied within the county. Similarly, the SEV of riverfront parcels totals $82,529,050, or 12 percent of the $720,586,056 SEV of all parcels in the county (see Exhibit 5).

EXHIBIT 5. Lake County Equalized Property Values

Parcels	Riverfront	1,330
	All	32,949
	Percentage riverfront	4.0%
Taxes	Riverfront property (2012)	$2,076,249
	All property (2012)	$24,136,783
	Percentage riverfront	8.6%
SEV	Riverfront	$82,529,050
	All parcels	$720,586,056
	Percentage riverfront	11.5%

SOURCE: PSC using data from Lake County.

Manistee County

Located in the northwestern portion of Michigan's Lower Peninsula, Manistee County contains portions of the Pine River, the Big Manistee, the Little Manistee, and the entirety of Bear Creek.

Information provided by the county indicates that of the 25,383 parcels within the entire county, about 2 percent (492) are along a river. The property taxes levied on riverfront parcels in 2012 total $789,523 which represents approximately 2 percent of the $37,539,629 of total property taxes levied within the county. Similarly, the SEV of riverfront parcels totals $31,898,000, or about 3 percent of the $1,292,570,037 SEV of all parcels in the county (see Exhibit 6).

EXHIBIT 6. Manistee County Equalized Property Values

Parcels	Riverfront	492
	All	25,383
	Percentage riverfront	1.9%
Taxes	Riverfront property (2012)	$789,523
	All property (2012)	$37,539,629
	Percentage riverfront	2.1%
SEV	Riverfront	$31,898,000
	All parcels	$1,292,570,037
	Percentage riverfront	2.5%

SOURCE: PSC using data from Manistee County.

Otsego County

Located in the central northern Lower Peninsula, Otsego County contains portions of the Au Sable, Black, Sturgeon, and Pigeon rivers.

Partial information was provided by the county regarding property values. Information provided indicates that there are 225 riverfront parcels which have an SEV of $28,585,500, which represents about 2 percent of the SEV of all parcels in the county which totaled $1,315,512,485 (see Exhibit 7). The county was unable to provide requested property tax information or the total number of parcels at the time of this writing.

EXHIBIT 7. Otsego County Equalized Property Values

Parcels	Riverfront	225
	All	NA
	Percentage riverfront	NA
Taxes	Riverfront property (2012)	NA
	All property (2012)	NA
	Percentage riverfront	NA
SEV	Riverfront	$28,585,500
	All parcels	$1,315,512,485
	Percentage riverfront	2.2%

SOURCE: PSC using data from Otsego County.

Roscommon County

Located in the central portion of the northern Lower Peninsula, Roscommon County contains portions of the South Branch of the Au Sable River.

Information provided by the county indicates that of the 35,751 parcels within the entire county, less than 1 percent (266) are along a river. The property taxes levied on riverfront parcels in 2012 total $280,021 which represents less than 1 percent of the $40,813,572 of total property taxes levied within the county. Similarly, the SEV of riverfront parcels totals $10,856,800, or less than 1 percent of the $1,368,730,016 SEV of all parcels in the county (see Exhibit 8).

EXHIBIT 8. Roscommon County Equalized Property Values

Parcels	Riverfront	266
	All	35,751
	Percentage riverfront	0.7%
Taxes	Riverfront property (2012)	$280,021
	All property (2012)	$40,813,572
	Percentage riverfront	0.7%
SEV	Riverfront	$10,856,800
	All parcels	$1,368,730,016
	Percentage riverfront	0.8%

SOURCE: PSC using data from Roscommon County.

Summary of Results

Perhaps not surprisingly, this analysis confirms that riverfront properties, on a relative basis, are valued higher than non-riverfront parcels and pay a proportionally higher amount of taxes than non-riverfront parcels. In addition, in four of five counties included in the analysis (Crawford, Kalkaska, Lake, and Manistee) riverfront parcels contribute a higher proportion to the tax base with fewer parcels than non-riverfront parcels.

The relative difference is most pronounced in the two counties with the lowest total SEV (Crawford and Lake). In Crawford County riverfront parcels comprise about 11 percent of all parcels but contribute approximately 23 percent of property taxes and 26 percent of the SEV for the entire county. In Lake County riverfront parcels comprise about 4 percent of all parcels but contribute approximately 9 percent of the property taxes and 12 percent of the SEV for the entire county. The relative difference is least pronounced in the two counties with the highest total SEV. In Roscommon County riverfront parcels comprise less than 1 percent of the parcels within the county and contribute less than 1 percent of property taxes and less than 1 percent of the SEV for the entire county. In Manistee County riverfront parcels comprise about 2 percent of parcels within the county and contribute approximately 2 percent of property taxes and 3 percent of the SEV for the entire county. This analysis confirms the importance of riverfront parcels and their relative contribution to the local tax base compared to non-riverfront parcels.