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NOVA SCOTIA AQUACULTURE REVIEW BOARD

IN THE MATTER OF: *Fisheries and Coastal Resources Act*, SNS 1996, c 25

- and -

IN THE MATTER OF: An Application by KELLY COVE SALMON LTD. for a boundary amendment and two new finfish aqaucutlure licenses and leases for the cultivation of Atlantic salmon (*Salmo salar*) - AQ#1205x, AQ#1432, AQ#1433, in Liverpool Bay, Queens County (the "**Application**")

Affidavit of Kurt Samways, PhD affirmed on January 19,2024

I affirm and give evidence as follows:

1. I am Kurt Samways, PhD, of Saint John, New Brunswick. I am a Research Associate and Parks Canada Research Chair in Aquatic Restoration at the University of New Brunswick, Saint John in the Department of Biological Sciences and Canadian Rivers Institute.

2. I have personal knowledge of the evidence affirmed in this affidavit except where otherwise stated to be based on information and belief.

3. I state, in this affidavit, the source of any information that is not based on my own personal knowledge, and I state my belief of the source.

4. I have been retained by Kelly Cove Salmon Limited ("**KCS**") to provide my independent expert opinion to the Nova Scotia Aquaculture Review Board relating to its consideration of the sustainability of wild salmon in connection with KCS's Application to expand its Atlantic salmon operations at Coffin Island (AQ#1205X) and for two new Atlantic salmon aquaculture farms at Mersey Point (AQ #1433) and Brooklyn Point (AQ #1432)**.**

5. I have reviewed the Liverpool Bay Finfish Marine Aquaculture Development Plan submitted by KCS on March 29, 2019 to the Department of Fisheries and Aquaculture in support of its Application (the "**Development Plan**"), with particular attention to Section 7, The Sustainability of Wild Salmon.

6. I am in general agreement with the commentary in these sections of the Development Plan. Since the Development Plan was prepared in 2019, there have been some recent developments and academic papers which are important to include in the consideration of the sustainability of wild salmon.

7. My comments with respect to the sustainability of wild salmon are set out in my report for the Nova Scotia Aquaculture Review Board attached as **Exhibit A**.

8. My CV is attached as **Exhibit B**.

AFFIRMED before me in, Fredericton, New Brunswick, on January 19, 2024.

[redacted]

New Brunswick Commissioner of Oaths
as a Solicitor

[redacted]

Kurt Samways, PhD

TAB A

KCS' Application re AQ#1205X, AQ#1432, AQ#1433 in Liverpool Bay, Queens County

This is Exhibit A referred to in the Affidavit of Kurt Samways, PhD, affirmed before me on January 19, 2024.

[redacted]

New Brunswick Commissioner of Oaths
ao a Solicitor

Report for the Nova Scotia Aquaculture Review Board

With respect to the Application by Kelly Cove Salmon Ltd.

Kurt Samways, PhD

January 18, 2024

Scope of Report

1. In this document, I limit my expert opinion to the Liverpool Bay Finfish Marine Aquaculture Development Plan for Atlantic salmon operations at Coffin Island (AQ#1205X), Mersey Point (AQ #1433), and Brooklyn Point (AQ #1432), with particular attention to Section 7, the Sustainability of Wild Salmon.

Nova Scotia Southern Upland Wild Salmon Population

2. As outlined in the Development Plan, the Nova Scotia Southern Upland salmon population native to the Mersey River is considered extirpated. No salmon were present in the Mersey River in 2008 according to surveys conducted by the federal Department of Fisheries and Oceans ("**DFO**") (DFO 2009).

3. The extirpation of the Mersey River population of Atlantic salmon is the result of many causes including the acidity of the Mersey River, the presence of dams and flow barriers along its course and high populations of invasive fish predators. Until these causes for the extirpation of salmon in the Mersey River have been addressed, efforts at restoring the wild salmon populations in the Mersey River will be extremely challenging.

4. The nearest Nova Scotia Southern Upland salmon spawning river to Liverpool Bay is the Medway River which is approximately 21 kilometers away. The number of salmon spawning there is currently small. Even if current efforts to restore this population to sustainable levels are successful, the salmon from this river are unlikely to be affected by the Liverpool Bay salmon farms.

5. Recent telemetry research in the Bay of Fundy has shown that post smolt salmon tend to migrate rapidly past aquaculture sites. The risk of disease transmission or sea lice transmission from farmed salmon to wild salmon is low even when the natal river empties into the same open bay occupied by the salmon farm. The distance from the Medway River, the nearest salmon spawning river to the Liverpool Bay greatly reduces the potential risk from the proposed Liverpool Bay farms upon wild salmon.

6. While mature wild salmon typically return from sea to their native river to spawn, approximately 12 to 15% of the returning mature salmon migrate to a different river.

7. If efforts at restoring the populations of Southern Uplands salmon are successful in rivers other than the Mersey River, mature salmon which travel up the Mersey River are not likely to be affected by the Liverpool Bay salmon farms and, in any event, will face the aforementioned challenges (acidified waters, barriers to migration, and invasive species predators) to reproductive success in the Mersey River.

Threats to wild salmon

8. Hundreds of research studies, conducted by thousands of researchers have attempted to identify the causative agents behind this alarming North Atlantic trend but, to date it is unclear what factor(s) are causing the continued decline. Numerous threats in both freshwater and marine habitats have been identified as potential causal agents, yet conclusive scientific evidence remains elusive. These threats include but are not limited to environmental change, exposure to contaminants, reduced habitat access, ecological community changes, aquaculture interactions, fisheries bycatch, and depressed population phenomena (Amiro et al. 2008, DFO 2010).

9. Recent expansive reviews by leading global salmon conservationists are increasingly indicating the likelihood of illegal, unreported, and unregulated (IUU) fisheries occurring outside the exclusive economics zones (EEZ) of the North Atlantic Ocean (Dadswell et al. 2021). This is supported by the fact that some stocks still persist at near historic recorded levels, the loss of stocks occurs in areas removed from aquaculture sites, and stocks continue to decline despite the large reduction in the populations of large offshore predators (Dadswell et al. 2021). This is concerning, as salmon conservation efforts, to date, have largely ignored IUU as a significant causative agent, and that any remedy of this on-going threat will require significant international agreements and joint enforcements. Until such time, salmon populations within the North Atlantic basin, will remain vulnerable, despite significant conservation efforts and investments remediating rivers and the near shore environment.

10. Wild Atlantic salmon in this area are potentially at risk from Atlantic salmon escapees. Atlantic salmon escapees would be capable of swimming up nearby rivers. If they enter these rivers and if they successfully spawn, there is the potential for genetic impacts of hybridization and introgression with, and into the resident population (Glover et al. 2020; Wacker et al. 2021). Subsequent interactions such as competition for spawning location and/or mates, as well as competition between offspring for food resources could arise and

result in the reduction of population size in nearby rivers (Flemming et al. 2000; McGinnity et al. 2003). There is little to no risk to wild salmon in the Mersey River (a once prominent salmon bearing river entering Liverpool Bay) as it has been all but completely extirpated. There is a low to medium risk to nearby salmon rivers (e.g., Medway River) as only 12 to 15% of returning Atlantic salmon typically stray to other rivers.

Distinct Southern Upland salmon

11. The Lahave River serves as DFO's index river for the Southern Upland salmon population. Using the present (2000's) population dynamics data (e.g., eggs, parr, smolt, adults, age, sex, spawning structure), in a population viability analysis shows that there is a zero probability of the river ever reaching its recovery target (Gibson and Bowlby 2013). A similar analysis conducted for the St. Mary's River, another Southern Upland salmon population, also demonstrated a zero probability of the river ever reaching its recovery target (Gibson and Bowlby 2013). Both populations will extirpate in the absence of human intervention or a change in vital rates (e.g. increased freshwater production or at sea survival) for some other reason (Gibson and Bowlby 2013).

12. With an extirpated salmon population on the Mersey, compounded with the effects of acidified waters, barriers to migration, and invasive species predators reducing freshwater productivity further, the Mersey River salmon population also has a zero probability of recovery.

Concerns about Salmon Farms Harming Wild Salmon

13. Concerns that marine-based finfish aquaculture can harm wild salmon by increasing their exposure to sea lice infestation and diseases like ISA were also discussed in the Doelle-Lahey report.

14. Sea lice are a natural part of the ecology of Atlantic salmon while at sea. Salmon caught in the Labrador Sea and off West Greenland have been shown to have a 78% to 93% infection rate respectively, however lice loads were extremely low at 4-10 lice per fish (Dadswell et al. 2021).

15. Lacroix and Knox (2005) found no evidence to support the hypothesis that parasites or diseases found in salmon farms or hatcheries were affecting post-smolts leaving the Bay of Fundy. Recent telemetry research in the Bay of Fundy has shown that post-smolts tend to rapidly migrate past aquaculture sites, typically spending less than an hour in close

proximity of an aquaculture cage. As such, the risk of disease transmission (e.g., infectious salmon anemia) from domesticated to wild fish is greatly reduced (M. Trudel, DFO, unpublished).

16. Currently, Nova Scotia farms tend to have very low lice loads usually not requiring treatment. By comparison, past and present surveys of lice on wild salmon, either very distant from aquaculture operation, or even prior to the establishment of salmon aquaculture (Templeman 1967; reviewed by Dadswell et al. 2021), show natural sea-lice loads can be 10x that found on untreated farmed salmon.

17. A study by Lacroix and Knox (2005) did not find any Lepeophtheirus salmonis (the species of sea lice of concern), on any of the 288 post-smolts sampled across three years (127 sampled in 2001; 229 sampled in 2002, and 42 sampled in 2003). The sea louse C. elongatus, a non-salmon specific species about half the size of L. salmonis, was found infrequently on post-smolts (2.4% in 2001, 4.4% in 2002, and 2.4% in 2003), with no more than one sea louse per fish was ever recorded on post-smolts.

18. Although there have been reports of sea lice affecting post-smolt ability to successfully return as adults, this appears to only occur in regions where post-smolts must navigate a complex of multiple farms, situated in narrow passageways, such as occurring in Scotland and Norway (Butler and Watt 2003, Greaker et al. 2020). Despite having many farms situated in very narrow fjords, Norway is among the countries with the smallest decline in adult abundance (Otero et al. 2011; Forseth et al. 2017).

19. However, in regions such as Liverpool Bay, where post-smolts (if present) can rapidly migrate to sea, the potential for sea-lice infestations to negatively impact post-smolt survival, is absent or negligible (Carr and Whoriskey 2004, Lacroix and Knox 2005).

20. In addition, the temporal management of the salmon farms reduces potential effects upon post-smolt. Recent findings by DFO scientists concluded that from all existing data sets and research articles, no statistical association exists between sea lice numbers found on Atlantic salmon farms and that found on wild juvenile Pacific salmon, across all salmon farming regions (6) of British Columbia, and across most recent (2015-2021) farming years (DFO 2023). This report strongly suggests that modern salmon farming practices are not negatively impacting wild salmon populations regarding sea lice.

21. Similarly, research also suggests that farmed salmon are more likely to contract pathogenic strains of ISA from wild salmon, which are more resistant (Doelle and Lahey 2014) than for wild salmon to contract ISA from farmed salmon. Indeed, according to DFO (DFO 2014) there have been no proven cases of the transmission of sea lice or ISA disease to wild populations from aquaculture sites.

Past and Current Regional Restoration Efforts

22. Native salmon stocks on the Mersey River were lost by the mid 1990's and with no conservation requirement, traditional stocking supported in-river exploitation of returning salmon (DFO 1997). With the implementation of dams and flow barriers along the watercourse, stocking of Atlantic salmon in the Mersey River ceased, and by 2013 the federally operated Mersey Fish Hatchery was closed. To date there have been no subsequent restoration efforts on the Mersey River.

23. There has been a long history of recovery efforts on the nearby Medway River, with the stocking of juvenile Atlantic salmon (from Medway River brood stock) since the early 1970's (Gray and Cameron 1980). Restoration efforts ceased with the closure of the Mersey Fish Hatchery. A partnership was formed in 2019 to begin a restoration initiative similar to the Fundy Salmon Recovery project. Through the help of dedicated partners, a baseline assessment of the Medway River salmon population and the riverine habitat are underway to help direct future restoration efforts.

24. I, Kurt Samways, sit on the steering committee of the Medway River salmon restoration initiative. I am the lead scientist on the Fundy Salmon Recovery project, with eight years' experience of endangered Atlantic salmon conservation rearing,

25. The Fundy Salmon Recovery project is a collaboration between Fundy National Park, Fort Folly First Nation, Atlantic Canada Fish Farmers Association, Cooke Aquaculture, and the University of New Brunswick.

26. Modelled after the Fundy Salmon Recovery project, the Medway River salmon restoration initiative aims to recover the population through increasing natural spawning. This occurs by collecting out migrating smolts, rearing them at a marine conservation farm to maturity, and subsequently releasing the adult salmon back to their natal river to spawn naturally.

27. As a result of the Fundy Salmon Recovery project, the rivers in Fundy National park have observed 30 year highs in adult returns, wild hatched juvenile production rivals what was observed in the early 1990's, age at smoltification is returning to historic proportions, freshwater productivity has increased and the river ecosystem is healthier now that adult salmon have returned, and the genetic diversity of the population has increased (with no indication of inbreeding). The Fundy Salmon Recovery project accounted for ~85% of all the returning inner Bay of Fundy Atlantic salmon.

28. Efforts to recover the Medway River in a similar manner to the Fundy Salmon Recovery project would not be in vain given its distance and location relative to the proposed Liverpool Bay Finfish Marine Aquaculture Development Plans.

Conclusion

29. Based on the available evidence, it is reasonable to conclude that the proposed Liverpool Bay finfish marine aquaculture Development Plans pose a very low risk to wild Atlantic salmon in the Liverpool Bay region.

30. Unless there is substantial increase in freshwater Atlantic salmon production and/or at sea survival, recovery of nearby Southern Upland wild salmon populations will not occur on their own. Recovery of nearby populations, like the Medway River may occur through innovative and careful recovery actions, which mitigate the pitfalls of traditional stocking practices.

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TAB B

KCS' Application re AQ#1205X, AQ#1432, AQ#1433 in Liverpool Bay, Queens County

This is Exhibit B referred to in the Affidavit of Kurt Samways, PhD, affirmed before me on January 19, 2024.

[redacted]

New Brunswick Commissioner of Oaths
as a Solicitor

Dr. Kurt Samways

University of New Brunswick
Department of Biological Sciences
355 Campus Ring Road
PO Box 5050
Saint John New Brunswick, E2L 4L5, Canada
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Degrees

2017 Doctorate, Biology, University of New Brunswick
Thesis Title: Importance of marine-derived nutrients from Atlantic anadromous fishes.

2008 Master's Thesis, Biology, The University of Regina
Thesis Title: Linking phenotypic variability to differential selective pressures in freshwater aquatic habitats.

2002 Bachelor's, Biology, The University of Regina
Thesis Title: Directional tree felling by beavers (*Castor canadensis*).

Employment

2019 – 2024 Research Associate; Parks Canada Research Chair Biological Sciences, Science, Applied Science and Engineering, University of New Brunswick

- *Establish a research program, supervise HQP, teach two courses annually, participate in departmental administration (i.e. sitting on committees*)

2017 – 2019 Research Associate, Biology, Science / University of New Brunswick / Fredericton, University of New Brunswick

- *Scientific lead of Fish Ecology with the Mactaquac Aquatic Ecosystem Study (MAES); Scientific lead for multi-year CRI/UNB/Parks Canada/industry collaboration to assess the efficacy and whole river restorative effects of releasing wild-exposed, cage reared inner Bay of Fundy Atlantic salmon; Responsible for leading proposal development, project management, study design and field sampling, data analysis, and report/publication writing.*

2012 Biologist, Fisheries and Ocean Canada

- *Scientific lead to oversee all research (primarily on Atlantic salmon) at the federal biodiversity facility. Partner of the inner Bay of Fundy Atlantic salmon live gene bank program. Responsible for coordinating with provincial, federal, and international agencies, project management, student supervision, study design and field sampling, data analysis, and report/publication writing.*

2008 Aquatic Biologist, Biology, Science, The University of Regina

- *Assisted with a monitoring program looking and the effects of anthropogenic and climate change effects on prairie lake ecosystems in Saskatchewan; Responsible for training new staff, field sampling and data collection, sample processing, and report writing.*

Event Administration

2019 Organizer, Canada Wide Science Fair; How to Track Fish, Workshop

Expert Witness Activities

2022 Expert Witness, Province of New Brunswick charged citizen with Atlantic Salmon poaching, Canada, Miramichi

- *Analysis of confiscated Atlantic salmon to determine origin (i.e., wild or aquaculture origin). Used a combination of traditional external morphometric analyses with stable isotope analysis to determine origin.*

Committee Memberships

2023 Committee Member, Coastal Classification System (CCS) Wild Salmon Data Committee, Centre for Marine Applied Research

- *The 2021 Ministerial Mandate Letter outlined a priority for the Minister of Fisheries and Aquaculture to create a system that classifies coastal areas based on their suitability for finfish aquaculture. This Coastal Classification System (CCS) was one of the core recommendations of the Doelle-Lahey Report. To support this work, the NS Department of Fisheries and Aquaculture have contracted the Centre for Marine Applied Research (CMAR) to complete a preliminary assessment that explores potential suitability throughout Nova Scotia's coastal waters. To ensure a collaborative process, Data Committees will be established under CMAR's direction and will include knowledge experts from within and outside of government. Additional Consultants or Researchers will be engaged by CMAR, if required. Advisory Committees will also be consulted throughout the project.*

2018 Committee Member, Fundy Salmon Recovery Executive Committee, Fundy Salmon Recovery

- *Responsible for operational planning and communications for the Fundy Salmon Recovery restoration initiative.*

2018 Committee Member, DFO Saint John River Gaspereau Management Team, Fisheries and Oceans Canada

- *A team comprised of relevant federal (DFO) and provincial (Nova Scotia and New Brunswick) government members as well as academia. Key functions of the Management Team include, advising DFO on the development of strategies and action plans for recovery actions and management of Gaspereau (collective term for alewife and blueback herring).*

2014 Committee Member, DFO inner Bay of Fundy Atlantic Salmon Planning Group, Fisheries and Oceans Canada

- *A group comprised of relevant federal (DFO, Parks Canada Agency (PCA) and Environment Canada (EC)) and provincial (Nova Scotia and New Brunswick) government members as well as academia, interested stakeholders and Aboriginal peoples from the inner Bay of Fundy area. Key functions of the Planning Group include, advising DFO on the development of recovery strategies and action plans, coordinating involvement in recovery actions including environmental, biological, technical and social (educational and stewardship) program initiatives.*

2014 Committee Member, DFO inner Bay of Fundy Atlantic Salmon Recovery Team, Fisheries and Oceans Canada

- *A team comprised of relevant federal (DFO, Parks Canada Agency (PCA) and Environment Canada (EC)) and provincial (Nova Scotia and New Brunswick) government members as well as academia, interested stakeholders and Aboriginal peoples from the inner Bay of Fundy area. Key functions of the Recovery Team include, advising DFO on the development of a recovery strategy and action plans, coordinating Recovery Team member/organization involvement in recovery actions including environmental, biological, technical and social (educational and stewardship) program initiatives, and facilitating discussion and communication on recovery activities.*

Other Memberships

2021 Member, University of New Brunswick Steering committee developing a new Masters of Public Policy degree

2019 Member, University of New Brunswick Faculty of Science, Applied Science and Engineering Committee for the development of a new Applied Ecology program for the Department of Biological Sciences

Publications

Journal Articles

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