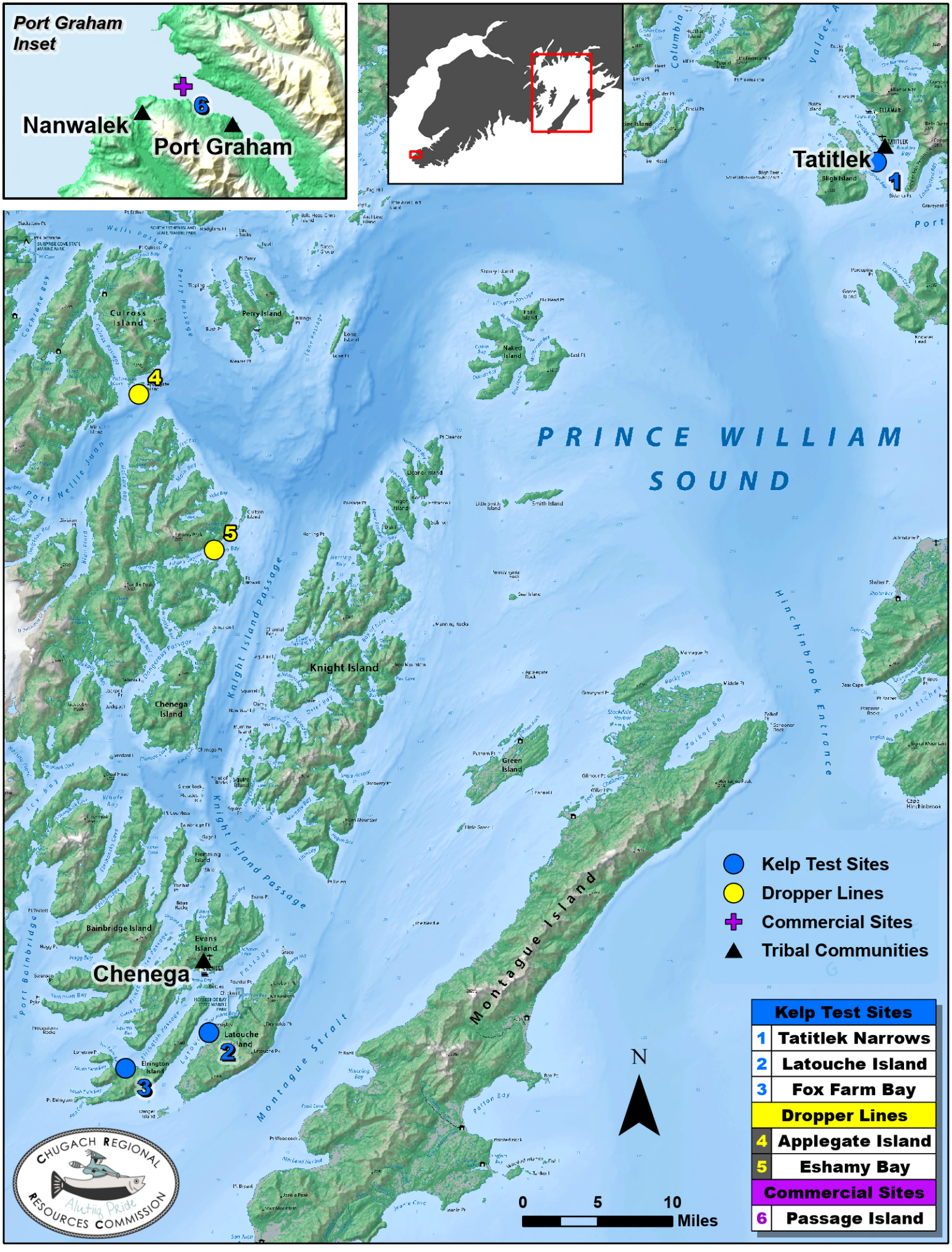
Appendix A:
EVOS Kelp Test Site and Dropper Line Map


Port Graham Inset
Nanwalek
Port Graham
6
Tatitlek
1
PRINCE WILLIAM SOUND
Culross Island
Perry Island
Naked Island
4
5
Knight Island
Chenega Island
Knight Island Passage
Hinchinbrook Entrance
Green Island
Montague Island
Bainbridge Island
Evans Island
Chenega
Latouche Island
2
Elrington Island
3
Montague Strait
Kelp Test Sites
Dropper Lines
Commercial Sites
Tribal Communities
N
0
5
10
Miles
Kelp Test Sites
1 Tatitlek Narrows
2 Latouche Island
3 Fox Farm Bay
Dropper Lines
4 Applegate Island
5 Eshamy Bay
Commercial Sites
6 Passage Island
CHUGACH REGIONAL RESOURCES COMMISSION
Uluting Pride

Appendix B:
25-26 Site
Monitoring Data

Project 25220300 25-26 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT):	Turbidity:	Notes and observations:
Fox Farm	11/15/25	7.9	28.99		
Fox Farm	12/10/25	5.7	30.49		
Fox Farm	12/19/25				Extreme cold—YSI would not turn on; water samples collected, no data
Fox Farm	1/18/26	5.2	31.21		
Fox Farm	1/25/26	5.2	31.07		
Latouche	11/15/25	7.7	28.27		
Latouche	12/10/25	5.6	29.93		
Latouche	12/19/25				Extreme cold—YSI would not turn on; water samples collected, no data
Latouche	1/18/25	5.4	31.18		
Latouche	1/25/26	5.3	31/07		
Tatitlek Narrows	11/6/25	8.8		10.97 m	
Tatitlek Narrows	11/16/25	8.5		13.7 m	
Tatitlek Narrows	1/27/26	2.2		12.19 m	
Tatitlek Narrows	2/18/26	3.7		12.8 m	
Applegate	11/15/25	6.6	26.93		
Applegate	12/10/25	4.4	28.65		
Applegate	12/19/25				Extreme cold—YSI would not turn on; water samples collected, no data
Applegate	1/18/25	5	30.6		
Applegate	1/25/26	4.3	30.65		
Eshamy	11/15/25	6.6	27.08		
Eshamy	12/10/25	6.5	28.92		
Eshamy	12/19/25				Extreme cold—YSI would not turn on; water samples collected, no data
Eshamy	1/18/25	5	30.39		

Project 25220300 25-26 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT):	Turbidity:	Notes and observations:
Eshamy	1/25/25	4.3	30.6		
Passage Island	10/17/25	8.6	34	12.9 m	Outplanting tour
Passage Island	10/17/25	9.6	35	10.6 m	
Passage Island	10/17/25	10.1	35	10.2 m	
Passage Island	11/2/25	8.8	34	No secchi disk available	Outplanting farm

Appendix C:
24-25 Kelp Test Site Harvest Data

Project 25220300 24-25 Test Site Harvest Data

Farmsite	Species	Date of Sample	Time of Sample	Date Outplanted	Seed String Outplanted (ft)	Total Poundage Harvested (lbs)	Plants per foot—Section1	Weight (lbs)—Section1	Plants per foot—Section2	Weight—Section2	Plants per foot—Section3	Weight—Section3
Passage Island	Sugar kelp	5/18/25	10:38 AM	11/17/24	100 feet	512	28	5.18	32	5.5	37	5.8
Passage Island	Ribbon kelp	5/18/25	4:54 PM	11/17/24	100 feet	33	3	0.375	2	<1 ounce	8	1.125
Passage Island	Three-ribbed kelp	5/18/25	11:30 AM	11/17/24	100 feet	79	40	4	0	0	3	0.68
Passage Island	Bull kelp	5/18/25	5:37 PM	11/17/24	100 feet	46	1	<1 ounce	5	2.3	8	4.125
Eshamy (dropper line)	Sugar kelp	6/5/25	12:00 PM	11/14/24	30 feet	0	0	0	0	0	0	0
Applegate (dropper line)	Sugar kelp	6/5/25	10:30 AM	11/14/24	30 feet	Not recorded	17	Not recorded	42	Not recorded	7	Not recorded
Latouche Passage	Sugar kelp	7/8/25	12:00 PM	10/30/24	100 feet	0	0	0	0	0	0	0
Latouche Passage	Bull kelp	7/8/25	12:00 PM	10/30/24	100 feet	0	0	0	0	0	0	0
Latouche Passage	Three-ribbed kelp	7/8/25	12:00 PM	10/30/24	100 feet	0	0	0	0	0	0	0
Latouche Passage	Ribbon kelp	7/8/25	12:00 PM	10/30/24	100 feet	0	0	0	0	0	0	0
Fox Farm Bay	Sugar kelp	6/5/25	2:00 PM	10/26/24	100 feet	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded
Fox Farm Bay	Ribbon kelp	6/5/25	2:00 PM	10/26/24	100 feet	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded
Fox Farm Bay	Three-ribbed kelp	6/5/25	2:15 PM	10/26/24	100 feet	30*	0	0	0	0	8	5.6
Fox Farm Bay	Bull kelp	6/5/25	2:30 PM	10/26/24	100 feet	610*	11	8.4	6	3.8	0	0
Port Gravina	Sugar kelp	5/8/25	Not recorded	11/22/24	100 feet	40.3*	Not recorded	0.42	Not recorded	0.37	Not recorded	0.42
Port Gravina	Ribbon kelp	5/8/25	Not recorded	11/22/24	100 feet	36.9*	Not recorded	0.45	Not recorded	0.318	Not recorded	0.34
Port Gravina	Bull kelp	5/8/25	Not recorded	11/22/24	100 feet	59.6*	Not recorded	0.83	Not recorded	0.65	Not recorded	0.31
Sheep Bay	Sugar kelp	5/8/25	Not recorded	11/22/24	100 feet	21.6*	Not recorded	0.14	Not recorded	0.08	Not recorded	0.43
Sheep Bay	Ribbon kelp	5/8/25	Not recorded	11/22/24	100 feet	16.6*	Not recorded	0.18	Not recorded	0.14	Not recorded	0.18
Sheep Bay	Bull kelp	5/8/25	Not recorded	11/22/24	100 feet	49.3*	Not recorded	0.07	Not recorded	0.99	Not recorded	0.42
Simpson Bay	Sugar kelp	5/8/25	Not recorded	11/22/24	100 feet	0	0	0	0	0	0	0
Simpson Bay	Ribbon kelp	5/8/25	Not recorded	11/22/24	100 feet	23.3*	Not recorded	0.27	Not recorded	0.15	Not recorded	0.28
Simpson Bay	Bull kelp	5/8/25	Not recorded	11/22/24	100 feet	38.6*	Not recorded	0.79	Not recorded	0.34	Not recorded	0.3
Tatitlek Narrows	Sugar kelp	5/15/25	9:30 AM	1/24/25	100 feet	0	0	0	0	0	0	0
Tatitlek Narrows	Ribbon kelp	5/15/25	9:30 AM	1/24/25	100 feet	0	0	0	0	0	0	0
Tatitlek Narrows	Bull kelp	5/15/25	9:30 AM	1/24/25	100 feet	0	0	0	0	0	0	0
Boulder Bay	Sugar kelp	5/15/25	10:00 AM	1/24/25	100 feet	0	0	0	0	0	0	0
Boulder Bay	Ribbon kelp	5/15/25	10:00 AM	1/24/25	100 feet	0	0	0	0	0	0	0
Boulder Bay	Bull kelp	5/15/25	10:00 AM	1/24/25	100 feet	0	0	0	0	0	0	0

Significant challenges were experienced during the 2025 harvesting period, chiefly a miscommunication between field teams recording harvest growth, leading to poor data collection. Where total weights for growlines were not recorded in the field, an average has been taken of the recorded one-foot sample section weights, then multiplied by 100 feet to provide some kind of estimate for annual harvest data taht could be comparable with other year-over-year harvest data. Data followed by an asterisk (*) indicate where estimates have been used.

Appendix C:
24-25 Site
Monitoring Data

Project 25220300 24-25 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT)	Dissolved Oxygen (mg/L):	Turbidity:	Notes and observations:
Fox Farm	10/30/24	7	27.56	8.59		Outplanted
Fox Farm	11/14/24	6.8	27.94	8.49		
Fox Farm	11/26/24	6.5	29.43	9.06		
Fox Farm	12/18/24	6.1	30.32	8.29		
Fox Farm	12/27/24	5.6	29.73	8.93		
Fox Farm	1/8/25	5.3	30.22	6.69		
Fox Farm	1/23/25	5.2	30.16	6.68		
Fox Farm	2/2/25	4.3	30.6	9.8		
Fox Farm	2/24/25	4.2	29.98	8.8		
Fox Farm	3/15/25	5.2	30.4	6.82		
Fox Farm	3/28/25	5.2	30.47	8.19		
Fox Farm	4/18/25	5.8	30.66	8.48		
Fox Farm	4/28/25	6	30.42	9.23		
Fox Farm	5/10/25	6.4	30.48	11.01		
Fox Farm	5/21/25	7.2	30.4	11.34		
Fox Farm	6/5/25	7.5	29.97	11.45		
Latouche	10/26/24	7.7	27.53	8.58		Outplanted
Latouche	11/14/24	7.2	28.43	8.37		
Latouche	11/26/24	6.1	29.49	10.07		
Latouche	12/18/24	6	30.21	8.01		
Latouche	12/27/24	5.5	29.27	9.15		
Latouche	1/8/25	5.3	29.94	6.57		
Latouche	1/23/25	5.2	29.92	6.61		
Latouche	2/2/25	4.5	30.54	9.62		
Latouche	2/24/25	4	30	8.98		
Latouche	3/15/25	5.1	30.09	7.25		
Latouche	3/28/25	5.3	30.52	8.69		
Latouche	4/18/25	5.7	30.66	8.48		

Project 25220300 24-25 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT)	Dissolved Oxygen (mg/L):	Turbidity:	Notes and observations:
Latouche	4/28/25	5.8	30.19	7.52		
Latouche	5/10/25	6.6	29.36	11.35		
Latouche	5/21/25	7.2	30.08	11.62		
Tatitlek Narrows	10/26/24	7.5	28.8	9.79		Outplanted
Tatitlek Narrows	12/27/24	5.1	36		25 m 29 cm	
Tatitlek Narrows	1/15/25	7.72	35		7 m 95 cm	
Tatitlek Narrows	1/24/25	5.2	34		N/A	Could not deploy Secchi disk due to bad weather
Tatitlek Narrows	2/18/25	4.2	32		8m 95 cm	
Tatitlek Narrows	2/24/25	4	31		8m 80 cm	
Tatitlek Narrows	3/11/25	4.2	32		4m 60cm	
Tatitlek Narrows	3/24/25	5.6	32		5m 10cm	
Tatitlek Narrows	4/23/25	8.1	31		10m 35cm	
Tatitlek Narrows	5/15/25	8.7	28.8	10.8		Harvested, no growth
Applegate	11/14/24	6.3	28.36	9.03		Outplanted
Applegate	11/26/24	5.8	29.01	9.18		
Applegate	12/18/24	4.5	27.62	9.22		
Applegate	12/27/24	4.4	27.33	9.9		
Applegate	1/8/25	3.9	27.27	7.04		
Applegate	1/23/25	3.7	26.64	7.09		
Applegate	2/2/25	3.3	29.32	8.93		
Applegate	2/24/25	2.8	29.11	8.05		
Applegate	3/15/25	3.6	28.17	7.67		
Applegate	3/28/25	4.2	28.94	9.44		
Applegate	4/18/25	5.3	27.99	9.23		
Applegate	4/28/25	6.2	28.46	10.59		
Applegate	5/10/25	7	28.5	11.95		
Applegate	5/21/25	9.3	10.36	22.52		

Project 25220300 24-25 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT)	Dissolved Oxygen (mg/L):	Turbidity:	Notes and observations:
Applegate	6/5/25	8.3	29.01	10.15		
Eshamy	11/14/24	6.5	28.67	8.74		
Eshamy	11/26/24	4.4	28.18	9.46		
Eshamy	12/18/24	5.5	28.73	8.68		
Eshamy	12/27/24	4.1	25.99	10.06		
Eshamy	1/8/25	4.2	28.02	6.7		
Eshamy	1/23/25	4	27.28	6.81		
Eshamy	2/2/25	2.3	28.7	10.01		
Eshamy	2/24/25	3.8	28.42	9.87		
Eshamy	3/15/25	4.1	27.55	7.48		
Eshamy	3/28/25	4.4	29.43	9.77		
Eshamy	4/18/25	5.5	26.69	9.12		
Eshamy	4/28/25	5.7	29.09	11.72		
Eshamy	5/10/25	6.6	29.9	11.51		
Eshamy	5/21/25	7.9	27.63	12.21		
Eshamy	6/5/25	8.2	29.81	10.68		
Copper Bay	11/14/24	6.9	29.12	8.42		
Copper Bay	12/18/24	5.7	29.68	8.72		
Copper Bay	12/27/24	4.7	27.81	9.91		
Copper Bay	1/8/25	4.8	29.33	6.9		
Copper Bay	1/23/25	4.3	27.73	7.09		
Copper Bay	2/2/25	4	30.23	9.93		
Copper Bay	2/24/25	4.2	30.05	8.42		
Copper Bay	3/15/25	4.6	30.07	7.6		
Copper Bay	3/28/25	4.7	29.79	8.86		
Copper Bay	4/18/25	6	28.93	9.31		
Copper Bay	4/28/25	6.8	27.89	10.12		
Copper Bay	5/10/25	7.1	27.77	11.7		
Copper Bay	5/21/25	7.9	27.7	12.21		

Project 25220300 24-25 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT)	Dissolved Oxygen (mg/L):	Turbidity:	Notes and observations:
Passage Island	11/10/24	5.1	29		12.1 m	
Passage Island	12/4/24	4.83	33		10.9 m	
Passage Island	12/14/24	6.3	32		9.5 m	
Passage Island	1/7/25	4.8	27.74		7.01 m	
Passage Island	1/17/25	5.8	30.25	8.49	5.7 m	
Passage Island	2/22/25	5.3	34		6.4 m	
Passage Island	3/4/25	4.5	34		9.4 m	Two trips taken back to back to train
Passage Island	3/6/25	4.3	34		9.14 m	samplers in Port Graham and Nanwalek
Passage Island	4/28/25	5.7	31		6.09 m	
Simpson Bay	10/23/24	9	29.06			Secchi disk not yet available
Simpson Bay	11/22/24	8.2	37		8 m 28.5 cm	Farm outplanted
Simpson Bay	12/12/24	6.1	35		4 m 75cm	
Simpson Bay	12/27/24	5	34		15 m 85 cm	
Simpson Bay	1/15/25	9.16	35		2 m 85 cm	
Simpson Bay	1/25/25	5.6	33		3 m 86.5 cm	
Simpson Bay	2/14/25	3.7	32		5m 90 cm	
Simpson Bay	2/24/25	5.8	31		6m 20 cm	
Simpson Bay	3/12/25	4.6	31		4m 45cm	
Simpson Bay	3/24/25	7.2	32		6m 75cm	
Simpson Bay	4/23/25	7.3	32		6m 75cm	
Sheep Bay	10/24/24	8.9	28.75		9 m 60 cm	
Sheep Bay	11/18/24		35		10 m 15 cm	Thermometer malfunctioning, no temp available
Sheep Bay	11/25/24	7.8	38		10 m	
Sheep Bay	12/12/24	5.5	34		9 m 15 cm	
Sheep Bay	12/27/24	6.1	29		24 m 68 cm	
Sheep Bay	1/15/25	6.1	28		5 m 16 cm	
Sheep Bay	1/25/25	4.3	30		6 m 11 cm	
Sheep Bay	2/14/25	4.1	31		6m 65cm	

Project 25220300 24-25 Site Monitoring Data

Site location:	Date of sample:	Temperature (°C)	Salinity (PPT)	Dissolved Oxygen (mg/L):	Turbidity:	Notes and observations:
Sheep Bay	2/24/25	6.5	31		4m 30cm	
Sheep Bay	3/12/25	3.3	28		8m 75cm	
Sheep Bay	3/24/25	6.8	31		6m 45cm	
Sheep Bay	4/23/25	7.4	29		5m80cm	
Gravina	11/25/24	6.8	36		1 m 35.5 cm	
Gravina	11/26/24	8.1	36		13 m 51 cm	
Gravina	12/12/24	4.7	36		6 m 3.5 cm	
Gravina	12/27/24	6.1	35		15 m 24 cm	
Gravina	1/15/25	6.3	34		5 m 26 cm	
Gravina	1/24/25	6.7	33		7 m 70 cm	
Gravina	2/14/25	4.2	33		6m 60cm	
Gravina	2/24/25	5.2	32		7m 10cm	
Gravina	3/11/25	5.7	33		3m 60cm	
Gravina	3/24/25	6.7	33		5m 5cm	
Gravina	4/23/25	8	32		6m 70cm	
Boulder Bay	1/24/25	6.72	35		7 m 12.5 cm	Outplanted late, could not access site
Boulder Bay	2/18/25	4.5	32		11m 75cm	
Boulder Bay	2/24/25	4.5	31		7m 5cm	
Boulder Bay	3/11/25	3.8	31		5m 80cm	
Boulder Bay	3/24/25	4.7	32		7m 45cm	
Boulder Bay	4/23/25	11.5	30		7m 80cm	
Boulder Bay	5/15/25	9.6	28.6	10.16		Harvested, no growth

Appendix C:
24-25 Kelp Test Site Phenotypic Data

Project 25220300 24-25 Test Site Sugar/Ribbon/Three-Ribbed Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Length (in	Width (in)
Fox Farm	Sugar	6/5/25	NA*see note	1	18	12
Fox Farm	Sugar	6/5/25	NA	2	30	18
Fox Farm	Sugar	6/5/25	NA	3	16	5
Fox Farm	Sugar	6/5/25	NA	1	26	8
Fox Farm	Sugar	6/5/25	NA	2	9	4
Fox Farm	Sugar	6/5/25	NA	3	23	8
Fox Farm	Sugar	6/5/25	NA	1	19	8
Fox Farm	Sugar	6/5/25	NA	2	27	8
Fox Farm	Sugar	6/5/25	NA	3	37	12
Fox Farm	Ribbon	6/5/25	NA	1	11	3
Fox Farm	Ribbon	6/5/25	NA	2	17	6
Fox Farm	Ribbon	6/5/25	NA	3	14	3.5
Fox Farm	Ribbon	6/5/25	NA	1	19	4.5
Fox Farm	Ribbon	6/5/25	NA	2	22	3.5
Fox Farm	Ribbon	6/5/25	NA	3	8	3
Fox Farm	Ribbon	6/5/25	NA	1	14	4
Fox Farm	Ribbon	6/5/25	NA	2	15	3.5
Fox Farm	Ribbon	6/5/25	NA	3	12	2.5
Fox Farm	Three-Ribbed	6/5/25	10 feet	1	0	0
Fox Farm	Three-Ribbed	6/5/25	10 feet	2	0	0
Fox Farm	Three-Ribbed	6/5/25	10 feet	3	0	0
Fox Farm	Three-Ribbed	6/5/25	50 feet	1	0	0
Fox Farm	Three-Ribbed	6/5/25	50 feet	2	0	0
Fox Farm	Three-Ribbed	6/5/25	50 feet	3	0	0
Fox Farm	Three-Ribbed	6/5/25	90 feet	1	0	0
Fox Farm	Three-Ribbed	6/5/25	90 feet	2	0	0
Fox Farm	Three-Ribbed	6/5/25	90 feet	3	0	0
Latouche	Sugar	7/8/25	10 feet	1	0	0
Latouche	Sugar	7/8/25	10 feet	2	0	0
Latouche	Sugar	7/8/25	10 feet	3	0	0
Latouche	Sugar	7/8/25	50 feet	1	0	0
Latouche	Sugar	7/8/25	50 feet	2	0	0
Latouche	Sugar	7/8/25	50 feet	3	0	0
Latouche	Sugar	7/8/25	90 feet	1	0	0
Latouche	Sugar	7/8/25	90 feet	2	0	0
Latouche	Sugar	7/8/25	90 feet	3	0	0
Latouche	Ribbon	7/8/25	10 feet	1	0	0
Latouche	Ribbon	7/8/25	10 feet	2	0	0
Latouche	Ribbon	7/8/25	10 feet	3	0	0
Latouche	Ribbon	7/8/25	50 feet	1	0	0
Latouche	Ribbon	7/8/25	50 feet	2	0	0
Latouche	Ribbon	7/8/25	50 feet	3	0	0
Latouche	Ribbon	7/8/25	90 feet	1	0	0

Project 25220300 24-25 Test Site Sugar/Ribbon/Three-Ribbed Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Length (in	Width (in)
Latouche	Ribbon	7/8/25	90 feet	2	0	0
Latouche	Ribbon	7/8/25	90 feet	3	0	0
Latouche	Three-Ribbed	7/8/25	10 feet	1	0	0
Latouche	Three-Ribbed	7/8/25	10 feet	2	0	0
Latouche	Three-Ribbed	7/8/25	10 feet	3	0	0
Latouche	Three-Ribbed	7/8/25	50 feet	1	0	0
Latouche	Three-Ribbed	7/8/25	50 feet	2	0	0
Latouche	Three-Ribbed	7/8/25	50 feet	3	0	0
Latouche	Three-Ribbed	7/8/25	90 feet	1	0	0
Latouche	Three-Ribbed	7/8/25	90 feet	2	0	0
Latouche	Three-Ribbed	7/8/25	90 feet	3	0	0
Applegate	Sugar	6/5/25	1 foot	1	23	8
Applegate	Sugar	6/5/25	1 foot	2	28	8
Applegate	Sugar	6/5/25	1 foot	3	18	5
Applegate	Sugar	6/5/25	15 feet	1	33	11
Applegate	Sugar	6/5/25	15 feet	2	21	8
Applegate	Sugar	6/5/25	15 feet	3	26	11
Applegate	Sugar	6/5/25	30 feet	1	23	8
Applegate	Sugar	6/5/25	30 feet	2	31	8
Applegate	Sugar	6/5/25	30 feet	3	26	9
Eshamy	Sugar	6/5/25	1 foot	1	0	0
Eshamy	Sugar	6/5/25	1 foot	2	0	0
Eshamy	Sugar	6/5/25	1 foot	3	0	0
Eshamy	Sugar	6/5/25	15 feet	1	0	0
Eshamy	Sugar	6/5/25	15 feet	2	0	0
Eshamy	Sugar	6/5/25	15 feet	3	0	0
Eshamy	Sugar	6/5/25	30 feet	1	0	0
Eshamy	Sugar	6/5/25	30 feet	2	0	0
Eshamy	Sugar	6/5/25	30 feet	3	0	0
Port Gravina	Sugar	5/8/25	10 feet	1	13.3	4.1
Port Gravina	Sugar	5/8/25	10 feet	2	11.4	3.4
Port Gravina	Sugar	5/8/25	10 feet	3	17.3	4.3
Port Gravina	Sugar	5/8/25	50 feet	1	10.2	3.4
Port Gravina	Sugar	5/8/25	50 feet	2	17.7	4.9
Port Gravina	Sugar	5/8/25	50 feet	3	9.4	5.3
Port Gravina	Sugar	5/8/25	90 feet	1	19.6	7.6
Port Gravina	Sugar	5/8/25	90 feet	2	21	5.9
Port Gravina	Sugar	5/8/25	90 feet	3	17.5	5.9
Port Gravina	Ribbon	5/8/25	10 feet	1	16.5	2.2
Port Gravina	Ribbon	5/8/25	10 feet	2	11.8	1.7
Port Gravina	Ribbon	5/8/25	10 feet	3	24.8	5.3
Port Gravina	Ribbon	5/8/25	50 feet	1	20.8	4.7
Port Gravina	Ribbon	5/8/25	50 feet	2	15.3	3.3

Project 25220300 24-25 Test Site Sugar/Ribbon/Three-Ribbed Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Length (in	Width (in)
Port Gravina	Ribbon	5/8/25	50 feet	3	14.9	2.1
Port Gravina	Ribbon	5/8/25	90 feet	1	9	1.9
Port Gravina	Ribbon	5/8/25	90 feet	2	6.6	1.4
Port Gravina	Ribbon	5/8/25	90 feet	3	8.2	1.7
Sheep Bay	Sugar	5/8/25	10 feet	1	16.1	5.5
Sheep Bay	Sugar	5/8/25	10 feet	2	9.8	3.9
Sheep Bay	Sugar	5/8/25	10 feet	3	13.3	5.5
Sheep Bay	Sugar	5/8/25	50 feet	1	9	2.7
Sheep Bay	Sugar	5/8/25	50 feet	2	9.8	3.3
Sheep Bay	Sugar	5/8/25	50 feet	3	11.8	3.5
Sheep Bay	Sugar	5/8/25	90 feet	1	16.5	8.6
Sheep Bay	Sugar	5/8/25	90 feet	2	15.3	3.7
Sheep Bay	Sugar	5/8/25	90 feet	3	13.3	3.5
Sheep Bay	Ribbon	5/8/25	10 feet	1	9	0.7
Sheep Bay	Ribbon	5/8/25	10 feet	2	13.7	0.9
Sheep Bay	Ribbon	5/8/25	10 feet	3	9.4	0.6
Sheep Bay	Ribbon	5/8/25	50 feet	1	9.4	1.5
Sheep Bay	Ribbon	5/8/25	50 feet	2	11.4	1.3
Sheep Bay	Ribbon	5/8/25	50 feet	3	7	0.9
Sheep Bay	Ribbon	5/8/25	90 feet	1	13.3	1
Sheep Bay	Ribbon	5/8/25	90 feet	2	10.6	1.2
Sheep Bay	Ribbon	5/8/25	90 feet	3	9.8	1.1
Simpson Bay	Sugar	5/8/25	10 feet	1	0	0
Simpson Bay	Sugar	5/8/25	10 feet	2	0	0
Simpson Bay	Sugar	5/8/25	10 feet	3	0	0
Simpson Bay	Sugar	5/8/25	50 feet	1	0	0
Simpson Bay	Sugar	5/8/25	50 feet	2	0	0
Simpson Bay	Sugar	5/8/25	50 feet	3	0	0
Simpson Bay	Sugar	5/8/25	90 feet	1	0	0
Simpson Bay	Sugar	5/8/25	90 feet	2	0	0
Simpson Bay	Sugar	5/8/25	90 feet	3	0	0
Simpson Bay	Ribbon	5/8/25	10 feet	1	17.7	2.5
Simpson Bay	Ribbon	5/8/25	10 feet	2	16.9	3.5
Simpson Bay	Ribbon	5/8/25	10 feet	3	10.6	1.96
Simpson Bay	Ribbon	5/8/25	50 feet	1	19.2	6.1
Simpson Bay	Ribbon	5/8/25	50 feet	2	8.6	1.7
Simpson Bay	Ribbon	5/8/25	50 feet	3	12.5	2.3
Simpson Bay	Ribbon	5/8/25	90 feet	1	12.4	1.8
Simpson Bay	Ribbon	5/8/25	90 feet	2	10.6	2.1
Simpson Bay	Ribbon	5/8/25	90 feet	3	13.3	2.5
Passage Island	Sugar	5/18/25	10 feet	1	68	23
Passage Island	Sugar	5/18/25	10 feet	2	83	29
Passage Island	Sugar	5/18/25	10 feet	3	23	9

Project 25220300 24-25 Test Site Sugar/Ribbon/Three-Ribbed Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Length (in	Width (in)
Passage Island	Sugar	5/18/25	50 feet	1	57	21
Passage Island	Sugar	5/18/25	50 feet	2	75	25
Passage Island	Sugar	5/18/25	50 feet	3	53	37
Passage Island	Sugar	5/18/25	90 feet	1	87	38
Passage Island	Sugar	5/18/25	90 feet	2	76	45
Passage Island	Sugar	5/18/25	90 feet	3	39	8
Passage Island	Ribbon	5/18/25	10 feet	1	9	2.75
Passage Island	Ribbon	5/18/25	10 feet	2	19	4
Passage Island	Ribbon	5/18/25	10 feet	3	11.25	1.75
Passage Island	Ribbon	5/18/25	50 feet	1	5	0.75
Passage Island	Ribbon	5/18/25	50 feet	2	16	1.25
Passage Island	Ribbon	5/18/25	50 feet	3	0	0
Passage Island	Ribbon	5/18/25	90 feet	1	12.25	3.75
Passage Island	Ribbon	5/18/25	90 feet	2	20	2
Passage Island	Ribbon	5/18/25	90 feet	3	17	3.25
Passage Island	Three-Ribbed	5/18/25	10 feet	1	52	15.25
Passage Island	Three-Ribbed	5/18/25	10 feet	2	61	14.5
Passage Island	Three-Ribbed	5/18/25	10 feet	3	15	4
Passage Island	Three-Ribbed	5/18/25	50 feet	1	0	0
Passage Island	Three-Ribbed	5/18/25	50 feet	2	0	0
Passage Island	Three-Ribbed	5/18/25	50 feet	3	0	0
Passage Island	Three-Ribbed	5/18/25	90 feet	1	30	7.5
Passage Island	Three-Ribbed	5/18/25	90 feet	2	37	5.25
Passage Island	Three-Ribbed	5/18/25	90 feet	3	28.75	4.25
Tatitlek Narrows	Sugar	5/15/25	10 feet	1	0	0
Tatitlek Narrows	Sugar	5/15/25	10 feet	2	0	0
Tatitlek Narrows	Sugar	5/15/25	10 feet	3	0	0
Tatitlek Narrows	Sugar	5/15/25	50 feet	1	0	0
Tatitlek Narrows	Sugar	5/15/25	50 feet	2	0	0
Tatitlek Narrows	Sugar	5/15/25	50 feet	3	0	0
Tatitlek Narrows	Sugar	5/15/25	90 feet	1	0	0
Tatitlek Narrows	Sugar	5/15/25	90 feet	2	0	0
Tatitlek Narrows	Sugar	5/15/25	90 feet	3	0	0
Tatitlek Narrows	Ribbon	5/15/25	10 feet	1	0	0
Tatitlek Narrows	Ribbon	5/15/25	10 feet	2	0	0
Tatitlek Narrows	Ribbon	5/15/25	10 feet	3	0	0
Tatitlek Narrows	Ribbon	5/15/25	50 feet	1	0	0
Tatitlek Narrows	Ribbon	5/15/25	50 feet	2	0	0
Tatitlek Narrows	Ribbon	5/15/25	50 feet	3	0	0
Tatitlek Narrows	Ribbon	5/15/25	90 feet	1	0	0
Tatitlek Narrows	Ribbon	5/15/25	90 feet	2	0	0
Tatitlek Narrows	Ribbon	5/15/25	90 feet	3	0	0
Boulder Bay	Sugar	5/15/25	10 feet	1	0	0

Project 25220300 24-25 Test Site Sugar/Ribbon/Three-Ribbed Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Length (in	Width (in)
Boulder Bay	Sugar	5/15/25	10 feet	2	0	0
Boulder Bay	Sugar	5/15/25	10 feet	3	0	0
Boulder Bay	Sugar	5/15/25	50 feet	1	0	0
Boulder Bay	Sugar	5/15/25	50 feet	2	0	0
Boulder Bay	Sugar	5/15/25	50 feet	3	0	0
Boulder Bay	Sugar	5/15/25	90 feet	1	0	0
Boulder Bay	Sugar	5/15/25	90 feet	2	0	0
Boulder Bay	Sugar	5/15/25	90 feet	3	0	0
Boulder Bay	Ribbon	5/15/25	10 feet	1	0	0
Boulder Bay	Ribbon	5/15/25	10 feet	2	0	0
Boulder Bay	Ribbon	5/15/25	10 feet	3	0	0
Boulder Bay	Ribbon	5/15/25	50 feet	1	0	0
Boulder Bay	Ribbon	5/15/25	50 feet	2	0	0
Boulder Bay	Ribbon	5/15/25	50 feet	3	0	0
Boulder Bay	Ribbon	5/15/25	90 feet	1	0	0
Boulder Bay	Ribbon	5/15/25	90 feet	2	0	0
Boulder Bay	Ribbon	5/15/25	90 feet	3	0	0

*Due to extremely poor and inconsistent growth, plants outside the one-foot sample sections at 10 feet, 50 feet, and 90 feet, were sampled for Fox Farm sugar and ribbon kelp, to provide some phenotypic data

Project 25220300 24-25 Test Site Bull Kelp Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Full Length (in)	Blade Width (in)
Latouche	Bull kelp	7/8/25	10 feet	1	0	0
Latouche	Bull kelp	7/8/25	10 feet	2	0	0
Latouche	Bull kelp	7/8/25	10 feet	3	0	0
Latouche	Bull kelp	7/8/25	50 feet	1	0	0
Latouche	Bull kelp	7/8/25	50 feet	2	0	0
Latouche	Bull kelp	7/8/25	50 feet	3	0	0
Latouche	Bull kelp	7/8/25	90 feet	1	0	0
Latouche	Bull kelp	7/8/25	90 feet	2	0	0
Latouche	Bull kelp	7/8/25	90 feet	3	0	0
Fox Farm	Bull kelp	6/5/25	10 feet	1	57	3.5
Fox Farm	Bull kelp	6/5/25	10 feet	2	24	4
Fox Farm	Bull kelp	6/5/25	10 feet	3	57	4
Fox Farm	Bull kelp	6/5/25	50 feet	1	60	4
Fox Farm	Bull kelp	6/5/25	50 feet	2	62	4
Fox Farm	Bull kelp	6/5/25	50 feet	3	60	4.5
Fox Farm	Bull kelp	6/5/25	90 feet	1	52	3.5
Fox Farm	Bull kelp	6/5/25	90 feet	2	0	0
Fox Farm	Bull kelp	6/5/25	90 feet	3	0	0
Passage Island	Bull kelp	5/18/25	10 feet	1	27	11
Passage Island	Bull kelp	5/18/25	10 feet	2	0	0
Passage Island	Bull kelp	5/18/25	10 feet	3	0	0
Passage Island	Bull kelp	5/18/25	50 feet	1	54	9
Passage Island	Bull kelp	5/18/25	50 feet	2	16	6
Passage Island	Bull kelp	5/18/25	50 feet	3	48	20
Passage Island	Bull kelp	5/18/25	90 feet	1	24	4
Passage Island	Bull kelp	5/18/25	90 feet	2	23	5
Passage Island	Bull kelp	5/18/25	90 feet	3	36	11
Simpson Bay	Bull kelp	5/8/25	10 feet	1	17.3	4.3
Simpson Bay	Bull kelp	5/8/25	10 feet	2	15.9	5.9
Simpson Bay	Bull kelp	5/8/25	10 feet	3	36.6	7
Simpson Bay	Bull kelp	5/8/25	50 feet	1	11.8	4.72
Simpson Bay	Bull kelp	5/8/25	50 feet	2	17.3	5.9
Simpson Bay	Bull kelp	5/8/25	50 feet	3	16.1	4.9
Simpson Bay	Bull kelp	5/8/25	90 feet	1	15.3	4.9
Simpson Bay	Bull kelp	5/8/25	90 feet	2	14.1	7
Simpson Bay	Bull kelp	5/8/25	90 feet	3	17.3	5.5
Sheep Bay	Bull kelp	5/8/25	10 feet	1	8.6	3.3
Sheep Bay	Bull kelp	5/8/25	10 feet	2	8.6	4.3
Sheep Bay	Bull kelp	5/8/25	10 feet	3	5.1	2.7
Sheep Bay	Bull kelp	5/8/25	50 feet	1	24.8	8.66
Sheep Bay	Bull kelp	5/8/25	50 feet	2	15.3	6.8
Sheep Bay	Bull kelp	5/8/25	50 feet	3	14.9	5.5

Project 25220300 24-25 Test Site Bull Kelp Phenotypic Data

Farmsite	Species	Date of Sample	Sample Section	Sample Number	Full Length (in)	Blade Width (in)
Sheep Bay	Bull kelp	5/8/25	90 feet	1	27.9	9.2
Sheep Bay	Bull kelp	5/8/25	90 feet	2	18.5	4.7
Sheep Bay	Bull kelp	5/8/25	90 feet	3	12.5	3.1
Port Gravina	Bull kelp	5/8/25	10 feet	1	12.2	4.9
Port Gravina	Bull kelp	5/8/25	10 feet	2	24.8	5.5
Port Gravina	Bull kelp	5/8/25	10 feet	3	19	7.4
Port Gravina	Bull kelp	5/8/25	50 feet	1	12.9	11.2
Port Gravina	Bull kelp	5/8/25	50 feet	2	23.2	5.9
Port Gravina	Bull kelp	5/8/25	50 feet	3	12.2	3.1
Port Gravina	Bull kelp	5/8/25	90 feet	1	19.2	5.5
Port Gravina	Bull kelp	5/8/25	90 feet	2	11.4	4.7
Port Gravina	Bull kelp	5/8/25	90 feet	3	13.3	5.1
Tatitlek Narrows	Bull kelp	5/15/25	10 feet	1	0	0
Tatitlek Narrows	Bull kelp	5/15/25	10 feet	2	0	0
Tatitlek Narrows	Bull kelp	5/15/25	10 feet	3	0	0
Tatitlek Narrows	Bull kelp	5/15/25	50 feet	1	0	0
Tatitlek Narrows	Bull kelp	5/15/25	50 feet	2	0	0
Tatitlek Narrows	Bull kelp	5/15/25	50 feet	3	0	0
Tatitlek Narrows	Bull kelp	5/15/25	90 feet	1	0	0
Tatitlek Narrows	Bull kelp	5/15/25	90 feet	2	0	0
Tatitlek Narrows	Bull kelp	5/15/25	90 feet	3	0	0
Boulder Bay	Bull kelp	5/15/25	10 feet	1	0	0
Boulder Bay	Bull kelp	5/15/25	10 feet	2	0	0
Boulder Bay	Bull kelp	5/15/25	10 feet	3	0	0
Boulder Bay	Bull kelp	5/15/25	50 feet	1	0	0
Boulder Bay	Bull kelp	5/15/25	50 feet	2	0	0
Boulder Bay	Bull kelp	5/15/25	50 feet	3	0	0
Boulder Bay	Bull kelp	5/15/25	90 feet	1	0	0
Boulder Bay	Bull kelp	5/15/25	90 feet	2	0	0
Boulder Bay	Bull kelp	5/15/25	90 feet	3	0	0

Appendix D:
24-25 Kelp Test Site Growth Report

EVOS Project 25220300 Kelp Test Site Growth Report 2024-2025

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Simpson Bay

Simpson Bay, located near the head of the bay and historically susceptible to reduced circulation, showed variable production during the 2024–2025 season.

- Sugar kelp production at Simpson Bay completely failed during this growing season, with no biomass recorded. Sugar kelp seed string outplanted at this site was also outplanted at other test sites throughout the Eastern side of the Sound (Sheep Bay and Port Gravina), which did produce some small, but measurable production of sugar kelp biomass.
- Ribbon kelp biomass per foot suggests uneven distribution along growlines, with higher rates of growth at either end of the growline and substantially smaller growth rates in the middle. Overall harvest yields of ribbon kelp at this site were consistent with findings recorded in the 2023-2024 Growth Report.
- Bull kelp production at Simpson Bay was the best producing species by biomass at this site.

Sheep Bay

Sheep Bay harvest results for 2024–2025 reflect more limited production compared to Gravina Bay, but higher biomass yields than Simpson Bay. While accessible and protected, this site has historically shown variability in biomass production, and current-season data continue that trend.

- Sugar kelp yields at Sheep Bay were substantially lower overall compared to growth Gravina Bay. Growth was unevenly concentrated at one end of the growline.
- Given prior documentation of sporadic growth patterns at this site, these results reinforce the possibility that nutrient exchange and site flushing remain limiting factors.
- Ribbon kelp production at Sheep Bay was poor, but even throughout the various sections of the growline.
- As at Simpson Bay, bull kelp production at Sheep Bay was the best producing species by biomass at this site.
- Total harvest yields for sugar and ribbon kelp at this site were similar to those observed during the 2024 harvest season as recorded in the 2023-2024 Growth Report.

Port Gravina

Port Gravina demonstrated moderate and relatively consistent production across species during the 2024–2025 growing season. While qualitative observations were limited, harvest data indicate that this site supported measurable biomass accumulation for all three cultivated species.

- Sugar kelp distribution along the growline appeared relatively even, but the biomass production per foot yields were less than half than what was recorded at the spring 2024 harvest at this site for this species.
- Ribbon kelp yields at Gravina Bay were slightly lower than sugar kelp but still demonstrated measurable biomass accumulation.
    - Ribbon kelp yields were consistent with harvest records from the spring 2024 harvest; although this site produced the most consistent growth and the highest biomass of the sites in this region, production is still poor compared to yields of commercial farmers on the Eastern side of the Sound.
- Bull kelp production at Gravina Bay was present but comparatively modest relative to sugar kelp. As noted throughout the other sites in this region, biomass per foot reflects higher concentrated growth at certain sections of the growline, rather than consistent growth throughout the growline.

Fox Farm Bay

The Fox Farm Bay site, located on the western side of Prince William Sound near Gulf-influenced waters, experienced highly inconsistent growth during the 2024–2025 growing season. Data collection was complicated by extremely patchy biomass distribution and large sections of blank growline across multiple species. As a result, sample measurements often represent isolated individuals rather than uniform growline production.

- Bull kelp growth at Fox Farm was variable across lines, with significant differences observed between sampling points.
- Overall, bull kelp demonstrated the strongest relative performance at this site, while ribbon and sugar kelp lines were almost entirely bare.
- Qualitative observations recorded thin stipes and small pneumatocysts, consistent with other commercial farmers reports on farm-raised bull kelp. Heavy slime and biofouling were also recorded on this line, which was an issue also noted in the 2023-2024 Growth Report.
- Ribbon kelp lines were almost entirely blank. Samples were collected from scattered, isolated plants rather than continuous growth along the growline.
- The sporadic nature of ribbon kelp settlement made it difficult to estimate meaningful pounds-per-foot production. Growth was not uniform, and large stretches of growline contained no plants. Biomass density was insufficient to support efficient commercial harvest operations.
- Similar to ribbon kelp, sugar kelp lines were largely blank. Samples represent random, isolated individuals.
- The absence of continuous growth along the growlines significantly limited harvestable biomass and prevented reliable yield calculations.

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- No consistent holdfast density was noted, further underscoring the irregularity of settlement.

Passage Island

The Passage Island site was selected for its relative exposure and strong tidal exchange, while still offering workable protection for routine monitoring and harvest operations. The 2024–2025 growing season marked the first harvest at this location under this project, including bull kelp, ribbon kelp, sugar kelp, and three-ribbed kelp. Growlines were oriented to optimize tidal flow across the farm footprint, and lessons learned from previous growing seasons in Prince William Sound—particularly with respect to line depth and tension—were incorporated into fall deployment.

The site demonstrated uniform growth across most sections of growline, particularly in areas with consistent submergence and appropriate tensioning. Unlike more protected sites in Prince William Sound, evaluated in previous seasons, Passage Island showed less sporadic biomass distribution and fewer bare sections of growline, though the middle sections of some growlines still did demonstrate smaller biomass yields similar to findings at other sites in previous growing seasons. Minimal biofouling was observed during harvest efforts in early May. Some filamentous algae were present on the second harvest trip in mid-May, primarily in areas of lower kelp density, but fouling was not extensive enough to significantly impact harvest quality or commercial viability.

- Bull kelp performed well at this site during the 2024–2025 season. Stipes were generally thick and resilient, with well-formed bulbs and substantial frond development. Growth appeared more vertically oriented compared to observations at Port Etches in 2023–2024, likely due to improved sinking depth and spacing between lines.
    - These production results are promising as bull kelp pickles are a highly valued traditional food source for Alaska Native communities and could provide a sourcing opportunity that doesn't involve harvesting from wild kelp beds.
- Ribbon kelp growth was the most inconsistent species observed at this site, with many sections of ribbon kelp line contaminated with opportunistically-setting three-ribbed or dragon kelp.
- Sugar kelp exhibited thick, voluminous blade growth throughout much of the farm footprint. Blades were opaque and richly pigmented, with stronger holdfast attachment than observed in 2023–2024 at locations in Prince William Sound. Loss of biomass during harvest was minimal, and tearing at the holdfast was far less prevalent than previously documented at other research sites.
- The improved structural integrity of sugar kelp at this site would likely translate well to commercial harvest and handling operations.

- Three-ribbed kelp performed consistently and demonstrated strong competitiveness at Passage Island. Growth occurred both on seeded sections and in limited areas of natural set. Blades were firm and well-structured, with characteristic ribbing clearly developed.
- Tissue strength and biomass distribution across species suggest that Passage Island is suitable for scaled commercial production of bull kelp, ribbon kelp, sugar kelp, and three-ribbed kelp.

Latouche Passage

The harvest at the Latouche Passage site was ultimately irretrievable due to severe gear entanglement likely caused by a significant weather event. At the time of attempted harvest, anchors had crossed and multiple growlines were under extreme tension. The harvesting vessel did not have the hydraulic or mechanical capacity necessary to safely retrieve lines under that degree of load, and the crew was not equipped to manage anchors and lines under such strain. As a result, no biomass was recovered during the initial harvest attempt and no harvest weights or phenotypic data were recorded for Latouche Passage for the 2024–2025 season. A separate crew later returned to assess and repair the site. By that time accessible lines had been stripped of kelp due to prolonged tension from crossed anchors and growlines. Several sections of gear had to be cut in order to release tension and prevent further equipment loss. No recoverable kelp biomass remained on the remaining accessible sections.

The loss at Latouche Passage underscores the natural forces inherent to kelp farming in Prince William Sound. Even well-established and historically productive sites remain vulnerable to extreme weather events. As with all forms of agriculture, crop loss is an inherent risk, and adaptive management remains essential for long-term commercial viability.

Boulder Bay

No measurable kelp biomass was recoverable at the Boulder Bay test site during the 2024–2025 growing season. Growlines exhibited no visible growth at the time of sampling, and no harvest weights or phenotypic data were recorded.

- One likely contributing factor was the late outplanting of seed string, which occurred in January due to logistical constraints for accessing the site. This delayed deployment may have reduced the effective growing window during peak winter and early spring conditions, limiting overall biomass accumulation.

Tatitlek Narrows

Similar to the Boulder Bay site, the site at Tatitlek Narrows also yielded no recoverable kelp biomass for the 2024–2025 season. Lines were completely bare at the time of harvest in mid-May, and no harvest or sampling data were collected.

- As at the Boulder Bay site, seed string was not outplanted until January due to access challenges. The delayed start likely shortened the productive growth period and may have significantly constrained development of seed string. Given that both sites have demonstrated productivity in prior seasons, the lack of growth this year is most plausibly attributed to timing rather than inherent site limitation.
- The poor growth results recorded from both the Boulder Bay and Tatitlek Narrows sites reinforce the importance of timely fall outplanting to maximize the winter growing window in Prince William Sound.

Applegate Island – Dropper Line

The Applegate Island location was deployed as a single dropper line during the 2024–2025 growing season rather than as a full research site. Only sugar kelp (*Saccharina latissima*) seed string was outplanted. Sampling was conducted on June 5 at three depth intervals along the dropper line: approximately 1 foot, 15 feet, and 30 feet. Overall growth at this location was poor. Field notes consistently describe kelp as pale, thin, and heavily fouled with bryozoans. Biomass appeared weak and underdeveloped across all depths.

- Blades were very pale in color, lacking the rich pigmentation typically associated with healthy spring growth.
- Tissue was thin, and delicate.
- Bryozoan fouling was present across sampled plants, which would significantly reduce commercial value and complicate processing.
- Overall plant structure was slight, with no indication of thick holdfast development or dense canopy formation.

Eshamy Bay – Dropper Line

A single dropper line was deployed at Eshamy Bay during the 2024–2025 growing season. However, no kelp or gear was recoverable at the time of attempted sampling and retrieval as the dropper line was missing and no attached kelp biomass was observed. The loss may have been due to severe weather and gear failure, or possible unauthorized removal; however, the exact cause cannot be confirmed. No growth or survivorship data are available for Eshamy Bay for the 2024–2025 season.

Appendix E: Interim Report— Liquid Kelp Biostimulant Product Refinement

Kelp Ag Product R&D: Liquid Kelp Biostimulant Product Refinement and Field & Market Testing Update:

Project Overview

This project aims to refine processing methods and evaluate the performance and market potential of an Alaska-made liquid kelp biostimulant derived from farmed sugar kelp. The work includes product formulation, pilot-scale production, laboratory analysis, on-farm field trials, and preliminary market testing.

Project updates rolling over from previous project report:

- **Field trials have been concluded, data is in the process of being synthesized, and whitepapers on field trial results are in process.**
- **Label has been created and marketing for product is underway with a variety of small and large-scale Alaska retailers being contacted for test marketing in state.**
- **The abstract submitted to the mariculture conference was accepted for a 15-minute presentation from project partners.**

Model Studies Results

Growth chamber bioassay studies to determine optimal rooting response of Mung Bean (*Vigna radiata*) to the project-produced biostimulant and two commercially available *Saccharina Latissima* products and dilutions were completed by Institute for Sustainable Horticulture Kwantlen Polytechnic University in Surrey BC, Canada. This experiment consisted of 25 treatments in total.

Four experiments were performed to evaluate different product doses, batches, and compare *Sea to Sprout* with known commercial products. Kelp extract produced in 2024 and 2025 was tested and both were shown to increase root growth in the assay. Product dosage at 1:100 was consistently found to improve both number and mass of roots. More concentrated applications (1:40, 1:10) were not effective.

Due to the timing of the project biostimulant production in May and June, the root bioassay study results were received in July, after the start of the field trials.

Field Trial Results (2025 Growing Season)
Preliminary statistical analyses have been completed for beet and potato field trials conducted at UAF Agriculture and Forestry Experiment Station (AFES) and Twitter Creek Gardens, with full datasets, including soils data and final analyses expected by the end of January from project partners. Response variables included plot-level yield metrics, fresh and dry biomass measurements, and subsampled leaf and root traits. Across all plots, qualitative observations were also recorded for plant vigor, pest resistance, disease incidence, and bolting sensitivity to support contextual interpretation of quantitative results.

Due to the timing of the project biostimulant production in May and June, the project team did not have 2025 batch root bioassay results on which to base dose for the field trials. Instead biostimulant dose was determined based on root bioassay results from 2024. The project biostimulant was mixed with water and applied as a root drench at a ratio of 25:1. As indicated by the 2025 root bioassay results, the optimal dosage was 100:1, likely having a significant impact on results:

Beets (AFES and Twitter Creek):
Across sites, beet responses to kelp application were generally positive at the vegetative level. At Twitter Creek, kelp-treated plots exhibited increased leaf area and leaf biomass relative to no-kelp controls, with effects approaching statistical significance (leaf area: $p = 0.0577$; leaf weight: $p = 0.0574$). These results suggest enhanced aboveground growth responses under kelp treatment.

At AFES, fertilizer rate significantly influenced beet root yield outcomes. Plots receiving 100% fertilizer exhibited significantly higher root-only plot yields than those receiving 70% fertilizer ($p = 0.00158$), and higher dry root biomass compared to 50% fertilizer treatments ($p = 0.0498$). These findings indicate a strong fertilizer rate effect and highlight the importance of evaluating kelp applications within appropriate nutrient management regimes.

Potatoes (AFES and Twitter Creek):
Potato response varied by site and treatment. At Twitter Creek, no-kelp treatments resulted in significantly higher average potato weight compared to kelp-treated plots ($p = 0.0148$). This negative response is consistent with concurrent dose–response observations from mung bean assays and is attributed to excessive kelp application concentration. Increased above-ground leaf size and vigor on the biostimulant -treated plots was observed at both test sites. These data reinforce the need for refined, crop-specific application protocols for belowground storage crops.

Preliminary field trial results reinforce the need for correct dosage and additional field trials. Preliminary soils data from pre-season testing indicate high degree of soil health at both test locations, indicating the benefit of future testing in more nutrient deficient conditions for better understanding the efficacy of the biostimulant.

Field trials for 2026 season:
While field trials for the 2026 growing season are not part of this project scope or budget, the project team is currently working with the State of Alaska Plant Materials Center in Palmer to design field trials on potatoes and grains.

White Papers and Technical Documentation
Spencer Spoitz of Marine Biologics will produce two technical white papers, documenting the mung bean trials (attached to this report) and 2025 field trials (in progress), including methodologies, application rates, response variables, and preliminary interpretation. A third white paper focused on soil impacts (e.g., nutrient availability, organic matter dynamics, and biological indicators) will be prepared once soil data are received from Homer Soil and Water Conservation District (HSWC) and the University of Alaska Fairbanks (pending).

A fourth internally led paper is also attached, synthesizing peer-reviewed literature on biostimulant efficacy across crop types, soil textures, nutrient regimes, and climatic growing conditions. An FAQ page responding to basic customer questions such as the difference between a biostimulant and fertilizer is also attached. Collectively, these informational documents will be hosted on the Kachemak Kelp / Sea to Soil webpage to support transparency, reproducibility, and knowledge transfer.

Additional Trials and Greenhouse Testing
Coordination is underway with two additional Alaska-based biostimulant projects and Southeast Conference to assess the feasibility of late-winter greenhouse trials targeting additional crops. These trials are intended to expand crop response datasets under controlled conditions and inform prioritization of future field-scale testing. Trial design, crop selection, and timelines are currently under development.

Market Testing and Adoption Constraints

Early-stage marketing for product sales to Alaska gardeners is underway with a variety of small and large-scale Alaska retailers being contacted for test marketing.

Outreach to the Alaska agriculture sector conducted to date functions primarily as early-stage market testing and has highlighted structural barriers to adoption within the sector. Engagement with UAF Extension, NRCS, and the Division of Agriculture indicates that producers operate under low-margin conditions and exhibit high risk aversion to novel inputs that could negatively affect yield. Feedback consistently emphasizes the need for clear efficacy data, locally relevant field results, and peer validation prior to adoption. The team's current focus is on developing agreements with 2-3 Alaska farms to test the biostimulant at no cost in exchange for empirical data.

Complementary outreach with Kenai Local Food Connection is supporting dissemination and producer engagement through a newsletter interview and a planned presentation or tabling event at the Kenai Peninsula Farm Bureau meeting in February. While promising for awareness-building, these marketing activities are resource-intensive and underscore the need to strategically align outreach effort with research and production capacity.

Product-facing materials continue to advance, with the product label finalized. A supplemental information sheet is also being prepared to convey application guidance, use limitations, and research findings beyond what can be accommodated on the label. The attached additional FAQ page responds to basic questions about the product and its efficacy and uses.

Production and Processing Optimization

Processing improvements are underway, including procurement of a screw press and auger to enhance solids separation efficiency, throughput, and consistency. January work has focused on refining fermentation protocols, including residence time, vessel configuration, and handling practices.

Outcomes from this process optimization work will inform decisions regarding work flows and labor requirements. In parallel, a harvest and production calendar is being developed to better align biomass availability with processing, labor, fermentation capacity.

SEA TO SPROUT

All purpose liquid soil & plant microbial food source

Made From Kachemak Bay Kelp.

Stimulates and improves germination, growth, quality, yield, nutrient uptake and availability, and plant resilience to stress

KACHEMAK KELP

VOLUME: 1 LITER

100% Sugar kelp (Saccarina latissima) regeneratively grown on kelp farms in the nutrient rich waters of Kachemak Bay, Alaska. Naturally fermented using pure water and beneficial Lactobacillus microbes.

Guaranteed analysis

CONSTITUENTS	
Dissolved Solids:	5%
Organic Matter:	3%
Ash	2%
pH	4-5

MACRO/MICRONUTRIENTS	
Potassium (as K2O):	1%
Sodium:	<0.5%
Magnesium	450 ppm
Calcium	300 ppm

All batches meet AAPFCO limits on heavy metals in fertilizers.

For more information visit kachemakkelp.com

Application & Storage

Apply as a foliar spray, soil drench or directly to seeds and roots to stimulate germination and growth and improve resistance to stress.

Dilute 1:100 for all applications.

For home gardens: 2 teaspoons per gallon.
Soil drench and foliar spray: Apply 1/2 quart/acre
Seed and root: Dip or soak directly in diluted solution

Store in a cool and dry environment away from direct sunlight.

Sea to Sprout is a non-irritant, non-toxic substance intended for plant, soil and seed application only. Users should follow safe practices: **Keep away from children, do not ingest, and wash hands after handling.**

Proudly produced in Homer, Alaska by Kachemak Kelp, LLC.

Best by:

MADE IN ALASKA

Scan for product and safety data information:

Sea to Sprout - Frequently Asked Questions

1. **How is Sea to Sprout made?**
    - Sea to Sprout is made from Sugar kelp (*Saccarina latissima*) regeneratively farmed from local seed, without any inputs, in Kachemak Bay and Lower Cook Inlet, Alaska.
    - We ferment the kelp using active lactobacillus culture. Fermentation helps break down cell walls and release phytoactive compounds (e.g., auxin-like substances, polysaccharides, and phenolics) that can enhance plant growth. Fermentation may further increase bioavailability of these compounds.
    - When fermentation is complete we filter the liquid portion, reserving the solid portion for other uses.

2. **What are the benefits of using a seaweed based plant biostimulant, and can it be used on different crops and types of plants?**
    - Seaweed-based plant biostimulants help plants grow better, handle stress, and use nutrients more efficiently, and they are highly versatile across many crop species and plant types. They are used on vegetables, fruits, row crops, turf, ornamentals, and tree crops. They are typically used in seed, soil, or foliar applications.

3. **How does a biostimulant differ from a fertilizer?**
    - A biostimulant mainly works by stimulating the plant's own physiological and microbial processes, while a fertilizer's primary role is to supply nutrients like nitrogen, phosphorus, and potassium directly. They are complementary: fertilizers "feed" the plant, and biostimulants help the plant use that nutrition more efficiently and cope with stress.
    - Fertilizers are defined by their nutrient content and are applied to correct or prevent nutrient deficiencies by adding essential elements (N, P, K, plus secondary and micronutrients) to soil or plants.
    - Biostimulants are defined by their mode of action: they stimulate natural processes that improve nutrient uptake, use efficiency, and stress tolerance, typically without supplying significant amounts of nutrients themselves.
    - Seaweed-derived biostimulants are known to contain phytoactive compounds (e.g., auxin-like substances, polysaccharides, and phenolics) that can enhance root growth. Fermentation may further increase bioavailability of these compounds.

4. **How do biostimulants "work"?**
    - Fertilizers act mainly through direct chemistry and plant nutrition: increasing available ions in soil solution for root uptake and driving yield via mass nutrient supply.
    - Biostimulants act through biochemical and biological modulation - by gently changing how plants and soil microbes function (e.g., plant metabolism, root architecture, microbial activity, signaling pathways), improving processes such as root growth, photosynthetic efficiency, and resilience to abiotic stress.

5. **How much seaweed biostimulant is needed to see benefits? What happens to plant and root growth and vigor with a too-concentrated dose?**
    - Sea to Sprout and other seaweed biostimulants are super concentrated. A little goes a long way. It can be applied as a soil drench, foliar spray or directly to seeds and roots, diluted 1:100 for all applications.
    - Excessive doses of seaweed biostimulants tend to inhibit growth by shifting from a positive, biostimulated state or "signal" to a "stress" that suppresses root and shoot growth. Physiologically, roots experience osmotic/ionic and hormonal imbalances, plus oxidative and sometimes metal toxicity, that collectively suppress meristem activity and elongation.

6. **Can seaweed biostimulants be used in organic certified agriculture? Does the biostimulant need to be certified?**
    - Yes, seaweed biostimulants can be used in organic certified agriculture: Under USDA National Organic Program (NOP) rules, nonsynthetic seaweed products (liquids, soluble powders, meals) are permitted in organic crop production, as long as processing uses only water, heat, pressure, or other nonsynthetic materials.
    - No, the biostimulant does not need to be certified: NOP does not require that every input used on an organic farm be "organic" or "certified" as a product; it requires that all inputs be allowed under the National List and comply with NOP handling/processing rules.
    - Therefore, a seaweed biostimulant may be used on certified organic farms if the formulation and extraction method fit those NOP criteria, even if the product is not itself certified organic.

7. **How are seaweed biostimulants classified and regulated in the US?**
    - There is currently no single, binding federal definition or dedicated category for "plant biostimulants"; instead, products are regulated either under state fertilizer/soil amendment laws or, if claims are made that the substance has pesticidal/plant regulator qualities, under FIFRA as pesticides/plant growth regulators by EPA.

For more information about Sea to Sprout and seaweed biostimulants see:
https://www.kachemakkelp.com/sea-to-sprout

Technical White Paper #1
Enhanced Root Growth with *Sea to Sprout;* Adventitious Root Growth Assay Using Fermented *Saccharina latissima* (Sugar Kelp) Extract

Executive Summary

This white paper summarizes a controlled bioassay evaluating the dose–response effects of a fermented seaweed extract derived from *Saccharina latissima* on adventitious root formation in Mung bean (*Vigna radiata*). The study demonstrates a concentration-dependent stimulation of root initiation and elongation. Results support the potential of fermented *S. latissima* extracts as plant biostimulants targeting early root development.

Background and Rationale

Adventitious root development is a critical determinant of early plant vigor, nutrient uptake, and stress resilience. Seaweed-derived biostimulants are known to contain phytoactive compounds (e.g., auxin-like substances, polysaccharides, and phenolics) that can enhance root growth. Fermentation may further increase bioavailability of these compounds.

This study was conducted by the Institute for Sustainable Horticulture, Kwantlen Polytechnic University in Surrey, British Columbia, Canada. It employed the Mung bean adventitious root assay, a sensitive and widely used model for screening root-promoting activity, to characterize the dose–response behavior of a fermented *S. latissima* extract. The key objectives of this study were:

- Quantify the effects of fermented *S. latissima* on adventitious root initiation and growth.
- Determine the dose–response relationship and identify an optimal concentration range.
- Assess potential inhibitory effects at high doses.

Seaweed Extract

- Source organism: *Saccharina latissima* (Sugar Kelp)
- Processing: Naturally fermented using pure water and beneficial *Lactobacillus* microbes
- Product dilution range (product to water, *v:v*) - 1:10 - 1:100

Experimental Design

- Assay type: Adventitious root growth assay in Mung bean (*Vigna radiata*)
- Treatments: Serial dilutions of fermented extract
- Control: Water and commercial kelp extract controls
- Replicates 10
- Exposure duration: 7 days
- Environmental conditions: 27 °C, 16-hour light / 8-hour dark, 80% relative humidity
- Datapoints: Number of roots, root dry-weight

Results and Discussion

Four experiments were performed to evaluate different product doses, batches, and compare *Sea to Sprout* with known commercial products. Kelp extract produced in 2024 and 2025 was tested and both were shown to increase root growth in the assay. Product dosage at 1:100 was consistently found to improve both number and mass of roots. More concentrated applications (1:40, 1:10) were not effective.

Experiment	Sample	Dose	No. of Roots	Mass Roots (mg)
1	2024 Product	1:100	103	13
	Commercial 1	1:75	98	11.4
	Control	1	7	0
2	2025 Product	1:100	95	11.8
	Control	1	13.4	2.1
3	2025 Product	1:100	87	9.4
	Control	1	1	0
4	2025 Product	1:100	67	7.9
	Commercial 2	1:100	56	8.9
	Control	1	15.3	3.3

Key Findings

- *Sea to Sprout* improves adventitious root initiation and growth.
- Optimal dilution: 1 part product to 100 parts water
- High doses inhibit root growth - a little goes a long way!

Technical White Paper #4
Scientific Literature on the Efficacy of Seaweed Biostimulants

Introduction

Seaweeds have been widely used as a source of nutrients in agriculture for centuries, and solid scientific evidence of seaweed biostimulants' function of mitigating abiotic stress and enhancing plant productivity is well documented. Here we provide the abstracts and links to four recent reviews of the scientific literature examining the efficacy of seaweed biostimulants. Some papers reviewed also address the current state of knowledge of the mechanisms of action of biostimulants on soils and plants. We have included useful figures from several of the publications. This Technical White Paper is intended to provide broad context on the current state of seaweed biostimulant efficacy research, and is not a full representation of the current body of literature. For results of field trials and laboratory analyses of *Sea to Sprout* see Technical White Papers 1, 2, and 3.

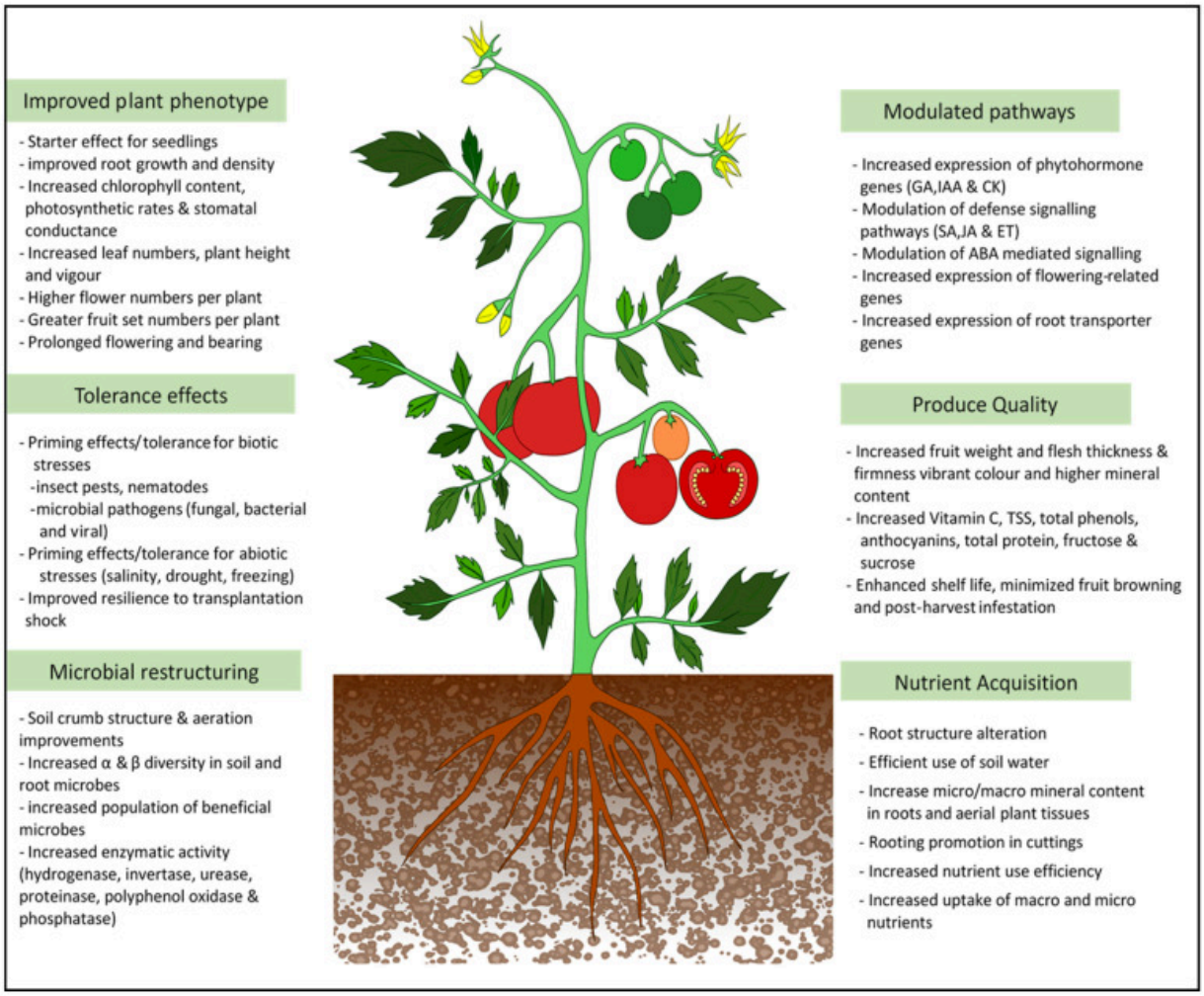
1. Biostimulant Properties of Seaweed Extracts in Plants: Implications towards Sustainable Crop Production (Ali et al 2021):

Abstract

The use of seaweed-based bioproducts has been gaining momentum in crop production systems owing to their unique bioactive components and effects. They have phytostimulatory properties that result in increased plant growth and yield parameters in several important crop plants. They have phytoelicitor activity as their components evoke defense responses in plants that contribute to resistance to several pests, diseases, and abiotic stresses including drought, salinity, and cold. This is often linked to the upregulation of important defense-related genes and pathways in the plant system, priming the plant defenses against future attacks. They also evoke phytohormonal responses due to their specific components and interaction with plant growth regulation. Treatment by seaweed extracts and products also causes significant changes in the microbiome components of soil and plant in support of sustainable plant growth. Seaweed extracts contain a plethora of substances which are mostly organic, but trace levels of inorganic nutrient elements are also present. Fractionation of seaweed extracts into their components and their respective bioassays, however, has not yielded favorable growth effects. Only the whole seaweed extracts have been consistently proven to be very effective, which highlights the role of multiple components and their complex interactive effects on plant growth processes. Since seaweed extracts are highly organic, they are ideally suited for organic farming and environmentally sensitive crop production. They are also very compatible with other crop inputs, paving the way for an integrated management approach geared towards sustainability. The current review discusses the growth and functional effects evoked by seaweed extracts and their modes and mechanisms of action in crop plants which are responsible for elicitor and phytostimulatory activities. The review further analyses the

potential value of seaweed extracts in integrated crop management systems towards sustainable crop production.

Figure 3- Overview of the positive effects of seaweed extracts on the plant and soil systems (Ali et al 2021).



2. Farming of Seagrasses and Seaweeds: Responsible Restoration & Revenue Generation (USDA 2024):

Summary

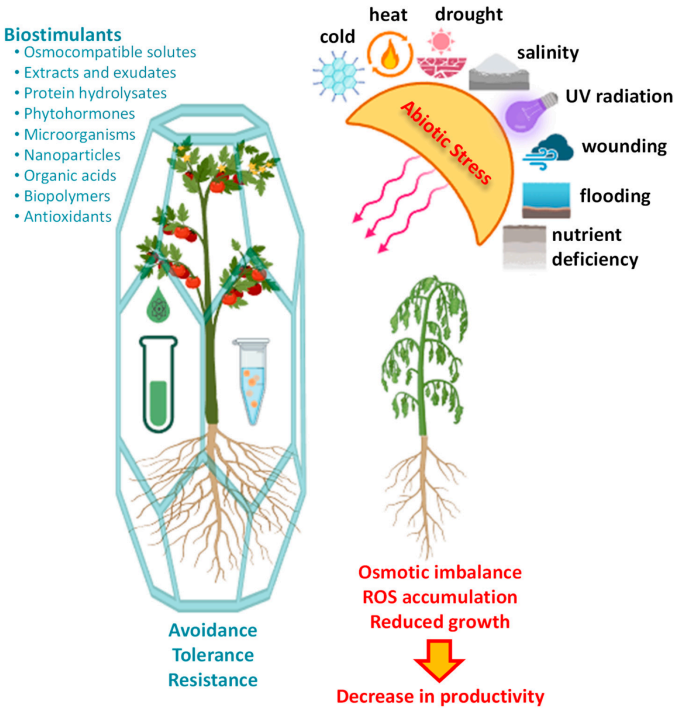
- Appendix 8 - **Seaweeds as Biostimulants Review**
- Evidence of categorial benefits of seaweed-based biostimulant application by crop type for 55 crop types.
- A review of seaweed-based biostimulant product application on agricultural crops and their learned benefits as presented in peer-reviewed literature. Articles were retrieved from 2014-2024, a time frame that reflects a period of increased published research on the topic.

3. Plant Biostimulants to Enhance Abiotic Stress Resilience in Crops (Di Sario et al 2025):

Abstract

The escalating impact of abiotic stress on crop productivity requires innovative strategies to ensure sustainable agriculture. This review examines the promising role of biostimulants in mitigating the adverse effects of abiotic stress on crops. Biostimulants, ranging from simple organic compounds to complex living microorganisms, have demonstrated significant potential in enhancing plant resilience, stress tolerance, and overall performance. The mechanisms underlying biostimulant action—such as enhancing antioxidant defenses, regulating hormonal pathways, and inducing metabolic adjustments—are reviewed. Furthermore, we incorporate the latest research findings, methodologies, and advancements in biostimulant applications for addressing abiotic stressors, including drought, salinity, high temperatures, and nutrient deficiencies. This review also highlights current challenges and future opportunities for optimizing biostimulant use in sustainable crop production. This revision aims to guide researchers and agronomists in applying biostimulants to improve crop resilience in the context of climate change.

Figure 1. The role of biostimulants in mitigating the negative effects of abiotic stress on crop productivity. Abiotic stress conditions, such as drought, salinity, extreme temperatures, and nutrient deficiencies, induce detrimental changes at morphological, physiological, biochemical, and molecular levels, severely limiting plant growth and productivity. Biostimulants help crops counteract these stress-induced damages, restoring plant performance and enhancing resilience against environmental stressors. Illustration created using BioRender. (Di Sario et al 2025)



4. Trends in Seaweed Extract Based Biostimulants: Manufacturing Process and Beneficial Effect on Soil-Plant Systems (Boukhari et al 2020):

Abstract

The time when plant biostimulants were considered as “snake oil” is erstwhile and the skepticism regarding their agricultural benefits has significantly faded, as solid scientific evidences of their positive effects are continuously provided. Currently plant biostimulants are considered as a full-fledged class of agri-inputs and highly attractive business opportunity for major actors of the agroindustry. As the dominant category of the biostimulant segment, seaweed extracts were key in this growing renown. They are widely known as substances with the function of mitigating abiotic stress and enhancing plant productivity. Seaweed extracts are derived from the extraction of several macroalgae species, which depending on the extraction methodology lead to the production of complex mixtures of biologically active compounds. Consequently, plant responses are often inconsistent, and precisely deciphering the involved mechanism of action remains highly intricate. Recently, scientists all over the world have been interested to exploring hidden mechanism of action of these resources through the employment of multidisciplinary and high-throughput approaches, combining plant physiology, molecular biology, agronomy, and multi-omics techniques. The aim of this review is to provide fresh insights into the concept of seaweed extract (SE), through addressing the subject in newfangled standpoints based on current scientific knowledge, and taking into consideration both academic and industrial claims in concomitance with market’s requirements. The crucial extraction process as well as the effect of such products on nutrient uptake and their role in abiotic and biotic stress tolerance are scrutinized with emphasizing the involved mechanisms at the metabolic and genetic level. Additionally, some often overlooked and indirect effects of seaweed extracts, such as their influence on plant microbiome are discussed. Finally, the plausible impact of the recently approved plant biostimulant regulation on seaweed extract industry is addressed.

Figure 2. Conceptual illustration highlighting the positive impact of seaweed extracts on the whole soil–plant system. Such effects encompass improving fruit quality, and plant phytohormone content, increasing soil enzymatic activity, improving the rooting system and the overall physiological features of plants. (Boukhari et al 2020)

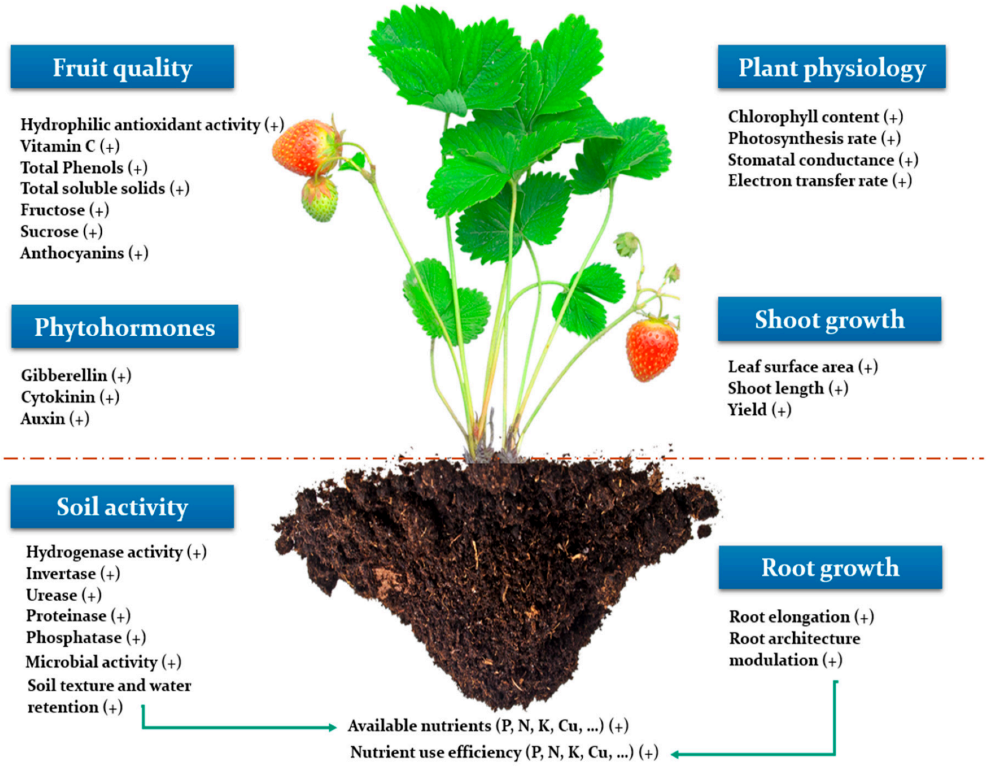
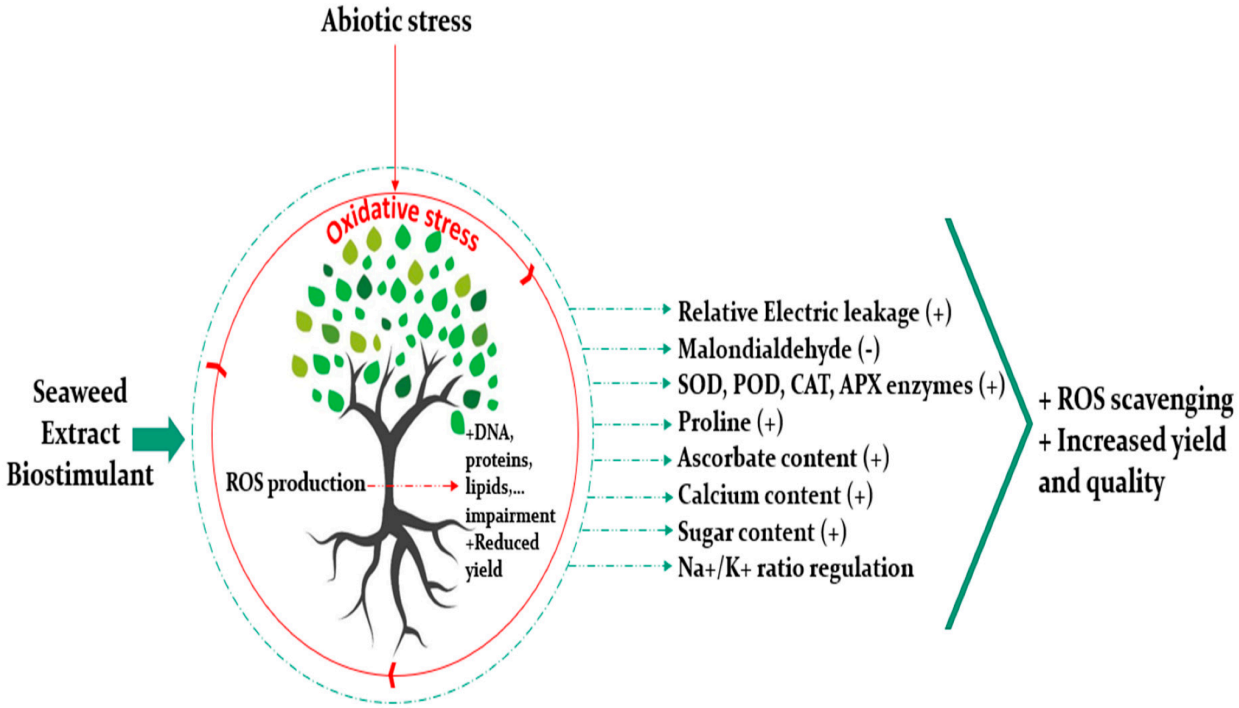


Figure 3. Beneficial effect of seaweed extracts under abiotic stress: Seaweed extracts play an important role in reactive oxygen species scavenging (ROS) through triggering several mechanisms involving stimulation of antioxidants and inhibition of lipid peroxidation. Superoxide dismutase (SOD), peroxidase (POD), catalase (CAT), ascorbate peroxidase (APX). (*Boukhari et al 2020*)



Project Title:

Determining optimal rooting response of Mung Bean (*Vigna radiata*) to various *Saccharina Latissima* products and dilutions in a growth chamber bioassay

Report to:

Spoitz Enterprises Inc.

215-1610 Pandora Street,

Vancouver, BC, V5L 1L6

From:

Institute for Sustainable Horticulture

Kwantlen Polytechnic University

12666 – 72th Ave

Surrey BC, V3W 2M8

Trial site:

Kwantlen Polytechnic University, Langley campus

20901 Langley Bypass, Langley BC, V3A 8G9V

Director:

Deborah Henderson, PhD

Research Trial Team:

Aria Tamanaei

July, 2025

Background:

Saccharina latissima, commonly known as sugar kelp, is a brown macroalga of the family *Laminariaceae* with a wide distribution across the North Atlantic, Arctic, and North Pacific regions. In recent years, it has garnered significant attention for its sustainable cultivation and versatile applications, ranging from food and feed to biostimulants and biomaterials (Diehl et al.)

Large-scale cultivation of *S. latissima* has been optimized using longline and net systems, achieving yields up to 91 t FW·ha^{-1} over 1.5 years. This species contributes to nutrient removal and carbon sequestration, enhancing ecosystem services while supporting sustainable agricultural systems (Boderskov et al.).

S. latissima contains a rich composition of bioactive molecules, polysaccharides (alginate, fucoidans), polyphenols, amino acids, minerals (e.g., Fe, Zn, Mn), and plant hormones (auxins, cytokinins), that collectively stimulate plant growth and stress resilience (Pacheco, D et al.). Extracts from brown algae, including *S. latissima*, have demonstrated enhanced root architecture, biomass accumulation, chlorophyll content, and tolerance to drought or salinity stress in a range of crops (Bilan et al.).

Cotas et al (2022), conducted trials using *S. latissima* extract and found significantly increased lettuce leaf mass and micronutrient levels—zinc and manganese—relative to controls, confirming the efficacy of crude seaweed extracts as natural biofertilizers. Another trial using tomato and petunia seedlings found that sugar kelp extracts improved biomass and root index ratings, particularly under low fertilization conditions (NEIWPCC 2020).

The stimulatory effect of algal extracts is hypothesized to arise from synergistic interactions among phytohormones, nutrients, and secondary metabolites that activate plant physiological pathways. However, formulation stability, extraction methods, and product consistency play a vital role.

Building upon existing research, this study evaluates a series of *Saccharina latissima*-derived products (Products 1, 2, 3, F4, and F1B) for their potential to enhance root development and biomass accumulation under controlled bioassay conditions. A range of high and low concentration dilutions was employed to reflect the practical need for dosage optimization, aiming to minimize phytotoxic effects while maximizing biostimulant efficacy.

Materials and methods:

Experiment:

In this experiment, two were provided by the Kachemak Kelp Hub, and were selectively fermented prior to packaging. The design of Experiment followed the layout illustrated in Table 1 below.

Treatment #	F4	F1B	Remo	Kelpman	Potassium (10,000 PPM)	Water
Exp 2						
1	10:1					
2	15:1					
3	20:1					
4	25:1					
5	30:1					
6	50:1					
7	100:1					
8		10:1				
9		15:1				
10		20:1				
11		25:1				
12		30:1				
13		50:1				
14		100:1				
15			750:1			
16			200:1			
17			75:1			
18				200:1		
19				75:1		
20				20:1		
21					10:1	
22					20:1	
23					40:1	
24					80:1	
25						1

Table 1: The arrangement of the second experiment.

This experiment consisted of 25 treatments in total. Two test products were evaluated, each at seven different dilution levels (7 treatments per product). Positive controls included two commercially available products, Remo and Kelpman, each tested at three dilution levels (3 treatments each), as well as a potassium solution (10,000 ppm) tested at four dilution levels. A water-only treatment served as the final control. Each treatment was replicated nine times to ensure statistical reliability.

Approximately 500 mung bean seeds were sown in seedling trays (26 × 52 cm) filled with Sunshine Mix #4 as the growing medium. The trays were placed in a controlled-environment growth chamber maintained at 27 °C, under a 16-hour light / 8-hour dark photoperiod and 80% relative humidity for a duration of seven days to promote uniform seedling development (Figure 3).

Figure 1: Mung bean seedlings in seedling trays

To organize the treatments and replicates systematically, twenty mL glass vials were arranged in a plastic box. Each box contained 12 rows, with 9 vials per row, resulting in a total of 108 vials per box (the number of replicates in each box). In this configuration, each row represented a distinct treatment, and each vial within a row corresponded to an individual replicate of that treatment. The complete vial arrangement is shown in Figure 2. Two of these boxes were used in this experiment, plus 10 extra vials for the water control.

The 20 mL glass vials were filled with the appropriate dilutions of the test products and control solutions in preparation for treatment application. Following the initial growth period in seedling trays, uniform and healthy mung bean seedlings exhibiting fully expanded primary leaves were selected. Each seedling was then cut 4 cm below the cotyledonary node to produce standardized cuttings. These cuttings were immediately placed into the prepared vials containing the designated test solutions.

The vials containing the cuttings were placed in a growth chamber maintained at 27 °C, with a 16-hour light / 8-hour dark photoperiod and 80% relative humidity. The cuttings were exposed to the test solutions for a duration of seven days. During this period, vials were routinely monitored and refilled with reverse osmosis (RO) water as needed to maintain consistent solution volumes and prevent dehydration. At the end of the seven-day treatment period, the cuttings were removed from the growth chamber. The number of roots produced on each cutting was counted and recorded. Subsequently, the roots were cut, placed on labeled aluminum foil sheets corresponding to their treatment group, and securely wrapped. The wrapped samples were transferred to a drying oven, where they were maintained at a constant temperature of 30c until fully desiccated. Upon drying, the dry weight (biomass) of each

replicate's root system was measured using a precision analytical balance, and the values were recorded for statistical analysis.

Upon completion of data collection and compilation, a one-way ANOVA was conducted to assess differences among treatments. The analysis indicated statistically significant variation between treatment groups. To identify which specific treatments differed significantly, a Tukey's HSD test was subsequently performed as a post-hoc analysis.

Results:

In this experiment a high rate of plant mortality was observed among several replicates of the F4 and F1B products, particularly at higher concentrations. As illustrated in Figure 7, these treatments resulted in little to no root development and were accompanied by visible symptoms of stress, such as leaf abscission. These findings suggest phytotoxic effects associated with the higher concentrations of F4 and F1B formulations.

Figure 2: Comparison of treatments highlighting phytotoxicity and root development.

Higher concentrations of Product F4 and F1B, specifically Treatments 1 and 2 (F4 at 10:1 and 15:1 dilution) and Treatments 8 and 9 (F1B at 10:1 and 15:1 dilutions), exhibited plant mortality, characterized by stem tissue damage below the cotyledonary node and complete leaf abscission. In contrast, lower concentrations of these products demonstrated a stimulatory effect on rooting. For example, Treatment 7 (F4 at 100:1 dilution) showed enhanced root development with no visible signs of phytotoxicity.

Table 4 shows the statistical differences among the 25 treatments with respect to mean root number and biomass. Treatments that share the same letter are not significantly different from one another. In contrast, treatments that do not share any letters are significantly different. This table provides a clear comparison of treatment performance, helping to identify which products and dilutions had the most consistent and statistically supported effects on root number and biomass.

treatments	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Mean Root #	7.22 ef	3.22 ef	10.11 ef	17.11 def	41.67 cd	48.33 bc	103 a	1.33 f	8.33 ef	7 ef	20.67 cdef	19.44 cdef	33.78 cde	83.67 a	46.44 bcd	87.89 a	97.78 a	80 a	73.56 ab	41.67 cd	0 f	0 f	0.56 f	24.44 cdef	6.56 ef
Mean Biomass (mg)	0.71 e	0.17 e	0.76 e	2.2 e	3.06 de	3.78 de	13.03 a	0.03 e	0.92 e	0.51 e	1.7 e	2.92 de	3.31 de	8.73 abc	4.16 cde	9.98 ab	11.39 ab	11.56 ab	7.63 bcd	2.22 e	0 e	0 e	0 e	3.88 cde	0.02 e

Table 2: Mean mung bean root number and biomass (in mg) of all treatments in Experiment 2. The same letter below means indicates no significant difference between the means.

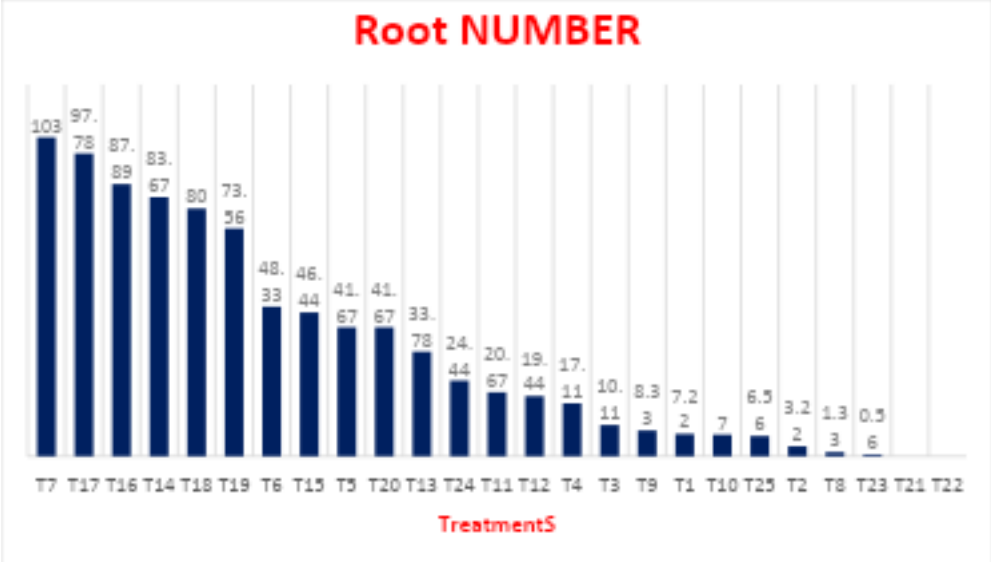


Figure 3: illustrates the average number of roots produced across 25 different treatments, presented in descending order. Each bar represents the mean root count per treatment, highlighting substantial variability in root development under the tested conditions.

Treatment 7 (Product F4 at a 100:1 dilution) and Treatment 17 (Product Remo at a 75:1 dilution) produced the highest root numbers, averaging 103 and 97.78 roots, respectively. These results indicate that this concentration range provided the most positive effect on root initiation. In contrast, Treatments 22 and 21 (Potassium at 20:1 and 10:1 dilution, respectively) yielded no root formation (0 roots).

These findings underscore the variation in treatment efficacy, with only a select few concentrations demonstrating statistically significant root development.

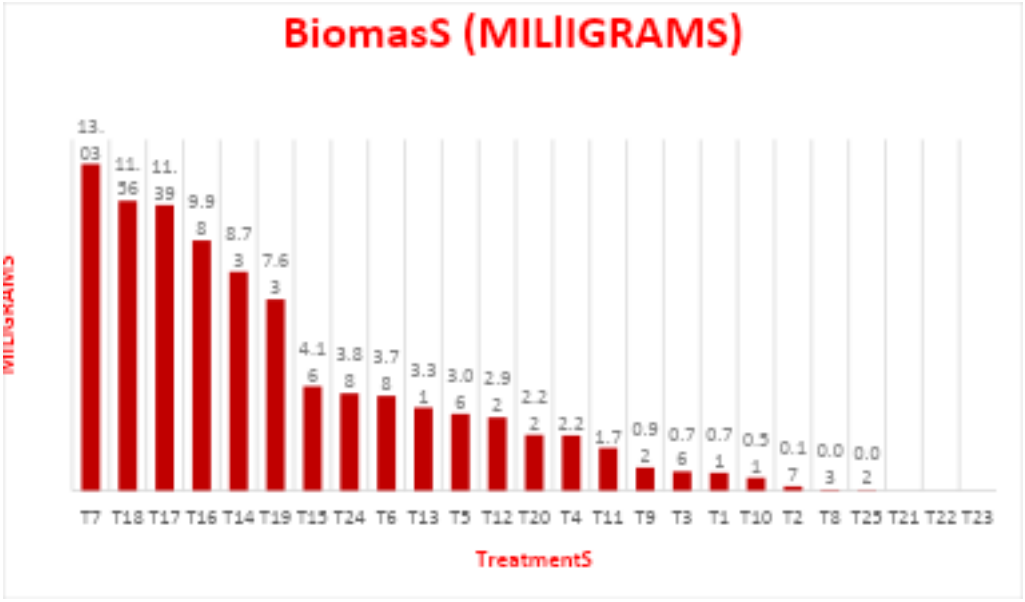


Figure 4: Presents the average dry root weight (biomass) across 25 different treatments, arranged in descending order. Each bar represents the mean biomass per treatment, revealing variability in root development under the tested conditions.

Treatment 7 (Product F4 at a 100:1 dilution) and Treatment 18 (Product Kelpman at a 200:1 dilution) recorded the highest biomass values, with averages of 13.03 mg and 11.56 mg, respectively, indicating a strong positive effect on root growth. In contrast, Treatments 23 and 22 (Potassium at 40:1 and 20:1 dilution, respectively) resulted in no measurable root biomass (0 mg).

Other notable treatments included Treatment 17 and Treatment 16 (Product Remo at 75:1 and 200:1 dilutions), which produced biomass values of 11.39 mg and 9.98 mg, respectively, demonstrating their effectiveness in enhancing root development.

As shown in Table 4, treatments sharing the same letter grouping are not significantly different from one another, while treatments with different letters are statistically distinct in terms of root biomass.

These results emphasize the variation in treatment efficacy, with only a subset of dilutions producing a statistically significant increase in root biomass.

Conclusion:

In terms of root number, Product F4 at a 100:1 dilution demonstrated the highest performance, followed closely by Product Remo at a 75:1 dilution, a commercially available kelp-based biostimulant. Product F1B at a 100:1 dilution ranked fourth overall in root number generation.

Regarding dry root biomass, Product F4 at 100:1 again yielded the highest value, followed by Product Kelpman at 200:1, another commercially available kelp-based product. Product F1B at 100:1 ranked fifth in biomass production.

Overall, between Products F4 and F1B, Product F4 at a 100:1 dilution was the most effective treatment, outperforming others in both root number and biomass, and demonstrating strong potential as a biostimulant in Experiment 2.

Work cited:

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8. Pacheco, D., Cotas, J., Pereira, L., & Bahcevandziev, K. (2023). A Possible Synergistic Approach: Case Study of *Saccharina latissima* Extract and Nitrifying Bacteria in Lettuce. *Journal of Marine Science and Engineering*, *11*(9), 1645. https://doi.org/10.3390/jmse11091645

Preliminary Results Jan 2, 2026

Methods summary:

AFES Beets

During harvest, we weighed the total yield from each plot of all harvested, marketable beets after washing (including leaves). Then we cut off the leaves of all the beets and weighed all the beets from the plot. We randomly selected 3 beets from each plot. For those beets, we measured the area (cm2) and weight of one randomly selected leaf per plant. Then we cut off all leaves from each of the selected beets and weighed them (roots only). We cut up the selected leaf and the selected 3 beets and dried them in a drying oven and weighed them again after drying.

- Response Variables:
    - Leaf Area (of 1 randomly sampled leaf from each of the 3 randomly sampled beets)
    - Fresh Weight (of 1 randomly sampled leaf from each of the 3 randomly sampled beets)
    - Dry Weight (of 1 randomly sampled leaf from each of the 3 randomly sampled beets)
    - Fresh Root Weight (of each of 3 randomly sampled beets)
    - Dry Root Weight (of each of 3 randomly sampled beets)
    - Plot Yield - Whole Plant
    - Plot Yield - Root Only

Twitter Creek Beets

The only difference between Twitter Creek and AFES is that at Twitter Creek we not only weighed and measured the weight and area of one randomly selected leaf. But we also weighed all the leaves together from each selected beet plant replicate. We dried all the leaves from each selected plant, together, so that we have the fresh and dry weight of all the leaves for each plant.

- Response Variables:
    - Plot Yield - Whole Plant
    - Plot Yield - Root Only
    - Leaf Area (of 1 randomly sampled leaf from each of the 3 randomly sampled beets)
    - Fresh Leaf Weight (of 1 randomly sampled leaf from each of the 3 randomly sampled beets)

- Dry Leaf Weight (of 1 randomly sampled leaf from each of the 3 randomly sampled beets)
- Fresh Leaves Weight (of all leaves from each of the 3 randomly sampled beets)
- Dry Leaves Weight (of all leaves from each of the 3 randomly sampled beets)
- Fresh Root Weight (of each of 3 randomly sampled beets)
- Dry Root Weight (of each of 3 randomly sampled beets)

AFES Potatoes

Total belowground biomass yield (potatoes only, no leaves) was measured for each plot. From each plot, 5 potatoes were selected and weighed all together (unfortunately, we did not have each of the 5 potatoes weighed individually). Then the group of 5 potatoes from each plot were cut up and dried together.

- Response Variables:
    - Plot Yield - Root Only
    - Fresh Weight (of a group of 5 randomly selected potatoes)
    - Dry Weight (of a group of 5 randomly selected potatoes)

Twitter Creek Potatoes

Every potato from every plot was weighed individually. Then 3 potatoes from each plot were randomly selected, weighed, and then cut up and dried individually. Pest damage and cracking were documented.

- Response Variables:
    - Fresh Weight Potato (of every potato from every plot)
    - Number of Potatoes per plot
    - Average Potato Weight (of all potatoes in a plot)
    - Plot Yield - Total Weight of All Potatoes
    - Number of Cracked Potatoes
    - Number of Pest Damaged Potatoes
    - Fresh Weight (of 3 randomly selected potatoes)
    - Dry Weight (of 3 randomly selected potatoes)

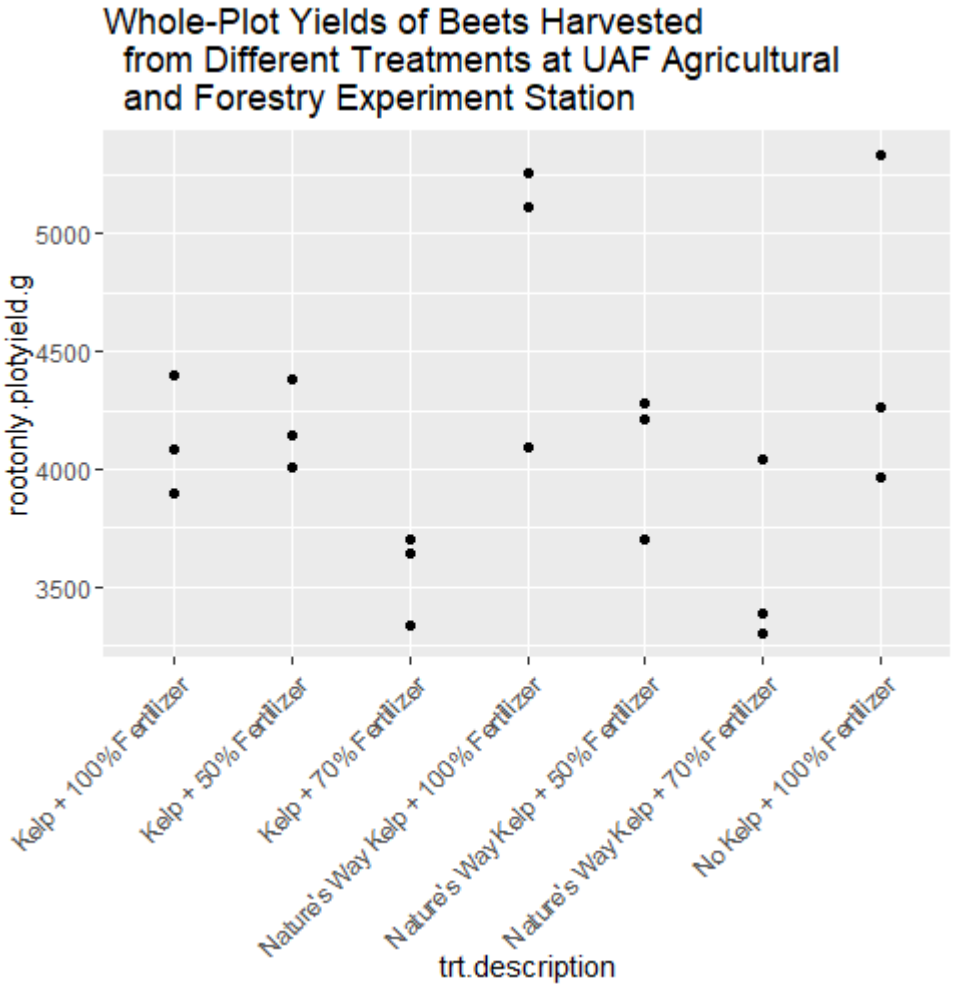
All Plots

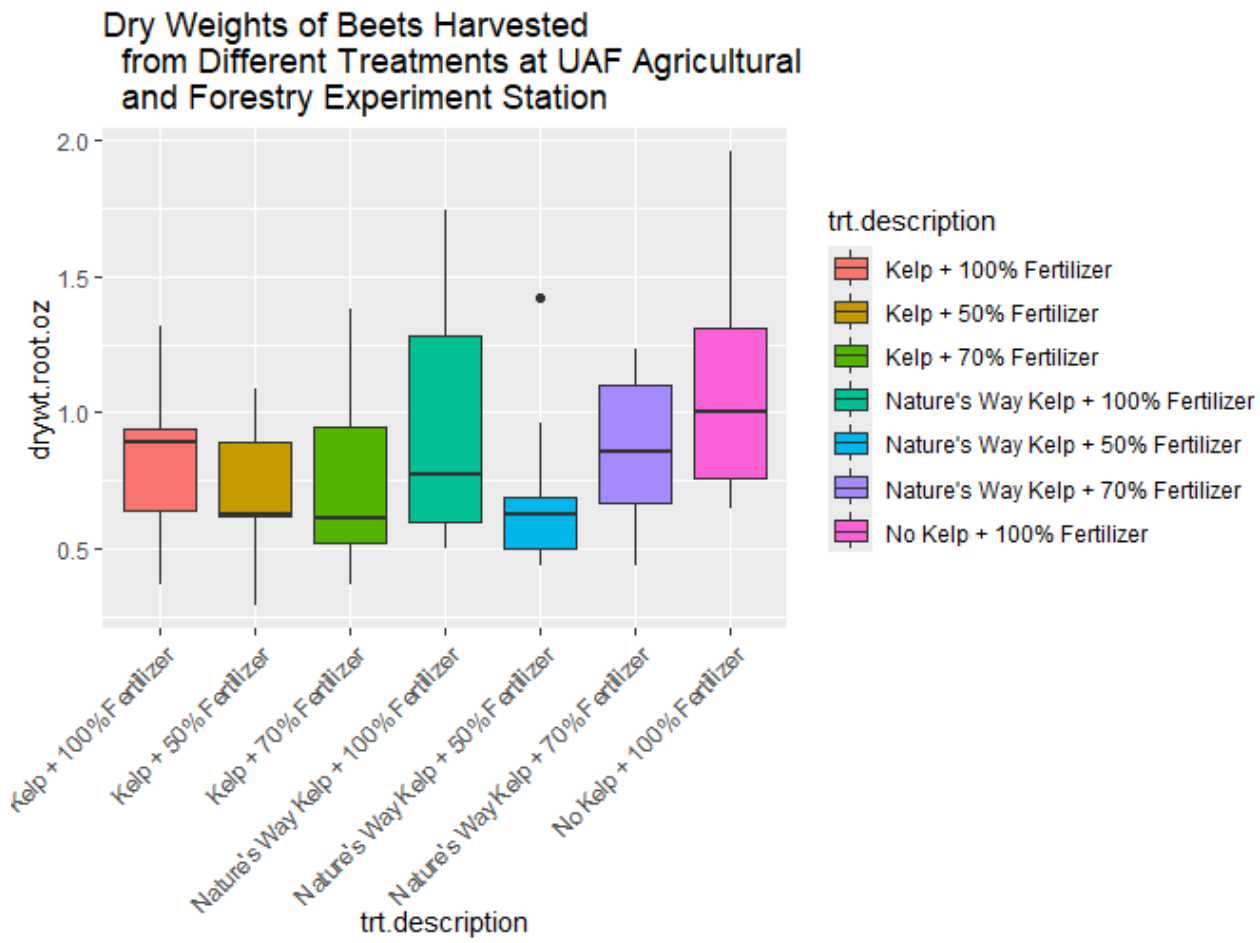
For all plots, we qualitatively observed plant characteristics including plant vigor, pest resistance, disease resistance, and bolting sensitivity.

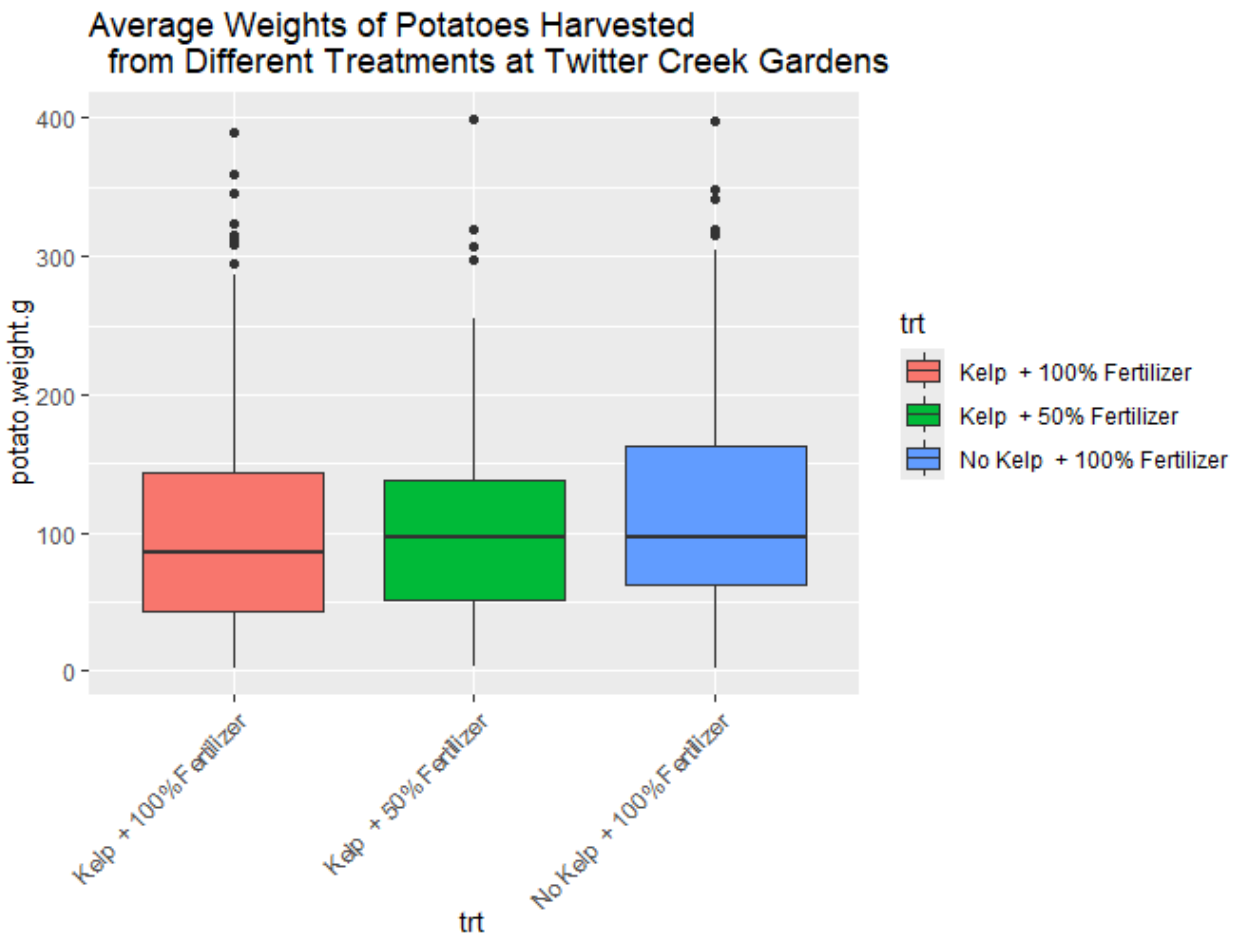
Results

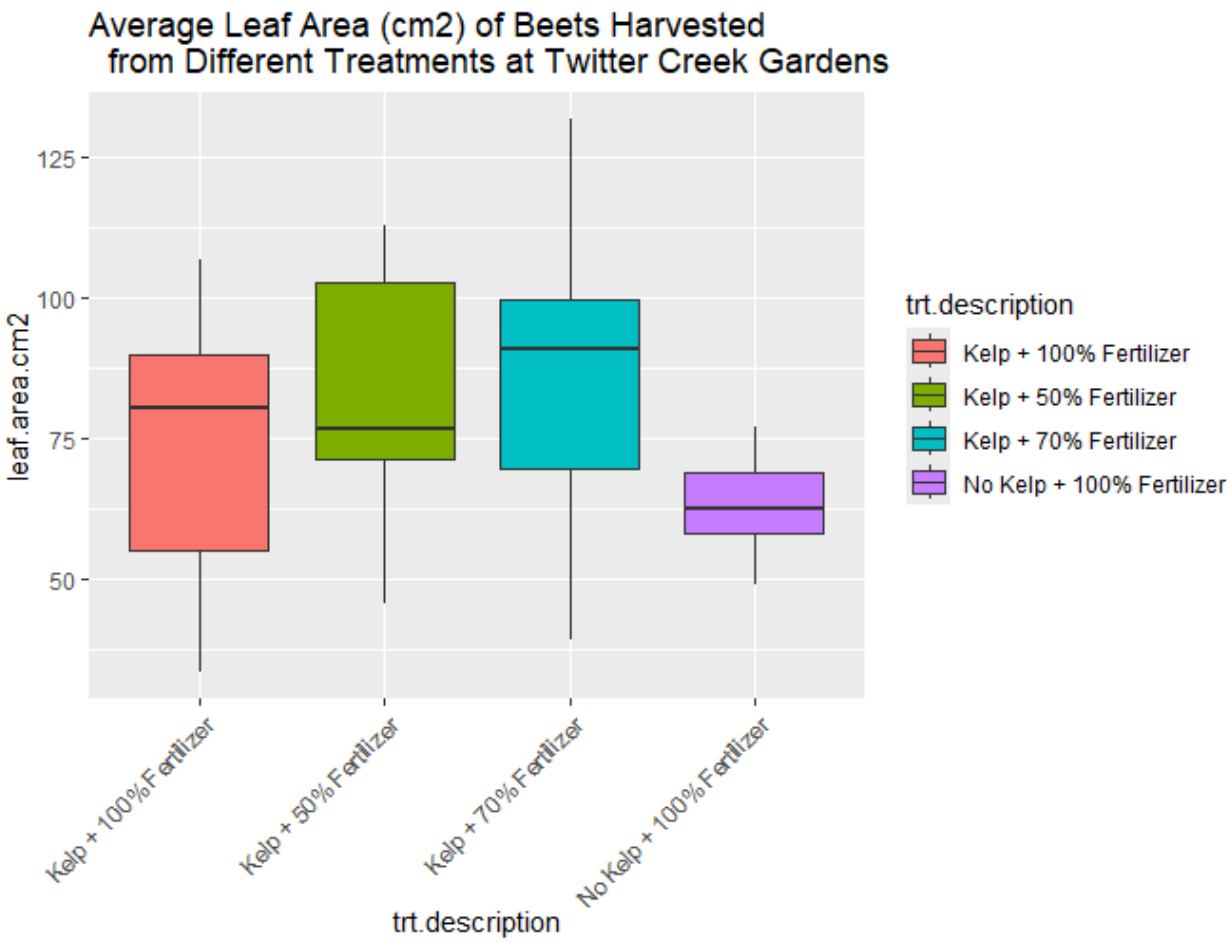
I analyzed the effect of kelp and fertilizer additions on every response variable. These were the results that were significant ($p < 0.05$) or close to significant.

For AFES Beets, 100% fertilizer resulted in higher root-only plot yields than 70% fertilizer. p = 0.00158
For AFES Beets, 100%fert resulted in higher dry weight of roots than 50% fert p = 0.0498
For TCG Potatoes, No Kelp resulted in higher average potato weight than Kelp. p = 0.0148
For TCG Beets, Kelp led to bigger leaf area (of 3 leaves subsampled) and higher leaf weights (of 3 weights subsampled) than No Kelp p = 0.0577 for leaf area and p = 0.0574 for leaf weight




Dry Weights of Beets Harvested
from Different Treatments at UAF Agricultural
and Forestry Experiment Station
drywt.root.oz
2.0
1.5
1.0
0.5
Kelp + 100% Fertilizer
Kelp + 50% Fertilizer
Kelp + 70% Fertilizer
Nature's Way Kelp + 100% Fertilizer
Nature's Way Kelp + 50% Fertilizer
Nature's Way Kelp + 70% Fertilizer
No Kelp + 100% Fertilizer
trt.description
trt.description
Kelp + 100% Fertilizer
Kelp + 50% Fertilizer
Kelp + 70% Fertilizer
Nature's Way Kelp + 100% Fertilizer
Nature's Way Kelp + 50% Fertilizer
Nature's Way Kelp + 70% Fertilizer
No Kelp + 100% Fertilizer


Average Weights of Potatoes Harvested
from Different Treatments at Twitter Creek Gardens
potato.weight.g
400
300
200
100
0
Kelp +100% Fertilizer
Kelp +50% Fertilizer
No Kelp +100% Fertilizer
trt
trt
Kelp +100% Fertilizer
Kelp +50% Fertilizer
No Kelp +100% Fertilizer


Average Leaf Area (cm2) of Beets Harvested
from Different Treatments at Twitter Creek Gardens
leaf.area.cm2
125
100
75
50
Kelp + 100% Fertilizer
Kelp + 50% Fertilizer
Kelp + 70% Fertilizer
No Kelp + 100% Fertilizer
trt.description
trt.description
Kelp + 100% Fertilizer
Kelp + 50% Fertilizer
Kelp + 70% Fertilizer
No Kelp + 100% Fertilizer

Appendix F: Department of Natural Resources Land Use Permits for EVOS Test Sites

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources

DIVISION OF MINING, LAND & WATER
Southcentral Regional Land Office

550 W. 7th Ave., Suite 900C
Anchorage, Alaska 99501-3577
Main: (907) 269-8503
TTY: 711 or 880.770.8973
Fax: (907) 269-8913

LAND USE PERMIT
AMENDED
AS 38.05.850
PERMIT # LAS 33304

CHUGACH REGIONAL RESOURCES COMMISSION herein known as the Grantee, is issued this permit from the Department of Natural Resources, herein known as the Grantor, authorizing the use of state land within:

Legal Description:
SW1/4 of Section 30, Township 2 South, Range 8 East, Seward Meridian (Foxfarm Bay)

This permit is issued for the purpose of authorizing the following:

The use of up to 4 acres of state-owned tidelands within Foxfarm Bay for the placement of an aquatic array as part of a research study on kelp growth. The array site will use a submerged longline kelp grow-out system with the dimensions of 100-feet long by 150-feet wide. The array site uses a total of (6) 500-pound anchors with (6) anchor buoys, plus (36) A-4 buoys to maintain the depth of the grow lines throughout the array. The site will be operational from mid-September through mid-May, while the anchors, buoys, and related gear will remain in place year-round until the project is complete.

This permit is for the term beginning **August 1, 2025** and ending **July 31, 2030** unless sooner terminated at the state's discretion, effective the date of signature by the Authorized State Representative. This permit does not convey an interest in state land and as such is revocable, with or without cause. The Grantor will give 30 days' notice before revoking a permit at will. A revocation for cause is effective immediately. No preference right for use or conveyance of the land is granted or implied by this authorization.

This permit is issued subject to the following:

- Payment of the annual use fee in the amount of $1,320.00 due on or before the annual anniversary date and any additional fees identified in the stipulations below.
- Remittance of a performance guaranty in the amount of $2,500.00 as required in the stipulations below.
- Proof of insurance as described in stipulations below.

The non-receipt of a courtesy billing notice does not relieve the Grantee from the responsibility of paying fees on or before the due date.

All activities shall be conducted in accordance with the following stipulations:

1. **Authorized Officer:** The Authorized Officer (AO) for the State of Alaska (State), Department of Natural Resources (DNR), Division of Mining, Land and Water (DMLW), is the Regional Manager or designee.

2. **Change of Contact Information:** The Grantee shall maintain current contact information with the AO. Any change of contact information must be submitted in writing to the AO.

3. **Valid Existing Rights:** This authorization is subject to all valid existing rights and reservations in and to the authorized area. The State makes no representations or warranties, whatsoever, either expressed or implied, as to the existence, number, or nature of such valid existing rights.

4. **Preference Right:** No preference right for subsequent authorizations is granted or implied by this authorization.

5. **Inspections:** The AO shall have reasonable access to the authorized area for inspection, which may be conducted without prior notice. If the Grantee is found to be in noncompliance the authorized area may be subject to reinspection. The Grantee may be charged for actual expenses of any inspection.

6. **Public Access:** The construction, operation, use, and maintenance of the authorized area shall not interfere with public use of roads, trails, waters, landing areas, and public access easements. The ability to use or access state land or public waters may not be restricted in any manner. However, if a specific activity poses a safety concern, the AO may allow the restriction of public access for a specific period of time. The Grantee is required to contact the AO in advance for approval. No restriction is allowed unless specifically authorized in writing by the AO.

7. **Public Trust Doctrine:** The Public Trust Doctrine guarantees public access to, and the public right to use, navigable and public waters and the land beneath them for navigation, commerce, fishing, and other purposes. This authorization is subject to the principles of the Public Trust Doctrine regarding navigable or public waters. The AO reserves the right to grant other interests consistent with the Public Trust Doctrine.

8. **Alaska Historic Preservation Act:** The Alaska Historic Preservation Act, AS 41.35.200, prohibits the appropriation, excavation, removal, injury, or destruction of any state owned historic, prehistoric, archaeological or paleontological site without written approval from the DNR Commissioner. Should any sites be discovered, the Grantee shall cease any activities that may cause damage and immediately contact the AO and the Office of History and Archaeology in the Division of Parks and Recreation.

9. **Compliance with Government Requirements:** The Grantee shall, at its expense, comply with all federal, state, and local laws, regulations, and ordinances directly or indirectly related to this authorization. The Grantee shall ensure compliance by its employees, agents, contractors, subcontractors, licensees, or invitees.

10. **Incurred Expenses:** The Grantor shall in no way be held liable for expenses incurred by the Grantee connected with the activities directly or indirectly related to this authorization.

11. **Waiver of Forbearance:** Any failure on the part of the AO to enforce the terms of this authorization, or the waiver of any right under this authorization by the Grantee, unless in writing, shall not discharge or invalidate the authorization of such terms. No forbearance or written waiver affects the right of the AO to enforce any terms in the event of any subsequent violations of terms of this authorization.

12. **Severability Clause:** If any clause or provision of this authorization is, in a final judicial proceeding, determined illegal, invalid, or unenforceable under present or future laws, then the Grantor and the Grantee agree that the remainder of this authorization will not be affected, and in lieu of each clause or provision of this authorization that is illegal, invalid, or unenforceable, there will be added as a part of this authorization a clause or provision as similar in terms to the illegal, invalid, or unenforceable clause or provision as may be possible, legal, valid, and enforceable.

13. **Permit Extensions/Reissuance:** Any request for permit extension or reissuance should be submitted at least 90 days prior to the end of the authorized term. A written statement requesting a one-year extension confirming there will be no changes to the development/operations plan, including photographs clearly depicting the current condition of the site and any improvements, must be submitted to the AO with any required filing fee. A new Land Use Permit application and any required filing fee is required when requesting reissuance of up to five years or for modifications to the approved development/operations plan on file with DMLW.

14. **Assignment:** This permit may not be transferred or assigned.

15. **Reservation of Rights:**
    a. The AO reserves the right to grant additional authorizations to third parties for compatible uses on or adjacent to the land under this authorization.
    b. Authorized concurrent users of state land, their agents, employees, contractors, subcontractors, and licensees, shall not interfere with the operation or maintenance activities of each user.
    c. The AO may require authorized concurrent users of state land to enter into an equitable operation or maintenance agreement.

16. **Violations:** A violation of this authorization is subject to any action available to the State for enforcement and remedies, including revocation of the permit, civil action for forcible entry and detainer, ejectment, trespass, damages, and associated costs, or arrest and prosecution for criminal trespass in the second degree. The State may seek damages available under a civil action, including restoration damages, compensatory damages, and treble damages under AS 09.45.730 or AS 09.45.735 for violations involving injuring or removing trees or shrubs, gathering geotechnical data, or taking mineral resources.

17. **Directives:** Directives may be issued for corrective actions that are required to correct a deviation from design criteria, project specifications, stipulations, State statutes or regulations. Work at the area subject to the Directive may continue while implementing the corrective action. Corrective action may include halting or avoiding specific conduct, implementing alternative measures, repairing any damage to state resources that may have resulted from the conduct, or other action as determined by DNR.

18. **Stop Work Orders:** Stop Work Orders may be issued if there is a deviation from design criteria, project specifications, stipulations, State statutes or regulations and that deviation is causing or is likely to cause significant damage to state resources. Under a Stop Work Order, work at the area subject to the Stop Work Order may not resume until the deviation is cured and corrective action is taken. Corrective action may include halting or avoiding specific conduct, implementing alternative measures, repairing any damage to state resources that may have resulted from the conduct, or other action as determined by DNR.

19. **Accidents and Incidents:** The Grantee will notify the AO within 24 hours of any accidents, injuries, or operational problems associated with the authorization including, but not limited to, conflicts with other operators or the general public, client or guide triggered avalanche incidents, lost or overdue clients or employees due to avalanche, or fatalities. The AO phone number is (907) 269-8503. The Grantee will maintain complete records or all accidents and incidents which will be made available to the AO upon request.

20. **Notification of Discharge:** The Grantee shall immediately notify the Department of Environmental Conservation (DEC) and AO of any unauthorized discharge of oil to water, any discharge of hazardous substances (other than oil), and any discharge of oil greater than 55 gallons on land. All fires and explosions must also be reported immediately.

    If a discharge, including a cumulative discharge, of oil is greater than 10 gallons but less than 55 gallons, or a discharge of oil greater than 55 gallons is made to an impermeable secondary containment area, the Grantee shall report the discharge within 48 hours. Any discharge of oil greater than one gallon up to 10 gallons, including a cumulative discharge, solely to land, must be reported in writing on a monthly basis.

    Notification of discharge during normal business hours must be made to the nearest DEC Area Response Team: Anchorage (907)269-3063, fax (907) 269-7648; Fairbanks (907) 451-2121, fax (907) 451-2362; Juneau (907) 465-5340, fax (907) 465-5245. For discharges in state off shore waters call (907) 269-0667. The DEC oil spill report number outside normal business hours is (800) 478-9300.

    Notification of discharge must be made to the appropriate DNR Office, preferably by e-mail: Anchorage email dnr.scro.spill@alaska.gov, (907) 269-8503; Fairbanks email dnr.nro.spill@alaska.gov, (907) 451-2739; Juneau email dnr.sero.spill@alaska.gov, (907) 465-3400. The Grantee shall supply the AO with all incident reports submitted to DEC.

21. **Returned Check Penalty:** A returned check penalty of $50.00 will be charged for any check on which the bank refuses payment. Late payment penalties shall continue to accrue.

22. **Late Payment Penalty Charges:** The Grantee shall pay a fee for any late payment. The amount is the greater of either $50.00 or interest accrued daily at the rate of 10.5% per annum and will be assessed on each past-due payment until paid in full.

23. **Use Fees:** The Grantee shall pay to DMLW an annual use fee of $1,320.00. The use fee is due on or before the annual anniversary of the effective date of this permit without the necessity of any billing by DMLW. The annual use fee is subject to adjustments in any relevant fee schedule.

24. **Request for Information:** The AO, at any time, may require the Grantee to provide any information directly or indirectly related to this authorization, in a manner prescribed by the AO.

25. **Completion Report:** A completion report shall be submitted prior to relinquishment, or within 30 days after expiration or termination of the authorization. Failure to submit a satisfactory report subjects the site to a field inspection requirement for which the Grantee may be assessed an inspection fee, as outlined herein. The report shall contain the following information:
    a. a statement of restoration activities and methods of debris disposal;
    b. a statement that the Grantee has removed all improvements and personal property from the authorized area;
    c. a report covering any known incidents of damage to the vegetative mat and underlying substrate, and follow-up corrective actions that may have taken place while operating under this authorization;
    d. and, photographs of the permitted site taken before, during and after the proposed activity to document permit compliance. Photographs must consist of a series of aerial view or ground-level view photographs that clearly depict compliance with site cleanup and restoration guidelines;

26. **Annual Report:** An annual report shall be submitted within 30 days after the seasonally authorized term or the annual anniversary date of the authorization, whichever is applicable. If the site was not used during the calendar year than the report should indicate such. The report shall include:
    1. a written report disclosing:
    2. a series of before, during, and after use aerial view and/or ground-level view photographs confirming compliance with site development and restoration guidelines; and
        i. i. the date the temporary facility was established or the first use of the site during the calendar year;
        ii. the date the temporary facility was dismantled and removed or cached the last use during the calendar year;
        iii. the restoration of damaged vegetation or disturbed soil; and
        iv. the dates of any hydrocarbon or hazardous substance spills, and the dates such spills were reported to DNR and DEC.

27. **Site Disturbance:** Site disturbance shall be kept to a minimum to protect local habitats. All activities at the site shall be conducted in a manner that will minimize the disturbance of soil and vegetation and changes in the character of natural drainage systems.
    a. Brush clearing is allowed but should be kept to the minimum necessary. Removal or destruction of the vegetative mat is not authorized under this permit.
    b. Establishment of, or improvements to, landing areas (i.e. leveling the ground or removing or modifying a substantial amount of vegetation) is prohibited.
    c. Attention must be paid to prevent pollution and siltation of streams, lakes, ponds, wetlands, and disturbances to fish and wildlife habitat.
    d. Any ground disturbances which may have occurred shall be contoured to blend with the natural topography to protect human and wildlife health and safety.

28. **Site Restoration:** On or before permit expiration (if a reissuance application has not been submitted) or termination of this authorization by the Grantee, the Grantee shall remove all

improvements, personal property, and other chattels, and return the permitted area to a clean and safe condition. In the event the Grantee fails to comply with this requirement, the Grantee shall be held liable for any and all costs incurred by the State to return the permitted area to a clean and safe condition.

29. **Indemnification:** The Grantee assumes all responsibility, risk and liability for its activities and those of its employees, agents, contractors, subcontractors, licensees, or invitees, directly or indirectly related to this permit, including environmental and hazardous substance risk and liability, whether accruing during or after the term of this permit. The Grantee shall defend, indemnify, and hold harmless the State, its agents and employees, from and against any and all suits, claims, actions, losses, costs, penalties, and damages of whatever kind or nature, including all attorney's fees and litigation costs, arising out of , in connection with, or incident to any act or omission by the Grantee, its employees, agents, contractors, subcontractors, licensees, or invitees, unless the proximate cause of the injury or damage is the sole negligence or willful misconduct of the State or a person acting on the State's behalf. Within 15 days, the Grantee shall accept any such cause, action or proceeding upon tender by the State. This indemnification shall survive the termination of the permit.

30. **Insurance:** Pursuant to 11 AAC 96.065 the Grantee shall secure or purchase at its own expense, and maintain in force at all times during the term of this permit, liability coverage and limits consistent with what is professionally recommended as adequate to protect the Grantee (the insured) and Grantor (the State, its officers, agents and employees) from the liability exposures of ALL the insured's operations on state land. Certificates of Insurance must be furnished to the AO prior to the issuance of this permit and must provide for a notice of cancellation, non-renewal, or material change of conditions in accordance with policy provisions. The Grantee must provide for a 60-day prior notice to the State before they cancel, not renew or make material changes to conditions to the policy. Failure to furnish satisfactory evidence of insurance, or lapse of the policy, are material breaches of this permit and shall be grounds, at the option of the State, for termination of the permit. All insurance policies shall comply with, and be issued by, insurers licensed to transact the business of insurance under Alaska Statute, Title 21. The policy shall be written on an "occurrence" form and shall not be written as a "claims-made" form unless specifically reviewed and agreed to by the Division of Risk Management, Department of Administration. The State must be named as an additional named insured on the policy with respect to the operations of the Grantee on or in conjunction with the permitted premises, referred to as LAS 33304.

31. **Performance Guaranty:** Pursuant to 11 AAC 96.060, the Grantee shall provide a surety bond or other form of security acceptable to the DMLW in the amount of $2,500.00 payable to the State of Alaska. Such performance guaranty shall remain in effect for the term of this authorization and shall secure performance of the Grantee's obligations hereunder. The amount of the performance guaranty may be adjusted by the AO in the event of approved amendments to this authorization, changes in the development plan, or any change in the activities or operations conducted on the premises. The guaranty may be utilized by the State to cover actual costs incurred by the State to pay for any necessary corrective actions in the event the Grantee does not comply with the site utilization, restoration requirements and other stipulations contained in this permit agreement. If the Grantee fails to perform the obligations under this permit within a reasonable timeframe, the State may perform the Grantee's obligations at the Grantee's expense. The Grantee agrees to pay within 20 days following demand, all costs and expenses incurred by the State as a result of the failure of the Grantee

to comply with the terms and conditions of this permit. Failure to do so may result in the termination of an authorization and/or forfeiture of the performance guaranty. The provisions of this permit shall not prejudice the State's right to obtain a remedy under any law or regulation. If the AO determines that the Grantee has satisfied the terms and conditions of this authorization, the performance guaranty will be subject to release. The performance guaranty may only be released in writing by the AO.

32. **Fuel and Hazardous Substances:** No fuel or hazardous substances may be stored on state land.

33. **Waste Disposal:** On-site refuse disposal is prohibited, unless specifically authorized. All waste generated during operation, maintenance, and termination activities under this authorization shall be removed and disposed of at an off-site DEC approved disposal facility. Waste, in this paragraph, means all discarded matter, including but not limited to human waste, trash, garbage, refuse, oil drums, petroleum products, ashes and discarded equipment.

34. **Wastewater Disposal:** No pit privies are authorized.

35. **Solid Waste:**
    a. All solid waste and debris, including dog waste, generated from the activities conducted under this authorization shall be removed to a facility approved by DEC on a regular basis such that the premise be maintained to ensure a healthy and safe environment.
    b. Putrescible waste (waste that can decompose and cause obnoxious odor) shall be stored in a manner that prevents the attraction of or access to wildlife or disease vectors; and
    c. Paper products may be burned on site if measures (e.g. burn barrels, clearing of burn area to mineral soil) are taken to prevent wildfires.

36. **Navigation and Public Access:** Anchoring methods, shoreties, buoys and running lines shall not preclude reasonable public access nor interfere with the ability to safely navigate within and adjacent to the permitted area.

37. **Destruction of Markers:** The Grantee shall protect all survey monuments, witness corners, reference monuments, mining claim posts, bearing trees, and unsurveyed corner posts against damage, destruction, or obliteration. The Grantee shall notify the AO of any damaged, destroyed, or obliterated markers and shall reestablish the markers at the Grantee’s expense in accordance with accepted survey practices of the DMLW.

38. **Site Maintenance:** The authorized area shall be maintained in a neat, clean, and safe condition, free of any solid waste, debris, or litter, except as specifically authorized herein. Nothing may be stored that would be an attractive nuisance to wildlife or create a potentially hazardous situation.

39. **Maintenance of Improvements:** The Grantor is not responsible for maintenance of authorized improvements or liable for injuries or damages related to those improvements. No action or inaction of the Grantor is to be construed as assumption of responsibility.

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must be approved by the AO in advance and may require additional fees and changes to the terms of this authorization.

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42. **Proper Location:** This authorization is for activities on state lands or interests managed by DMLW. It does not authorize any activities on private, federal, native, and municipal lands, or lands which are owned or solely managed by other offices and agencies of the State. The Grantee is responsible for proper location within the authorized area.

43. **Improvements:** Any improvements/structures that may be authorized under this permit must be constructed in a manner that will allow for removal from the permitted site within 48 hours of receiving a notice to vacate. The establishment of permanent foundations and structures is prohibited under this permit. Authorized temporary improvements must be sited in a manner which impacts the least amount of ground consistent with the purpose of the facility. Any use of these improvements for purposes other than those explicitly authorized by this permit are prohibited.

44. **Fire Prevention, Protection and Liability:** The Grantee shall take all reasonable precautions to prevent and suppress forest, structure, brush and grass fires, and shall assume full liability for any damage to state land and structures resulting from the negligent use of fire. The State is not liable for damage to the Grantee's personal property and is not responsible for forest fire protection of the Grantee's activity. To report a wildfire, call 911 or 1-800-237-3633.

45. **Anchor Lines and Shoreties:**
    a. All lines must be secured and properly tensioned to avoid entanglement with marine mammals. The Grantee shall contact the NOAA Fisheries' 24/7 hotline at (877) 925-7773 if an injured, entangled, or dead marine mammal is seen in the authorized area.
    b. Use of shoreties connected to adjacent uplands is prohibited unless written permission is first obtained from the upland owner. Unauthorized use of the uplands where an authorization is required shall constitute just cause for termination of this permit.
    c. Shoreties that extend above water must be well-marked with reflective material.
    d. Shoreties spanning potential boat routes are to be submerged by weights or anchors so as not to impede or impair access and must be marked with buoys where the lines may present a potential navigation hazard.

Advisories:

1. Choose a farm location that avoids or minimizes overlap with important marine mammal habitats or migration corridors. Contact ADF&G Marine Mammals Program or NMFS Protected Resources to obtain any current, localized species distribution data when considering farm placement.
2. Minimize the number of vertical lines in the water to reduce entanglement risks for marine mammals.
3. Regularly maintain and monitor aquatic farm structures, keep lines secured, and keep lines tensioned under all tidal conditions.
4. Mark and maintain all buoys with the aquatic farm's ADL number or other unique

identifier. Markings must withstand the elements over time.
5. Remove grow lines and culture gear from the water when not in use.
6. Inspect moorings and anchors at least annually, and after storm events.
7. Collect and properly dispose of waste materials, excess line, and other debris.
8. Do not allow aquatic farm staff to interact with or feed marine mammals.
9. Practice avoidance techniques prior to attempting to deter any marine mammal from being near the farm site. Avoiding interactions is the safest method for preventing death, serious injury, or significant adverse effects to marine mammals. For example, remove attractants such as food or accessible platforms that seals or sea lions may use to haul out.
10. Maintain a documented predator avoidance plan that uses only benign, non-lethal deterrents (e.g., predator netting, increased net rigidity, electric fencing).
11. Operate vessels at slow speeds and with caution for marine mammals when transiting to the farm site and around the farm site.
12. Adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). Specifically:

a. Do not approach, by any means, including by interception (i.e., placing a vessel in the path of an oncoming humpback whale), within 100 yards of any humpback whale.

b. Do not cause a vessel or other object to approach within 100 yards of a humpback whale.

c. Do not disrupt the normal behavior or prior activity of a whale by any other act or omission.

13. Maintain a record of visits to the farm and gear inspections.
14. Participate in the Whale Alert program to report real-time sightings of whales while transiting in the waters of Alaska and to minimize the risk of vessel strikes (https://alaskafisheries.noaa.gov/pr/whale-alert).
15. Follow NMFS marine mammal viewing guidelines at https://www.fisheries.noaa.gov/alaska/marine-life-viewing-guidelines/alaska-marinemammal-viewing-guidelines-and-regulations
16. Immediately report any marine mammal observed entangled or otherwise directly interacting with the facility structures to the NMFS Alaska 24-hr. Stranding Hotline: 877-925-7773.

-Signature Page to Follow-

The Authorized Officer reserves the right to modify these stipulations or use additional stipulations as deemed necessary. The Grantee will be advised before any such modifications or additions are finalized. DNR has the authority to implement and enforce these conditions under AS 38.05.850. Any correspondence on this authorization may be directed to the Department of Natural Resources, Division of Mining, Land and Water, Southcentral Regional Land Office, 550 W. 7th Ave., Suite 900C, Anchorage, AK 99501-3577, (907) 269-8503.

I have read and understand all of the foregoing and attached stipulations. By signing this authorization, I agree to conduct the authorized activity in accordance with the terms and conditions of this authorization.

Dillon Hedrick-Price	Executive	1/26/
Signature of Grantee or Authorized Representative	Title	Date

6613 Brayton	Ancho	A	995
Grantee's Address	City	State	Zip

Briana		907-224	
Contact Person	Home Phone	Work Phone	

John Faber	NRM1 (Acting)	1/26/2026
Signature of Authorized State Representative	Title	Date

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources

DIVISION OF MINING, LAND & WATER
Southcentral Regional Land Office

550 W. 7th Ave., Suite 900C
Anchorage, Alaska 99501-3577
Main: (907) 269-8503
TTY: 711 or 880.770.8973
Fax: (907) 269-8913

LAND USE PERMIT
AMENDED
AS 38.05.850
PERMIT # LAS 33306

CHUGACH REGIONAL RESOURCES COMMISSION herein known as the Grantee, is issued this permit from the Department of Natural Resources, herein known as the Grantor, authorizing the use of state land within:

Legal Description:
SE1/4 of Section 13, Township 2 South, Range 8 East, Seward Meridian (Latouche Passage)

This permit is issued for the purpose of authorizing the following:

The use of up to 4 acres of state-owned tidelands within Latouche Passage for the placement of an aquatic array as part of a research study on kelp growth. The array site will use a submerged longline kelp grow-out system with the dimensions of 100-feet long by 150-feet wide. The array site uses a total of (6) 500-pound anchors with (6) anchor buoys, plus (36) A-4 buoys to maintain the depth of the grow lines throughout the array. The site will be operational from mid-September through mid-May, while the anchors, buoys, and related gear will remain in place year-round until the project is complete.

This permit is for the term beginning **August 1, 2025** and ending **July 31, 2030** unless sooner terminated at the state's discretion, effective the date of signature by the Authorized State Representative. This permit does not convey an interest in state land and as such is revocable, with or without cause. The Grantor will give 30 days' notice before revoking a permit at will. A revocation for cause is effective immediately. No preference right for use or conveyance of the land is granted or implied by this authorization.

This permit is issued subject to the following:

- Payment of the annual use fee in the amount of $1,320.00 due on or before the annual anniversary date and any additional fees identified in the stipulations below.
- Remittance of a performance guaranty in the amount of $2,500.00 as required in the stipulations below.
- Proof of insurance as described in stipulations below.

The non-receipt of a courtesy billing notice does not relieve the Grantee from the responsibility of paying fees on or before the due date.

All activities shall be conducted in accordance with the following stipulations:

1. **Authorized Officer:** The Authorized Officer (AO) for the State of Alaska (State), Department of Natural Resources (DNR), Division of Mining, Land and Water (DMLW), is the Regional Manager or designee.

2. **Change of Contact Information:** The Grantee shall maintain current contact information with the AO. Any change of contact information must be submitted in writing to the AO.

3. **Valid Existing Rights:** This authorization is subject to all valid existing rights and reservations in and to the authorized area. The State makes no representations or warranties, whatsoever, either expressed or implied, as to the existence, number, or nature of such valid existing rights.

4. **Preference Right:** No preference right for subsequent authorizations is granted or implied by this authorization.

5. **Inspections:** The AO shall have reasonable access to the authorized area for inspection, which may be conducted without prior notice. If the Grantee is found to be in noncompliance the authorized area may be subject to reinspection. The Grantee may be charged for actual expenses of any inspection.

6. **Public Access:** The construction, operation, use, and maintenance of the authorized area shall not interfere with public use of roads, trails, waters, landing areas, and public access easements. The ability to use or access state land or public waters may not be restricted in any manner. However, if a specific activity poses a safety concern, the AO may allow the restriction of public access for a specific period of time. The Grantee is required to contact the AO in advance for approval. No restriction is allowed unless specifically authorized in writing by the AO.

7. **Public Trust Doctrine:** The Public Trust Doctrine guarantees public access to, and the public right to use, navigable and public waters and the land beneath them for navigation, commerce, fishing, and other purposes. This authorization is subject to the principles of the Public Trust Doctrine regarding navigable or public waters. The AO reserves the right to grant other interests consistent with the Public Trust Doctrine.

8. **Alaska Historic Preservation Act:** The Alaska Historic Preservation Act, AS 41.35.200, prohibits the appropriation, excavation, removal, injury, or destruction of any state owned historic, prehistoric, archaeological or paleontological site without written approval from the DNR Commissioner. Should any sites be discovered, the Grantee shall cease any activities that may cause damage and immediately contact the AO and the Office of History and Archaeology in the Division of Parks and Recreation.

9. **Compliance with Government Requirements:** The Grantee shall, at its expense, comply with all federal, state, and local laws, regulations, and ordinances directly or indirectly related to this authorization. The Grantee shall ensure compliance by its employees, agents, contractors, subcontractors, licensees, or invitees.

10. **Incurred Expenses:** The Grantor shall in no way be held liable for expenses incurred by the Grantee connected with the activities directly or indirectly related to this authorization.

11. **Waiver of Forbearance:** Any failure on the part of the AO to enforce the terms of this authorization, or the waiver of any right under this authorization by the Grantee, unless in writing, shall not discharge or invalidate the authorization of such terms. No forbearance or written waiver affects the right of the AO to enforce any terms in the event of any subsequent violations of terms of this authorization.

12. **Severability Clause:** If any clause or provision of this authorization is, in a final judicial proceeding, determined illegal, invalid, or unenforceable under present or future laws, then the Grantor and the Grantee agree that the remainder of this authorization will not be affected, and in lieu of each clause or provision of this authorization that is illegal, invalid, or unenforceable, there will be added as a part of this authorization a clause or provision as similar in terms to the illegal, invalid, or unenforceable clause or provision as may be possible, legal, valid, and enforceable.

13. **Permit Extensions/Reissuance:** Any request for permit extension or reissuance should be submitted at least 90 days prior to the end of the authorized term. A written statement requesting a one-year extension confirming there will be no changes to the development/operations plan, including photographs clearly depicting the current condition of the site and any improvements, must be submitted to the AO with any required filing fee. A new Land Use Permit application and any required filing fee is required when requesting reissuance of up to five years or for modifications to the approved development/operations plan on file with DMLW.

14. **Assignment:** This permit may not be transferred or assigned.

15. **Reservation of Rights:**
    a. The AO reserves the right to grant additional authorizations to third parties for compatible uses on or adjacent to the land under this authorization.
    b. Authorized concurrent users of state land, their agents, employees, contractors, subcontractors, and licensees, shall not interfere with the operation or maintenance activities of each user.
    c. The AO may require authorized concurrent users of state land to enter into an equitable operation or maintenance agreement.

16. **Violations:** A violation of this authorization is subject to any action available to the State for enforcement and remedies, including revocation of the permit, civil action for forcible entry and detainer, ejectment, trespass, damages, and associated costs, or arrest and prosecution for criminal trespass in the second degree. The State may seek damages available under a civil action, including restoration damages, compensatory damages, and treble damages under AS 09.45.730 or AS 09.45.735 for violations involving injuring or removing trees or shrubs, gathering geotechnical data, or taking mineral resources.

17. **Directives:** Directives may be issued for corrective actions that are required to correct a deviation from design criteria, project specifications, stipulations, State statutes or regulations. Work at the area subject to the Directive may continue while implementing the corrective action. Corrective action may include halting or avoiding specific conduct, implementing alternative measures, repairing any damage to state resources that may have resulted from the conduct, or other action as determined by DNR.

18. **Stop Work Orders:** Stop Work Orders may be issued if there is a deviation from design criteria, project specifications, stipulations, State statutes or regulations and that deviation is causing or is likely to cause significant damage to state resources. Under a Stop Work Order, work at the area subject to the Stop Work Order may not resume until the deviation is cured and corrective action is taken. Corrective action may include halting or avoiding specific conduct, implementing alternative measures, repairing any damage to state resources that may have resulted from the conduct, or other action as determined by DNR.

19. **Accidents and Incidents:** The Grantee will notify the AO within 24 hours of any accidents, injuries, or operational problems associated with the authorization including, but not limited to, conflicts with other operators or the general public, client or guide triggered avalanche incidents, lost or overdue clients or employees due to avalanche, or fatalities. The AO phone number is (907) 269-8503. The Grantee will maintain complete records or all accidents and incidents which will be made available to the AO upon request.

20. **Notification of Discharge:** The Grantee shall immediately notify the Department of Environmental Conservation (DEC) and AO of any unauthorized discharge of oil to water, any discharge of hazardous substances (other than oil), and any discharge of oil greater than 55 gallons on land. All fires and explosions must also be reported immediately.

    If a discharge, including a cumulative discharge, of oil is greater than 10 gallons but less than 55 gallons, or a discharge of oil greater than 55 gallons is made to an impermeable secondary containment area, the Grantee shall report the discharge within 48 hours. Any discharge of oil greater than one gallon up to 10 gallons, including a cumulative discharge, solely to land, must be reported in writing on a monthly basis.

    Notification of discharge during normal business hours must be made to the nearest DEC Area Response Team: Anchorage (907)269-3063, fax (907) 269-7648; Fairbanks (907) 451-2121, fax (907) 451-2362; Juneau (907) 465-5340, fax (907) 465-5245. For discharges in state off shore waters call (907) 269-0667. The DEC oil spill report number outside normal business hours is (800) 478-9300.

    Notification of discharge must be made to the appropriate DNR Office, preferably by e-mail: Anchorage email dnr.scro.spill@alaska.gov, (907) 269-8503; Fairbanks email dnr.nro.spill@alaska.gov, (907) 451-2739; Juneau email dnr.sero.spill@alaska.gov, (907) 465-3400. The Grantee shall supply the AO with all incident reports submitted to DEC.

21. **Returned Check Penalty:** A returned check penalty of $50.00 will be charged for any check on which the bank refuses payment. Late payment penalties shall continue to accrue.

22. **Late Payment Penalty Charges:** The Grantee shall pay a fee for any late payment. The amount is the greater of either $50.00 or interest accrued daily at the rate of 10.5% per annum and will be assessed on each past-due payment until paid in full.

23. **Use Fees:** The Grantee shall pay to DMLW an annual use fee of $1,320.00. The use fee is due on or before the annual anniversary of the effective date of this permit without the necessity of any billing by DMLW. The annual use fee is subject to adjustments in any relevant fee schedule.

24. **Request for Information:** The AO, at any time, may require the Grantee to provide any information directly or indirectly related to this authorization, in a manner prescribed by the AO.

25. **Completion Report:** A completion report shall be submitted prior to relinquishment, or within 30 days after expiration or termination of the authorization. Failure to submit a satisfactory report subjects the site to a field inspection requirement for which the Grantee may be assessed an inspection fee, as outlined herein. The report shall contain the following information:
    a. a statement of restoration activities and methods of debris disposal;
    b. a statement that the Grantee has removed all improvements and personal property from the authorized area;
    c. a report covering any known incidents of damage to the vegetative mat and underlying substrate, and follow-up corrective actions that may have taken place while operating under this authorization;
    d. and, photographs of the permitted site taken before, during and after the proposed activity to document permit compliance. Photographs must consist of a series of aerial view or ground-level view photographs that clearly depict compliance with site cleanup and restoration guidelines;

26. **Annual Report:** An annual report shall be submitted within 30 days after the seasonally authorized term or the annual anniversary date of the authorization, whichever is applicable. If the site was not used during the calendar year than the report should indicate such. The report shall include:
    1. a written report disclosing:
    2. a series of before, during, and after use aerial view and/or ground-level view photographs confirming compliance with site development and restoration guidelines; and
        i. i. the date the temporary facility was established or the first use of the site during the calendar year;
        ii. the date the temporary facility was dismantled and removed or cached the last use during the calendar year;
        iii. the restoration of damaged vegetation or disturbed soil; and
        iv. the dates of any hydrocarbon or hazardous substance spills, and the dates such spills were reported to DNR and DEC.

27. **Site Disturbance:** Site disturbance shall be kept to a minimum to protect local habitats. All activities at the site shall be conducted in a manner that will minimize the disturbance of soil and vegetation and changes in the character of natural drainage systems.
    a. Brush clearing is allowed but should be kept to the minimum necessary. Removal or destruction of the vegetative mat is not authorized under this permit.
    b. Establishment of, or improvements to, landing areas (i.e. leveling the ground or removing or modifying a substantial amount of vegetation) is prohibited.
    c. Attention must be paid to prevent pollution and siltation of streams, lakes, ponds, wetlands, and disturbances to fish and wildlife habitat.
    d. Any ground disturbances which may have occurred shall be contoured to blend with the natural topography to protect human and wildlife health and safety.

28. **Site Restoration:** On or before permit expiration (if a reissuance application has not been submitted) or termination of this authorization by the Grantee, the Grantee shall remove all

improvements, personal property, and other chattels, and return the permitted area to a clean and safe condition. In the event the Grantee fails to comply with this requirement, the Grantee shall be held liable for any and all costs incurred by the State to return the permitted area to a clean and safe condition.

29. **Indemnification:** The Grantee assumes all responsibility, risk and liability for its activities and those of its employees, agents, contractors, subcontractors, licensees, or invitees, directly or indirectly related to this permit, including environmental and hazardous substance risk and liability, whether accruing during or after the term of this permit. The Grantee shall defend, indemnify, and hold harmless the State, its agents and employees, from and against any and all suits, claims, actions, losses, costs, penalties, and damages of whatever kind or nature, including all attorney's fees and litigation costs, arising out of , in connection with, or incident to any act or omission by the Grantee, its employees, agents, contractors, subcontractors, licensees, or invitees, unless the proximate cause of the injury or damage is the sole negligence or willful misconduct of the State or a person acting on the State's behalf. Within 15 days, the Grantee shall accept any such cause, action or proceeding upon tender by the State. This indemnification shall survive the termination of the permit.

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31. **Performance Guaranty:** Pursuant to 11 AAC 96.060, the Grantee shall provide a surety bond or other form of security acceptable to the DMLW in the amount of $2,500.00 payable to the State of Alaska. Such performance guaranty shall remain in effect for the term of this authorization and shall secure performance of the Grantee's obligations hereunder. The amount of the performance guaranty may be adjusted by the AO in the event of approved amendments to this authorization, changes in the development plan, or any change in the activities or operations conducted on the premises. The guaranty may be utilized by the State to cover actual costs incurred by the State to pay for any necessary corrective actions in the event the Grantee does not comply with the site utilization, restoration requirements and other stipulations contained in this permit agreement. If the Grantee fails to perform the obligations under this permit within a reasonable timeframe, the State may perform the Grantee's obligations at the Grantee's expense. The Grantee agrees to pay within 20 days following demand, all costs and expenses incurred by the State as a result of the failure of the Grantee

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44. **Fire Prevention, Protection and Liability:** The Grantee shall take all reasonable precautions to prevent and suppress forest, structure, brush and grass fires, and shall assume full liability for any damage to state land and structures resulting from the negligent use of fire. The State is not liable for damage to the Grantee's personal property and is not responsible for forest fire protection of the Grantee's activity. To report a wildfire, call 911 or 1-800-237-3633.

45. **Anchor Lines and Shoreties:**
    a. All lines must be secured and properly tensioned to avoid entanglement with marine mammals. The Grantee shall contact the NOAA Fisheries' 24/7 hotline at (877) 925-7773 if an injured, entangled, or dead marine mammal is seen in the authorized area.
    b. Use of shoreties connected to adjacent uplands is prohibited unless written permission is first obtained from the upland owner. Unauthorized use of the uplands where an authorization is required shall constitute just cause for termination of this permit.
    c. Shoreties that extend above water must be well-marked with reflective material.
    d. Shoreties spanning potential boat routes are to be submerged by weights or anchors so as not to impede or impair access and must be marked with buoys where the lines may present a potential navigation hazard.

Advisories:

1. Choose a farm location that avoids or minimizes overlap with important marine mammal habitats or migration corridors. Contact ADF&G Marine Mammals Program or NMFS Protected Resources to obtain any current, localized species distribution data when considering farm placement.
2. Minimize the number of vertical lines in the water to reduce entanglement risks for marine mammals.
3. Regularly maintain and monitor aquatic farm structures, keep lines secured, and keep lines tensioned under all tidal conditions.
4. Mark and maintain all buoys with the aquatic farm's ADL number or other unique

identifier. Markings must withstand the elements over time.
5. Remove grow lines and culture gear from the water when not in use.
6. Inspect moorings and anchors at least annually, and after storm events.
7. Collect and properly dispose of waste materials, excess line, and other debris.
8. Do not allow aquatic farm staff to interact with or feed marine mammals.
9. Practice avoidance techniques prior to attempting to deter any marine mammal from being near the farm site. Avoiding interactions is the safest method for preventing death, serious injury, or significant adverse effects to marine mammals. For example, remove attractants such as food or accessible platforms that seals or sea lions may use to haul out.
10. Maintain a documented predator avoidance plan that uses only benign, non-lethal deterrents (e.g., predator netting, increased net rigidity, electric fencing).
11. Operate vessels at slow speeds and with caution for marine mammals when transiting to the farm site and around the farm site.
12. Adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). Specifically:

a. Do not approach, by any means, including by interception (i.e., placing a vessel in the path of an oncoming humpback whale), within 100 yards of any humpback whale.

b. Do not cause a vessel or other object to approach within 100 yards of a humpback whale.

c. Do not disrupt the normal behavior or prior activity of a whale by any other act or omission.

13. Maintain a record of visits to the farm and gear inspections.
14. Participate in the Whale Alert program to report real-time sightings of whales while transiting in the waters of Alaska and to minimize the risk of vessel strikes (https://alaskafisheries.noaa.gov/pr/whale-alert).
15. Follow NMFS marine mammal viewing guidelines at https://www.fisheries.noaa.gov/alaska/marine-life-viewing-guidelines/alaska-marinemammal-viewing-guidelines-and-regulations
16. Immediately report any marine mammal observed entangled or otherwise directly interacting with the facility structures to the NMFS Alaska 24-hr. Stranding Hotline: 877-925-7773.

-Signature Page to Follow-

The Authorized Officer reserves the right to modify these stipulations or use additional stipulations as deemed necessary. The Grantee will be advised before any such modifications or additions are finalized. DNR has the authority to implement and enforce these conditions under AS 38.05.850. Any correspondence on this authorization may be directed to the Department of Natural Resources, Division of Mining, Land and Water, Southcentral Regional Land Office, 550 W. 7th Ave., Suite 900C, Anchorage, AK 99501-3577, (907) 269-8503.

I have read and understand all of the foregoing and attached stipulations. By signing this authorization, I agree to conduct the authorized activity in accordance with the terms and conditions of this authorization.

Dillon Hedrick-Price		Executive	1/26/
Signature of Grantee or Authorized Representative		Title	Date
6613 Brayton	Ancho	A	995
Grantee's Address	City	State	Zip
Briana		907-224	
Contact Person	Home Phone	Work Phone	
John Farber		NRM1 (Acting)	1/26/2026
Signature of Authorized State Representative		Title	Date

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources

DIVISION OF MINING, LAND & WATER
Southcentral Regional Land Office

550 W. 7th Ave., Suite 900C
Anchorage, Alaska 99501-3577
Main: (907) 269-8503
TTY: 711 or 880.770.8973
Fax: (907) 269-8913

LAND USE PERMIT
AMENDED
AS 38.05.850
PERMIT # LAS 33308

CHUGACH REGIONAL RESOURCES COMMISSION herein known as the Grantee, is issued this permit from the Department of Natural Resources, herein known as the Grantor, authorizing the use of state land within:

Legal Description: NW1/4 of Section 8, Township 12 South, Range 8 West, Copper River Meridian (Tatitlek Narrows)

This permit is issued for the purpose of authorizing the following:

The use of up to 4 acres of state-owned tidelands within Tatitlek Narrows for the placement of an aquatic array as part of a research study on kelp growth. The array site will use a submerged longline kelp grow-out system with the dimensions of 100-feet long by 150-feet wide. The array site uses a total of (6) 500-pound anchors with (6) anchor buoys, plus (36) A-4 buoys to maintain the depth of the grow lines throughout the array. The site will be operational from mid-September through mid-May, while the anchors, buoys, and related gear will remain in place year-round until the project is complete.

This permit is for the term beginning **August 1, 2025** and ending **July 31, 2030** unless sooner terminated at the state's discretion, effective the date of signature by the Authorized State Representative. This permit does not convey an interest in state land and as such is revocable, with or without cause. The Grantor will give 30 days' notice before revoking a permit at will. A revocation for cause is effective immediately. No preference right for use or conveyance of the land is granted or implied by this authorization.

This permit is issued subject to the following:

- Payment of the annual use fee in the amount of $1,320.00 due on or before the annual anniversary date and any additional fees identified in the stipulations below.
- Remittance of a performance guaranty in the amount of $2,500.00 as required in the stipulations below.
- Proof of insurance as described in stipulations below.

The non-receipt of a courtesy billing notice does not relieve the Grantee from the responsibility of paying fees on or before the due date.

All activities shall be conducted in accordance with the following stipulations:

1. **Authorized Officer:** The Authorized Officer (AO) for the State of Alaska (State), Department of Natural Resources (DNR), Division of Mining, Land and Water (DMLW), is the Regional Manager or designee.

2. **Change of Contact Information:** The Grantee shall maintain current contact information with the AO. Any change of contact information must be submitted in writing to the AO.

3. **Valid Existing Rights:** This authorization is subject to all valid existing rights and reservations in and to the authorized area. The State makes no representations or warranties, whatsoever, either expressed or implied, as to the existence, number, or nature of such valid existing rights.

4. **Preference Right:** No preference right for subsequent authorizations is granted or implied by this authorization.

5. **Inspections:** The AO shall have reasonable access to the authorized area for inspection, which may be conducted without prior notice. If the Grantee is found to be in noncompliance the authorized area may be subject to reinspection. The Grantee may be charged for actual expenses of any inspection.

6. **Public Access:** The construction, operation, use, and maintenance of the authorized area shall not interfere with public use of roads, trails, waters, landing areas, and public access easements. The ability to use or access state land or public waters may not be restricted in any manner. However, if a specific activity poses a safety concern, the AO may allow the restriction of public access for a specific period of time. The Grantee is required to contact the AO in advance for approval. No restriction is allowed unless specifically authorized in writing by the AO.

7. **Public Trust Doctrine:** The Public Trust Doctrine guarantees public access to, and the public right to use, navigable and public waters and the land beneath them for navigation, commerce, fishing, and other purposes. This authorization is subject to the principles of the Public Trust Doctrine regarding navigable or public waters. The AO reserves the right to grant other interests consistent with the Public Trust Doctrine.

8. **Alaska Historic Preservation Act:** The Alaska Historic Preservation Act, AS 41.35.200, prohibits the appropriation, excavation, removal, injury, or destruction of any state owned historic, prehistoric, archaeological or paleontological site without written approval from the DNR Commissioner. Should any sites be discovered, the Grantee shall cease any activities that may cause damage and immediately contact the AO and the Office of History and Archaeology in the Division of Parks and Recreation.

9. **Compliance with Government Requirements:** The Grantee shall, at its expense, comply with all federal, state, and local laws, regulations, and ordinances directly or indirectly related to this authorization. The Grantee shall ensure compliance by its employees, agents, contractors, subcontractors, licensees, or invitees.

10. **Incurred Expenses:** The Grantor shall in no way be held liable for expenses incurred by the Grantee connected with the activities directly or indirectly related to this authorization.

11. **Waiver of Forbearance:** Any failure on the part of the AO to enforce the terms of this authorization, or the waiver of any right under this authorization by the Grantee, unless in writing, shall not discharge or invalidate the authorization of such terms. No forbearance or written waiver affects the right of the AO to enforce any terms in the event of any subsequent violations of terms of this authorization.

12. **Severability Clause:** If any clause or provision of this authorization is, in a final judicial proceeding, determined illegal, invalid, or unenforceable under present or future laws, then the Grantor and the Grantee agree that the remainder of this authorization will not be affected, and in lieu of each clause or provision of this authorization that is illegal, invalid, or unenforceable, there will be added as a part of this authorization a clause or provision as similar in terms to the illegal, invalid, or unenforceable clause or provision as may be possible, legal, valid, and enforceable.

13. **Permit Extensions/Reissuance:** Any request for permit extension or reissuance should be submitted at least 90 days prior to the end of the authorized term. A written statement requesting a one-year extension confirming there will be no changes to the development/operations plan, including photographs clearly depicting the current condition of the site and any improvements, must be submitted to the AO with any required filing fee. A new Land Use Permit application and any required filing fee is required when requesting reissuance of up to five years or for modifications to the approved development/operations plan on file with DMLW.

14. **Assignment:** This permit may not be transferred or assigned.

15. **Reservation of Rights:**
    a. The AO reserves the right to grant additional authorizations to third parties for compatible uses on or adjacent to the land under this authorization.
    b. Authorized concurrent users of state land, their agents, employees, contractors, subcontractors, and licensees, shall not interfere with the operation or maintenance activities of each user.
    c. The AO may require authorized concurrent users of state land to enter into an equitable operation or maintenance agreement.

16. **Violations:** A violation of this authorization is subject to any action available to the State for enforcement and remedies, including revocation of the permit, civil action for forcible entry and detainer, ejectment, trespass, damages, and associated costs, or arrest and prosecution for criminal trespass in the second degree. The State may seek damages available under a civil action, including restoration damages, compensatory damages, and treble damages under AS 09.45.730 or AS 09.45.735 for violations involving injuring or removing trees or shrubs, gathering geotechnical data, or taking mineral resources.

17. **Directives:** Directives may be issued for corrective actions that are required to correct a deviation from design criteria, project specifications, stipulations, State statutes or regulations. Work at the area subject to the Directive may continue while implementing the corrective action. Corrective action may include halting or avoiding specific conduct, implementing alternative measures, repairing any damage to state resources that may have resulted from the conduct, or other action as determined by DNR.

18. **Stop Work Orders:** Stop Work Orders may be issued if there is a deviation from design criteria, project specifications, stipulations, State statutes or regulations and that deviation is causing or is likely to cause significant damage to state resources. Under a Stop Work Order, work at the area subject to the Stop Work Order may not resume until the deviation is cured and corrective action is taken. Corrective action may include halting or avoiding specific conduct, implementing alternative measures, repairing any damage to state resources that may have resulted from the conduct, or other action as determined by DNR.

19. **Accidents and Incidents:** The Grantee will notify the AO within 24 hours of any accidents, injuries, or operational problems associated with the authorization including, but not limited to, conflicts with other operators or the general public, client or guide triggered avalanche incidents, lost or overdue clients or employees due to avalanche, or fatalities. The AO phone number is (907) 269-8503. The Grantee will maintain complete records or all accidents and incidents which will be made available to the AO upon request.

20. **Notification of Discharge:** The Grantee shall immediately notify the Department of Environmental Conservation (DEC) and AO of any unauthorized discharge of oil to water, any discharge of hazardous substances (other than oil), and any discharge of oil greater than 55 gallons on land. All fires and explosions must also be reported immediately.

    If a discharge, including a cumulative discharge, of oil is greater than 10 gallons but less than 55 gallons, or a discharge of oil greater than 55 gallons is made to an impermeable secondary containment area, the Grantee shall report the discharge within 48 hours. Any discharge of oil greater than one gallon up to 10 gallons, including a cumulative discharge, solely to land, must be reported in writing on a monthly basis.

    Notification of discharge during normal business hours must be made to the nearest DEC Area Response Team: Anchorage (907)269-3063, fax (907) 269-7648; Fairbanks (907) 451-2121, fax (907) 451-2362; Juneau (907) 465-5340, fax (907) 465-5245. For discharges in state off shore waters call (907) 269-0667. The DEC oil spill report number outside normal business hours is (800) 478-9300.

    Notification of discharge must be made to the appropriate DNR Office, preferably by e-mail: Anchorage email dnr.scro.spill@alaska.gov, (907) 269-8503; Fairbanks email dnr.nro.spill@alaska.gov, (907) 451-2739; Juneau email dnr.sero.spill@alaska.gov, (907) 465-3400. The Grantee shall supply the AO with all incident reports submitted to DEC.

21. **Returned Check Penalty:** A returned check penalty of $50.00 will be charged for any check on which the bank refuses payment. Late payment penalties shall continue to accrue.

22. **Late Payment Penalty Charges:** The Grantee shall pay a fee for any late payment. The amount is the greater of either $50.00 or interest accrued daily at the rate of 10.5% per annum and will be assessed on each past-due payment until paid in full.

23. **Use Fees:** The Grantee shall pay to DMLW an annual use fee of $1,320.00. The use fee is due on or before the annual anniversary of the effective date of this permit without the necessity of any billing by DMLW. The annual use fee is subject to adjustments in any relevant fee schedule.

24. **Request for Information:** The AO, at any time, may require the Grantee to provide any information directly or indirectly related to this authorization, in a manner prescribed by the AO.

25. **Completion Report:** A completion report shall be submitted prior to relinquishment, or within 30 days after expiration or termination of the authorization. Failure to submit a satisfactory report subjects the site to a field inspection requirement for which the Grantee may be assessed an inspection fee, as outlined herein. The report shall contain the following information:
    a. a statement of restoration activities and methods of debris disposal;
    b. a statement that the Grantee has removed all improvements and personal property from the authorized area;
    c. a report covering any known incidents of damage to the vegetative mat and underlying substrate, and follow-up corrective actions that may have taken place while operating under this authorization;
    d. and, photographs of the permitted site taken before, during and after the proposed activity to document permit compliance. Photographs must consist of a series of aerial view or ground-level view photographs that clearly depict compliance with site cleanup and restoration guidelines;

26. **Annual Report:** An annual report shall be submitted within 30 days after the seasonally authorized term or the annual anniversary date of the authorization, whichever is applicable. If the site was not used during the calendar year than the report should indicate such. The report shall include:
    1. a written report disclosing:
    2. a series of before, during, and after use aerial view and/or ground-level view photographs confirming compliance with site development and restoration guidelines; and
        i. i. the date the temporary facility was established or the first use of the site during the calendar year;
        ii. the date the temporary facility was dismantled and removed or cached the last use during the calendar year;
        iii. the restoration of damaged vegetation or disturbed soil; and
        iv. the dates of any hydrocarbon or hazardous substance spills, and the dates such spills were reported to DNR and DEC.

27. **Site Disturbance:** Site disturbance shall be kept to a minimum to protect local habitats. All activities at the site shall be conducted in a manner that will minimize the disturbance of soil and vegetation and changes in the character of natural drainage systems.
    a. Brush clearing is allowed but should be kept to the minimum necessary. Removal or destruction of the vegetative mat is not authorized under this permit.
    b. Establishment of, or improvements to, landing areas (i.e. leveling the ground or removing or modifying a substantial amount of vegetation) is prohibited.
    c. Attention must be paid to prevent pollution and siltation of streams, lakes, ponds, wetlands, and disturbances to fish and wildlife habitat.
    d. Any ground disturbances which may have occurred shall be contoured to blend with the natural topography to protect human and wildlife health and safety.

28. **Site Restoration:** On or before permit expiration (if a reissuance application has not been submitted) or termination of this authorization by the Grantee, the Grantee shall remove all

improvements, personal property, and other chattels, and return the permitted area to a clean and safe condition. In the event the Grantee fails to comply with this requirement, the Grantee shall be held liable for any and all costs incurred by the State to return the permitted area to a clean and safe condition.

29. **Indemnification:** The Grantee assumes all responsibility, risk and liability for its activities and those of its employees, agents, contractors, subcontractors, licensees, or invitees, directly or indirectly related to this permit, including environmental and hazardous substance risk and liability, whether accruing during or after the term of this permit. The Grantee shall defend, indemnify, and hold harmless the State, its agents and employees, from and against any and all suits, claims, actions, losses, costs, penalties, and damages of whatever kind or nature, including all attorney's fees and litigation costs, arising out of , in connection with, or incident to any act or omission by the Grantee, its employees, agents, contractors, subcontractors, licensees, or invitees, unless the proximate cause of the injury or damage is the sole negligence or willful misconduct of the State or a person acting on the State's behalf. Within 15 days, the Grantee shall accept any such cause, action or proceeding upon tender by the State. This indemnification shall survive the termination of the permit.

30. **Insurance:** Pursuant to 11 AAC 96.065 the Grantee shall secure or purchase at its own expense, and maintain in force at all times during the term of this permit, liability coverage and limits consistent with what is professionally recommended as adequate to protect the Grantee (the insured) and Grantor (the State, its officers, agents and employees) from the liability exposures of ALL the insured's operations on state land. Certificates of Insurance must be furnished to the AO prior to the issuance of this permit and must provide for a notice of cancellation, non-renewal, or material change of conditions in accordance with policy provisions. The Grantee must provide for a 60-day prior notice to the State before they cancel, not renew or make material changes to conditions to the policy. Failure to furnish satisfactory evidence of insurance, or lapse of the policy, are material breaches of this permit and shall be grounds, at the option of the State, for termination of the permit. All insurance policies shall comply with, and be issued by, insurers licensed to transact the business of insurance under Alaska Statute, Title 21. The policy shall be written on an "occurrence" form and shall not be written as a "claims-made" form unless specifically reviewed and agreed to by the Division of Risk Management, Department of Administration. The State must be named as an additional named insured on the policy with respect to the operations of the Grantee on or in conjunction with the permitted premises, referred to as LAS 33308.

31. **Performance Guaranty:** Pursuant to 11 AAC 96.060, the Grantee shall provide a surety bond or other form of security acceptable to the DMLW in the amount of $2,500.00 payable to the State of Alaska. Such performance guaranty shall remain in effect for the term of this authorization and shall secure performance of the Grantee's obligations hereunder. The amount of the performance guaranty may be adjusted by the AO in the event of approved amendments to this authorization, changes in the development plan, or any change in the activities or operations conducted on the premises. The guaranty may be utilized by the State to cover actual costs incurred by the State to pay for any necessary corrective actions in the event the Grantee does not comply with the site utilization, restoration requirements and other stipulations contained in this permit agreement. If the Grantee fails to perform the obligations under this permit within a reasonable timeframe, the State may perform the Grantee's obligations at the Grantee's expense. The Grantee agrees to pay within 20 days following demand, all costs and expenses incurred by the State as a result of the failure of the Grantee

to comply with the terms and conditions of this permit. Failure to do so may result in the termination of an authorization and/or forfeiture of the performance guaranty. The provisions of this permit shall not prejudice the State's right to obtain a remedy under any law or regulation. If the AO determines that the Grantee has satisfied the terms and conditions of this authorization, the performance guaranty will be subject to release. The performance guaranty may only be released in writing by the AO.

32. **Fuel and Hazardous Substances:** No fuel or hazardous substances may be stored on state land.

33. **Waste Disposal:** On-site refuse disposal is prohibited, unless specifically authorized. All waste generated during operation, maintenance, and termination activities under this authorization shall be removed and disposed of at an off-site DEC approved disposal facility. Waste, in this paragraph, means all discarded matter, including but not limited to human waste, trash, garbage, refuse, oil drums, petroleum products, ashes and discarded equipment.

34. **Wastewater Disposal:** No pit privies are authorized.

35. **Solid Waste:**
    a. All solid waste and debris, including dog waste, generated from the activities conducted under this authorization shall be removed to a facility approved by DEC on a regular basis such that the premise be maintained to ensure a healthy and safe environment.
    b. Putrescible waste (waste that can decompose and cause obnoxious odor) shall be stored in a manner that prevents the attraction of or access to wildlife or disease vectors; and
    c. Paper products may be burned on site if measures (e.g. burn barrels, clearing of burn area to mineral soil) are taken to prevent wildfires.

36. **Navigation and Public Access:** Anchoring methods, shoreties, buoys and running lines shall not preclude reasonable public access nor interfere with the ability to safely navigate within and adjacent to the permitted area.

37. **Destruction of Markers:** The Grantee shall protect all survey monuments, witness corners, reference monuments, mining claim posts, bearing trees, and unsurveyed corner posts against damage, destruction, or obliteration. The Grantee shall notify the AO of any damaged, destroyed, or obliterated markers and shall reestablish the markers at the Grantee’s expense in accordance with accepted survey practices of the DMLW.

38. **Site Maintenance:** The authorized area shall be maintained in a neat, clean, and safe condition, free of any solid waste, debris, or litter, except as specifically authorized herein. Nothing may be stored that would be an attractive nuisance to wildlife or create a potentially hazardous situation.

39. **Maintenance of Improvements:** The Grantor is not responsible for maintenance of authorized improvements or liable for injuries or damages related to those improvements. No action or inaction of the Grantor is to be construed as assumption of responsibility.

40. **Amendment or Modification:** The Grantee may request an amendment or modification of this authorization; the Grantee’s request must be in writing. Any amendment or modification

must be approved by the AO in advance and may require additional fees and changes to the terms of this authorization.

41. **Development Plan:** Development shall be limited to the authorized area and improvements specified in the approved development plan or subsequent modifications approved by the AO. The Grantee is responsible for accurately siting development and operations within the authorized area. Any proposed revisions to the development plan must be approved in writing by the AO before the change in use or development occurs.

42. **Proper Location:** This authorization is for activities on state lands or interests managed by DMLW. It does not authorize any activities on private, federal, native, and municipal lands, or lands which are owned or solely managed by other offices and agencies of the State. The Grantee is responsible for proper location within the authorized area.

43. **Improvements:** Any improvements/structures that may be authorized under this permit must be constructed in a manner that will allow for removal from the permitted site within 48 hours of receiving a notice to vacate. The establishment of permanent foundations and structures is prohibited under this permit. Authorized temporary improvements must be sited in a manner which impacts the least amount of ground consistent with the purpose of the facility. Any use of these improvements for purposes other than those explicitly authorized by this permit are prohibited.

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    b. Use of shoreties connected to adjacent uplands is prohibited unless written permission is first obtained from the upland owner. Unauthorized use of the uplands where an authorization is required shall constitute just cause for termination of this permit.
    c. Shoreties that extend above water must be well-marked with reflective material.
    d. Shoreties spanning potential boat routes are to be submerged by weights or anchors so as not to impede or impair access and must be marked with buoys where the lines may present a potential navigation hazard.

Advisories:

1. Choose a farm location that avoids or minimizes overlap with important marine mammal habitats or migration corridors. Contact ADF&G Marine Mammals Program or NMFS Protected Resources to obtain any current, localized species distribution data when considering farm placement.
2. Minimize the number of vertical lines in the water to reduce entanglement risks for marine mammals.
3. Regularly maintain and monitor aquatic farm structures, keep lines secured, and keep lines tensioned under all tidal conditions.
4. Mark and maintain all buoys with the aquatic farm's ADL number or other unique

identifier. Markings must withstand the elements over time.
5. Remove grow lines and culture gear from the water when not in use.
6. Inspect moorings and anchors at least annually, and after storm events.
7. Collect and properly dispose of waste materials, excess line, and other debris.
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10. Maintain a documented predator avoidance plan that uses only benign, non-lethal deterrents (e.g., predator netting, increased net rigidity, electric fencing).
11. Operate vessels at slow speeds and with caution for marine mammals when transiting to the farm site and around the farm site.
12. Adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). Specifically:

a. Do not approach, by any means, including by interception (i.e., placing a vessel in the path of an oncoming humpback whale), within 100 yards of any humpback whale.

b. Do not cause a vessel or other object to approach within 100 yards of a humpback whale.

c. Do not disrupt the normal behavior or prior activity of a whale by any other act or omission.

13. Maintain a record of visits to the farm and gear inspections.
14. Participate in the Whale Alert program to report real-time sightings of whales while transiting in the waters of Alaska and to minimize the risk of vessel strikes (https://alaskafisheries.noaa.gov/pr/whale-alert).
15. Follow NMFS marine mammal viewing guidelines at https://www.fisheries.noaa.gov/alaska/marine-life-viewing-guidelines/alaska-marinemammal-viewing-guidelines-and-regulations
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-Signature Page to Follow-

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I have read and understand all of the foregoing and attached stipulations. By signing this authorization, I agree to conduct the authorized activity in accordance with the terms and conditions of this authorization.

Signature of Grantee or Authorized Representative	Title	Date
Dillon Hedrick-Price	Executive	1/26/

Grantee's Address	City	State	Zip
6613 Brayton Drive, Suite A	Ancho	A	995

Contact Person	Home Phone	Work Phone
Briana		907-224

Signature of Authorized State Representative	Title	Date
John Fuhs	NRM1 (Acting)	1/26/2026

Appendix G:
Kelp Tissue Testing
(see separate excel file)