

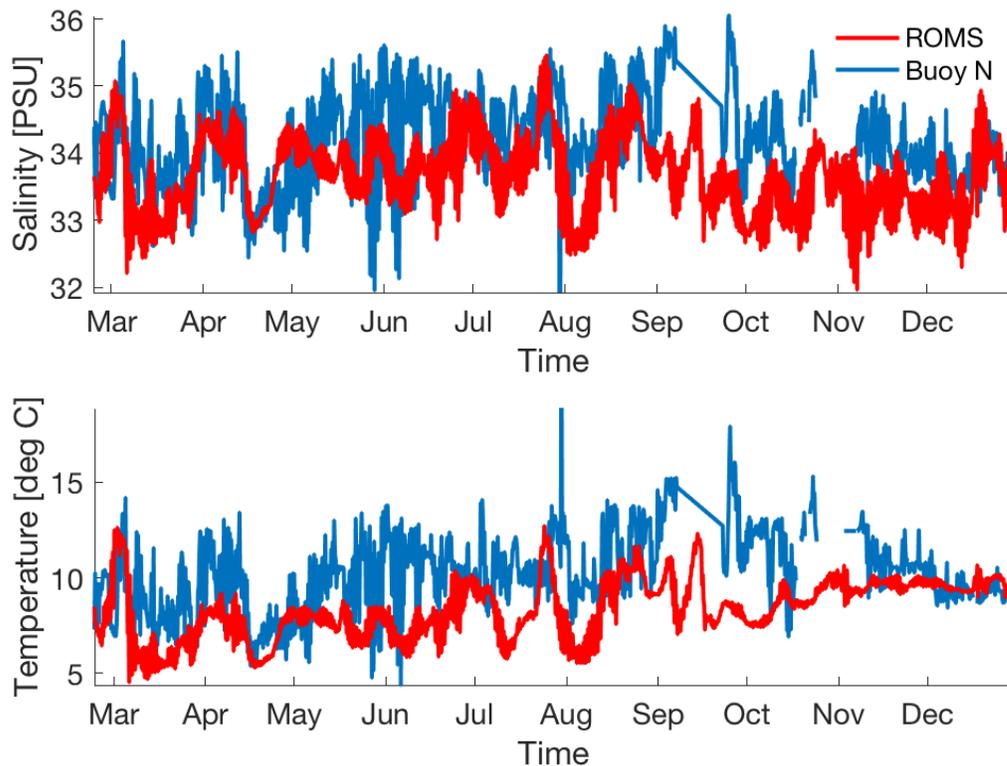
1 1 Supplementary Material

2 1.1 Methods

3 1.1.1 Model-Data Comparison

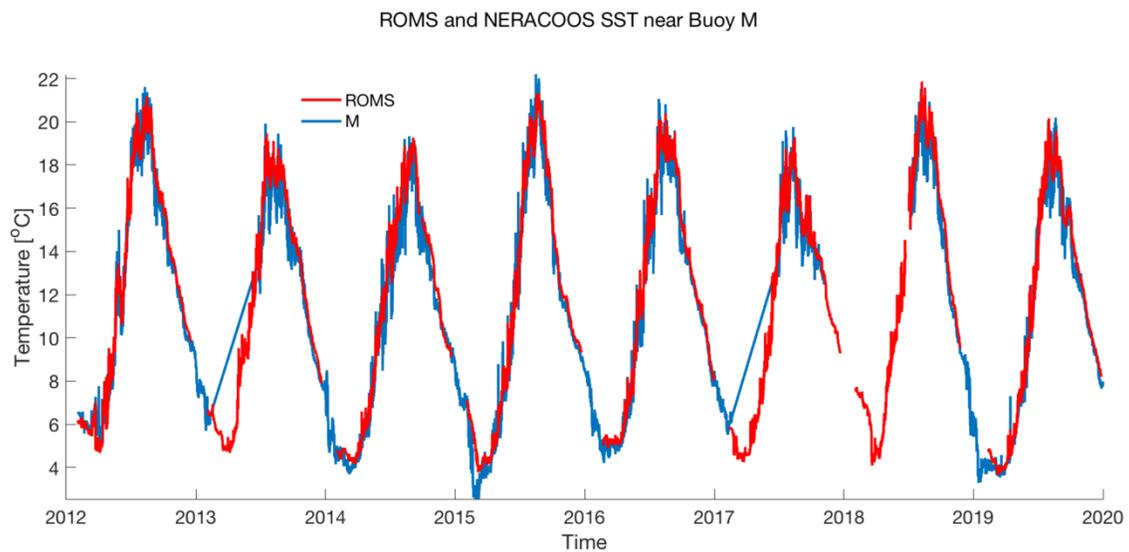
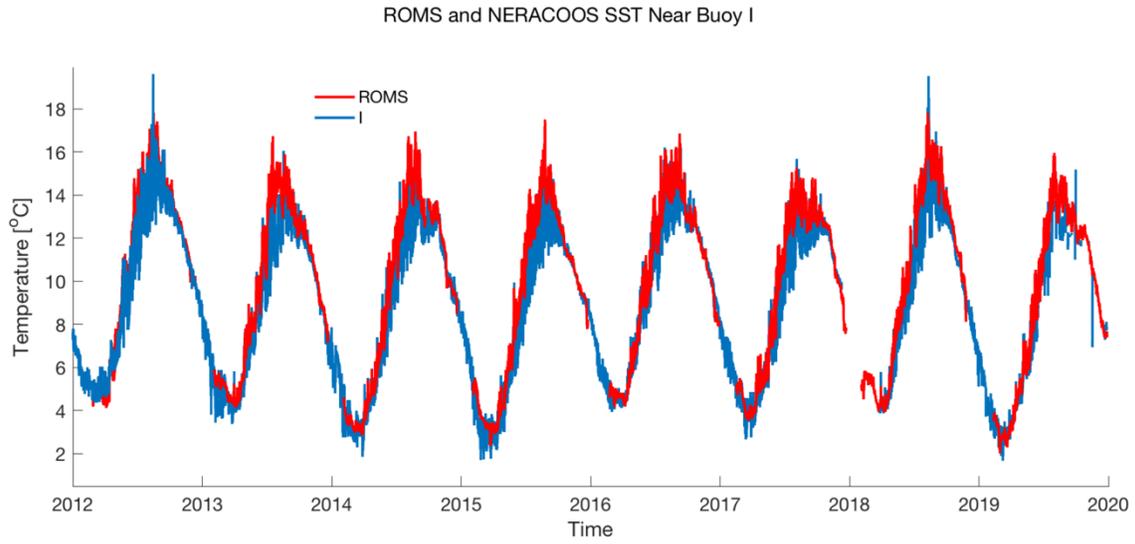
4 “The model also depicted the episodic nature of Northeast Channel inflows: at depth (>100m)
5 near NERACOOS buoy N, both ROMS and the observations showed changes in salinity up to 2
6 PSU and changes in temperature up to 6°C in as little as a week.”

2016 ROMS vs. NERACOOS at 100m near Buoy N



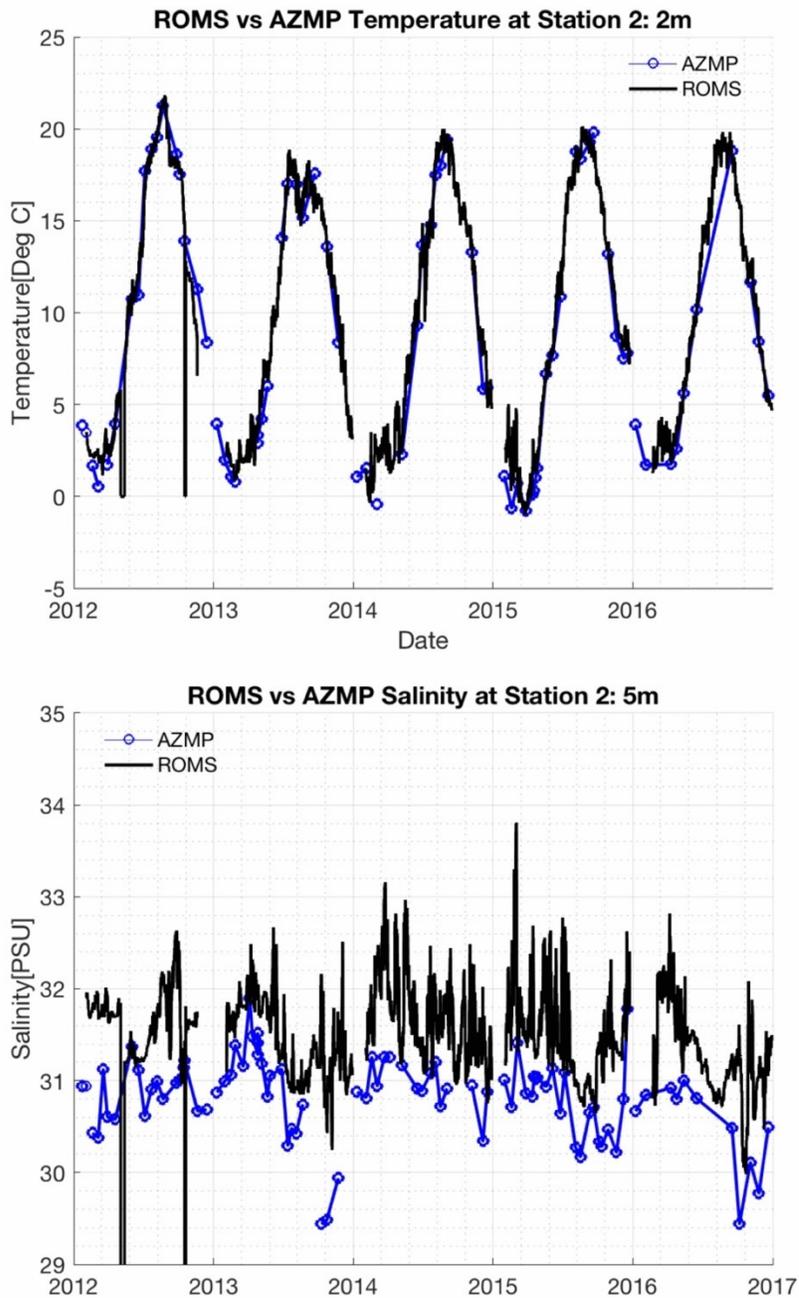
7
8 *Figure S-1 - (top) salinity and (bottom) temperature vs. time from ROMS (red) and NERACOOS buoy N (blue) at*
9 *100m. ROMS data were taken from the nearest grid cell to the NERACOOS buoy location. Mean salinity values were*
10 *33.89 (ROMS) and 34.26 (Buoy N), while mean temperature values were 8.69 PSU (ROMS) and 10.48 PSU (Buoy N).*
11 *Standard deviations of the salinity values were 0.55 (ROMS) and 0.70 (Buoy N), while standard deviations of*
12 *temperature values were 1.46 (ROMS) and 2.13 (Buoy N).*

13 “The model also captures seasonal and spatial patterns in sea surface temperature: time series
14 of model output vs NERACOOS Buoy measurements ... are in good agreement.”



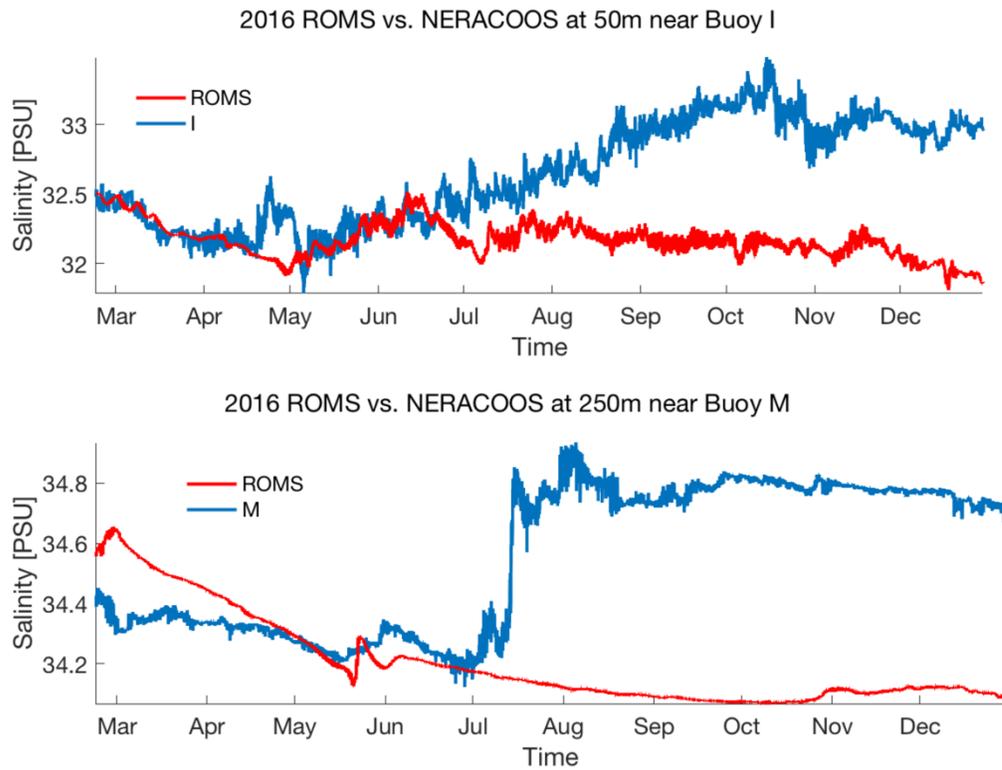
15
16 *Figure S-2 –(top) NERACOOS buoy I, (bottom) NERACOOS buoy M, and ROMS (red) SST vs. time from 2012 to 2019.*
17 *Standard deviations of the Buoy I temperature values were 3.5°C (ROMS) and 3.32°C (NERACOOS), while standard*
18 *deviations of Buoy M temperature values were 4.76°C (ROMS) and 4.72°C (NERACOOS).*

19 “At some locations, ROMS inaccurately simulated salinity: at Halifax Station 2, surface salinity in
20 the model was more saline than observations by up to 1.8 PSU”
21

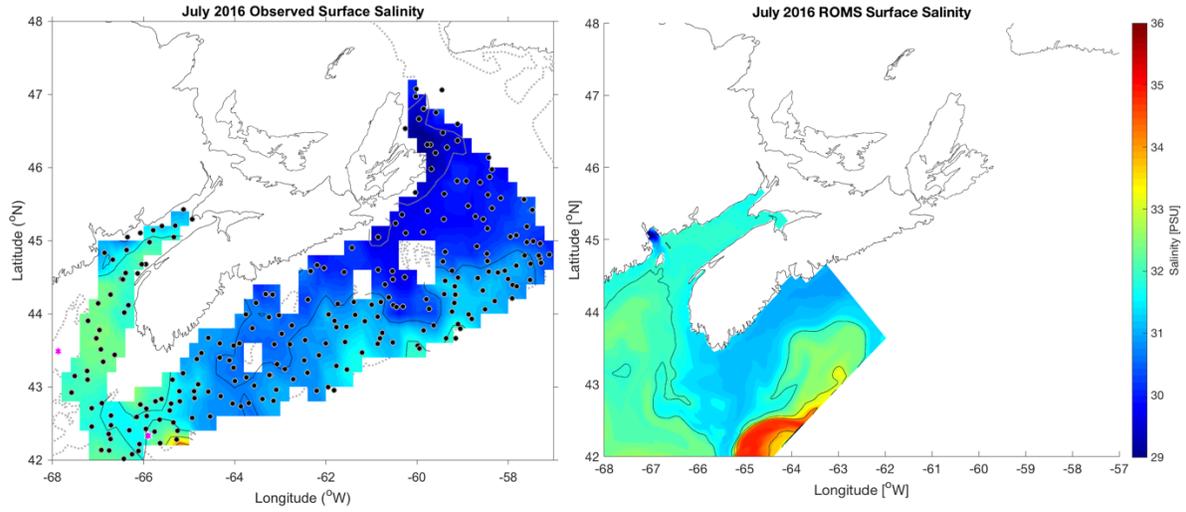


22
23 *Figure S-3 – (top) SST vs. time from (black) ROMS and (blue) Halifax Station 2 for 2012-2016; (bottom) surface*
24 *salinity vs. time from (black) ROMS and (blue) Halifax Station 2 for 2012-2016. 5m was chosen instead of 2m*
25 *because of gaps in the data. Mean temperature values were 10.14°C (ROMS) and 9.73°C (AZMP), while mean*
26 *salinity values were 31.25 PSU (ROMS) and 30.73 PSU (AZMP). Standard deviations of the temperature values were*
27 *6.36°C (ROMS) and 6.27°C (AZMP), while standard deviations of salinity values were 0.46 PSU (ROMS) and 0.37*
28 *PSU (AZMP).*

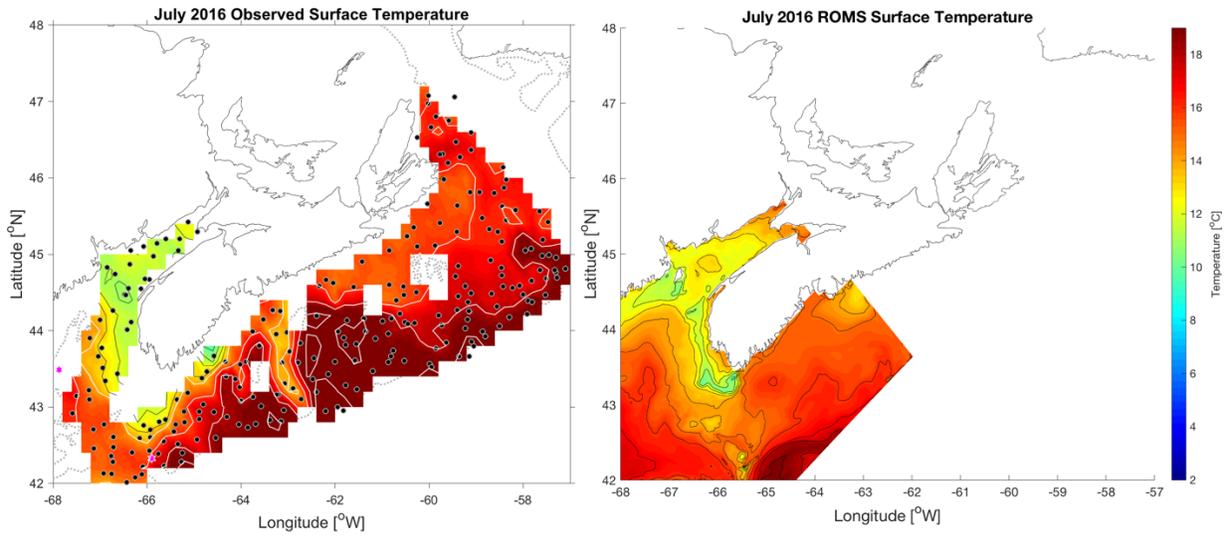
29 “At NERACOOS buoy I, 50m modeled salinity was sometimes fresher than observations by up to
30 1.3 PSU.”



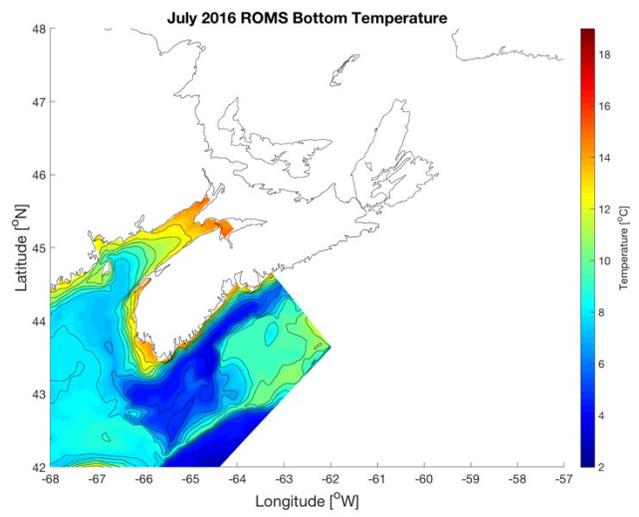
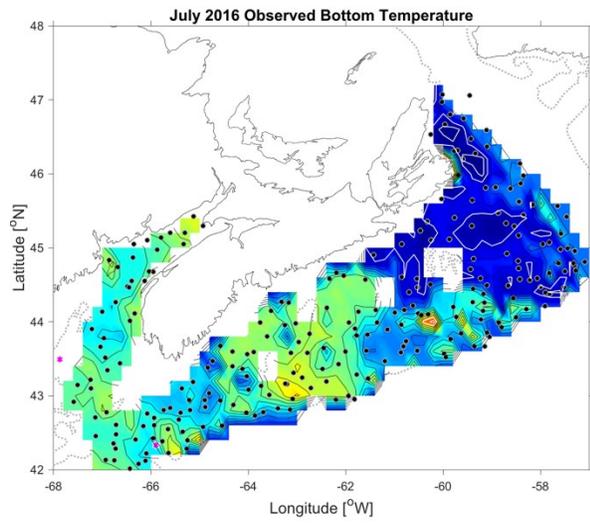
31
32 *Figure S-4 – (top) 50m salinity vs. time in 2016 from (red) ROMS output and (blue) NERACOOS Buoy I; (bottom)*
33 *250m salinity vs. time in 2016 from (red) ROMS output and (blue) NERACOOS Buoy M.*



34
 35 *Figure S-5 - Surface salinity in July 2016 as measured during the DFO survey (left) and as calculated by ROMS*
 36 *(right).*



37
 38 *Figure S-6 - Surface temperature in July 2016 as measured on the DFO Summer Survey (left) and as calculated by*
 39 *ROMS (right).*



40
41
42

Figure S-7 - Bottom temperature in July 2016 as measured on the DFO Summer Survey (left) and as calculated by ROMS (right).

43 1.1.2 LTRANS

44 1.1.2.1 Growth Delivery Potential

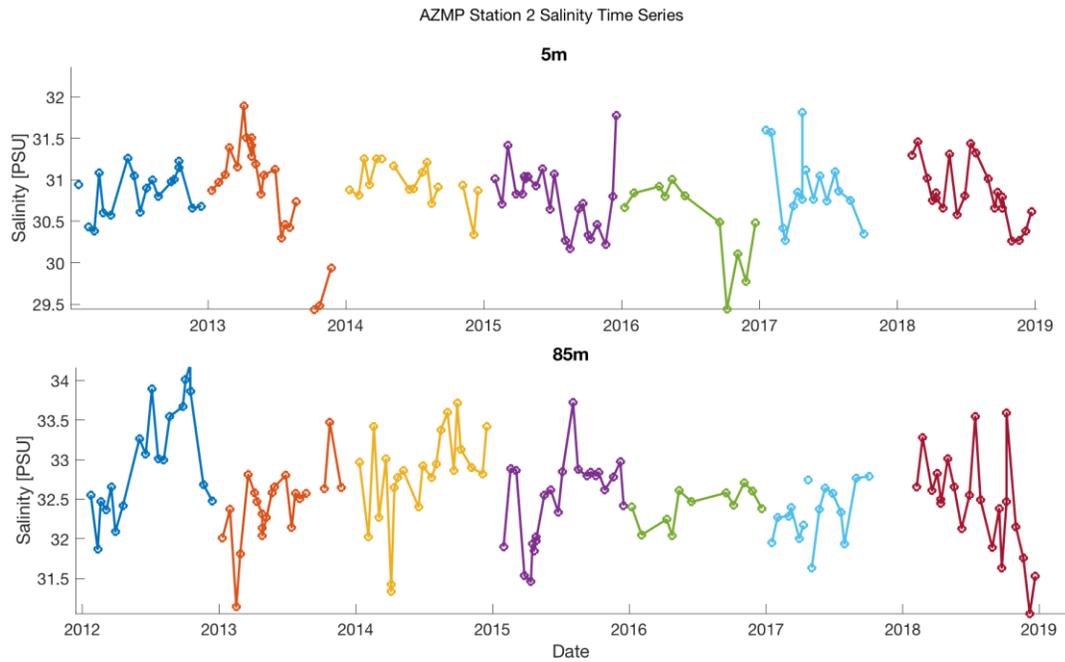
45 Table S-1 - Growth rates and associated standard error (S.E.) per degree Celsius as measured during laboratory
46 experiments. SE are listed only for laboratory growth rates.

Temperature (°C)	Growth Rate (μ , day ⁻¹) \pm SE
4	0.27
7	0.33 \pm 0.06
9	0.39 \pm 0.08
11	0.38 \pm 0.02
13	0.46 \pm 0.03
15	0.47 \pm 0.14
18	0.38

48 1.2 Results

49 1.2.1 ROMS and Field Data

50 “Similarly, at Halifax Station 2, surface salinity (5–20m) in 2016 decreased below any other year
51 in the 8-year time period besides 2013, and mid-depth salinity (50–100m) in 2016 and 2017 was
52 less variable than in the other 6 years studied.”

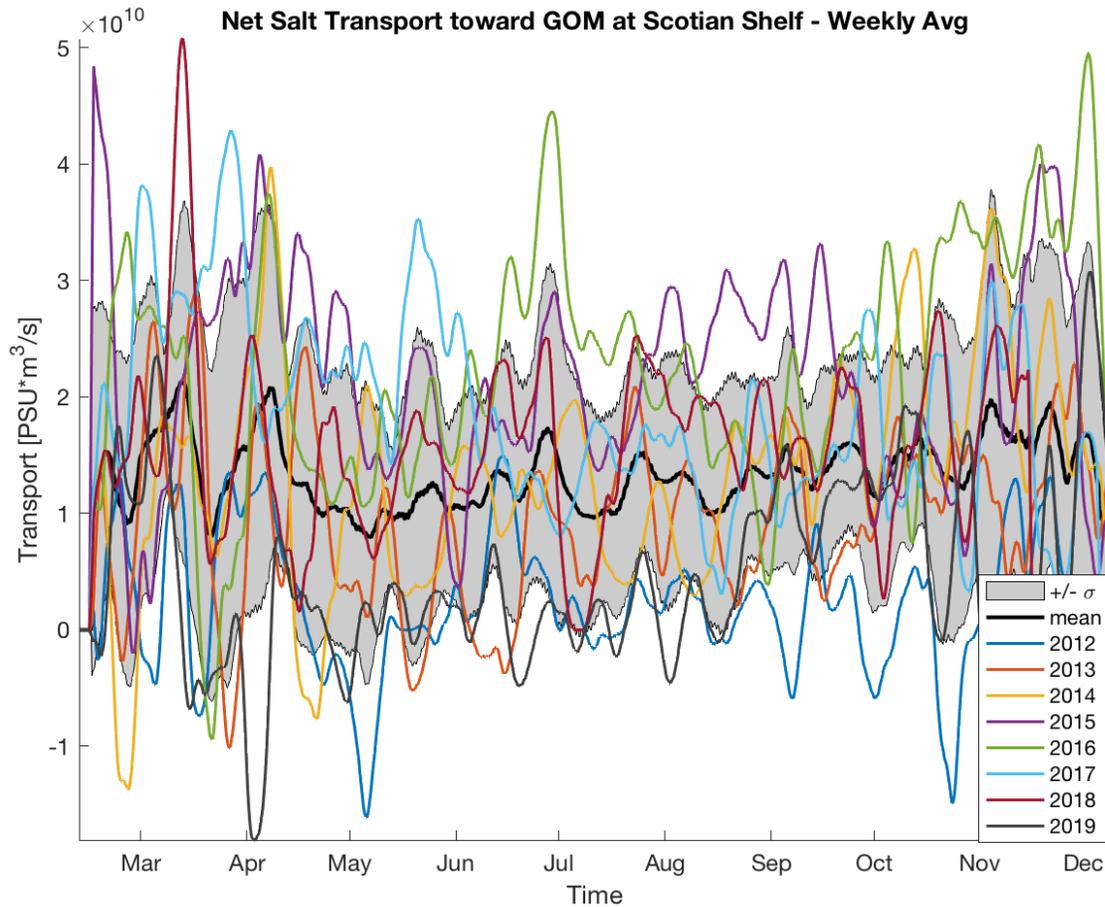


53 Figure S-8 - (top) 5m and (bottom) 85m salinity vs time as measured during monthly measurements at AZMP Station
54 2.
55

56

57 1.2.2 Transport

58 "At the same time and location that positive salinity anomalies were observed on the Scotian
59 Shelf in July 2016, modeled volume and salt transport toward the GOM increased as a result of
60 increased velocities and increased salinity."

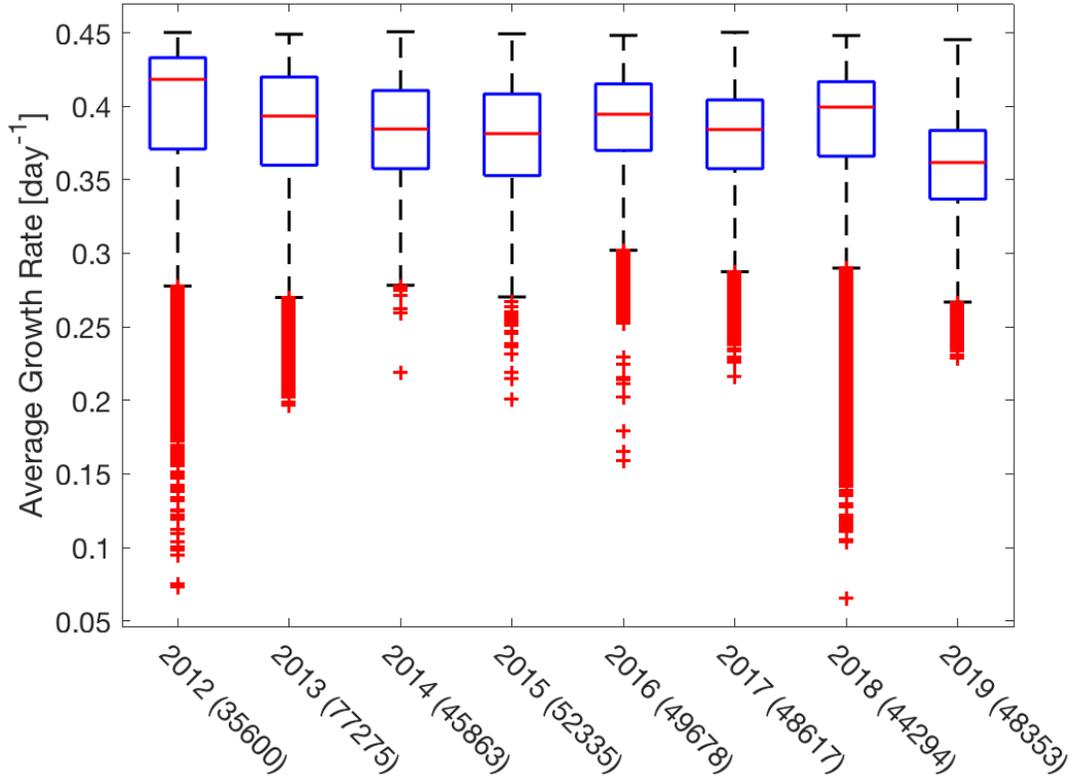


61
62 *Figure S-9 - Salt transport toward the GOM at the Scotian Shelf transect vs time. The grey shaded area indicates +/-*
63 *one standard deviation, the black line indicates the interannual mean, and the green line indicates 2016. Data were*
64 *smoothed over one week before plotting.*

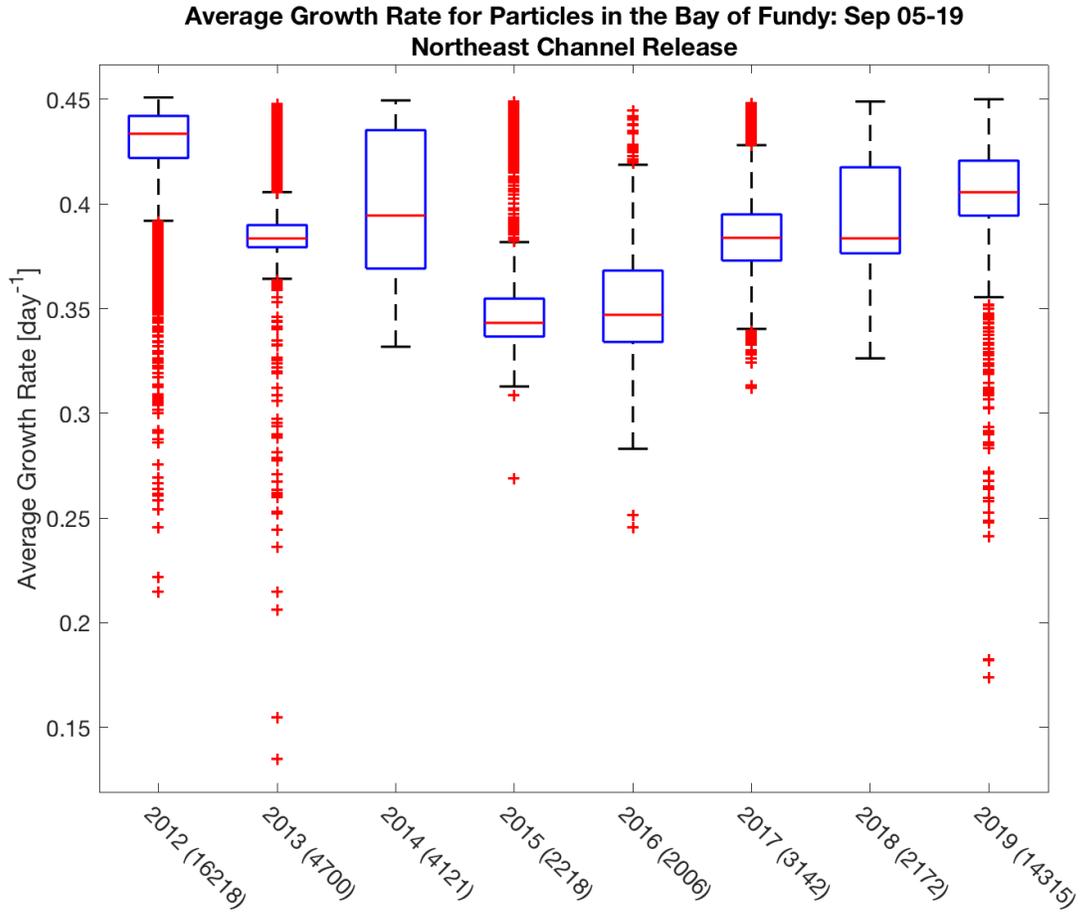
65 1.2.3 Growth Delivery Potential

66 "Potential daily growth rates were neither significantly higher nor significantly lower in 2016
67 compared to other years from 2012 to 2019, regardless of release location."

**Average Growth Rate for Particles in the Bay of Fundy: Sep 05-19
Scotian Shelf Release**



68 Figure S-10 - Box and Whisker plots of each year's per particle averaged potential daily growth rates for particles
69 released on the inner Scotian Shelf that were in the Bay of Fundy between September 5 and 19. The number of
70 particles in each year's boxplot is indicated in parentheses. For each Box-and-Whisker plot, the red line indicates the
71 median, the blue box indicates 1st and 3rd quartiles, and black dashed lines indicates extrema excluding outliers. The
72 crosses are outliers, defined as points greater than (less than) $Q3(Q1) +(-) 1.5*(Q3-Q1)$, where Q1 is the first quartile
73 and Q3 is the third quartile.
74



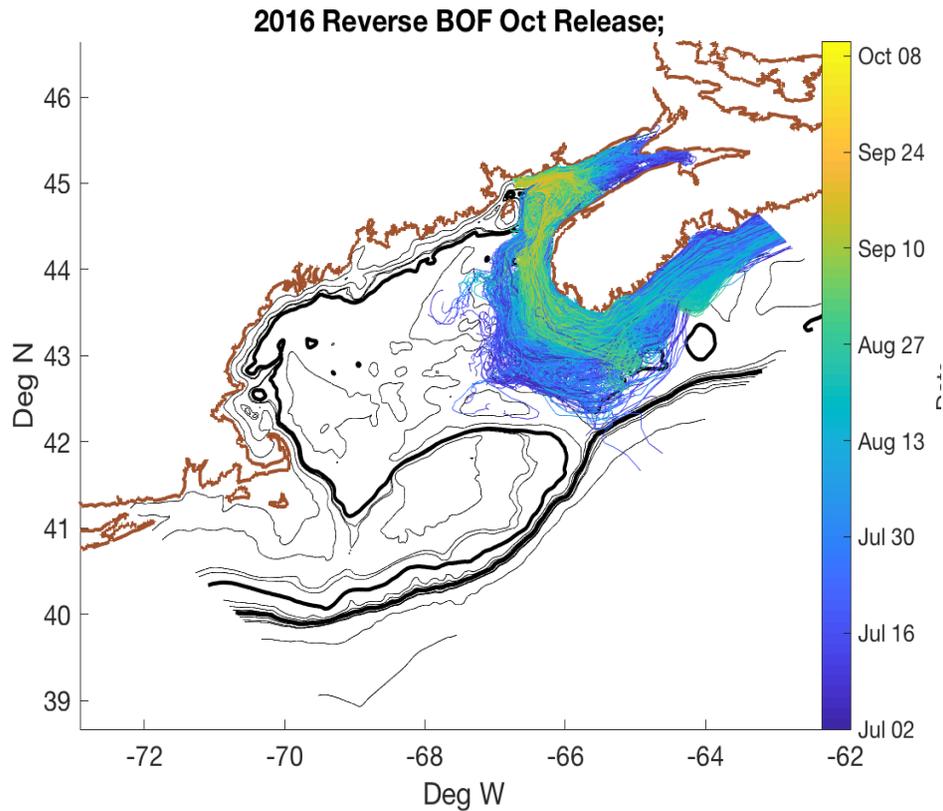
75
 76 *Figure S-11 - Box and Whisker plots of each year's per particle averaged potential daily growth rates for particles*
 77 *released in the Northeast Channel that were in the Bay of Fundy between September 5 and 19. See Figure S-10 for*
 78 *box plot descriptions.*

79

80 1.3 Discussion

81 1.3.1 Likely *P. australis* Introduction Pathways

82 “An additional reverse experiment was run with particles released just below the surface in the
83 Bay of Fundy from September 12 to September 19, which was the period of shellfish closures in
84 that region. It confirmed that particles in the Bay of Fundy were connected to the inner Scotian
85 Shelf via the coastal route, but were not connected to the Northeast Channel.”



86
87 *Figure S-12 - Particle tracks color-coded by date for particles released in the Bay of Fundy from Sep 12-Sep 19, 2016,*
88 *and run in reverse. Dates are indicated by the color bar on the right. The thick brown contour indicates the*
89 *shoreline, the thick black contours indicate 100m and 500m, and the thin black contours indicate 25m, 50m, 75,*
90 *every 100m to 1000m, 2000m, and 3000m.*

91