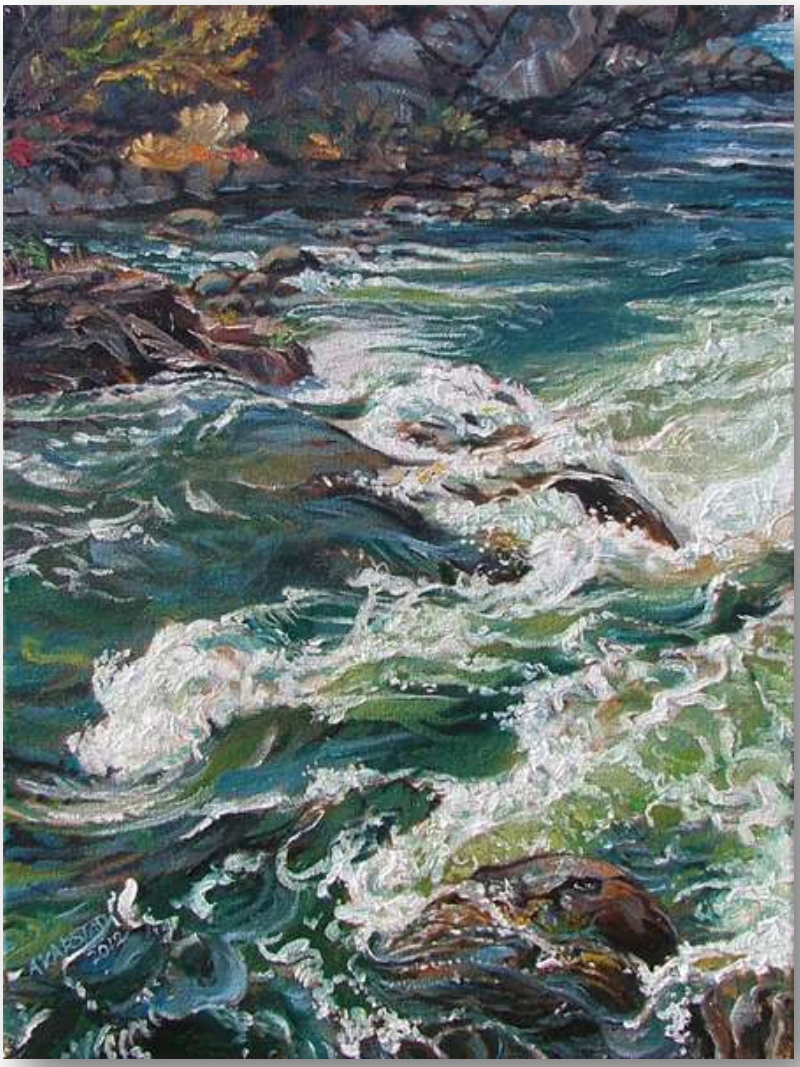


Wabaaishik Rapids, Vermilion River, by Aleta Karstad

ONTARIO RIVERS ALLIANCE

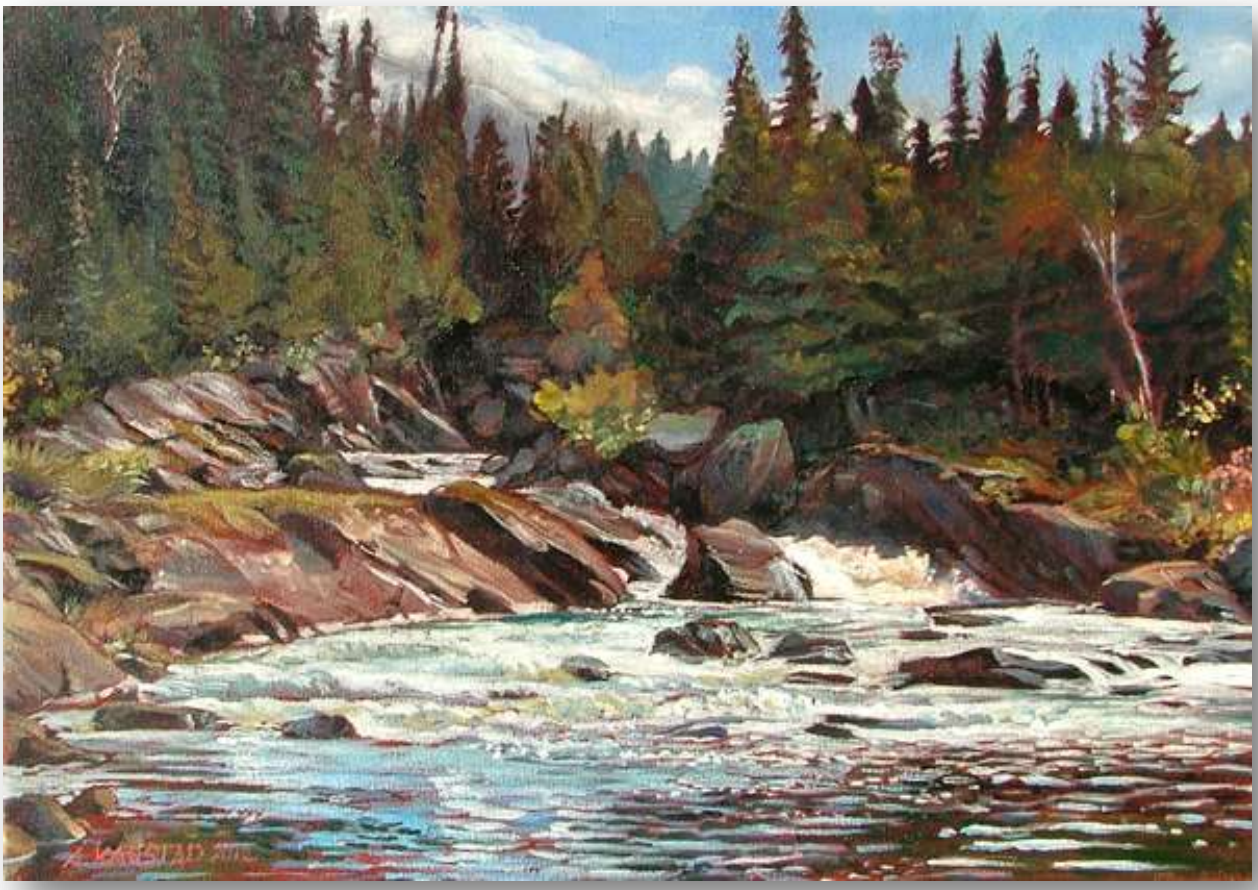
2013 ANNUAL REPORT

ANNUAL GENERAL MEETING

23 November 2013

Prepared by:

Linda Heron, Chair



The Chute, Ivanhoe River, by Aleta Karstad

Visit Aleta's Website for More of her Great Paintings

About ORA:

Ontario Rivers Alliance (ORA) is a Not-for-Profit grassroots organization with a focus on healthy river ecosystems all across Ontario. ORA is a voice for a number of member organizations such as the French River Delta Association, CPAWS-Ottawa Valley, Council of Canadians, Kiishik Community Association, Food & Water First, Whitewater Ontario, Vermilion River Stewardship, Mississippi Riverwatchers, French River Stewardship, as well as many other stewardships, associations, and private and First Nations citizens. We have come together to protect, conserve and restore healthy river ecosystems all across Ontario, and to ensure that development affecting Ontario rivers is environmentally, ecologically and socially sustainable.

ORA was established in February of 2011 to

- Share information, strategies, ideas and tools;
- Advocate for the protection of Ontario's rivers from a growing list of threats to their ecological integrity
- Speak out for stakeholder, public and First Nation safety and rights
- Effect positive change in government policy and process, and
- Ensure development on Ontario rivers is environmentally, ecologically and socially sustainable.

ORA is concerned with all issues affecting Ontario rivers and their connecting wetlands, creeks, springs, lakes and their shorelines, habitat, fisheries, and the biodiversity of aquatic life within a watershed.

The rash of proposed hydroelectric dams is our most immediate and pressing issue, however, ORA is concerned with all issues affecting Ontario rivers and lakes, including the cumulative effects of the numerous waste water treatment facilities, mining and industry releasing effluent into our waterways, diminished water quality and water quantity, forestry impacts, blue-green algae, invasive species, overdevelopment of our shorelines, endangered species, threatened fisheries, old dams no longer serving any useful purpose that block our waterways, and of course the most daunting challenge of all, climate change.

ORA has a solid track record of providing science-based and reasoned advice on policy and development that affects Ontario rivers.

Challenges to Ontario Rivers:

Healthy river ecosystems are fundamental to the overall well-being of Ontario's environment, our freshwater resources, and its inhabitants. However, our rivers and associated wetlands and lakes have suffered more than a century and a half of abuse and neglect from unharnessed development. Many river ecosystems have been destroyed or badly damaged, fish species have been decimated, and toxic algae is on the increase.

As a result of a long history of hydroelectric development, thousands of dams block or impede upstream fish migration. Turbines kill and maim fish as they move downstream. Headponds and reservoirs flood wetlands, destroy riparian habitat, contaminate fish with mercury, degrade water quality, and threaten our fisheries and endangered species. [1],[2] Wetlands have also been obliterated for agricultural, residential and industrial purposes or used as landfill sites. Lake

[1]Environment Canada. 2001. Threats to Sources of Drinking Water and Aquatic Ecosystem Health in Canada. National Water Research Institute, Burlington, Ontario. NWRI Scientific Assessment Report Series No. 1. 72p. Page 69 – 15. Impacts of Dams/Diversions and Climate Change

[2] Silt, Turbidity and Suspended Sediments in the Aquatic Environment: An Annotated Bibliography and Literature Review, S. J. Kerr, Ontario Ministry of Natural Resources

shore habitats have been dramatically altered by residential, agricultural and cottage development. While rivers, lakes and wetlands are often used as convenient dumping grounds for human, agricultural and mining waste, few waterways remain in a natural and healthy state, except in the far north of the province.

It is not surprising that many species that rely on aquatic ecosystems have been placed in jeopardy. Atlantic salmon have been eradicated from the Great Lakes and their tributaries. The American Eel has lost most of its range in Ontario and its population has decreased to less than 2% of historical levels, and Lake Sturgeon populations are in danger across much of the province. Seven of eight Ontario turtle species are on the provincial Species at Risk list and face an uncertain future. And of course the Ontario Atlantic Salmon is now extirpated, to a large part because of dams.

In carrying out our mission to protect, conserve and restore healthy river ecosystems, we support the concept of the development of "authentic" green energy, however it must be truly sustainable, and not the green-washed version that has been prevalent today in waterpower.

Hard as it may be to imagine, the threats to our rivers and watersheds have risen sharply in the past several years.

Ontario now has an ample supply of electricity[3], so let's take the time to focus on energy conservation, efficiencies, storage, and truly green alternatives before any new generation is procured. Let's upgrade existing hydroelectric facilities with efficiencies, increased environmental flows and fish passage before any new dams are approved.

ORA Activities - November 2012 to November 2013 - A Year in Review:

1. Grant:

In order to take ORA to the next level it is necessary to receive funding from outside sources. We are happy to announce our successful application to Mountain Equipment Coop (MEC) in the amount of $34,871, and our first paid contract person – Carrie Regenstreif, of Sudbury.

These dollars will enable ORA to undertake strategic planning, branding, membership/partnership development, a newsletter, and fundraising to increase our capacity to protect, conserve and restore healthy Ontario river ecosystems.

Grant Application:	$34,871
ORA In-kind	8,400
Green Acorn Consulting	8,400
Total Project	$53,271

2. ORA Comments on EBR Postings:

For the last few years, the Ministry of Natural Resources has been going through major modernizing and streamlining of approvals and policy, and the Endangered Species Act and Fisheries Act have been badly weakened. All this paves the way for more development and proponent led approvals and self-monitoring.

[3] Making Choices, Reviewing Ontario's Long-Term Energy Plan, P-5

Self-monitoring will mean very few compliance issues will come to light until after the damage is done. This gutting of environmental protection does not seem to be letting up anytime soon, as there is more yet to come. It has been a very busy and challenging year, but ORA has commented on all water related EBR postings as follows:

1. **EBR 011-6751: Modernizing of Approvals, Nov 2012**
2. **EBR 011-7070: Draft Provincial Policy Statement, Nov 2012**
3. **EBR 011-7540: Framework for Modernizing Ontario's Approach to Natural Resource Management, Jan 2013**
4. **EBR 011-7669: MNR's Modernization of Approvals Initiative – Public Lands Act, Jan 2013**
5. **EBR 011-7696: Proposed Approaches to the Implementation of the Endangered Species Act, Feb 2013**
6. **EBR 011-6461: Great Lakes Protection Act, Apr 2013**
7. **EBR 011-9040: Ontario's Long Term Energy Plan, Sep 2013**
8. **EBR 011-9614: Conservation First, Sep 2013**

3. Proposed Waterpower Projects:

An important aspect of what ORA does is to review waterpower proposals moving through the environmental screening and approvals process, and we make a special effort when Notices of Inspection and Completion and are issued for comment. Again, it has been a very busy year as follows:

1. **Trout Lake River HE Proposal**
   Horizon Hydro Operations Ltd. proposed a 3 to 4 MW run-of-river waterpower facility at Big Falls on the Trout Lake River.
   - ORA Comments on Notice of Inspection, Dec 2012.
   - ORA Comments on Environmental Report, May 2013.
   - ORA Part II Order request, May 2013.

2. **Enerdu Generating Station Expansion & Redevelopment, Mississippi River**
   Enerdu Power Systems Inc. is proposing to expand and redevelop its existing run-of-river hydroelectric waterpower facility to increase capacity from 300 kw to approximately 0.95 MW. This expansion turned out to be a peaking facility upon closer examination.
   - ORA Comments on Environmental Report, Jan 2013.
   - ORA Part II Order request, Feb 2013.

3. **Kabinakagami River Hydroelectric Proposal**
   A joint venture partnership of Constance Lake First Nation and Northland Power Inc., proposing to jointly construct, own and operate four strict run-of-river hydroelectric facilities on the Kabinakagami River, with a combined generating capacity of 26 MW. Wahpeestan, Wapoose, Neeskah and Peeshoo would have a total of 200 hectares of headponds. Fort Albany First Nation citizens' group requested ORA's assistance.

- ORA Comments on Notice of Inspection, May 2012.
- ORA Comments on Environmental Report, Feb 2013.
- Part II Order request, Feb 2013.

4. **Wabagishik Rapids Waterpower Project**
   Xeneca Power Development Inc. (Xeneca) proposes to construct a 3.4 MW modified run-of-river hydroelectric power generation station at Wabagishik Rapids, on the Vermilion River. There were over 20 Part II Order requests made.
   - ORA to Xeneca – Comments on the Notice of Completion, Oct 2013.
   - ORA to Minister of Environment – Part II Order request, Nov 2013.

Follow-up from 2012:

1. **The Ivanhoe, Serpent and Frederick House Rivers**
   These proposals were all "modified run of river", proposed by Xeneca Power Development Inc. All three proposals were rejected by MOE as the requirements of the Class EA for Waterpower were not met, and the developer was sent back to do additional studies.
   - Ivanhoe River – ORA Comments – Part II Order request, Sept 2011.
   - Serpent River, ORA Comments - Part II Order Request, Sep 2011.
   - Frederick House River, ORA Comments - Part II Order Request, Nov 2011.

   Update: None of the above proposals have come back through to ER to date.

2. **Bala Falls**
   Swift River Energy Limited proposed a 3 to 5 MW "run of river" hydroelectric facility near the south end of Bala's existing north dam, located in the Town of Bala, Township of Muskoka Lakes, Ontario. The dam is owned by Ontario's Ministry of Natural Resources (MNR).
   - Part II Order request, May 2011.
   - Comments to Muskoka Lakes, Aug 2011.
   - Comments to MOE, Apr 2012.
   - ORA to MOE, Re Addendum, Jun 2012.
   - Request to Review Director's Decision, Oct 2012.

   Update: MOE Decision Letter to Requesters – Request denied, Jan 2013.

4. ORA Comments on Legislation and Policy:

1. **ORA to OWA** - Proposed Amendments to the Class EA for Waterpower – ORA made several suggestions for amendments. This was timely because the Class EA for Waterpower is going through its 5 year review, July 2013.
2. **ORA to OPA** - Ontario Dialogue on Regional Planning & Siting of Large Energy Infrastructure, July 2013.
3. **ORA to OPA** - Feedback on Large Renewable Competitive Procurement Process – ORA to OPA, Aug 2013.
4. **ORA to OPA** - FIT Program Review – Draft FIT 3, Sep 2013.

Follow-up from 2012

1. **ORA comments** on Proposed Amendment to the Class Environmental Assessment for Waterpower, Sep 2012.
    - This proposed amendment has not been approved by MOE to date.

5. Strategies and Initiatives:

An important part of ORA's strategy is to let the Premier and Ministers know what our concerns are, and inevitably to meet with them to help influence policy decisions. We have made several requests as follows:

1. **ORA to Kathleen Wynne** - Arnold Chan's Appointment to Kathleen Wynne's Transition Team – ORA felt this was a conflict of interest and requested Chan's appointment be cancelled, Feb 2013.
    - Premier Wynne to ORA – Letter of acknowledgement, Jul 2013.
2. **ORA to Northern Ontario Heritage Fund** – NOHFC Funding to Xeneca Power Development Inc. ORA was protesting over $832,000 in funding provided to Xeneca Power Development Inc, Feb 2013.
3. **ORA to Premier Kathleen Wynne** - Urgent Meeting Request Concerning Community Say on Hydroelectric Projects, Apr 2013.
    - Wynne to ORA – Suggested meeting with Ministers Chiarelli, Orazietti and Bradley, May 2013.
4. **ORA to Energy Minister Bob Chiarelli** – Meeting Request, May 2013.
    - ORA to Energy Minister Bob Chiarelli – Briefing Notes, Oct 2013.
    - ORA met with Minister Chiarelli and his two policy advisors on 10 October 2013. Thanks to the generous contributions from Brad Benson, Whitewater Ontario's Advocacy Committee, and the Hell or High Water Committee we were able to hire Chris Lalonde, a consultant, to help us with this important meeting. Chris was very helpful, and we hope this meeting will bear fruit when the Long Term Energy Plan is released.
    - ORA to Energy Minister Bob Chiarelli – Follow-up to Meeting, Oct 2013.
5. **Hydroelectric produces "Dirty" Energy – Addendum 1**
   A follow-up document was sent to Minister Chiarelli in support of our statement that hydroelectric is dirty energy. A revised and updated version of this document is now ORA's position statement on the environmental impacts of hydroelectric dams.

Follow-up from 2012:

1. **Economic Impact of Waterpower Projects on Crown Land in Ontario**, MNR commissioned report. – ORA Comments, Sep 2012.
    - Minister Gravelle rejected ORA's request to withdraw this report, however suggested a meeting with Safa Fayek, MNR., Oct 2012.
    - Nov.2012: ORA to Safa Fayek, MNR – Meeting Request
2. **Provincial Strategy on Waterpower in Ontario** – ORA Recommendation, Oct 2012.

- Deputy Minister O'Toole to ORA – Promised to consider, Nov 2012.
- Deputy Minister O'Toole to ORA – Rejected our request, Dec 2012.

6. Key ORA Meetings

- **MOE invited ORA** to meet with the Director of Approvals and review team. We were told that the public's intervention in these Environmental Reports is important to improve projects and reduce environmental impacts, Dec 2012.
- **Met with MNR Renewable Energy Policy Team** to discuss the AECOM Report, Dec 2012.
- **Met with Peter Tabuns, NDP Energy Critic; and Mike Schreiner, Green Party Leader**, Jan 2013.
- **Met with Paul Norris**, Ontario Waterpower Association – we informed him we would be making a request for amendments to the Class EA for Waterpower, Mar 2013.
- **Invited to meet with MNR** – Water Management Plan Policy Review, May 2013.
- **Met with the Honourable Bob Chiarelli, Minister of Energy**
  ORA described the harmful environmental effects of hydroelectric development, and called it dirty energy. The Minister expressed interest in our environmental concerns but asked what he could do as Energy Minister. We recommended eliminating all hydro under 10 MW in order to take the pressure off of smaller rivers where the environmental damage can be severe, and real power generated is often only a few megawatts. The Minister requested documentation supporting our claim – see Addendum 1, Oct 2013.
- **Invited to meet with MNR** – Coordinated Policy Guidance for Waterpower Projects. Permitting and approvals - roles of MOE and MNR, Nov 2013.

7. Key Presentations and Interviews:

- **CBC Radio, Morning North** – Navigation Protection Act, Nov 2012.
- **Presentation to University of Waterloo Environmental Class** - An excellent response – standing ovation, Nov 2012.
- **20th Annual Great Lakes/St. Lawrence River Symposium, Cornwall** – Presentation: The Green Energy Gold Rush, May 2013.
- **Blue Water Day – Royal Bank** in Sudbury, Jun 2013.
- **Giigdowin "Having a Talk"** - **Laurentian University**, Oct 2013.
- **Indigenous Studies - Laurentian University**, Nov 2013.

8. Currently working on:

1. **EBR Posting No. 012-0290** – Coordinated Policy Guidance for Waterpower Projects

2. **ORA Position Statement** - A document setting out ORA's position on the many challenges and threats facing our source water.

In Conclusion:

2013 has been an extremely busy year for deadlines. The downsizing and streamlining of MNR has made for several policy and legislative reviews, and the Wynne government has been busy modifying green energy procurement and placement of large infrastructure. We have had four Environmental Reports for hydroelectric development proposals go through to Notice of Completion, and ORA has requested Part II Orders to elevate these proposals to Individual Environmental Assessments to ensure a much more rigorous and thorough environmental assessment. To date we have not heard back from the Minister on any of our Part II Order requests – except Bala Falls.

Many people see hydro as a clean source of power generation – no smoke, no radiation, and no environmental impacts. But it couldn't be further from the truth because water quality, water quantity, endangered species and fisheries are seriously impacted. Climate change is a reality, and flooding and drought conditions are occurring worldwide. Let's ensure our freshwater is protected so that our children and grandchildren have drinkable, swimmable and fishable freshwater.

A special thank you to those people and organizations that have assisted ORA by way of dollars and hours contributed. Whatever success we can claim has been made possible through the help of our very generous and supportive members! Your help has been crucial and very welcomed!

Yours in sustainability,

Linda Heron
Chair
Ontario Rivers Alliance
OntarioRiversAlliance.ca

"Healthy, flowing rivers are the lifelines of our planet. They provide people with water, food, medicines, building materials, land-replenishing silts, navigation, recreation, and cultural and spiritual strength. Rivers and their catchments – and the rich variety of life they sustain – reduce the impacts of floods and droughts, support forests, recharge groundwater supplies, sustain fisheries, and maintain the ecological integrity of local ecosystems.

Yet rivers and riverine ecosystems are also one of the most threatened in the world, and climate change brings serious new threats to these critical systems.

More extreme floods and droughts are on the rise. Higher temperatures are increasing evaporation and reducing water supply. Large water infrastructure projects can cause considerable harm to ecosystem services and livelihoods by altering the hydrological cycle. When the impacts of climate change combine with these infrastructure-related impacts, the scenario becomes a "perfect storm" for the world's fisheries, forests, critical natural habitats, and agriculture."[4]

[4] Civil Society Guide to Healthy Rivers and Climate Resilience, by Katy Yan and Lori Pottinger

Addendum 1

Hydroelectric Produces "Dirty" Energy

Hydroelectric facilities, whether large or small, cannot be viewed as a source of "clean" or "green" energy, and those using headponds (impoundments or diversions), and cycling and peaking operations, are particularly harmful to the environment. These are the usual tools of the trade utilized by developers to maximize power generation, and to take advantage of the peaking incentives offered to provide power during peak demand hours.

With the recent promulgation of the Green Energy Act (GEA), waterpower has been pitched as a green energy source, but

> *"…that doesn't mean we shouldn't worry about the impacts of these projects and technologies. Nor does it mean that we should allow run-of-river power projects or windmills anywhere without proper government oversight and planning. Panic shouldn't guide policy.*
>
> *It's ludicrous to think that we must sacrifice all environmental considerations to get green energy onto the grid. It's not green if it causes negative ecological impacts."* [5]

As we noted in our October 2012 letter to Deputy Minister O'Toole[6], ORA feels that a much more strategic approach to waterpower needs to be developed across the province before considering such facilities. The one-off approach that has been previously employed in Ontario and elsewhere, often leads to significant cumulative effects on the environment and ecology of watersheds, and some impacts may be irreversible.[7]

In the view of many, waterpower has significant benefits; however, it is incorrect to consider waterpower as clean or green energy. A very high socioeconomic price has been paid in the past in terms of losses to other renewable benefits due to the installation of dams and waterpower.[8],[9]

The negative effects of dams and hydropower have been well documented. Indeed:

> The World Commission on Dams found that while "*dams have made an important and significant contribution to human development, and benefits derived from them have been considerable … in too many cases an unacceptable and often unnecessary price has been paid to secure those benefits, especially in social and environmental terms, by people displaced, by communities downstream, by taxpayers and by the natural environment.*" [10]

[5] Faisal Moola and David Suzuki 2009i: http://www.straight.com/news/david-suzuki-run-river-power-projects-may-offer-green-energy-solutions
[6] Letter to Deputy Minister O'Toole, MNR – Request for a Provincial Strategy for Waterpower Development – October 2012
[7] Gower et al. 2012
[8] Guihua Wang, Qinhua Fang , Luoping Zhang, Weiqi Chen, Zhenming Chen, Huasheng Hong. 2009. Valuing the effects of hydropower development on watershed ecosystem services: Case studies in the Jiulong RiverWatershed, Fujian Province, China
[9] Institute for Fisheries Resources.1996.Cost of Doing Nothiing: The economic burden of salmon declines in the Columbia River basin. Report No. 1 of 3. http://www.pcffa.org/CDNReport-Columbia.pdf
[10] World Commission on Dams. 2000. Dams and Development: a new framework for decision making. http://www.internationalrivers.org/files/attached-files/world_commission_on_dams_final_report.pdf

> Applying a "balance-sheet" approach to assess the costs and benefits of dams that trade off one group's loss with another's gain is seen as unacceptable, particularly given existing commitments to human rights and sustainable development.

The collateral environmental damage caused by dams and hydroelectric facilities has been well known for decades,[11] including loss or serious decline in migratory fish species (hydroelectric facilities are key factors in the listing of some iconic fish species as species at risk in Ontario and elsewhere); declining biodiversity[12],[13],[14],[15],[16]; impaired water quality (including increasing mercury concentrations in fish tissue); and are key threats to imperilled aquatic species.[17] In the past, little attempt has been made to mitigate these effects in Ontario, despite the fact that hydroelectric facilities have been inducing ongoing harm for more than 100 years.

The environmental and ecological costs of waterpower are well known throughout the world. Perhaps the most famous case involves the devastating cumulative impacts of hydropower on Pacific Salmon stocks in the Columbia and Snake Rivers[18]. Similar examples occur here in Ontario where dams are considered to be a major factor in the extirpation of Ontario's Atlantic Salmon stock[19], one of the important causes of significant anthropogenic mortalities and decline of Ontario's American Eel[20], and a key threat to Ontario's declining Lake Sturgeon populations.[21],[22]

There are many scientific publications supporting the view that the environmental neutrality of small hydropower should not be taken for granted, and further research is required to determine the full range of possible effects that small hydro projects can have on the riverine ecosystem and how these could be mitigated.[23],[24] Indeed, a major concern is that the accumulated effects of multiple small-scale schemes could amount to similar overall environmental degradation per unit of electricity generated as is caused by larger projects.[25]

Following are some of the studies and reports which describe specific negative effects of hydroelectric and which support our conclusion that hydroelectric facilities, regardless of their

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[11] Baxter, R. M., 1977, ENVIRONMENTAL EFFECTS OF DAMS AND IMPOUNDMENTS: Annual Review of Ecology and Systematics, v. 8, p. 255-283
[12] Ricciardi A, Rasmussen JB. 1999. Extinctionrates of North American freshwater fauna.Conserv. Biol. 13:1220–22
[13] Vaughn, C and C. Taylor.1999. Impoundments and the Decline of Freshwater Mussels: a Case Study of an Extinction Gradient. Conservation Biology 13(4): 912-920
[14] Bunn, S. and A. Arthington. 2002. Basic Principles and Ecological Consequences of Altered Flow Regimes for Aquatic Biodiversity. Environmental Management Vol. 30, No. 4, pp. 492–507
[15] Carew-Reid, Jeremy, Josh Kempinski and Alison Clausen. 2010. Biodiversity and Development of the Hydropower Sector: Lessons from the Vietnamese Experience – Volume I: Review of the Effects of Hydropower Development on Biodiversity in Vietnam. ICEM – International Centre for Environmental Management, Prepared for the Critical Ecosystem Partnership Fund, Hanoi, Viet Nam.
[16] Jelks, H. J., S. J. Walsh, N. M. Burkhead, S. Contreras-Balderas, E. Díaz-Pardo, D. A. Hendrickson, J. Lyons, N. E. Mandrak, F. McCormick, J. S. Nelson, S. P. Platania, B. A. Porter, C. B. Renaud, J. J. Schmitter-Soto, E. B. Taylor, and M. L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. Fisheries 33(8): 372–407
[17] Wilcove DS, Rothstein D, Dubow J, Phillips A, Losos E. 1998. Quantifying threats to imperiled species in the United States BioScience 48: 607–615
[18] Blumm, M; E.J. Thorson and J.D. Smith. 2006. PRACTICED AT THE ART OF DECEPTION: THE FAILURE OF COLUMBIA BASIN SALMON RECOVERY UNDER THE ENDANGERED SPECIES ACT. Environmental Law: 36: 709
[19] OMNR 2013. Restoration of Atlantic Salmon to Lake Ontario: past, present and future. http://www.mnr.gov.on.ca/en/Business/LetsFish/2ColumnSubPage/STEL02_165905.html
[20] MacGregor, R., J. Casselman, L. Greig, W. A. Allen, L. McDermott, and T. Haxton. 2010. DRAFT Recovery Strategy for the American Eel (Anguilla rostrata) in Ontario.
Ontario Recovery Strategy Series. Prepared for Ontario Ministry of Natural Resources, Peterborough, Ontario. vii+ 78 pp.
[21] Golder Associates Ltd. 2011. Recovery Strategy for Lake Sturgeon (Acipenser fulvescens) – Northwestern Ontario, Great Lakes-Upper St. Lawrence River and Southern Hudson Bay-James Bay populations in Ontario. Ontario Recovery Strategy, Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vii + 77 pp.
[22] COSEWIC 2006. COSEWIC assessment and update status report on the lake sturgeon Acipenser fulvescens in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.
xi + 107 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
[23] Abbasi, T. & Abbasi, S.A (2011). Small hydro and the environmental implications of its extensive utilization .Renewable and Sustainable Energy Reviews, 15, 2134-2143.
[24] Uttley, J. (2012). http://e-futures.group.shef.ac.uk/publications/pdf/183_17.%20Jim%20Uttley.pdf
[25] Abbasi and Abbasi 2011

size, result in “dirty” energy. Those using headponds, and cycling and peaking operating strategies can be particularly harmful to the environment. Energy is not “clean”[26] when it induces significant and ongoing collateral ecological damage.

1. Hydroelectric with Diversions/Headponds:

“Regardless of their intended use, impoundments can have many negative environmental effects, including exacerbating water quality and other environmental effects of other land uses within the watershed.” [27]

“*Since 2002, most new renewable electricity projects in British Columbia (BC) are built and owned by private developers. Most projects are river diversions – commonly known as “run-of-river” or “small hydro.” While it is often assumed that these projects have smaller environmental impacts than traditional hydropower dams, the impacts of river diversion projects can be severe, especially when multiple projects are clustered within single valleys. The sheer number of river diversions approved and proposed, combined with a lack of land-use planning to ensure appropriate siting, are threatening some of BC’s fish and wildlife populations, and reducing their ability to cope with stresses caused by climate change, urbanization, resource extraction, pollution and other threats. Impacts to social and cultural values are also an issue. The practice of diverting rivers for hydroelectricity is relatively new in BC, and many of the potential impacts are still not well understood or considered.”* [28]

“*River diversion projects are sometimes seen as “greener” than large hydro dams because water is more quickly returned to the channel, and because they don’t necessarily flood large areas of land to create reservoirs. However, when all the various impacts are examined, there is little reason to believe that river diversion projects are less harmful than big dams.”* [29]

The environmental impacts of big hydropower dams have been well documented since their widespread construction began in the early 1900s. While large hydro gets much of the attention, small hydro carries many of the same impacts per unit of power generated.[30] That being said, many of the hydro facilities on smaller rivers use peaking strategies to maximize power generation. So the *“comparisons between river diversions and large dams can be difficult to make, given that “run-of-river” power is intermittent while large dams can provide stable year-round power.”* [31]

“Most of our current knowledge of the impacts of water quantity changes on water quality is based on studies of the effects of Canada’s more than 600 dams and 60 large interbasin diversions, which makes the nation the world leader in water diversion (Day and Quinn 1992). Most Canadian dams store water during peak flow periods and release flow to generate power during winter, low-flow periods. Such changes to water quantity also modify various water quality parameters within the reservoir and downstream, the effects decreasing with distance from the impoundment. Major examples include: thermal stratification within the reservoir and modification of

[26] Fearnside, P. 2007. Why hydropower is not clean energy. C:\Users\Rob\Documents\dams and waterpower effects\Why Hydropower is Not Clean Energy - Scitizen.html
[27] Winter and Duthie. 1998. Canadian Water Resources Journal: 23(2): 245-257.
[28] Gower, T., A. Rosenberger, A. Peatt, and A. Hill. 2012. Tamed Rivers: A guide to river diversion hydropower in British Columbia. Prepared for Watershed Watch Salmon Society. 64 pages.
[29] Abbasi, T. & Abbasi, S.A (2011). Small hydro and the environmental implications of its extensive utilization .Renewable and Sustainable Energy Reviews, 15, 2134-2143.
[30] Abbasi and Abbasi. 2011
[31] Gower, T., A. Rosenberger, A. Peatt, and A. Hill. 2012. Tamed Rivers: A guide to river diversion hydropower in British Columbia. Prepared for Watershed Watch Salmon Society. 64 pages.

downstream water temperatures; eutrophication; promotion of anoxic conditions in hypolimnetic water and related changes in metal concentrations in outflow; increased methylation of mercury; sediment retention; associated changes in TDS, turbidity and nutrients in the reservoir and discharged water; increased erosion/deposition of downstream sediments and associated contaminants." [32]

2. Impacts of Silt, Turbidity and Suspended Sediments:

Dams and reservoirs act as a settling basin for silt and other suspended materials. There are numerous direct and indirect impacts of silt, suspended sediments and associated turbidity.[33] These include changes to water quality, reduced light penetration diminished recreational values and aesthetics as well as direct and indirect impacts to fish, invertebrates, aquatic plants. [34],[35]

3. Peaking's Role in the Release of Heavy Metals

A recently published study is very relevant to hydroelectric peaking operations that store water during off-peak hours to produce power during peak demand hours. This results in daily wetting and drying of upstream and downstream soils and sediments, as well as peat in wetland areas. This wetting and drying, especially in areas that have been heavily impacted by mining, can result in the "*subsequent release of acidic, metal contaminated waters from wetlands. We believe that in areas where historical deposition of metals and sulphur was severe, these episodic pulses of metals could reach concentrations sufficiently high to severely affect aquatic communities in receiving waters and cause a delay in biological recovery.*" [36] "*This sulphate-release has been documented in wetland soils and riparian sediments in the Sudbury area and elsewhere, and can result in metal release with even small changes in soil moisture content.*"[37]

4. Methylmercury and Greenhouse Gas Emissions:

a. Changes in methyl mercury concentrations in zooplankton from four experimental reservoirs with differing amounts of carbon in the flooded catchments:
"*This study demonstrated dramatic increases (10X to 20X) in both methyl mercury and greenhouse gases (carbon dioxide and methane) production in response to flooding of wetland vegetation. Clearly, the microbial breakdown of dead plants and organic soils resulted in the methylation of mercury already present in the system, and the production of significant quantities of carbon dioxide and methane*." [38]

b. Impacts of Reservoir Creation on the Biogeochemical Cycling of Methyl Mercury and Total Mercury in Boreal Upland Forests
The Flooded Upland Dynamics Experiment (FLUDEX) at the Experimental Lakes Area (ELA) in northwestern Ontario was designed to study the greenhouse gas and mercury impacts of flooding forested upland areas, and to test the

[32] Environment Canada. 2001. Threats to Sources of Drinking Water and Aquatic Ecosystem Health in Canada. National Water Research Institute, Burlington, Ontario. NWRI Scientific Assessment Report Series No. 1. 72 p. - Page 69 – 15.
[33] *Appleby and Scarratt 1989 - European Inland Fisheries Advisory Commission 1965*
[34] Kerr, S.J. 1995. Silt, turbidity and suspended sediments in the aquatic environment: an annotated bibliography and literature review. Ontario Ministry of Natural Resources, Southern Region Science & Technology Transfer Unit Technical Report TR-008. 277
[35] *Baxter 1977*
[36] Szkokan-Emilson, E.J., Kielstra, B., Watmough, S., Gunn, J.M. (2013) Drought-induced release of metals from peatlands in watersheds recovering from historical metal and sulphur deposition. *Biogeochemistry DOI:* 10.1007/s10533-013-9919-0
[37] 29 October 2013 letter from Erik Szkokan-Emilson to Xeneca – Re: Wabagishik Rapids GS ER
[38] Impacts of Reservoir Flooding 1991 to Present, Experimental Lakes Area

hypothesis that methyl mercury (MeHg) production in reservoirs is related to the amount, and subsequent decomposition, of flooded organic matter. *"After five years of flooding, the experiment confirmed that flooded upland soils and vegetation could also produce significant quantities of methyl mercury and greenhouse gases. However, the production of greenhouse gases seems to dissipate more quickly than in wetland systems, probably because there is less stored carbon, particularly in a form that is readily decomposed by bacteria."* [39]

5. Dams and Blue-green Algae

There are numerous studies that associate impoundments with inducing blue-green algae (cyanobacteria) blooms. *"The building of dams and regulation of rivers has created more habitats suitable for cyanobacteria. The general opinion now is that "cyanobacterial blooms" are increasing in frequency worldwide. Exposure to hepatotoxins (microcystins, nodularins and cylindrospermopsins) has been reported to induce several health disorders depending on the route of exposure, the quantities absorbed and the toxicity of the cyanobacterial strain. Harmfulness ranges from minor disorders (headaches, nauseas, diarrheas) to lethal deterioration of hepatic functions. It is also thought that chronic exposure to low concentrations can promote liver cancer. In 1996, 60 patients died in Brazil after haemodialysis with contaminated water (Pouria et al. 1998). WHO considers that freshwater contamination by cyanobacteria, and the toxins they synthesize, constitutes a major worldwide threat that can limit utilization of water resources (Chorus & Bartram 1999)."* [40]

6. Impacts on Fisheries:

"The effects of dams and hydroelectric facilities on fisheries have been well documented over the past century, and include the loss or serious decline of many iconic fish species (note: fish are also renewable resources important to the economy and to Ontario's natural and cultural heritage). Effects include barriers to fish migration, often preventing access to critical habitat (e.g. spawning and rearing areas), changes in water temperature and water quality to conditions unsuitable for many native fish species, mortality of fish due to turbines etc.. Indeed, the effects can be so severe that hydroelectric facilities are often described as important reasons for their decline and/or significant threats to the recovery of species at risk." [41, 42, 43, 44, 45, 46]

To fully understand the effect of flow reduction on habitat quality and quantity, much work is needed at an extremely fine scale – something not usually feasible for streams

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[39] Impacts of Reservoir Flooding 1991 to Present, Experimental Lakes Area
[40] Cyanobacteria, cyanotoxins and potential health hazards in small tropical reservoirs
[41] Haxton, T.J., and C.S. Findlay. 2008. Variation in lake sturgeon (Acipenser fulvescens) abundance and growth among river reaches in a large regulated river. Canadian Journal of Fisheries and Aquatic Sciences. 65: 645-657. © Queen's
[42] Golder Associates Ltd. 2011. Recovery Strategy for Lake Sturgeon (Acipenser fulvescens) – Northwestern Ontario, Great Lakes-Upper St. Lawrence River and Southern Hudson Bay-James Bay populations in Ontario. Ontario Recovery Strategy, Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vii + 77 pp.
[43] MacGregor, R., J. Casselman, L. Greig, W. A. Allen, L. McDermott, and T. Haxton. 2010. DRAFT Recovery Strategy for the American Eel (Anguilla rostrata) in Ontario. Ontario Recovery Strategy Series. Prepared for Ontario Ministry of Natural Resources, Peterborough, Ontario. vii+ 78 pp.
[44] Pratt, T.C and A. Mathers. 2011. 2010 Update on the status of American Eel (Anguilla rostrata) in Ontario. Canadian Science Advisory Secretariat, Research Document 2011/050, Central and Arctic Region, Fisheries and Oceans Canada. 18pp. Available: http://www.dfo-mpo.gc.ca/Csas-sccs/publications/resdocs-docrech/2011/2011_050-eng.pdf.
[45] Hildebrand, L. R. and M. Parsley. 2013. Upper Columbia White Sturgeon Recovery Plan – 2012 Revision. Prepared for the Upper Columbia White Sturgeon Recovery Initiative.
129p. + 1 app. Available at: www.uppercolumbiasturgeon.org
[46] *Middle Columbia River Steelhead Recovery Plan 2009*

with complex channel geometries.[47] *Generally speaking, hydraulic modeling does not reveal flow patterns at scales that are important to fish survival,*[48] *and as such can't provide the kind of biological understanding necessary to understand how reduced flows will likely affect fish populations.*[49] *Consequently, no matter what method is used to determine instream flow requirements, an accurate prediction of the changes to the quantity and quality of the remaining habitat is not likely, and may not be possible within the constraints of a development project. In any case, the full impacts of river diversion on physical, chemical and biological conditions may take decades or centuries to become apparent."*[50],[51],[52]

The decline in fish populations can have significant effects on local economies; for instance, decline and eventual closure of the commercial sport fisheries for American Eel in Ontario had an important economic impact to local communities in Ontario. American Eel landings once represented 50% of the value of the total landed catch from the lake, but the fishery was closed in 2004 due to severely reduced abundance. [36]

7. Cumulative Impacts of Multiple Projects on a Single River

To compensate for the lower output of power generation from a small river operation, developers will often opt for building several cascading units on a single river, thus multiplying the impacts. The cumulative effects of such projects can include severe fragmentation of aquatic habitats due to multiple dams, as well as fragmentation of terrestrial habitats due to the associated infrastructure (generating stations, hydro corridors and access roads). Yet cumulative effects are seldom adequately considered by the proponent led Environmental Assessment process.

For example, the Ottawa River supports 50 waterpower facilities, and their effects have not been effectively mitigated, nor has there been any meaningful attempt to do so. Adding more facilities to this watershed makes little sense without effective mitigation of existing effects. There are many more watersheds with similar cumulative environmental impacts that should be carefully examined in the context of cumulative effects before introducing more waterpower facilities. It may not be possible for instance to effectively mitigate some impacts depending on the circumstances within the watershed; and the potential for mitigation of effects should be determined before the release of sites for potential waterpower development.

The supporting information we have offered above is by no means exhaustive, however, it should provide a good overview of why ORA has such pressing concerns over the inclusion of hydroelectric in Ontario's Long Term Energy Plan, and especially its inclusion under the Green Energy Act and FIT Program, or any other kind of incentive program.

[47] Kondolf, G.M., E.W. Larsen, and J.G. Williams. 2000. Measuring and modeling the hydraulic environment for assessing instream flows. North American Journal of Fisheries Management 20: 1016-1028.
[48] Kondolf et al. 2000
[49] Jowett, I.G. 1997. Instream flow methods: a comparison of approaches. *Regulated Rivers: Research & Management* 13:115-127
[50] Ryan, S. 1997. Morphologic response of subalpine streams to trans-basin flow diversions. *Journal of the American Water Resources Association* 33:839-854
[51] Petts, G. and P. Calow. 1996. *River biota: diversity and dynamics*. Blackwell Science, London, UK.
[52] Tamed Rivers – A Guide to River Diversion Hydropower in British Columbia – P-15.

Table 1 – Current Waterpower Proposals under 10 MW:

Following is a list of waterpower proposals that we are aware of. There is no complete list available to the public, so this list may not reflect all current proposals, but all are under 10 MW.

	RIVER	FIT PROJECT	Installed Capacity MW	Actual Power MW
1	Kapuskasing River	Outlet Kapuskasing lake	2.5	1.25
2	Kapuskasing River	Lapinigam Rapids	8.2	4.1
3	Kapuskasing River	Middle Twp	5	2.5
4	Kapuskasing River	Near North Boundary	3.75	1.88
5	Petawawa River	Big Eddy	5.3	2.65
6	Larder Lake	Raven Falls	1.25	6.25
7	Ivanhoe River	Third Falls	5.1	2.55
8	Ivanhoe River	The Chute	3.6	1.8
9	Frederick House River	Wanatango Falls	4.67	2.34
10	Serpent River	Four Slide Falls	7.3	3.65
11	Serpent River	McCarthy Chute	2.0	1
12	Serpent River	Pecors Power Small Hydro Project	2	1
13	Blanche River	Marter Twp.	2.1	1
14	Vermilion River	McPherson Falls	2	1
15	Vermilion River	Cascade Falls	2.1	1
16	Vermilion River	At Soo Crossing	4.3	2.1
17	Vermilion River	Wabagishik Rapids	3.4	1.7
18	Wanapitei River	Allen & Struthers	2.8	1.4
19	Wanapitei River	Secord Rapids	750 kw	475 kw
20	Shaw Dam Lake	Shaw Dam GS	200 kw	100 kw
21	Little Rapids	Little Rapids GS	200 kw	100 kw
22	Clyde River	Herron Mills Waterpower Project	156 kw	78 kw
23	Grand River	Elora Hydro Electric	1	500 kw
24	Mississippi River	Almonte GS	5	2.5
25	Mississippi River	Enerdu Hydroelectric Project	1	.5
26	Twelve Mile Creek	Shickluna Small Hydro Project	4	2
27	Kawartha Lakes	Northland Power Hydropower Project	500 kw	250 kw
28	Drag River	Drag River GS	0.3 kw	0.15 kw
29	Kabinakagami River	Neeskah Project	6.5	3.25
30	Kabinakagami River	Peeshoo Project	6.5	3.25
31	Kabinakagami River	Wapoose Project	6.5	3.25
32	Kabinakagami River	Wahpeeston Project	6.5	3.25
33	Trout Lake River	Trout Lake River Hydro Project	4	2
34	Namakan River	High Falls Hydropower Development	4.5	2.3
		Total Hydroelectric Proposals - MW	114	57

Note: 34 waterpower proposals will compromise 20 Ontario rivers and their ecosystems to generate 57 MW of power under the Green Energy Act. Studies show that headponds produce significant amounts of greenhouse gas and mercury – 10 to 20 times increase.

Seasonal flows limit actual power generated to approximately 50% of Installed Capacity.