Response to the Environmental Assessment proposed Open Net Fin Farm – site # 1372 - Beaver Harbour - file number 12-01-67129, # 1371 - Spry Harbour and Shoal Bay site #1370 - Shoal Bay - file number 12-01-66202

The Environmental Impact Assessment for the proposed aquaculture Sites #1370 West Schoal Bay, #1371 Spry Bay West, and #1372 Beaver West, written by Sweeney International for Snow Island Salmon Inc. uses 20 year old, 1991wind and wave data which is irrelevant in 2012. The reference for the wind and wave sections is quoting the **Wind and Wave Climate Atlas – Volume I: The East Coast of Canada, for the Nova Scotian Shore, prepared by MacLaren Plansearch Ltd. (1991).** How useless is that? This is a major piece of information that is missing from this environmental assessment.

Why did the author of this environmental assessment choose to use outdated wind and wave data? In 20 years, there has been a significant change in the weather and climate patterns of the Atlantic Seaboard which includes Nova Scotia. Current data shows the current status of the marine weather which varies differently than 1991 data. Storms are more frequent with greater winds which create greater wave heights. Included in this response to the environmental assessment is current data of climate patterns as well as historical data which show newer trending patterns towards more frequent storms.

The following graphs show summary data on the number of hurricanes at the North Atlantic Basin which affects Nova Scotia weather. **Figure 1** is used as an explanatory table. Keep in mind that not all storms reached Nova Scotia as a hurricane.

Fig. 1 Uses of This Data Tables

Canadian Hurricane Centre Response Zone 100 year statistics

100 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL	Sys-Spd
#	38	140	69	71	89	57	22	5	0	173	178	351	24.1

Canadian Hurricane Centre Response Zone 100 year statistics

100 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL	Sys-Spd
Return	2.6	0.7	1.4	1.4	1.1	1.8	4.5	20	0	0.6	0.6	0.3	0

Canadian Hurricane Centre Response Zone 50 year statistics

50 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL	Sys-Spd
#	22	88	33	55	63	29	10	4	0	106	110	216	24.5

Canadian Hurricane Centre Response Zone 50 year statistics

50 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL	Sys-Spd
Return	2.3	0.6	1.5	0.9	0.8	1.7	5	12.5	0	0.5	0.5	0.2	0

All = 351: 351 unique storms touched or crossed the area during the 100 year period. The count is not based upon the storm intensity as it moved through the area… A tropical depression counts as one as does a force 3 hurricane.

S1 = 89: 89 distinct storms of Saffir-Simpson strength 1 transited the area during the 100 year study period. These 89 storms would be included in the 'All' value above. http://www.ec.gc.ca/Hurricane/default.asp?Lang=En&n=B85DD278-1

Figure 2 Summary Statistics of North Atlantic Basin

North Atlantic Basin 100 year summary statistics

100 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL
#	0	370	195	175	171	127	105	82	22	507	370	877

North Atlantic Basin 100 year summary statistics

100 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL
Return	0	0.3	0.5	0.6	0.6	0.8	1	1.2	4.5	0.2	0.3	0.1

North Atlantic Basin 50 year summary statistics

50 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL
#	0	204	87	117	121	54	57	47	16	295	204	499

North Atlantic Basin 50 year summary statistics

50 Yr	TD	TS	G	S	S1	S2	S3	S4	S5	H	<H	ALL
Return	0	0.2	0.6	0.4	0.4	0.9	0.9	1.1	3.1	0.2	0.2	0.1

The statistics displayed above were generated from one record for each storm. The record chosen was the first report of the highest maximum sustained wind during the event. This explains why no tropical depression strength storms are included in the table… every storm eventually reported winds in excess of 33 knots. Example: during the 100 year period, 507 of the 877 storms eventually grew to hurricane strength. http://www.ec.gc.ca/Hurricane/default.asp?lang=en&n=9AC6CF3B-1

Figure 3 The following abbreviations are used in the summary statistics tables throughout this document.

Wind Speed Classification Ranges

Abbreviation	Definition	Winds (knots)	Winds (km/h)	Winds (mph)
TD	Tropical Depression	< 34	< 63	< 39
TS	Tropical Storm	34-63	63-118	39-73
G	Gale	34-47	63-87	39-54
S	Storm	48-63	88-118	55-73
SS1 (or S1)	Saffir-Simpson 1	64-82	119-153	74-95
SS2 (or S2)	Saffir-Simpson 2	83-95	154-177	96-110
SS3 (or S3)	Saffir-Simpson 3	96-113	178-209	111-130
SS4 (or S4)	Saffir-Simpson 4	114-135	210-251	131-155
SS5 (or S5)	Saffir-Simpson 5	>135	>251	>155
H	Hurricane Strength	64	117	74
<H	Less Than Hurricane	<64	<117	<74
ALL	Count of all tropical storms moving through the area, regardless of wind strength			

Wind Speed Classification Ranges

Abbreviation	Definition	Winds (knots)	Winds (km/h)	Winds (mph)
Avg Sys Spd (kts) (or Spd) (or Sys-Spd)	The average system or translation speed of the storm in knots.			

***1.0 knot = 1.1516 mph = 0.5148 m/s = 1.853 km/hhttp://www.ec.gc.ca/Hurricane/default.asp?lang=en&n=1BF124E5-1**

Figure 4 Decadal and Five Year Storm Frequency

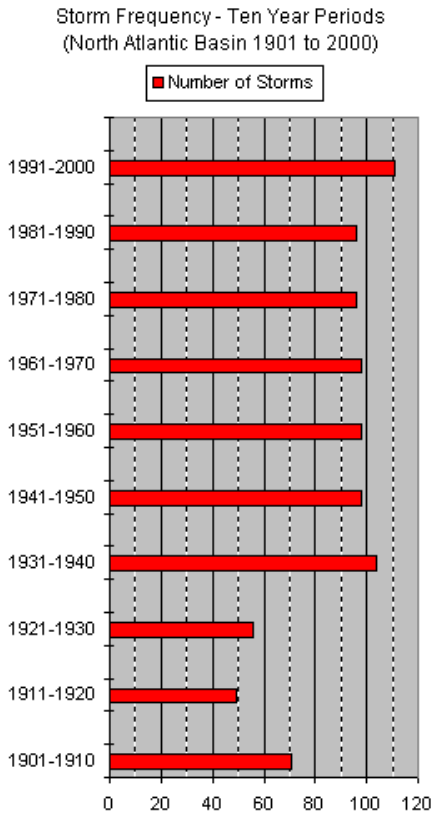


Figure 5 North Atlantic Basin Storm Frequency by Number of Storms per Ten Years http://www.ec.gc.ca/Hurricane/default.asp?lang=en&n=677F9423-1

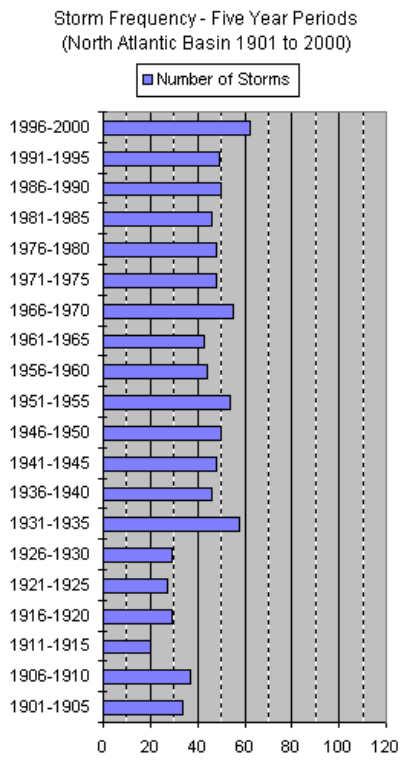


Figure 6 North Atlantic Basin Decadal and Five Year Storm Freqency

North Atlantic Basin Decadal and Five Year Storm Frequency

10-Year Periods	Number of Storms	5-Year Periods	Number of Storms
1901-1910	71	1901-1905	34
		1906-1910	37
1911-1920	49	1911-1915	20
		1916-1920	29
1921-1930	56	1921-1925	27
		1926-1930	29
1931-1940	104	1931-1935	58
		1936-1940	46
1941-1950	98	1941-1945	48
		1946-1950	50
1951-1960	98	1951-1955	54
		1956-1960	44
1961-1970	98	1961-1965	43
		1966-1970	55
1971-1980	96	1971-1975	48
		1976-1980	48
1981-1990	96	1981-1985	46

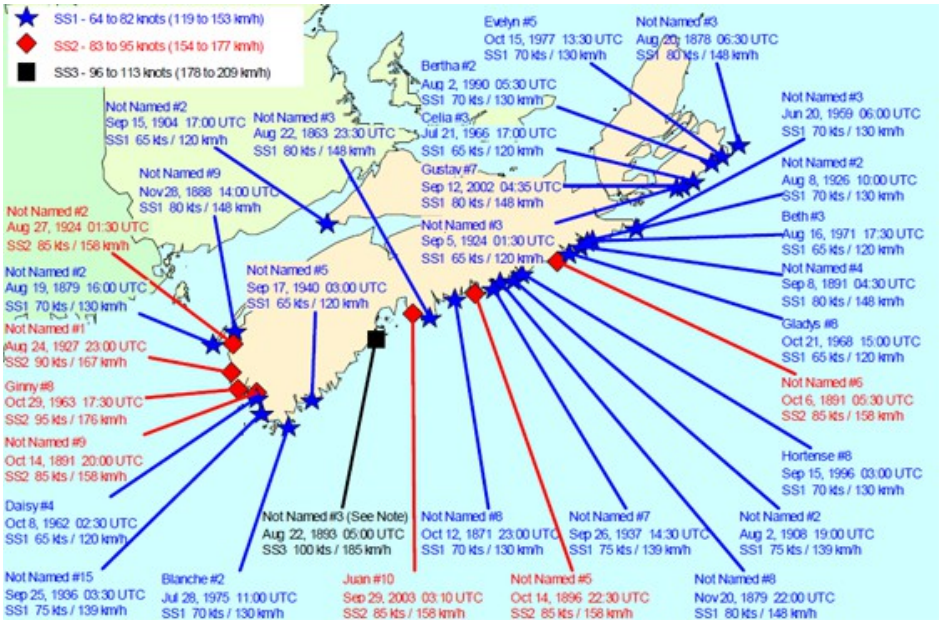
North Atlantic Basin Decadal and Five Year Storm Frequency

10-Year Periods	Number of Storms	5-Year Periods	Number of Storms
		1986-1990	50
1991-2000	111	1991-1995	49
		1996-2000	62

http://www.ec.gc.ca/Hurricane/default.asp?lang=en&n=1BF124E5-1

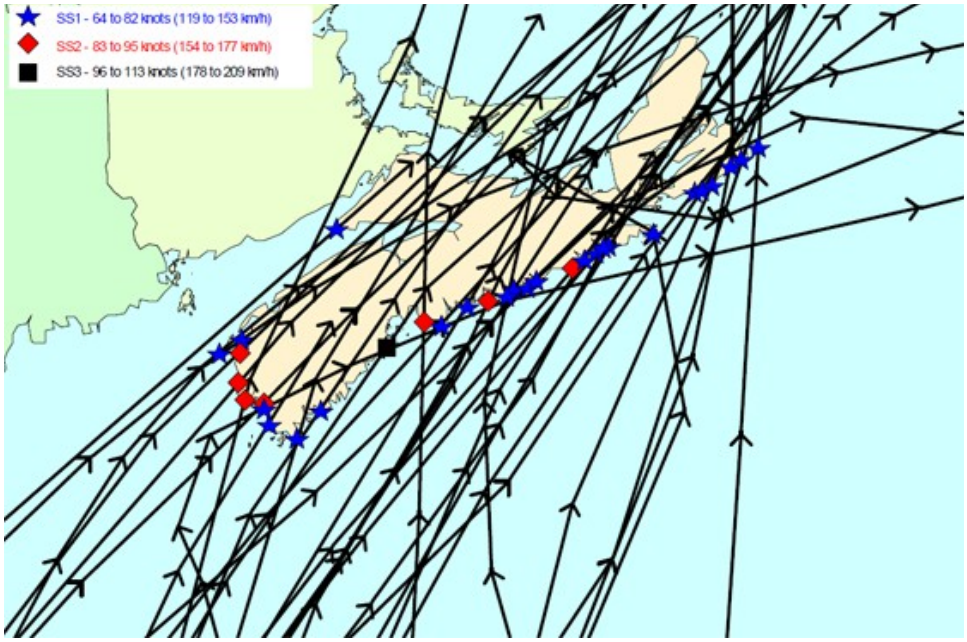
Figures 4, 5 and 6 show the increasing number of storms from 1900 to 2000. It also shows that the greatest number of storms have occurred from 1991 to 2000. There were 111 storms from 1991 to 2000 which is higher than 96 for the previous decade. Why has the author omitted this data? Who does it benefit if this information is left out? Due to the fact that open pen fin farming is done in the marine environment, it is cruical that the wind and wave data be current.

Figure 7 Nova Scotia Landfalling Hurricanes



http://www.ec.gc.ca/Hurricane/default.asp?lang=en&n=6DA4287E-1

Figure 8 Nova Scotia Paths of Landfalling Hurricane

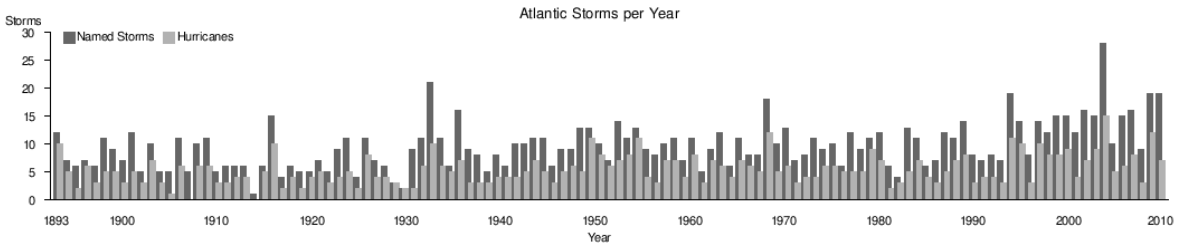


http://www.ec.gc.ca/Hurricane/default.asp?lang=En&n=FC989FA6-1&offset=2&toc=show

Figure 7 shows that storms and hurricanes have been part of the history of Nova Scotia. These storms will continue to frequent our shores. Figure 8 shows the path of storms follows a southwest pattern. It also shows that the hurricanes were listed as SS1, SS2 and one SS3.

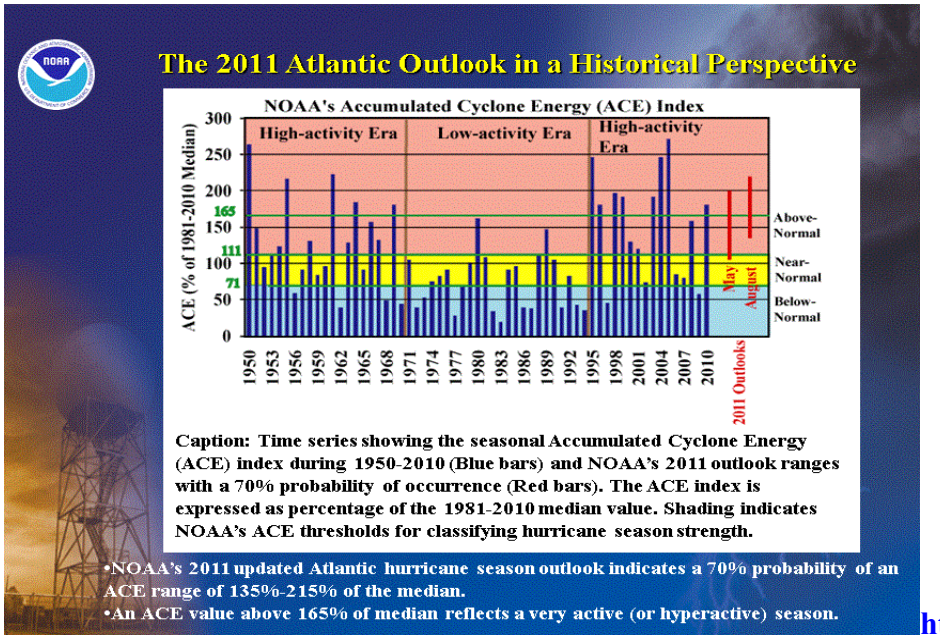
Figure 9 Nova Scotia Storm Frequency by Year

This bar chart shows the number of named storms and hurricanes per year from 1893-2011:



http://en.wikipedia.org/wiki/List_of_Atlantic_hurricane_records

Figure 10 The 2011 Atlantic Outlook in a Historical Perspective

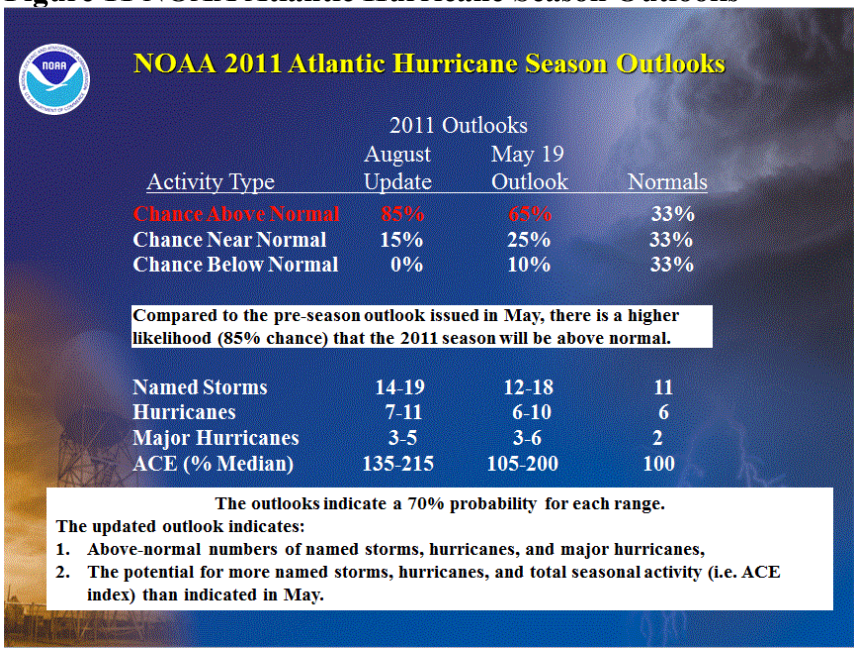


http://www.cpc.ncep.noaa.gov/products/outlooks/figure1.gif

This bar graph shows that the Atlantic storms per year from 1995 – 2010 have increased in number from previous years. Both Figures 10 and 11 indicate that the 2011 outlook for occurrence of hurricanes was predicted to be above normal.

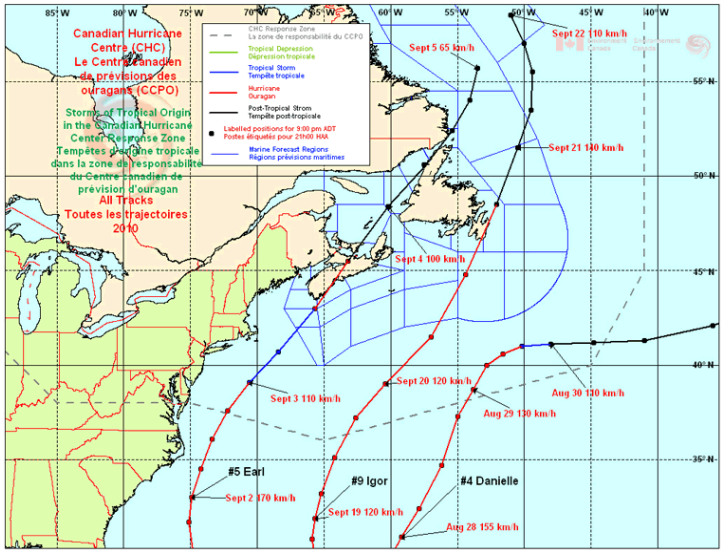
The 2010 seasonal Accumulated Cyclone Energy (ACE) value (Bell et al. 2000) was 166.3 x 104 kt2, which corresponds to 190% of the 1950-2000 median value. This places 2010 as the tenth most active season since 1950. NOAA classifies the 2010 season as "above normal," as defined in http://www.cpc.ncep.noaa.gov/products/outlooks/. "

Figure 11 NOAA Atlantic Hurricane Season Outlooks



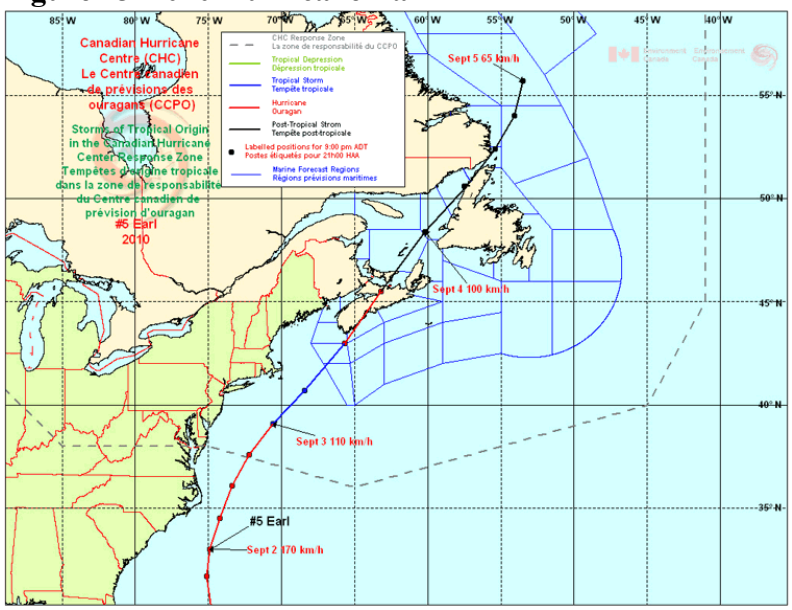
http://www.cpc.ncep.noaa.gov/products/outlooks/figure1.gif

Figure 12 Tropical Storm Colin | Hurricane Danielle | Hurricane Earl | Hurricane Igor - 2010



Three tropical cyclones entered the Canadian Hurricane Centre (CHC) Response Zone (RZ) in 2010. The CHC issued bulletins on four storms – one of which dissipated before entering the RZ (Tropical Storm Colin). The CHC forecast desk was activated again when Hurricane Danielle entered the zone, affecting the southernmost portion of the Grand Banks off Newfoundland on August 30th. Then, on September 4th, the long-lived Hurricane Earl tracked over Nova Scotia, and forecasters posted hurricane watches and tropical storm warnings for a large portion of the Maritime Provinces. About two weeks later Hurricane Igor struck Newfoundland on September 21st with severe impacts.

Figure 13 2010 Hurricane Earl



Storm Summary

As Earl moved northeast late on September 3rd its intensity dropped to Category 1 status, however, the wind field expanded significantly. On September 4th at 10:30 a.m. ADT, Earl made landfall as a 120-km/h Category 1 hurricane about 35 km southwest of Liverpool, Nova Scotia, with a central pressure remaining in the low 960-millibar range. Earl's forward speed of motion was 75 km/hour while crossing central Nova Scotia and into the Gulf of St. Lawrence and the storm was a 100-km/h tropical storm as it moved across eastern Prince Edward Island between 3 and 4 p.m.

Conditions

Earl brought high winds to much of southern and eastern Nova Scotia with hurricane-force gusts and sustained overland wind speeds of mid tropical-storm force. Several stations in and around Halifax (urban area) registered peak winds near 110 km/h. Although rainfall was not significantly heavy with this storm, when the rain was accompanied by high wind gusts, conditions were certainly typical of a hurricane. Ocean conditions along the Atlantic coast of Nova Scotia were turbulent and consistent with a Category 1 hurricane or strong tropical storm. Significant wave heights of 10 to 13 m (33 to 43 ft) were recorded with peak waves up to 23 m (75 ft) at the Halifax Harbour buoy (located outside the mouth of the harbour). Storm surge in Bedford Basin (head of Halifax Harbour) reached 120 cm or 4 ft. Some of the highest rainfall amounts and strongest wind data are shown below:

Figure 14

Station	Wind Gusts (km/h)	**Station**	Rainfall (mm)
Beaver Island, NS	**135 (104 sustained)**	**Edmundston, NB**	**76**
McNabs Island, NS	**130 (104 sustained)**	**Florenceville, NB***	**67**
Wreckhouse, NL	**129**	**St. Stephen, NB**	**55**
Osborne Head, NS*	**128**	**Aéroport d'Halifax, NS**	**52**
Drum Head, NS*	**127+**	**Parc Kejimkujik, NS**	**46**
Aéroport d'Halifax, NS	**117**	**Charlottetown, PEI**	**30**
Jetée Shearwater, NS	**117**		
Stephenville, NL	**115**		

Station	Wind Gusts (km/h)	Station	Rainfall (mm)
Antigonish, NS*	**110**		

*** Private or volunteer observation Figure 15**

Buoy	Maximum Wind** Sustained/Gust (knots)	Significant Wave Height (m)	Maximum Wave Height (m)
Halifax Harbour 44258	**46/67**	**10.1**	**23.3**
LaHave Bank 44150	**45/66**	**13.1**	**25.1**
NE Channel 44024	**45/60**	**9.0**	**N/A**
East Scotian Slope	**37/48**	**10.3**	**18.3**

**** Sustained wind is a 10-minute mean at the 5m level above water surface.**

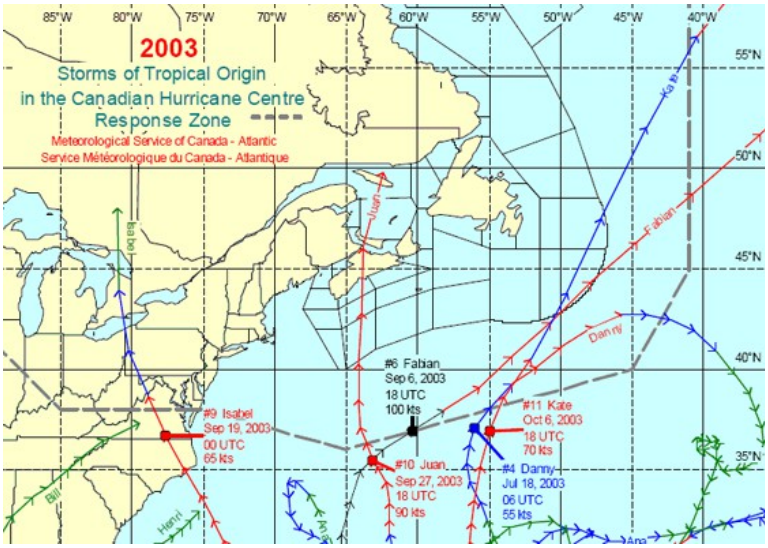
Impacts

The primary impact from Earl was wind damage to trees and related problems. Numerous trees were uprooted or trunks snapped over central and eastern Nova Scotia and in parts of western Newfoundland. Many large tree limbs fell onto Halifax area streets resulting in large-scale power failures, leaving up to 200 000 Nova Scotia Power customers without electricity at some point during the storm. It was a few days before power was restored for the hardest-hit areas such as eastern Halifax County and Guysborough County in Nova Scotia. Trees and large branches were also reported downed in New Glasgow and Antigonish, Nova Scotia.

Four of the eight official public forecast regions under the hurricane watch experienced hurricane-force gusts and sustained wind speeds that were not far below hurricane-force (the immediate coastline of Halifax and Guysborough Counties for instance).”

http://www.ec.gc.ca/ouragans-hurricanes/default.asp?lang=En&n=2A6E3A33-1

Figure 16 Canadian Tropical Cyclone Season Summary for 2003 Prepared by: Peter Bowyer



2003 Storm Tracks Image

Five tropical cyclones entered the Canadian Hurricane Centre (CHC) Response Zone (RZ) in 2003: two moved inland, two entered Canadian waters, and one remained outside Canadian waters.

The year 2003 marked the fourth consecutive year for a landfalling tropical cyclone in Canada. Three of these were hurricanes. Eleven fatalities resulted from Hurricanes Fabian and Juan. Juan made landfall while Fabian remained offshore. Hurricane Juan was the worst hurricane to hit the population centre of Atlantic Canada in over 100 years, claiming more inland lives in Canada than any tropical cyclone since Daisy killed six in 1962. The CHC issued 113 bulletins during 2003.

Hurricane Juan Storm Summary. Prepared by Peter Bowyer, October 29, 2003

At 12:10 a.m. ADT, Monday, September 29, 2003, Hurricane Juan made landfall in Nova Scotia between Shad Bay and Prospect. Juan arrived as a Category 2 storm. The storm ripped northward through the province, weakening quickly as tropical cyclones do over land. To date, Juan has claimed the lives of eight individuals: two when trees fell on their motor vehicle, two fishermen near Anticosti Island, three in a house fire speculated to have been started by candles used during the power outage, and one involved in relief work weeks after the storm.

Hurricane Juan will be recorded as the most damaging storm in modern history for Halifax, Nova Scotia (as measured by the widespread tree blow-downs, power outages, and damaged homes). Hundreds of thousands of Maritimers in Nova Scotia and Prince Edward Island lost power when the storm passed Sunday night. Nova Scotia Power reported that the last of their affected customers had power restored by the morning of Sunday October 12: just short of 2 weeks.

The last time that the city of Halifax was hit by the eastern eyewall of a hurricane (the worst winds in such a storm) was on August 22, 1893, when a Category 3

(sustained winds of about 180 km/h) storm made landfall in St. Margaret's Bay near 3.00 a.m. ADT. That storm, known then as "the second Great August Gale," claimed 25 lives and sank the vessels "Dorcas" and "Etta Stewart.

Significant wave heights of well over 10 metres were expected (although not measured) along the Eastern Shore of Nova Scotia, as far east as Ecum Secum. The largest significant waves recorded at the coast were 9 metres at Halifax Harbour with maximum waves of 19.9 metres.

The Storm Surge and Waves at Halifax with Hurricane Juan.

A field of 9-13 -metre (30-43 feet) significant wave heights--an average of the highest one third of the waves--approached the coast of Nova Scotia with Hurricane Juan. The Environment Canada buoy 44258, just outside Halifax Harbour, recorded maximum significant wave heights of 9 metres at the same time that Juan was making landfall. The maximum waves around the same time were 19-20 metres.

Figure 17 The accompanying graph shows that the largest of these waves occurred between 12:20 and1:20a.m. ADT.

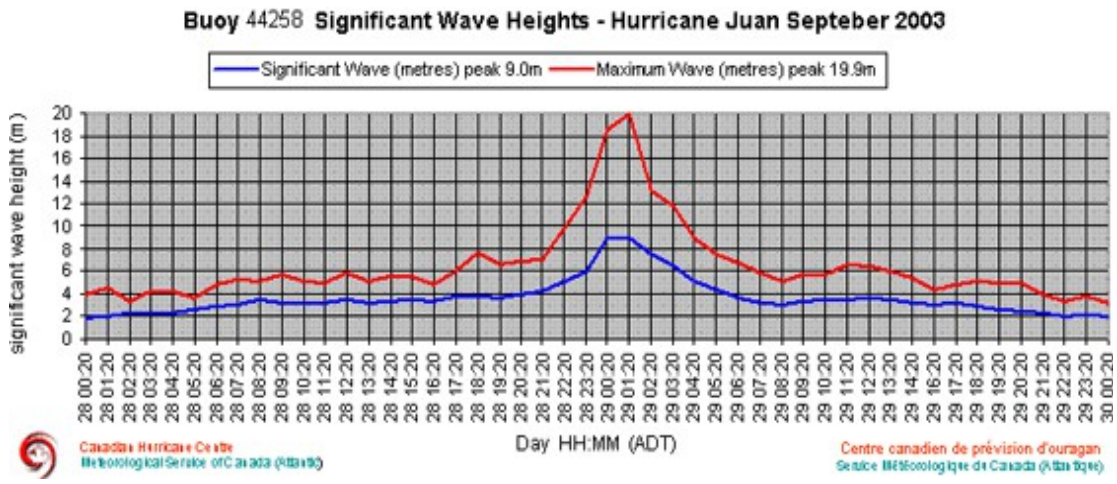


Figure 17

Storm surge graph, shows that the largest of these waves occurred between 12:20 and 1:20 a.m. ADT. The storm peaked at 19.9 metres which was the highest on record for almost a century.
http://www.ncdc.noaa.gov/oa/ibtracs/index.php?name=ibtracs-data for history pf

The information from this environmental assessment, in the sections Wind and Waves is either outdated or gives minimal wind speeds and minimal wave heights. It only takes one major storm to damage an open net cage system. The newest information shows that Nova Scotia has received more storms with greater wind forces and this trend is predicted to continue.

Let's review the statistics for Hurricane Juan and Hurricane Earl. Hurricane Juan was the worst hurricane to hit the Atlantic seaboard in over 100 years. On September 29, 2003 Juan arrived as a Category 2 storm with wind recorded at 158 km/h sustained with gusts over 185 km/h. The largest significant waves recorded at the coast were 9 metres at Halifax Harbour with maximum waves of 19.9 metres (approximent - 43 feet).

On September 4th at 10:30 a.m. ADT, Earl made landfall as a 120-km/h Category. Significant wave heights of 10 to 13 m (33 to 43 ft) were recorded with peak waves up to 23 m (75 ft) at the Halifax Harbour buoy (located outside the mouth of the harbour).

Associated with these storms is major structural damage to infrastructure such as roads, power lines etc., buildings, trees, wash outs to land, power outage for days etc. In section **2.7 Mooring and Anchoring System Descriptions** the author of the report states "**This type of mooring and anchoring system** (referring to the salmon cage) **is currently in use at the existing Owls Head aquaculture farm (NS lease #772) and has been shown to withstand hurricane winds and 8 m swells with no damage".**

I would like to know which hurricane this was, what was the wind speed, and were the cages full or empty? It seems incredulous that this salmon farm survived intact during a hurricane with no escapes, in relation to the recorded damage during Hurricane Juan (2003), Earl (2010) and Bill (2009). Looking at the prediction for increased numbers of storms and hurricanes, it seems inevitable that at some point, cages are going to be damaged. This creates several problems. What happens to the netting that is ripped free of its cage? Can this be a danger to endangered species such as the Blue whale, the Fin whale, the Harbour porpoises, and Basking sharks? One must not forget that these are endangered species which are protected by the provincial and federal Species at Risk Act.

What about the risks to the Atlantic salmon? Any escapes could potentially breed with the Atlantic salmon. According to research, this could cause problems with the life cycle of salmon that go to the rivers to spawn. Also, escapes may be infested with lice (which occurs frequently) and pass these lice to wild salmon and sea trout. Studies written about aquaculture of fin farms in British Columbia and New Brunswick show that wild salmon populations near salmon cages have greatly diminished or have been eradicated from the neighbouring rivers**.**

A study appearing in the December 14 issue of the journal Science shows, for the first time, that parasitic sea lice infestations caused by salmon farms are driving nearby populations of wild salmon toward extinction. The results show that the affected pink salmon populations have been rapidly declining for four years. The scientists expect a 99% collapse in another four years, or two salmon generations, if the infestations continue.

The impact is so severe that the viability of the wild salmon populations is threatened," says lead author Martin Krkosek, a fisheries ecologist from the University of Alberta. Krkosek and his co-authors calculate that sea lice have killed more than 80% of the annual pink salmon returns to British Columbia's Broughton Archipelago. "If nothing changes, we are going to lose these fish." Matt Wright mwright@seaweb.org

The Gardner-Pinfold (2011) study shows that each wild Atlantic salmon caught and released is worth $2,500 to the tourism and recreational fishing industries. The Nova Scotia Salmon Association has spent almost a million dollars and hundreds of volunteer hours restoring the wild Atlantic salmon to the West River of Sheet Harbour. This recovery could be endangered by open net salmon farms. The provincial government is well aware of the plight of the Atlantic salmon. Representatives of the NS Salmon Association met with Minister of Fisheries and Aquaculture Sterling Belliveau this year to present their concerns about open pen fin farms.

Even though this report states that salmon cages in Owl's Head have withstood hurricane force wind and waves, the following section deals with damaged cages and a recapture plan for escapes.

5.4.2 Pen Damage Caused by Extreme Weather
Aquaculture farms along the Atlantic shore of Nova Scotia are sometimes subject to extreme weather conditions that may result in physical damage to the pen system. Wind and wave damage caused by storms and ice damage during extremely low temperatures are environmental hazards that may cause unwanted changes to the project. However, employing proper gear and utilizing the most recent technologies for design and construction as well as routine inspection and maintenance will help prevent any unfavourable effects on the project caused by weather and climate extremes. During extreme weather conditions such as high winds, personnel will not be working on the pen farm. Once the extreme weather has passed, crews will be dispatched to examine the pen system and fish stock for damage. Repairs will be carried out as necessary.

Table 13. The nature of the damage incurred during a storm event will determine the type and extent of the repairs that will be conducted.

10.6.2 Containment and Recapture Plan
Net integrity is checked after every severe weather event and repairs are carried out as necessary. Net changes are conducted in such a manner as to prevent escapes and salmon losses. Divers inspect the nets prior to and after transfers between pens to ensure escapes are unlikely. In the unlikely event that there is an accidental release, gill nets may be deployed with the approval of the Department of Fisheries and Oceans. The gill nets would be set until they no longer captured farmed salmon. In

the event of a mass escape, such as what might be incurred during major storm damage of pens, the Farm Manager will contact the Production Manager, who will then contact NSDFA to report the losses. The Containment and Recapture plan for SIS can be found in Appendix F.

10.6 Accidents and Malfunctions

10.6.1 Contingency Plans
Key farm crew members will have appropriate Marine Emergency Duties (MED) Certification. In the event of equipment failure or malfunction, the Rainbow Net & Rigging Ltd. maintenance crew is dispatched immediately. Generally, repairs can be made within one day. In the case of net pen damage, divers will inspect all nets and pens and make repairs as necessary on the farm.

Why does the report need a section on repair of damaged cages if they are strong enough to survive hurricanes? It's because storm damage happens regularly around the world. These farms will be no different. Loch Duhart, the parent company for Snow Island Salmon Inc., along with other Scottish aquaculture companies have reported escapes over the last decade. www.scotland.gov.uk./Topics/Fisheries/Fish-Shellfish/18692

The provincial government are not listening to the people of Nova Scotia. They are not listening to the people who have already been affected by salmon farms – St Mary's Bay, Shelburne Harbour and Port Mouton. It is time to start listening.

The Eastern Shore has been suffering from an economic decline in the last forty years. In 1971, Hurricane Beth caused flooding which destroyed the pulp mill in Sheet Harbour. Jobs were lost and it also affected the logging industry. In the early 90's the cod fishery no longer existed. We now depend on the logging and mining industry (small % of jobs), the tourist industry and other fisheries such as the lobster industry, crab, herring, mackerel, oyster, mussel, and sea urchin. The licensing of open pen fin farms could harm our waters. We depend on the pristine waters of the Eastern Shore for our livelihood. We call the Eastern Shore the forgotten shore because governments seem to have abandoned us. There has been little growth in industries in the last number of years. Now some of our industries may be greatly impacted if our pristine waters are harmed.

We are asking the government to pay attention to the people of the Eastern Shore. We would like to see a 5 year moratorium on open pen fin fish aquaculture. This time would allow for independent studies to be conducted on the method of open pen fish farms to look at issues of sea lice, habitat loss, environmental pollution, illegal use of pesticides, effect of escapes on wild salmon populations, and Infectious Salmon Anaemia and other diseases. We need to know what impact the salmon farms may have on our economy. We also need to see a better system for granting licenses and making additions to these farms whereby the communities that will be affected should have a say in this process. We would also like to see the government look at the possibilities of fish aquaculture on land. These types of farms exist in several parts of the world. Right now, open pen fin farms around the world are not working and are not sustainable. We need our elected officials who represent the people to take a serious look at these requests.

Sandra Moser – representing The Association for the Preservation of the Eastern Shore
Director - Sheet Harbour & Area Chamber of Commerce