SAVE MIRAMICHI SALMON INC.

Sauvons les saumon de la Miramichi / Plamu 1st

Commercial Fisheries Management in Canada

The United Nations Agreement on Straddling and Highly Migratory Fish Stocks, which came into force in 2001, commits Canada to use the Precautionary Approach in managing straddling stocks as well as, in effect, domestic stocks. Commercially fished species in Canada are normally managed to achieve the Maximum Sustainable Yield of single species, i.e., in a silo. The Precautionary Approach Framework requires the identification of a lower, or Limit Reference Point for the stocks of individual species. Below the LRP, no directed harvest is allowed.

The stocks are normally analyzed according to a stock-recruitment model. For Atlantic salmon, it is the Beverton-Holt stock recruitment model that is applied, and it appears bass are “managed” according to the same model. In the case of salmon, the Limit Reference Points are specified in terms of egg deposition, 1.74 per m^2 of wetted area in the Northwest/Little Southwest, and 1.52 eggs per m^2 for the Southwest. In the case of southern Gulf of St. Lawrence, striped bass, the LRP is 330,000 spawners.

Directives to DFO for Multi-Species Situations

As I said, stocks are normally managed in separate silos. However, given the apparent serious effects of striped bass on Miramichi salmon, the following directive was given to DFO Gulf by the Commons Standing Committee of Fisheries and Oceans / Peche et. Oceans (FOPO):

- **"That Fisheries and Oceans Canada's restoration framework prioritize the long-term balance of fish species in the Southern Gulf of Saint Lawrence and Miramichi River".**

Further, in 2019, a policy document was published that said:

- **"in cases where rebuilding one stock has the potential to negatively impact the status of another (e.g., rebuilding a predator species which would result in a decline in a prey species), objectives should be carefully developed through a balanced approach to ensure neither is depleted to a point of serious harm". And from the same document:**
- **…" it is important to acknowledge that it is not possible to simultaneously achieve yields corresponding to Maximum Sustainable Yield (MSY) predicted from single species assessments for a system of multiple, interacting species. As such, rebuilding efforts should be approached within an ecosystem context to the extent possible."**

Directives to DFO for Multi-Species Situations (continued)

…..and

From Research Document 2022/029 (Fisheries Reference Points for Striped Bass (Morone saxatilis) from the Southern Gulf of St. Lawrence:

- **The reference points presented are derived based on optimizing value functions specific to Striped Bass. No multi-species reference points or management options are discussed.**

So, it would seem obvious to almost everyone that the multi-species policy should apply, and the 330,000 striped bass Limit Reference Point could be undercut, but it is considered sacrosanct by DFO Gulf.

Research Document 2022/030

But not to Gerald Chaput. In Res. Doc. 2022/030, Chaput continually refers to a bass number of 100,000 as the cut-off point beyond which there is serious harm to Miramichi salmon. For example: "Based on acoustic tagging estimates of (smolt) survivals through Miramichi Bay, the years when Striped Bass spawner abundances exceeded approximately 100 thousand spawners corresponded to years with visibly lower estimated survival rates.", and "Striped Bass abundances in the range of 100 thousand spawners in the past corresponded to.... the highest survival rates of acoustically tagged smolts through Miramichi Bay."

Research Document 2022/030 (continued)

In the end however, Chaput capitulated. He used incomplete smolt tagging data and a head-scratching procedure known as the "cohort analysis" plus denial of the universally recognized assumption that the ocean is a density-independent environment for salmon, and said:

"It is not clear from these time series of data, that reducing Striped Bass spawner abundances to the level of the early 2000s, i.e., less than 100 thousand spawners, would improve the acoustic tagged smolt survival estimates, the population level relative survival rates derived from the cohort model, or the landings trends of gaspereau and Rainbow Smelt in the commercial fisheries. It is not possible to suggest a reference level to address the multiple species concerns based on the information and analyses presented in this working document. Ultimately, the decision to use an alternate "target" Striped Bass reference point to account for the multi-species interactions will be made by fisheries managers."

And Gulf Management did, and the 330K Limit Reference Point remains. Striped bass continue to be managed in a silo.

Does the Miramichi Atlantic Salmon / Striped Bass Situation Fit These Recommendations?

To force DFO to implement the 2019 multi-species management policy, we therefore have to prove that striped bass are having a serious population-level effect on salmon We have to answer six questions (#6 below is a straw man), or at least the first three plus #7, which are slam dunks. #4 is challenging, and #5 will be a difficult hurdle to overcome, but it's doable. The questions:

1. **Are Miramichi salmon declining?**
2. **Is it to a point of serious harm?**
3. **Are striped bass causing the problem?**
4. **If the answers to 1 to 3 are "yes", what reduction to the bass population is required to mitigate the harm?**
5. **If all the above are true, what annual harvest is required to reduce the bass to the level identified in #4?**
6. **What alleged causes are irrelevant?**
7. **Are there unacceptable effects on the striped bass population and what would be a reasonable LRP for this species?**

Q1. Are Miramichi salmon declining? Answer= Yes
Barrier Counts 2010 versus 2024,

Northwest

Final Date	Year	Total Grilse to Date	Total MSW to Date	Total Atlantic Salmon to Date
Oct. 22	2010	852	284	1136
Oct. 11	2024	8	39	47
Change	14 years	-844	-245	-1089
Change Magnitude	-	-99.1%	-86.3%	-95.9%

Dungarvon

Final Date	Year	Total Grilse to Date	Total MSW to Date	Total Atlantic Salmon to Date
Oct. 22	2010	660	207	867
Oct. 11	2024	6	45	51
Change	14 years	-654	-162	-816
Change Magnitude	-	-99.1%	-78.3%	-94.1%

Q1. Are Miramichi salmon declining? Answer= Yes
Barrier Counts 2010 versus 2024

Plus, Adult Returns were 80,000 in 2011 and were 5,400 in 2024.

Northwest Headwater Barrier

Final Date	Year	Total Grilse to Date	Total MSW to Date	Total Atlantic Salmon to Date
Oct. 22	2010	852	284	1136
Oct. 11	2024	8	39	47
Change	14 years	-844	-245	-1089
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Dungarvon Headwater Barrier

Final Date	Year	Total Grilse to Date	Total MSW to Date	Total Atlantic Salmon to Date
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Oct. 11	2024	6	45	51
Change	14 years	-654	-162	-816
Change Magnitude	-	-99.1%	-78.3%	-94.1%

Q2. Is it to a point of serious harm? Answer= Yes

In 2011, salmon returns to the greater Miramichi were 34,090 MSW salmon and 45,880 grilse for a total of 79,970 fish. According to just released DFO figures in 2024, there were 4500 MSWs and 800 grilse that returned for a total of 5,400 fish, a 93% decline. This illustrates serious harm as does the 35% of LRP that was achieved in 2024.

Returns of Grilse and MSW Salmon in 2024

Northwest Miramichi		Southwest Miramichi	
Grilse	MSW	Grilse	MSW
300	1600	500	3100

Fecundities

River	Prop. Female Lg.	Prop. Female Grilse	Fecundity (eggs per fish) Lg.	Fecundity Grilse
NW	0.81	0.24	7427	3612
SW	0.81	0.11	7508	3651

from Sci Resp Doc 2018/015

Wetted Areas

m^2	NW	16,590,000
	SW	35,470,000

Egg Deposition Calculation (Eggs per m^2)

Stage...	Grilse	MSW	Eggs per Drainage	Deposition
Northwest	534,744	9,625,392	10,160,136	0.61
Southwest	200,805	18,852,588	19,053,393	0.54

2024 Estimated Egg Deposition Rates and Percentage of LRPs

Southwest			Northwest		
Mean Dep.	(eggs / m^2)	0.54	Mean Dep.	(eggs / m^2)	0.61
	LRP	1.52		LRP	1.76
	Ratio LRP	35.3%		Ratio LRP	34.8%

Q3. Are Striped Bass Causing the Problem? Answer= Yes

CRI 2023 Predator Tag Data for Smolts during Estuary Passage

Category	Dungarvon	NW	Total	Dung % Total	Dung % (Total minus tag fail)	NW % Total	NW % (Total minus tag fail)	All % Tot	Both Tribs % (Tot minus tag fail)
GoSL Alive	12	4	16	9.4%	10.1%	3.3%	3.7%	6.4%	7.0%
Bass Predation	82	80	162	64.6%	68.9%	65.6%	74.1%	65.1%	71.4%
Otter / Mink Predation	3	1	4	2.4%	2.5%	0.8%	0.9%	1.6%	1.8%
Unknown tag on bottom loss	3	1	4	2.4%	2.5%	0.8%	0.9%	1.6%	1.8%
Bird Predation	19	22	41	15.0%	16.0%	18.0%	20.4%	16.5%	18.1%
Tag failure	8	14	22	6.3%	6.7%	11.5%	13.0%	8.8%	9.7%
Total	127	122	249						
Tot minus tag fail	119	108	227						

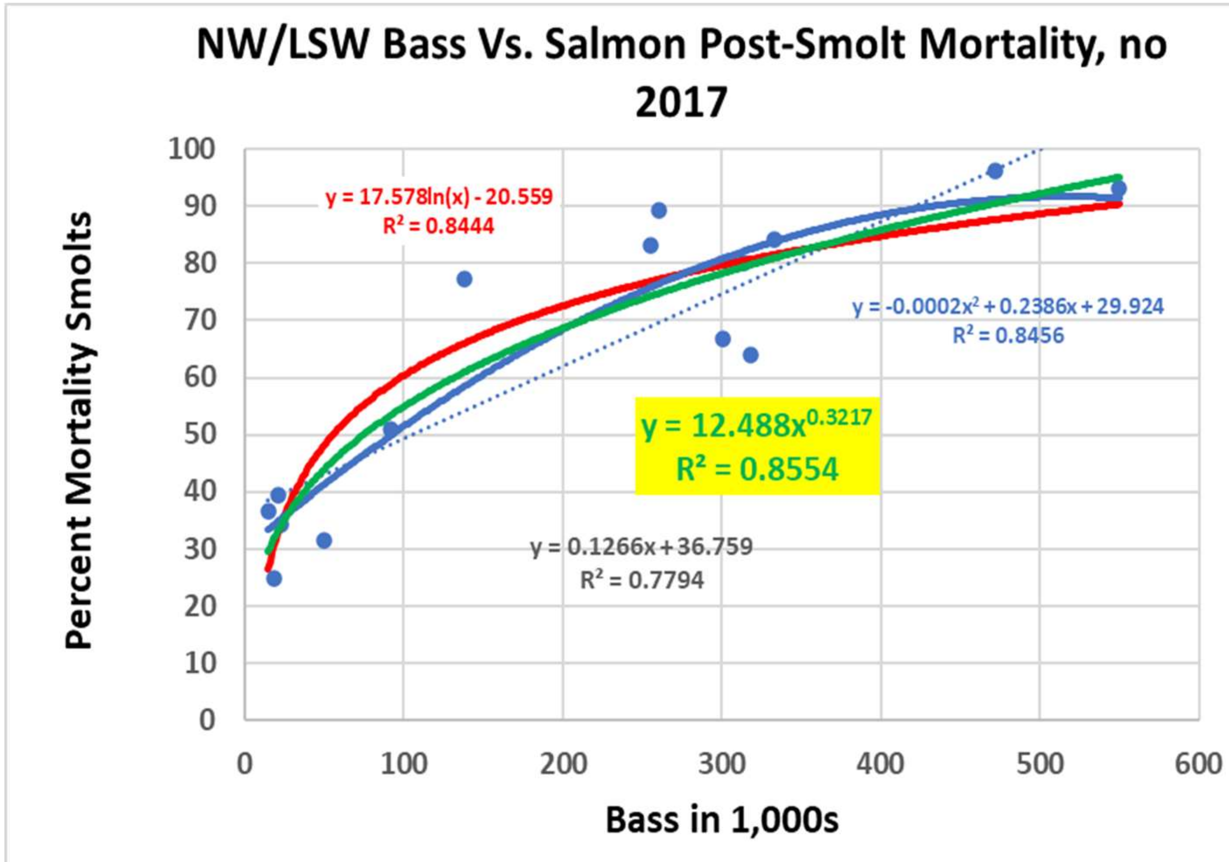
Q4. What reduction to the bass population is required to mitigate the harm?

We already saw Gerald Chaput alluding to 100K being the answer before. He used data only up to 2016. Here is a more recent picture:

Northwest				Southwest		
Year	Bass 1000s	Measured Smolt Mortality (ASF)		Year	Bass (1,000s)	Measured Smolt Mortality (ASF)
2003	20.61	39.3		2003	20.61	56.4
2004	14.51	36.5		2004	14.51	53.8
2005	18.37	24.8		2005	18.37	38.3
2006	22.33	34.4		2006	22.33	32.5
2007	49.52	31.4		2007	49.52	32.6
2008	91.9	50.8		2008	91.9	43.1
2013	255.5	83.1		2009	48.04	43.9
2014	138.3	77.2		2011	203.1	40.0
2015	301	66.9		2013	255.5	43.6
2016	318	64.1		2014	138.3	61.0
2017	994	92.3		2015	301	60.4
2018	333	84.2		2016	318	65.3
2019	314	80		2017	994	80.4
2021	260.7	89.4		2018	333	63.7
2022	471.8	96.2		2019	314	66.4
2023	550	93.1		2021	260.7	64.5
				2022	471.8	73.1
				2023	550	79.1
Correlation Bass vs Smolt mort., NW				Correlation Bass vs Smolt mort. SW		
R	0.768635946			R	0.784493393	
p	<0.01			p	<0.01	

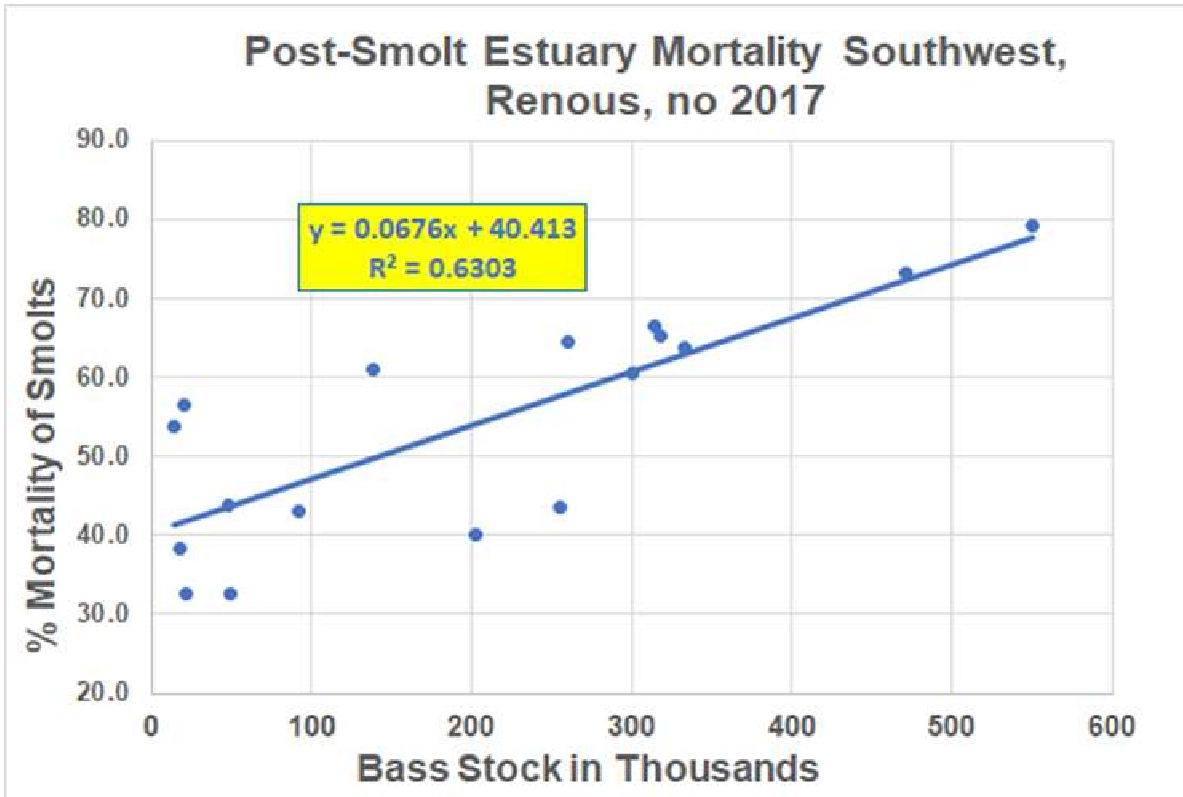
Q4. Northwest Best Fit Bass versus Tagged Smolt Mortality

So, all I did was line up the bass numbers on the X-axis and Tagged smolt mortality on the Y-axis and let Excel draw various lines to best fit the data. Three curves were very good on the Northwest, but the best is the green line with its formula highlighted in yellow, an exponential fit with 86% goodness of fit. This equation can be used to predict smolt mortality in the estuary given any bass number you want to propose.



Q4. Southwest Best Fit Bass versus Tagged Smolt Mortality

The same thing for the Southwest. A straight line proved to be the best fit for the data, and the formula is depicted in the yellow highlight. This formula can predict smolt mortality on the Southwest for any given bass number.



Q4. Sensitivity Analysis by Varying Bass Number

Here is a demonstration: We assume an initial egg deposition, in this case for the NW. 1.76 eggs per m^2 is the lower acceptable rate (the Limit Reference Point) for the NW. Multiply this by the area (16.5 million m^2) and we get the total eggs deposited (29M). Survival to the smolt stage is ~1%, so, we get 292K smolts. Then we assume the # of bass, in this case 330K. which is DFOs lower limit target for bass below which the bass population is in trouble <joke, please laugh>. The formula for the NW (the green line on previous slide) says the smolt survival through Miramichi Bay is 19.6%, and multiplying by this number says 57202 smolts make it to the Gulf. These fish survive at a rate of 5 to 8% in the ocean, and we get the adult returns of 4,485. These fish are translated into the number of eggs they will spawn and we add in eggs from the repeat spawners of the previous generation. Sustainability is decided by whether the bottom value highlighted in blue exceeds the initial deposition value, also highlighted in blue. 330K bass turn an initial egg deposition rate of 1.76 to 1.14 in the next generation.
<u>Verdict: Not sustainable.</u>

Miramichi Salmon Population Sensitivity Model		NW Composite
Row #	Parameter	Value or Calculation
1	Initial Egg Deposition	1.76
2	Area	16,590,000
3	Eggs	29,198,400
4	Eggs per Fish	2,618
5	Fish	11,155
6	Potential Eggs Southesk	
7	Additional Egg Deposition SAS	0.00
8	Total Egg Deposition Natural + SAS	1.76
9	# Eggs	29,198,400
10	Egg-to-smolt Survival	1.0%
11	# Smolts	291,984
12	Bass in thousands	330
13	Smolt-to-High-Seas survival	19.59%
14	# Smolts to high seas	57,202
15	Subsequent high seas survival	7.84%
16	# Pre-spawning Maiden Adults	4,485
17	% Repeat Spawners Grilse	20%
18	% Repeat Spawners MSWs	30%
19	Mean Egg Deposition Repeat Spawn Cohorts	1.76
20	Total % Repeat Spawners	25%
21	# Repeat Spawners	2,758
22	Total Spawners	7,243
23	Added Recruits from Natural	-3,912
24	Potential Eggs Spawned	18,959,672
25	Egg Difference from Total Eggs Spawned	-10,238,728
26	Egg Deposition next Generation	1.14

Q4. What reduction to the bass population is required to mitigate the harm - Northwest?

When we run this model for the Northwest with 100,000 bass, smolt mortality in the estuary rises to 45.2% from 19.6% with 330K bass. The result is the population pretty well balances, 1.76 eggs starting, and 1.88 produced by returns. Note that we can add in eggs produced by Southesk hatchery-reared fish and it will provide a fishable surplus or more eggs spawned. So, to achieve sustainability for salmon on the NW: **The Answer to Q4= 100,000 bass.**

Miramichi Salmon Population Sensitivity Model		NW Composite
Row #	Parameter	Value or Calculation
1	Initial Egg Deposition	1.76
2	Area	16,590,000
3	Eggs	29,198,400
4	Eggs per Fish	2,618
5	Fish	11,155
6	Potential Eggs Southesk	
7	Additional Egg Deposition SAS	0.00
8	Total Egg Deposition Natural + SAS	1.76
9	# Eggs	29,198,400
10	Egg-to-smolt Survival	1.0%
11	# Smolts	291,984
12	Bass in thousands	100
13	Smolt-to-High-Seas survival	45.24%
14	# Smolts to high seas	132,080
15	Subsequent high seas survival	6.93%
16	# Pre-spawning Maiden Adults	9,147
17	% Repeat Spawners Grilse	20%
18	% Repeat Spawners MSWs	30%
19	Mean Egg Deposition Repeat Spawn Cohorts	1.76
20	Total % Repeat Spawners	25%
21	# Repeat Spawners	2,758
22	Total Spawners	11,905
23	Added Recruits from Natural	750
24	Potential Eggs Spawned	31,161,814
25	Egg Difference from Total Eggs Spawned	1,963,414
26	Egg Deposition next Generation	1.88

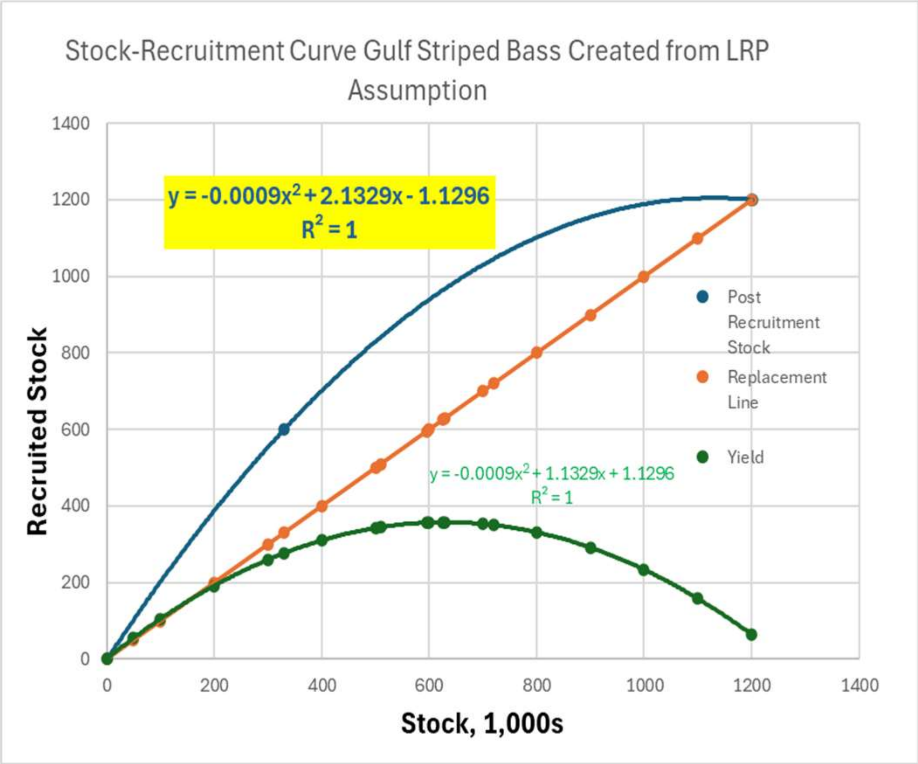
Q4. What reduction to the bass population is required to mitigate the harm - Southwest?

A bit better for the Southwest. Smolt survival in the estuary goes to 52.8% with 100K bass from 37.3% with 330K bass. This results in a calculated 1.99 eggs per m^2 from an initial LRP deposition level of 1.52. the SW seemingly can withstand a higher bass level, but we have to plan for the worst case, which is the Northwest, so the answer to Q4: a reduction to 100,000 bass.

Miramichi Salmon Population Sensitivity Model		SW
Row #	Parameter	Value or Calculation
1	Initial Egg Deposition	1.52
2	Area	29,540,000
3	Eggs	44,900,800
4	Eggs per Fish	2,958
5	Fish	15,182
6	Potential Eggs Southesk	
7	Additional Egg Deposition SAS	0.00
8	Total Egg Deposition Natural + SAS	1.52
9	# Eggs	44,900,800
10	Egg-to-smolt Survival	1.0%
11	# Smolts	449,008
12	Bass in thousands	100
13	Smolt-to-High-Seas survival	52.83%
14	# Smolts to high seas	237,197
15	Subsequent high seas survival	6.65%
16	# Pre-spawning Maiden Adults	15,783
17	% Repeat Spawners Grilse	20%
18	% Repeat Spawners MSWs	30%
19	Mean Egg Deposition Repeat Spawn Cohorts	1.52
20	Total % Repeat Spawners	27%
21	# Repeat Spawners	4,074
22	Total Spawners	19,858
23	Added Recruits from Natural	4,676
24	Potential Eggs Spawned	58,729,596
25	Egg Difference from Total Eggs Spawned	13,828,796
26	Egg Deposition next Generation	1.99

Q5. What annual Bass Harvest is Required to Reduce the Population to 100,000?

I'm going to go through this quickly. Recall in one of the first slides I said that commercial stocks are analyzed through a Beverton-Holt stock-recruitment analysis? Well, here is my attempt. I'm not going to explain the workings, but trust me, it's dead simple, and the outcome is the blue curve with the yellow-highlighted formula. This formula tells you how many recruits, or new fish will be produced by any number of bass spawners. We can then use DFO's past bass spawner numbers to predict annual recruitment 3, 4, and 5 years later. We can assume a more-than-published rate of natural and recreational fishing annual mortality (30%, add in the assumed commercial harvests and see what happens. So, it's just the existing population minus natural and fishing mortality, minus commercial harvest plus recruitment.



Q5. What annual harvest is required to reduce the bass to 100,000? –

Answer= Constant 175K Harvest is <u>not</u> the answer (assumption 30% recfish + natural mortality – index number is the red text with yellow highlight) **This is an MSY strategy**

Year	Population Pre-harvest & Spawn	Pre-spawn Commercial Harvest	Pre-spawn Recfish + Natural Mortality	Pre-spawn Mortality	Spawning Stock / Post Spawn Population	Recruited Population	Recruitment for Future	Post-Spawn Comm. Harvest	Late Rec. Harvest +Natural	Total Late Mortality	Recruitment from 3 Yr Prior	Recruitment from 4 Yr Prior	Recruitment from 5 Yr Prior	Total Recruitment	Total Comm. Harvest
2019					314	582	268								
2020					390	696	306	Pre-spawn Recfish + Natural ratio=			20%		Recruit Schedule		
2021					261	496	235	Recfish + Natural Mortality Rate=			32%	3 yrs Prior	4 Yrs prior	5 yrs Prior	
2022					472	807	335					50%	40%	10%	
2023					550	902	352								
2024	404	25	26	51	353	642	289	25	90	115	118	122	27	267	50
2025	505	50	32	82	422	741	319	125	108	233	168	94	31	292	175
2026	482	50	31	81	401	711	311	125	103	228	176	134	24	334	175
2027	507	50	32	82	424	744	320	125	109	234	144	141	34	319	175
2028	510	50	33	83	427	748	321	125	109	234	160	116	35	310	175
2029	503	50	32	82	421	739	318	125	108	233	155	128	29	312	175
2030	500	50	32	82	418	735	317	125	107	232	160	124	32	316	175
2031	502	50	32	82	420	738	318	125	107	232	160	128	31	319	175
2032	507	50	32	82	424	744	320	125	109	234	159	128	32	320	175
2033	510	50	33	83	428	749	321	125	109	234	159	127	32	318	175

2020 value is an estimate based on back calculation from smolt survival rate

Q5. What annual harvest is required to rapidly reduce the bass population to 100,000? – Answer= Large Initial Harvests to Account for Anticipated Recruitment Surges Followed by Tapering Down to Achieve Balance at 100K(assumption 30% recfish + natural mortality – index number is the red text with yellow highlight)

Bass Population Model with Harvest to Achieve 100K Post-Spawning Population with 30% Natural and Recfish Mortality Rate

Year	Population Pre-harvest & Spawn	Pre-spawn Commercial Harvest	Pre-spawn Recfish + Natural Mortality	Pre-spawn Mortality	Spawning Stock / Post Spawn Population	Recruited Population	Recruitment for Future	Post-Spawn Comm. Harvest	Late Rec. Harvest +Natural	Total Late Mortality	Recruitment from 3 Yr Prior	Recruitment from 4 Yr Prior	Recruitment from 5 Yr Prior	Total Recruitment	Total Comm. Harvest
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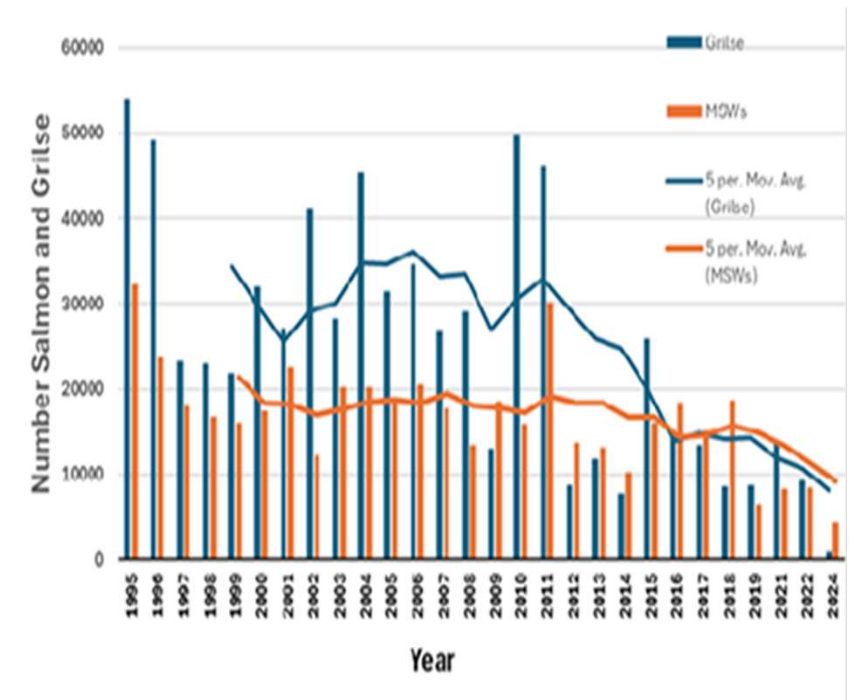
2023					550	902	352								
2024	404	25	26	51	353	642	289	25	90	115	118	122	27	267	50
2025	505	150	32	182	322	595	273	250	83	333	168	94	31	292	400
2026	282	150	18	168	114	233	119	200	29	229	176	134	24	334	350
2027	219	100	14	114	105	214	110	225	27	252	144	141	34	319	325
2028	172	50	11	61	111	226	115	200	28	228	136	116	35	287	250
2029	169	50	11	61	109	222	114	125	28	153	59	109	29	197	175
2030	153	35	10	45	108	222	113	75	28	103	55	47	27	130	110
2031	135	25	9	34	102	209	107	50	26	76	58	44	12	113	75
2032	139	25	9	34	105	216	110	50	27	77	57	46	11	114	75
2033	142	25	9	34	108	221	113	50	28	78	57	45	12	114	75

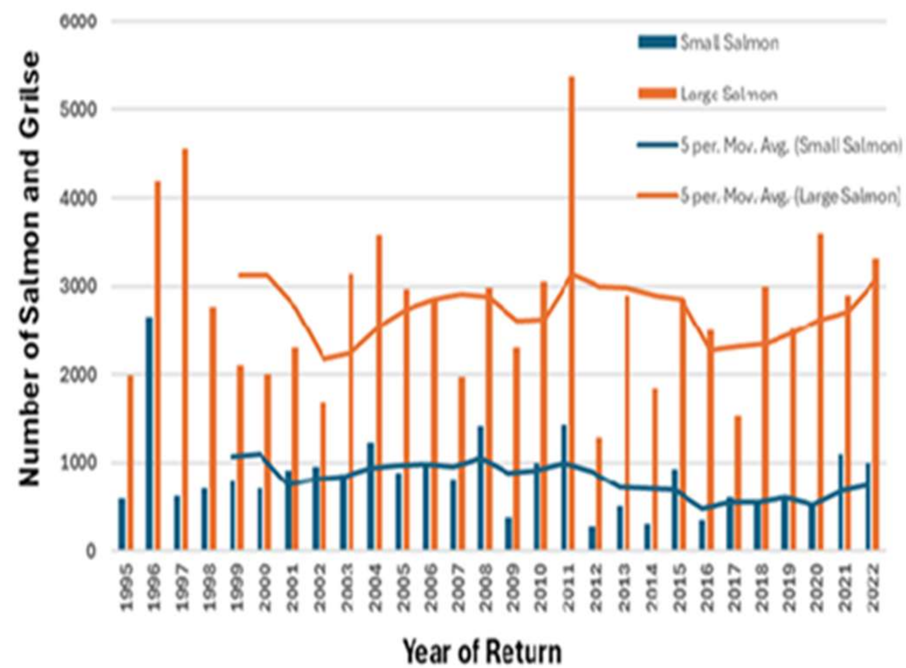
2020 value is an estimate based on back calculation from smolt survival rate

Q6. What it's Not – A General Decline in the Gulf Salmon Population

Miramichi Salmon Returns



Margaree Salmon Returns



Q6. What it’s Not - Habitat Loss

Re: Habitat Loss?

RC

Richard Cunjak<cunjak@unb.ca>

To: You

Reply Reply all Forward ···

Fri 2025-01-24 1:37 PM

Hi John
This makes no sense. Habitat is one feature in abundance in the Miramichi, for all life stages, and accessibility is also not an issue. The only ‘habitat loss’ that DFO may be referring to is thermal habitat, specifically access to cool water refugia. However, I don't see how this is a major contributor to the decline

Let me know if you need more input
R

Sent from my iPhone

On Jan 24, 2025, at 10:26, John Bagnall <johnbagnall@rogers.com> wrote:

Hi Rick. One of the reasons proposed by DFO for the decade-long decline in the Miramichi salmon population is habitat loss. I assume they mean freshwater habitat. Have you heard anything about habitat loss on the Miramichi, loss of such magnitude the salmon population has crashed?

JB

Q7. Are there unacceptable effects on the striped bass population and what would be a reasonable LRP for this species?

- **What is a safe lower population below which harm may occur?** **Res. Doc. 2022/029 states: "*Based on the trajectory of the population over the relatively short period of assessment, maintaining a spawner abundance that exceeds 330 thousand spawners should be more than sufficient to avoid serious harm to the population.*"**
- **So, what LRP value is sufficient to protect sGSL striped bass? The population recovered from levels below 5,000 spawners at points in the 1990s which is very clear evidence that the actual LRP is not anywhere close to the elevated 330,000 accepted by DFO today. SMS proposes that this fisheries target level and an associated lower LRP that has actual value in protecting the bass stock be implemented immediately so that DFO can assess the impact on the striped bass and other species of the Miramichi impacted by the bass.**

Q7. Are there unacceptable effects on the striped bass population? (Answer: No); and what would be a reasonable LRP for this species? (Answer: 31,200 seems reasonable)

- **DFO. (2011) states the following: The Recovery Potential Assessment *for Striped Bass in the sGoSL* (southern Gulf of St. Lawrence) *proposed a recovery limit and compliance rule of 21,600 spawners in 5 of 6 years (DFO 2006). Douglas et al. (2006) further proposed that once the recovery limit was met, achieving an increased level of 31,200 spawners in 3 of 6 years could be a recovery target to consider for managing access to the resource.***

- **The passage from the 2011 DFO publication is a strong indication that a level of 100,000 represents virtually no risk of population failure. Either of the 21,600 or 31,200 numbers would be appropriate LRP levels for sGSL's bass. From the minutes of testimony for FOPO (2019): *"I would suggest that the recovery target the DFO set of 31,200 is your bottom. That's the floor." – Bill Taylor, ASF***

Bottom Line

Striped bass are causing serious harm to the Miramichi Atlantic salmon to the point that the population is in danger of falling to depressed population status from which it is very difficult to recover. This is essentially extirpation.

This is an emergency!!!

Half measures such as a First Nations' fishery of only 175,000 bass, a quota that probably will not be realized, is not the answer, and this strategy contravenes existing DFO policy on multi—species management. There is a huge recruitment wave that is imminent from the 472,000 bass in 2022 and the 550,000 in 2023. A robust initial harvest is needed to rapidly achieve a bass population level of 100,000. After this, annual post-spawning population assessments will be needed to assure this population, which is compatible with a stable bass population, is maintained.