

NOVA SCOTIA AQUACULTURE REVIEW BOARD

IN THE MATTER OF: Applications made by TOWN POINT CONSULTING INC. for NEW MARINE SHELLFISH LICENCES/LEASES in ANTIGONISH HARBOUR, ANTIGONISH COUNTY for the SUSPENDED CULTIVATION of AMERICAN OYSTERS (AQ#1442, #1443, and #1444)

AFFIDAVIT OF EXPERT WITNESS – DAVID J. GARBARY

I, DAVID J. GARBARY, of Antigonish, in the Province of Nova Scotia, HEREBY MAKE OATH AND SAY AS FOLLOWS:

- 1. I am a resident of Antigonish, Nova Scotia.
2. I am currently employed as a Professor of Biology and Coordinator of Interdisciplinary Studies in Aquatic Sciences at St. Francis Xavier University.
3. Attached to this my affidavit as Exhibit "A" is a true copy of a report that sets out my expertise, education and training along with a statement of the substance of my proposed evidence.
4. I make this affidavit in connection with the Applications made by Town Point Consulting Inc. for New Marine Shellfish Licences/Leases in Antigonish Harbour for the Suspended Cultivation of American Oysters and for no improper purpose.

SWORN/AFFIRMED before me at
Antigonish, in the
Province of Nova Scotia, this 24
day of May, 2023

James C. MacIntosh
Commissioner for Taking Oaths

James C. MacIntosh
Notary Public
Nova Scotia

DAVID J. GARBARY

This is **Exhibit "A"** referred to in the
Affidavit of DAVID J. GARBARY sworn
before me on May 24, 2023



James C. MacIntosh
Notary Public
Nova Scotia

**Submission to the Aquaculture Review Board regarding the proposal of Town Point Oysters for an Oyster Farm in Antigonish Harbour (13 March, 2023).
Lease application numbers AQ#1442, AQ#1443 and AQ#1444**

David J Garbary MSc, PhD, FLS

Professor of Biology, St. Francis Xavier University (1984 to present)

Coordinator of Interdisciplinary Studies in Aquatic Sciences (2019 to present)

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Fields of scientific expertise:

- 1) Marine plants including seaweeds and seagrasses,
- 2) Ecology of barrier beach/sand dune systems and climate change in Nova Scotia
- 3) Ecology and conservation of rare plants in Nova Scotia

Scientific publications associated with Antigonish Harbour (and nearby estuaries) in peer-reviewed journals

Note: some of these publications will be cited in the text that follows. I present these titles here (less than 10% of my overall formal publications) as published work relevant to Antigonish Harbour.

Garbary, D.J. & Barkhouse, L.B. 1987. *Blidingia ramifera* (Bliding) stat. nov. (Chlorophyta: a new marine alga for eastern North America. *Nordic Journal of Botany* 7: 359–363.

Murphy, S.T., Doiron, L.M., Seymour, N.R. & Garbary, D.J. 1989. Location of foraging activity by black duck (*Anas rubripes*) broods in a Nova Scotia estuarine marsh. *Proceedings of the Nova Scotian Institute of Science* 39: 59–66.

Seymour, N.R., Miller, A.G. & Garbary, D. 2002. Decline of Canada Geese (*Branta canadensis*) and Common Goldeneye (*Bucephala clangula*) associated with a collapse of eelgrass (*Zostera marina*) in a Nova Scotia estuary. *Helgoland Marine Research* 56: 198–202.

Kim, K.Y., Garbary, D. J. & McLachlan, J.L. 2004. Phytoplankton dynamics in Pomquet Harbour, Nova Scotia: a lagoon in the southern Gulf of St. Lawrence. *Phycologia* 43: 311–328.

Garbary, D.J., Miller, A.G., Scrosati, R., Kim, K.Y. & Schofield, W.B. 2008. Distribution and salinity tolerance of mosses from Nova Scotia salt marshes in the southern Gulf of St. Lawrence. *Bryologist* 111: 282–291.

Watt, C.A., Garbary, D.J. & Longtin, C. 2011. Population structure of the ribbed mussel *Geukensia demissa* (Dillwyn) in salt marshes of the southern Gulf of St. Lawrence. *Helgoland Marine Research* 65: 275–263.

Garbary, D.J., Miller, A.G., Williams, J. & Seymour N. 2014. Drastic decline of extensive eelgrass beds in Nova Scotia due to activity of the invasive green crab (*Carcinus maenas*). *Marine Biology* 161: 3–15.

Halat L., Galway, M., Gitto, S. & Garbary, D.J. 2015. Epidermal shedding in *Ascophyllum nodosum* (Phaeophyceae): seasonality, productivity and relationship to harvesting. *Phycologia* 54: 599–608.

Halat, L., Galway, M.E. & Garbary, D.J. 2020. Morphogenesis of epidermal cell walls during shedding in the fucoid brown alga, *Ascophyllum nodosum*. *Protoplasma* 257: 1319–1331.

Wilson, E. & Garbary D.J. 2020. Absence of recovery in a degraded eelgrass (*Zostera marina*) bed in Nova Scotia, Canada: results from a transplant study. *Proceedings of the Nova Scotian Institute of Science* 50: 251–267.

Peer reviewed technical reports

Note: the following reports deal with numerous estuaries in the southern Gulf of St. Lawrence including Antigonish Harbour.

Garbary, D.J., Miller, A.G., Seymour, N. & Williams, J. 2004. Destruction of eelgrass beds in Nova Scotia by the invasive green crab. In: *Status and Conservation of Eelgrass (Zostera marina) in Eastern Canada* (Ed. by A.R. Hansen), Canadian Wildlife Service, Atlantic Region, Technical report series No. 412: 13-14. (note)

Garbary, D.J. & Munro, J. 2004. Eelgrass decline: Reality and causation (summary of group discussion). In: *Status and Conservation of Eelgrass (Zostera marina) in Eastern Canada*, (Ed. by A.R. Hansen) Canadian Wildlife Service, Atlantic Region, Technical report series No. 412: 23-26. (note)

Weldon, J., Garbary, D., Courtenay, S., Ritchie, W., Godin, C., Thériault, M.-H., Boudreau, M & Lapenna, A. 2005. *2004 Overview – Community Aquatic Monitoring Project for New Brunswick, Prince Edward Island and Nova Scotia*. Canadian Technical Report of Fisheries and Aquatic Sciences 2624. viii + 53 p.

Weldon, J., Courtenay, S. & Garbary D. 2007. The Community Aquatic Monitoring Program (CAMP) for measuring marine environmental health in coastal waters of the southern Gulf of St. Lawrence. Canadian Technical Report of Fisheries and Aquatic Sciences 2708. viii + 55 pp.

Weldon, J., Courtenay, S. & Garbary D. 2008. The Community Aquatic Monitoring Program (CAMP) for measuring marine environmental health in coastal waters of the southern Gulf of St. Lawrence. Canadian Technical Report of Fisheries and Aquatic Sciences 2783. viii + 61 pp.

Weldon, J., Courtenay, S. & Garbary D. 2009. The Community Aquatic Monitoring Program (CAMP) for measuring marine environmental health in coastal waters of the southern Gulf of St. Lawrence: 2007 overview. Canadian Technical Report of Fisheries and Aquatic Sciences 2825. ix + 75 pp.

Unpublished:

Garbary, D.J. & Miller A. Erosion of salt marshes in Antigonish Harbour. (field work circa 2006-2008).

Kang, E.J., Kim, K.Y., Miller, A. & Garbary, D.J. Photosynthesis of the air bladder or *Ascophyllum nodosum* (Fucales, Phaeophyceae). (field work on algae from Antigonish Harbour circa 2015.)

History of research and public outreach associated with oysters

As someone with a history of research on Antigonish Harbour and regional estuaries (see publications above), I was initially approached by some former colleagues and friends who raised an issue with me regarding the proposal of an oyster farm by Town Point Consulting Inc. in Antigonish Harbour. My initial reaction to the proposal was somewhat negative based on the red box showing extensive area of the harbour that was being proposed for the farm and my limited knowledge of aquaculture in general (mostly finfish aquaculture).

Given the obvious concern of members of the public about the potential impact of the proposed farm on Antigonish Harbour, as the Coordinator of Aquatic Resources at StFX, I organised a public panel discussion on the issue that was held at St. Francis Xavier University in August 2019. The intent of this event was to give both sides of the controversy a voice either to advocate for the oyster farm or to voice concerns regarding potential impacts on the harbour. The opposition to the farm had coalesced around *Friends of Antigonish Harbour*, a community group that made two presentations (15 min each), the farm proponent (30 min), Kerry Prosper (15 min for a First Nations perspective), Tony Miller (15 min on natural history), and me (15 min) speaking to the regulatory process for establishing the farm. About-250 people attended the meeting.

Following the meeting I became more interested in the potential impact of oyster farming in general and the potential impact on the eelgrass population in Antigonish Harbour. Mr. Ernie Porter asked me if I was willing to undertake an arms-length study of oyster farming and eelgrass and to compare the oyster growing technology that that was being designed by Dockport Ltd. (BOBR – Benefit of Being Round).

Thus, in the summer of 2021 my lab carried out a study of the two cage designs at the Shandalph Oyster Farm at Big Island (Merigomish Harbour, Pictou County), and made observations on the eelgrass beds in and around the farm. This work allowed me to make three important observations:

- 1) Populations of eelgrass occurred within the oyster farm that had been in operation for over 20 years.
- 2) Extremely lush beds of eelgrass occurred immediately adjacent to the farm, and
- 3) Oyster growth was dramatically improved over the roughly 70-day experimental period in the new oyster cage design.

This work allowed me to make the following conclusions:

- 1) Except for the immediate impacts of shading directly beneath the cages, there does not seem to be long-term degradation of eelgrass populations in or around oyster farms.
- 2) Growth rates of oysters in the new cage design (BOBR) were over 100% greater than the traditional Oyster-grow cages that are the industry standard in Nova Scotia and Prince Edward Island.

In the summer/fall of 2022 my laboratory was involved in a further test of the cage technology in Havre Boucher (Antigonish Co.). It was too late in the season to evaluate eelgrass populations at the site of the cages, and water depth and sea conditions made it impossible to monitor the eelgrass. The conclusion regarding the growth of the oysters using the two technologies was similar to that in 2021, i.e., greater than 100% improvement in growth rates in the BOBR cage design.

An assessment of eelgrass populations was made in two areas of Antigonish Harbour (AH) in the summer of 2022 relevant to the farm proposal. We sampled 20 random sites in the general area proposed for the oyster farm in AH using a modified coring device that sampled a similar amount of the bottom to the device used by Seymour et al. (2002). In none of these samples did we recover any living or dead eelgrass remains. Thus, it appears that 20 years after the collapse of eelgrass in Antigonish Harbour this part of the harbour has reached a new steady state in which the eelgrass is unable to regenerate. This is consistent with the lack of recovery found in parts of Tracadie Harbour after the collapse in eelgrass beginning in 2001 (Garbary et al. 2013; Wilson & Garbary 2020). In Captains Pond (a northeastern inlet of AH and a licensed site for spat collection) a diver found no evidence of eelgrass in her transects across the inlet.


Community Liasson Committee (CLC)

I was asked to become a member of the CLC to provide my background in science to evaluate some of the ecological concerns that had been raised by the *Friends of Antigonish Harbour*. As part of my contribution, I provided recent scientific papers on the effect of oyster farming on the organism that causes eelgrass wasting disease and insight into the issue of calcium removal that was raised by the *Friends of Antigonish Harbour* as a serious environmental concern. I fully endorse the responses of the CLC to the points raised by the *Friends of Antigonish Harbour*. In the summer of 2021 I made an oral presentation at a public meeting as part of a CLC organised event at the Legion Hall .

General Conclusions Regarding the Impact of Oyster Cultivation on Antigonish Harbour

The primary ecological concern raised by *Friends of Antigonish Harbour* was that the proposed farm would have a negative impact on the eelgrass population which is fundamental to the ecological health of Antigonish Harbour. My observations of commercial oyster farms in Nova Scotia and PEI show no evidence for this. In addition, the actual sites proposed for the farm are currently depleted of eelgrass. A previous survey by Dr Barrell in 2019 in the same areas showed a sparse population (i.e., not a meadow) that seemed to have declined in 2022, although this may reflect sampling methodology.

Antigonish Harbour has extensive human-caused environmental impacts that have historically –and will likely continue for many years– adversely affected the overall health of the harbour. These activities include residential development, runoff from farms adjacent to the harbour, effluent from the municipal water treatment facility, and farming in the harbour watershed. On the one hand, I regard all of these as having long-term negative implications for the health of the harbour. On the other hand, the impacts of these human activities may be partially mitigated by an oyster farm that can reduce eutrophication by consuming phytoplankton and the nutrients that allow the plankton to grow. In addition, climate change and associated sea level rise have been changing the harbour; these changes will only increase as the impacts of climate change become more apparent.



David J. Garbary