

1 Appendix

2 Table A.1. Tukey's honest significant difference analysis on seasonal non-Dungeness crab revenue per
 3 vessel, corresponding to Figure 3b in the main text. MHW: marine heatwave period; Non-MHW: non-
 4 marine heatwave period. Bolded rows are within-behavioral-group, between-period comparisons. Of
 5 these within-group comparisons, differences with a p-value<0.05 are indicated with stars in Fig. 3b.
 6

Group 1	Group 2	Difference	Lower	Upper	Adjusted p-value
MHW:Local Specialists	Non-MHW:Local Specialists	18443.58	-25358.40	62245.56	0.91
Non-MHW:Local Generalists	Non-MHW:Local Specialists	99076.71	63874.12	134279.31	0.00
MHW:Local Generalists	Non-MHW:Local Specialists	271157.43	215093.29	327221.57	0.00
Non-MHW:Roving Specialists	Non-MHW:Local Specialists	50960.93	10636.99	91284.88	0.00
MHW:Roving Specialists	Non-MHW:Local Specialists	124890.20	75417.33	174363.08	0.00
Non-MHW:Roving Generalists	Non-MHW:Local Specialists	436511.75	398995.54	474027.96	0.00
MHW:Roving Generalists	Non-MHW:Local Specialists	819962.88	767106.93	872818.84	0.00
Non-MHW:Local Generalists	MHW:Local Specialists	80633.13	37124.66	124141.60	0.00
MHW:Local Generalists	MHW:Local Specialists	252713.85	191094.44	314333.26	0.00
Non-MHW:Roving Specialists	MHW:Local Specialists	32517.35	-15229.74	80264.44	0.44
MHW:Roving Specialists	MHW:Local Specialists	106446.62	50757.04	162136.20	0.00
Non-MHW:Roving Generalists	MHW:Local Specialists	418068.17	372667.40	463468.94	0.00
MHW:Roving Generalists	MHW:Local Specialists	801519.30	742803.75	860234.85	0.00
MHW:Local Generalists	Non-MHW:Local Generalists	172080.72	116245.59	227915.85	0.00
Non-MHW:Roving Specialists	Non-MHW:Local Generalists	-48115.78	-88120.71	-8110.86	0.01
MHW:Roving Specialists	Non-MHW:Local Generalists	25813.49	-23399.71	75026.69	0.76
Non-MHW:Roving Generalists	Non-MHW:Local Generalists	337435.04	300261.93	374608.14	0.00
MHW:Roving Generalists	Non-MHW:Local Generalists	720886.17	668273.19	773499.15	0.00

Non-MHW:Roving Specialists	MHW:Local Generalists	-220196.50	-279394.13	-160998.87	0.00
MHW:Roving Specialists	MHW:Local Generalists	-146267.23	-212038.83	-80495.62	0.00
Non-MHW:Roving Generalists	MHW:Local Generalists	165354.32	108032.38	222676.26	0.00
MHW:Roving Generalists	MHW:Local Generalists	548805.45	480452.76	617158.14	0.00
MHW:Roving Specialists	Non-MHW:Roving Specialists	73929.27	20931.76	126926.79	0.00
Non-MHW:Roving Generalists	Non-MHW:Roving Specialists	385550.82	343495.65	427605.99	0.00
MHW:Roving Generalists	Non-MHW:Roving Specialists	769001.95	712833.25	825170.65	0.00
Non-MHW:Roving Generalists	MHW:Roving Specialists	311621.55	260727.71	362515.38	0.00
MHW:Roving Generalists	MHW:Roving Specialists	695072.68	632013.44	758131.92	0.00
MHW:Roving Generalists	Non-MHW:Roving Generalists	383451.13	329262.86	437639.40	0.00

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9 Table A.2. Tukey's honest significant difference analysis on seasonal home range size (in square km) per
 10 vessel, corresponding to Figure 4b in the main text. MHW: marine heatwave period; Non-MHW: non-
 11 marine heatwave period. Bolded rows are within-behavioral-group, between-period comparisons. Of
 12 these within-group comparisons, differences with a p-value<0.05 are indicated with stars in Fig. 4b.
 13

Group 1	Group 2	Difference	Lower	Upper	Adjusted p-value
MHW:Local Specialists	Non-MHW:Local Specialists	43.9	-678.4	766.2	1.0
Non-MHW:Local Generalists	Non-MHW:Local Specialists	137.0	-429.9	703.8	1.0
MHW:Local Generalists	Non-MHW:Local Specialists	161.0	-791.0	1113.0	1.0
Non-MHW:Roving Specialists	Non-MHW:Local Specialists	3576.5	3016.9	4136.0	0.0
MHW:Roving Specialists	Non-MHW:Local Specialists	4739.1	4024.6	5453.7	0.0
Non-MHW:Roving Generalists	Non-MHW:Local Specialists	2608.9	2031.1	3186.7	0.0
MHW:Roving Generalists	Non-MHW:Local Specialists	3998.4	3210.2	4786.6	0.0
Non-MHW:Local Generalists	MHW:Local Specialists	93.1	-638.1	824.3	1.0
MHW:Local Generalists	MHW:Local Specialists	117.1	-941.1	1175.2	1.0
Non-MHW:Roving Specialists	MHW:Local Specialists	3532.6	2807.0	4258.1	0.0
MHW:Roving Specialists	MHW:Local Specialists	4695.2	3844.4	5546.0	0.0
Non-MHW:Roving Generalists	MHW:Local Specialists	2565.0	1825.3	3304.8	0.0
MHW:Roving Generalists	MHW:Local Specialists	3954.5	3041.0	4868.1	0.0
MHW:Local Generalists	Non-MHW:Local Generalists	24.0	-934.8	982.8	1.0
Non-MHW:Roving Specialists	Non-MHW:Local Generalists	3439.5	2868.5	4010.5	0.0
MHW:Roving Specialists	Non-MHW:Local Generalists	4602.2	3878.6	5325.7	0.0
Non-MHW:Roving Generalists	Non-MHW:Local Generalists	2472.0	1883.1	3060.9	0.0
MHW:Roving Generalists	Non-MHW:Local Generalists	3861.4	3065.1	4657.8	0.0

Non-MHW:Roving Specialists	MHW:Local Generalists	3415.5	2461.0	4370.0	0.0
MHW:Roving Specialists	MHW:Local Generalists	4578.1	3525.3	5631.0	0.0
Non-MHW:Roving Generalists	MHW:Local Generalists	2448.0	1482.7	3413.3	0.0
MHW:Roving Generalists	MHW:Local Generalists	3837.4	2733.3	4941.6	0.0
MHW:Roving Specialists	Non-MHW:Roving Specialists	1162.6	444.8	1880.5	0.0
Non-MHW:Roving Generalists	Non-MHW:Roving Specialists	-967.5	-1549.4	-385.7	0.0
MHW:Roving Generalists	Non-MHW:Roving Specialists	421.9	-369.2	1213.1	0.7
Non-MHW:Roving Generalists	MHW:Roving Specialists	-2130.2	-2862.3	-1398.0	0.0
MHW:Roving Generalists	MHW:Roving Specialists	-740.7	-1648.1	166.7	0.2
MHW:Roving Generalists	Non-MHW:Roving Generalists	1389.5	585.3	2193.7	0.0

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16 Table A.3. Tukey's honest significant difference analysis on seasonal profit per vessel, corresponding to
 17 Figure 5b in the main text. MHW: marine heatwave period; Non-MHW: non-marine heatwave period.
 18 Bolded rows are within-behavioral-group, between-period comparisons. Of these within-group
 19 comparisons, differences with a p-value<0.05 are indicated with stars in Fig. 5b.
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Group 1	Group 2	Difference	Lower	Upper	Adjusted p-value
MHW:Local Specialists	Non-MHW:Local Specialists	9107.0	-9384.8	27598.8	0.8
Non-MHW:Local Generalists	Non-MHW:Local Specialists	-16791.5	-32499.1	-1083.8	0.0
MHW:Local Generalists	Non-MHW:Local Specialists	5184.9	-18367.7	28737.5	1.0
Non-MHW:Roving Specialists	Non-MHW:Local Specialists	76699.6	59361.7	94037.5	0.0
MHW:Roving Specialists	Non-MHW:Local Specialists	100511.1	79681.9	121340.3	0.0
Non-MHW:Roving Generalists	Non-MHW:Local Specialists	75771.9	59332.7	92211.1	0.0
MHW:Roving Generalists	Non-MHW:Local Specialists	117442.9	95216.6	139669.2	0.0
Non-MHW:Local Generalists	MHW:Local Specialists	-25898.5	-44653.5	-7143.5	0.0
MHW:Local Generalists	MHW:Local Specialists	-3922.1	-29607.6	21763.4	1.0
Non-MHW:Roving Specialists	MHW:Local Specialists	67592.6	47452.6	87732.7	0.0
MHW:Roving Specialists	MHW:Local Specialists	91404.1	68190.4	114617.8	0.0
Non-MHW:Roving Generalists	MHW:Local Specialists	66664.9	47293.1	86036.6	0.0
MHW:Roving Generalists	MHW:Local Specialists	108335.9	83860.9	132810.9	0.0
MHW:Local Generalists	Non-MHW:Local Generalists	21976.4	-1783.4	45736.2	0.1
Non-MHW:Roving Specialists	Non-MHW:Local Generalists	93491.1	75872.8	111109.4	0.0
MHW:Roving Specialists	Non-MHW:Local Generalists	117302.6	96239.4	138365.8	0.0
Non-MHW:Roving Generalists	Non-MHW:Local Generalists	92563.4	75828.7	109298.0	0.0
MHW:Roving Generalists	Non-MHW:Local Generalists	134234.4	111788.6	156680.1	0.0
Non-MHW:Roving	MHW:Local Generalists	71514.7	46647.1	96382.3	0.0

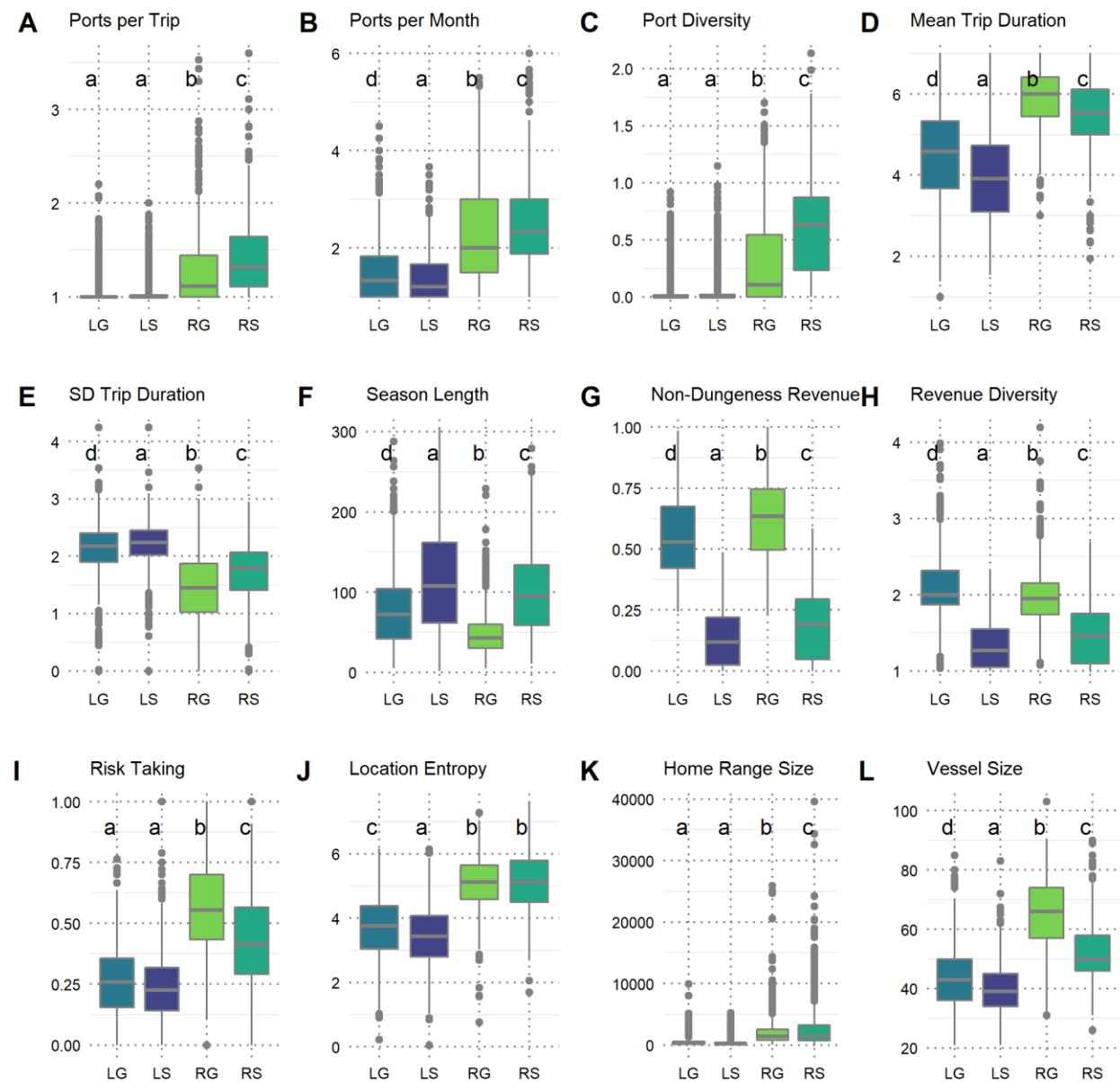
Specialists						
MHW:Roving Specialists	MHW:Local Generalists	95326.2	67909.9	122742.5		0.0
Non-MHW:Roving Generalists	MHW:Local Generalists	70587.0	46337.4	94836.6		0.0
MHW:Roving Generalists	MHW:Local Generalists	112258.0	83765.8	140750.1		0.0
MHW:Roving Specialists	Non-MHW:Roving Specialists	23811.5	1506.1	46116.9		0.0
Non-MHW:Roving Generalists	Non-MHW:Roving Specialists	-927.7	-19201.2	17345.8		1.0
MHW:Roving Generalists	Non-MHW:Roving Specialists	40743.3	17128.0	64358.6		0.0
Non-MHW:Roving Generalists	MHW:Roving Specialists	-24739.2	-46353.4	-3125.0		0.0
MHW:Roving Generalists	MHW:Roving Specialists	16931.8	-9353.9	43217.4		0.5
MHW:Roving Generalists	Non-MHW:Roving Generalists	41671.0	18707.4	64634.6		0.0

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23 **Appendix Figures**

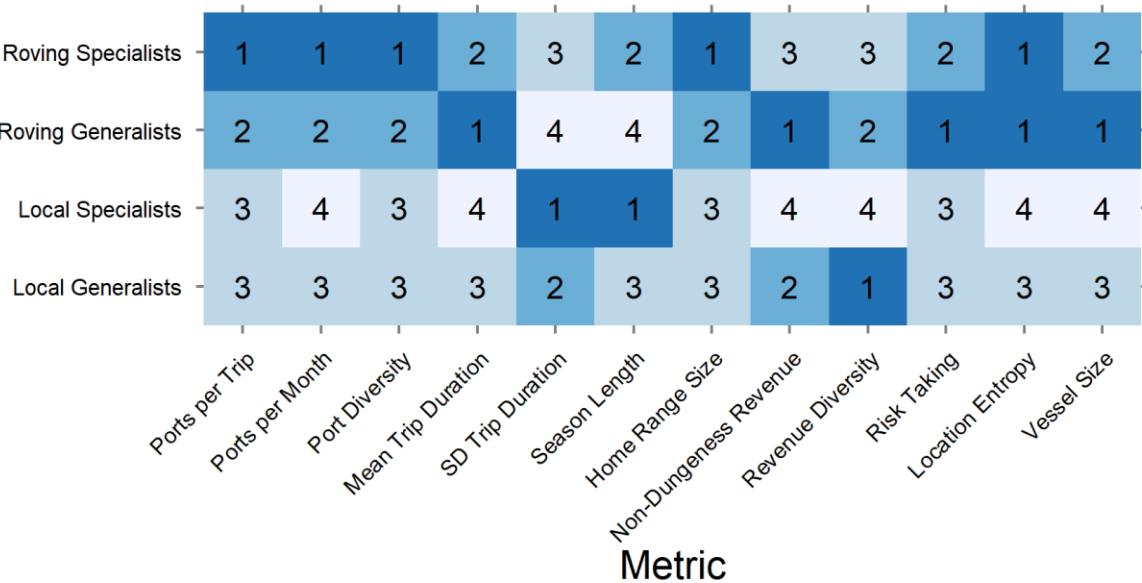
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Figure A.1. Distribution of behavioral variables by behavioral groups (LG: Local Generalists; LS: Local Specialists; RG: Roving Generalists; RS: Roving Specialists). Letters represent significant group differences based on Tukey's HSD.



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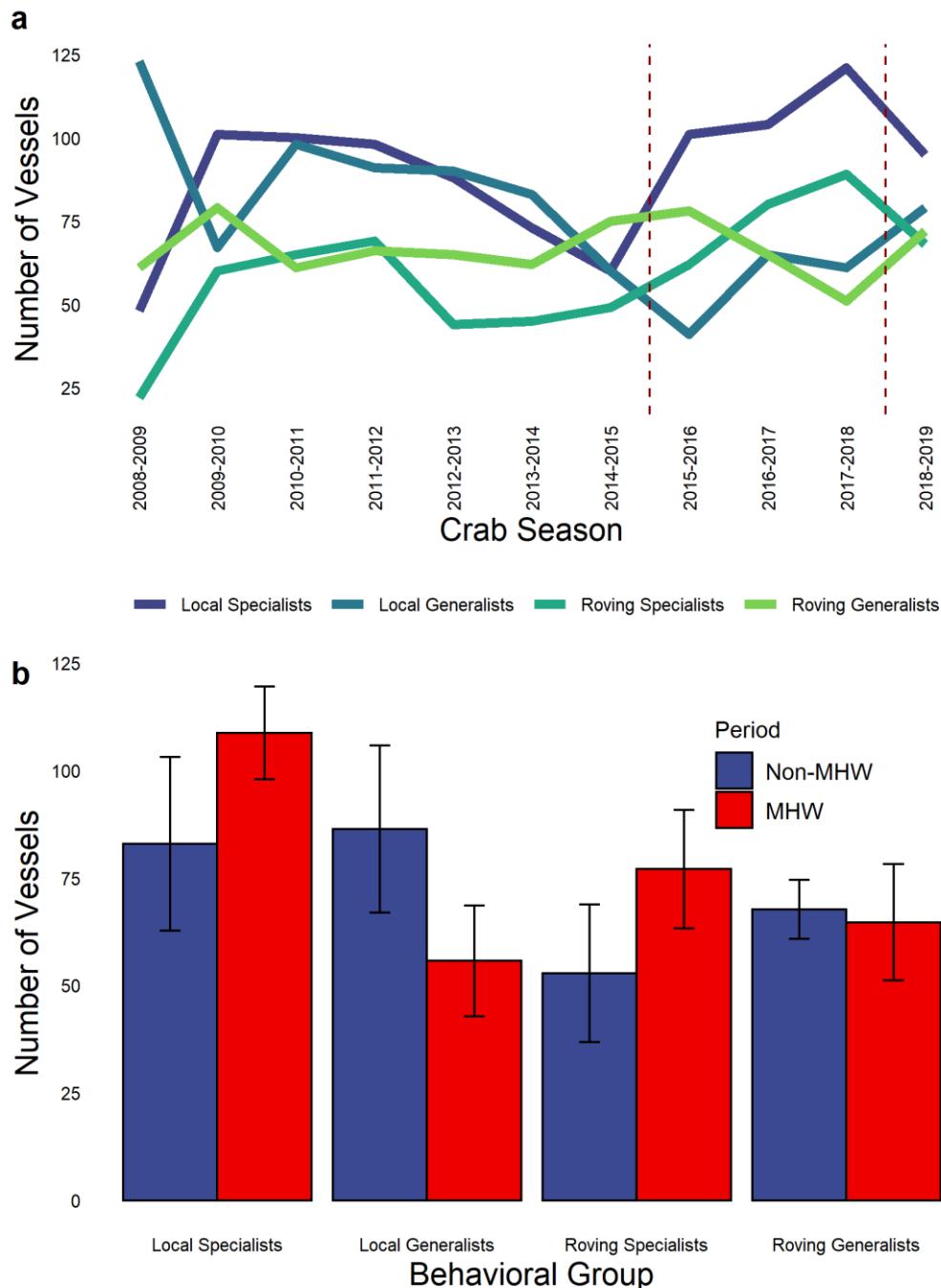
31 Figure A.2. Rankings of each behavioral group relative to each variable included in the cluster analysis.
32 Groups with non-significant differences (according to Tukey's HSD, Supplementary Figure 1) are
33 assigned the same rank.



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37 Figure A.3. Number of vessels in each clustered behavioral group across crab seasons. (a) Number of
38 vessels in each behavioral group in each crab season. Vertical lines delineate the period of the marine
39 heatwave. (b) Mean number of vessels (+/- 1 SD) in each group in heatwave (MHW) versus non-MHW
40 seasons.

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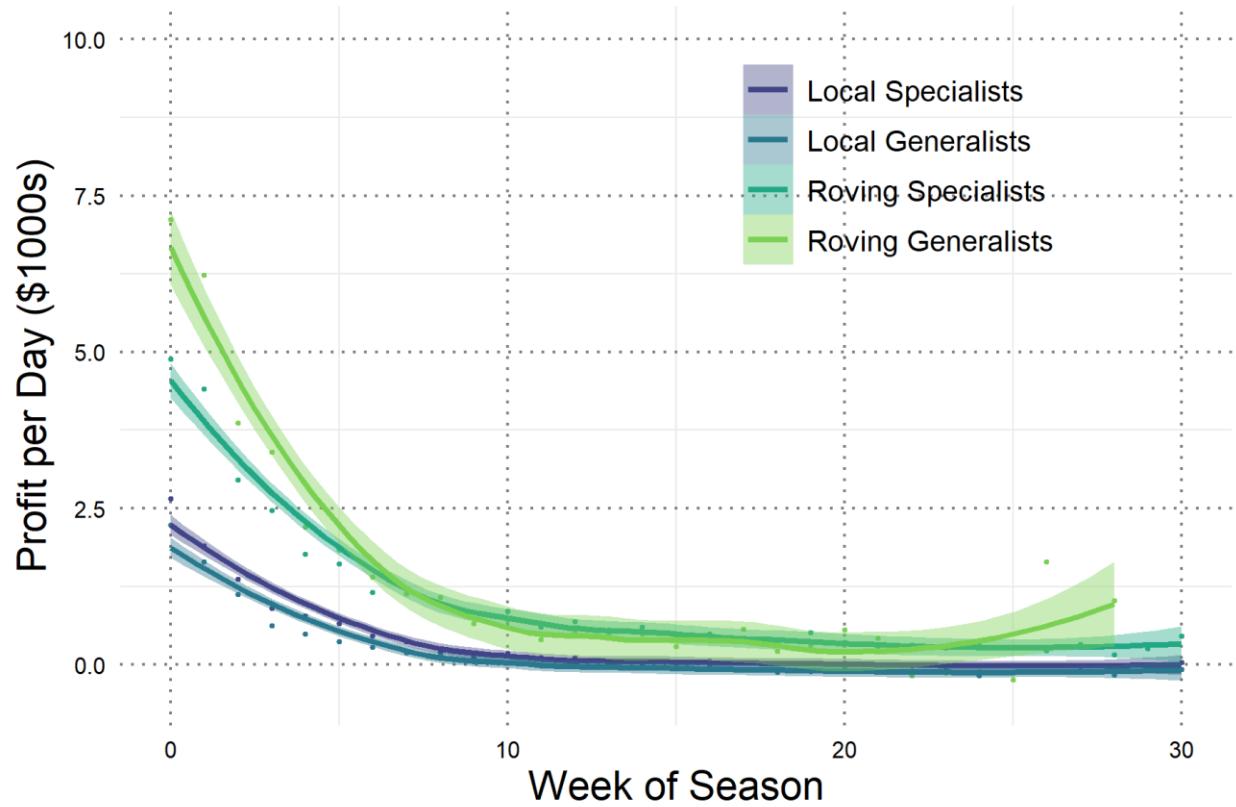
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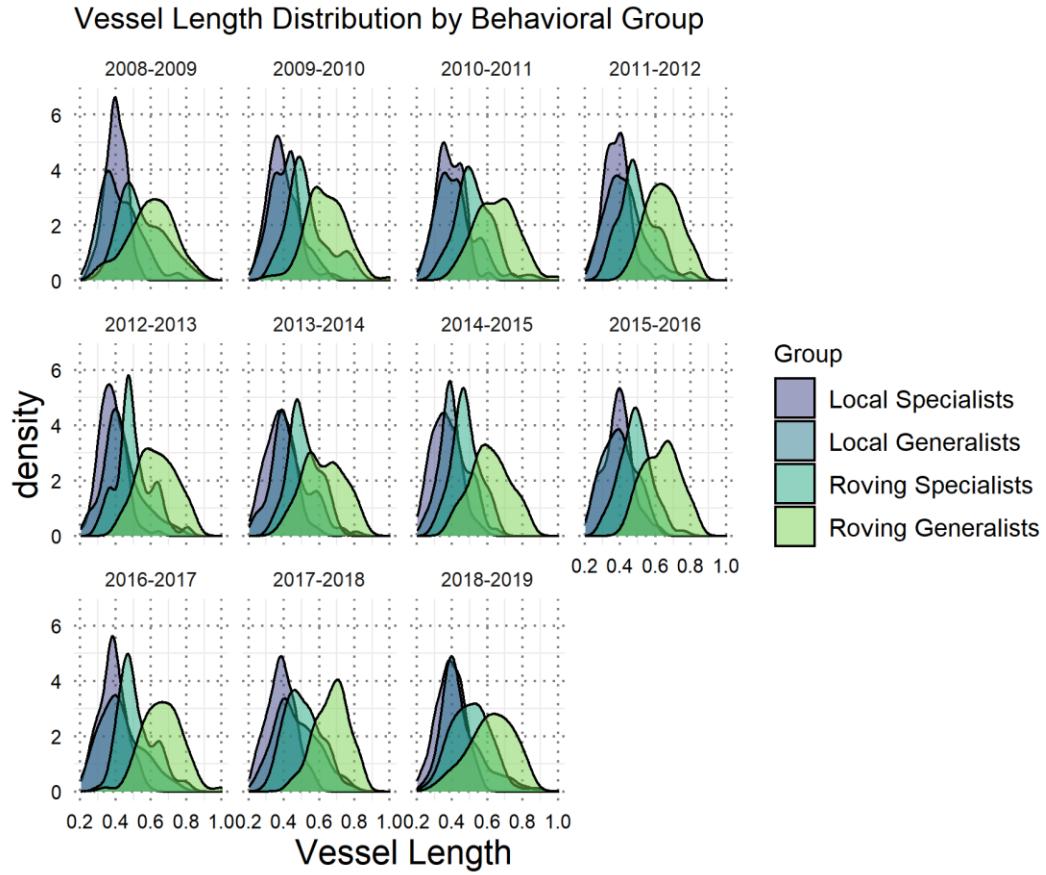
46 Figure A.4. Mean profit per day fished for each behavioral group in each week of the crab season,
47 averaged across all seasons. Lines show a loess smooth across weeks for each group.



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50 Figure A.5. Smoothed kernel density distributions of vessel length by behavioral group and crab season.
51 We used vessel registration data from PacFIN to obtain vessel lengths in feet. Vessel lengths were
52 checked for reporting errors, and only the most recent length value was used if a vessel reported multiple
53 different lengths. Lengths here are shown after normalizing to a 0-1 scale.

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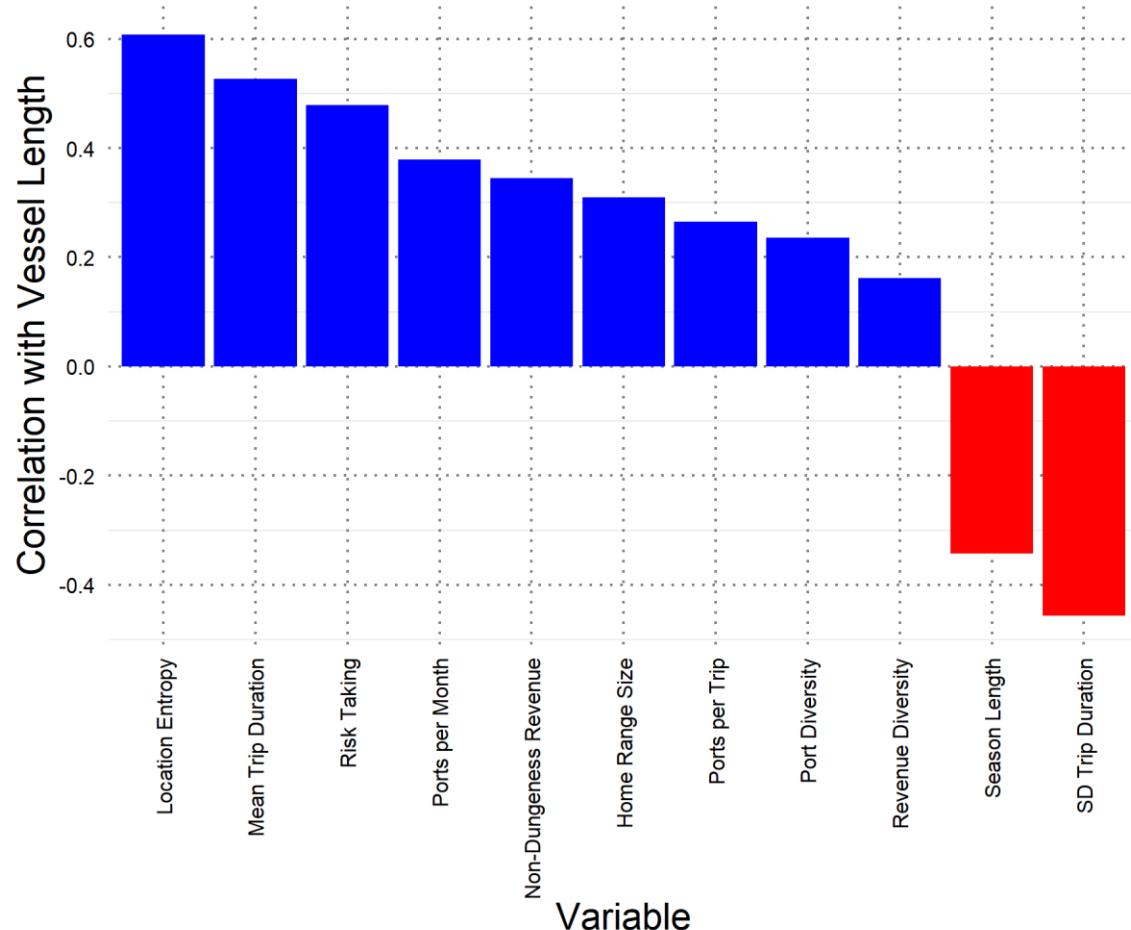


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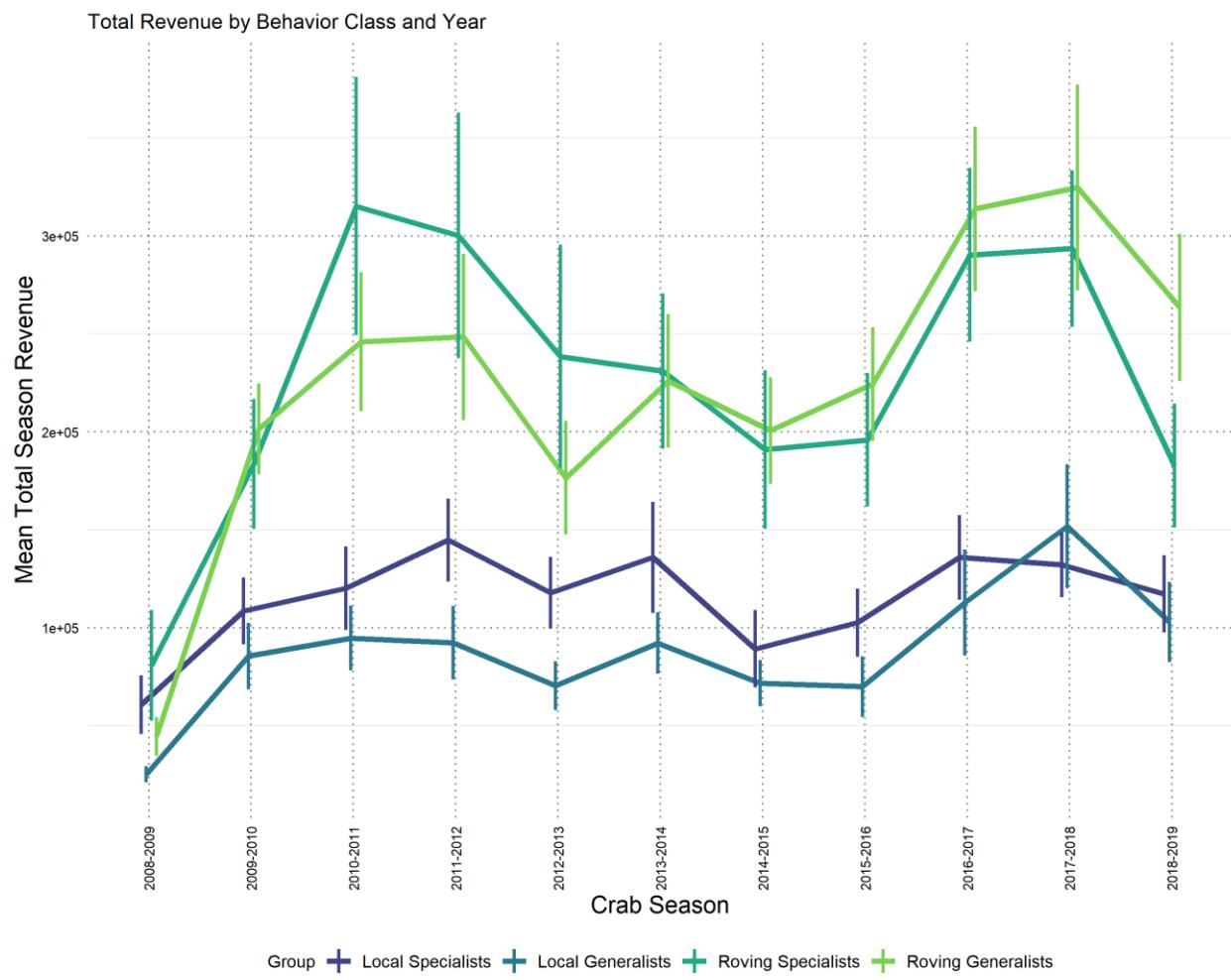
57 Figure A.6. Correlation of vessel length with behavioral metrics used in the cluster analysis. We used
58 vessel registration data from PacFIN to obtain vessel lengths in feet. Vessel lengths were checked for
59 reporting errors, and only the most recent length value was used if a vessel reported multiple different
60 lengths.

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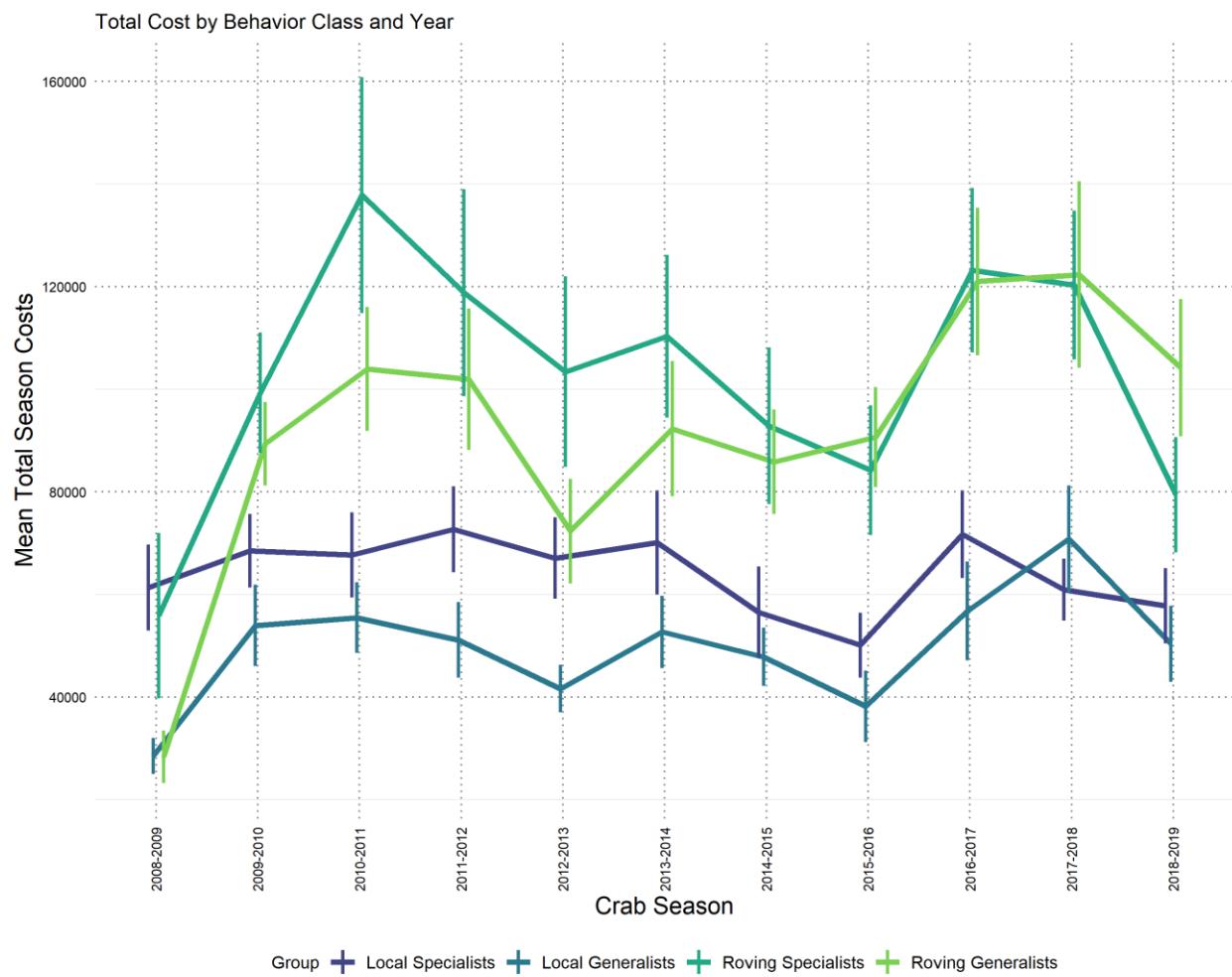
64 Figure A.7 Seasonal mean Dungeness crab revenue (+/- 2SE) for vessels in each behavioral
65 group.
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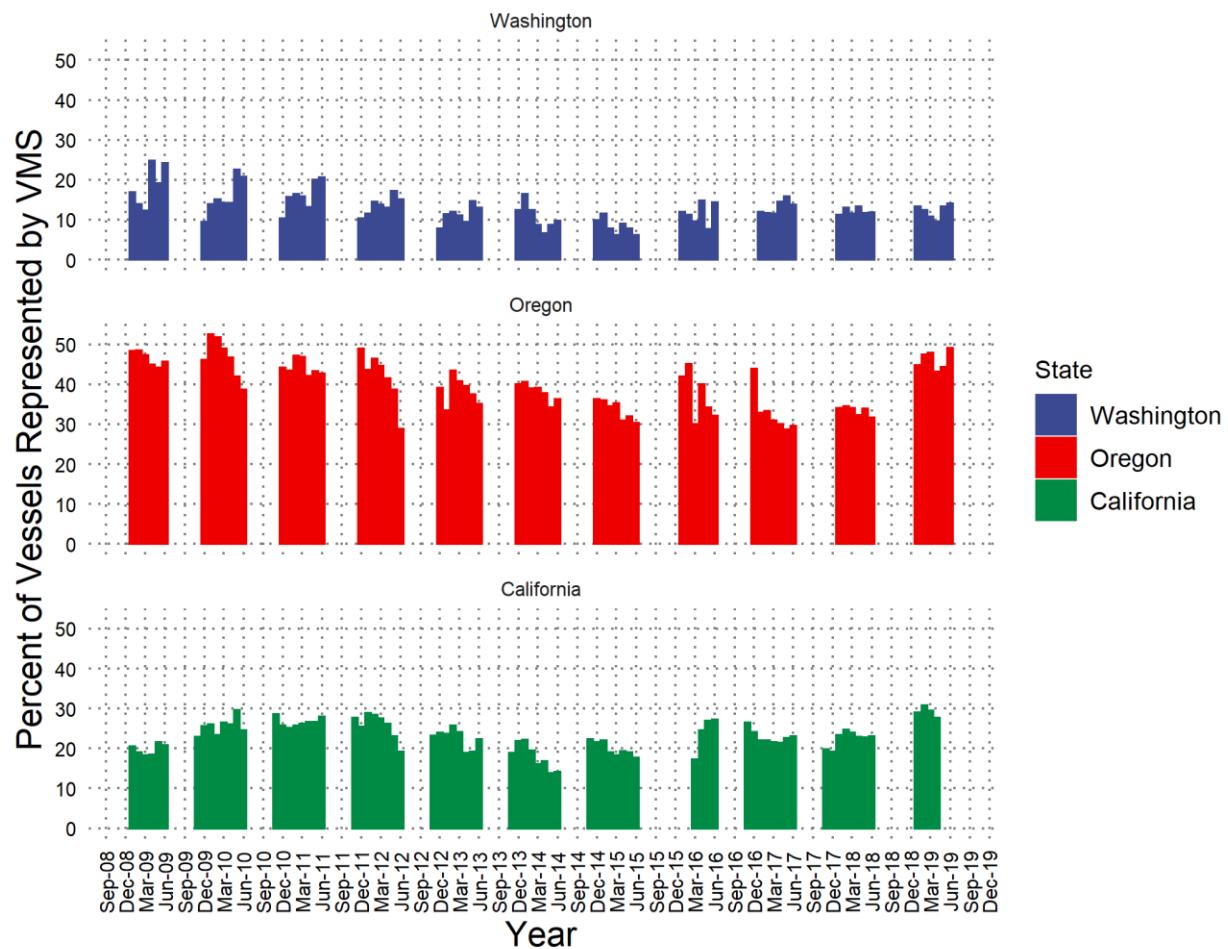
69 Figure A.8 Seasonal total estimated costs (main text equations 2-7) (+/- 2SE) for vessels in
70 each behavioral group.

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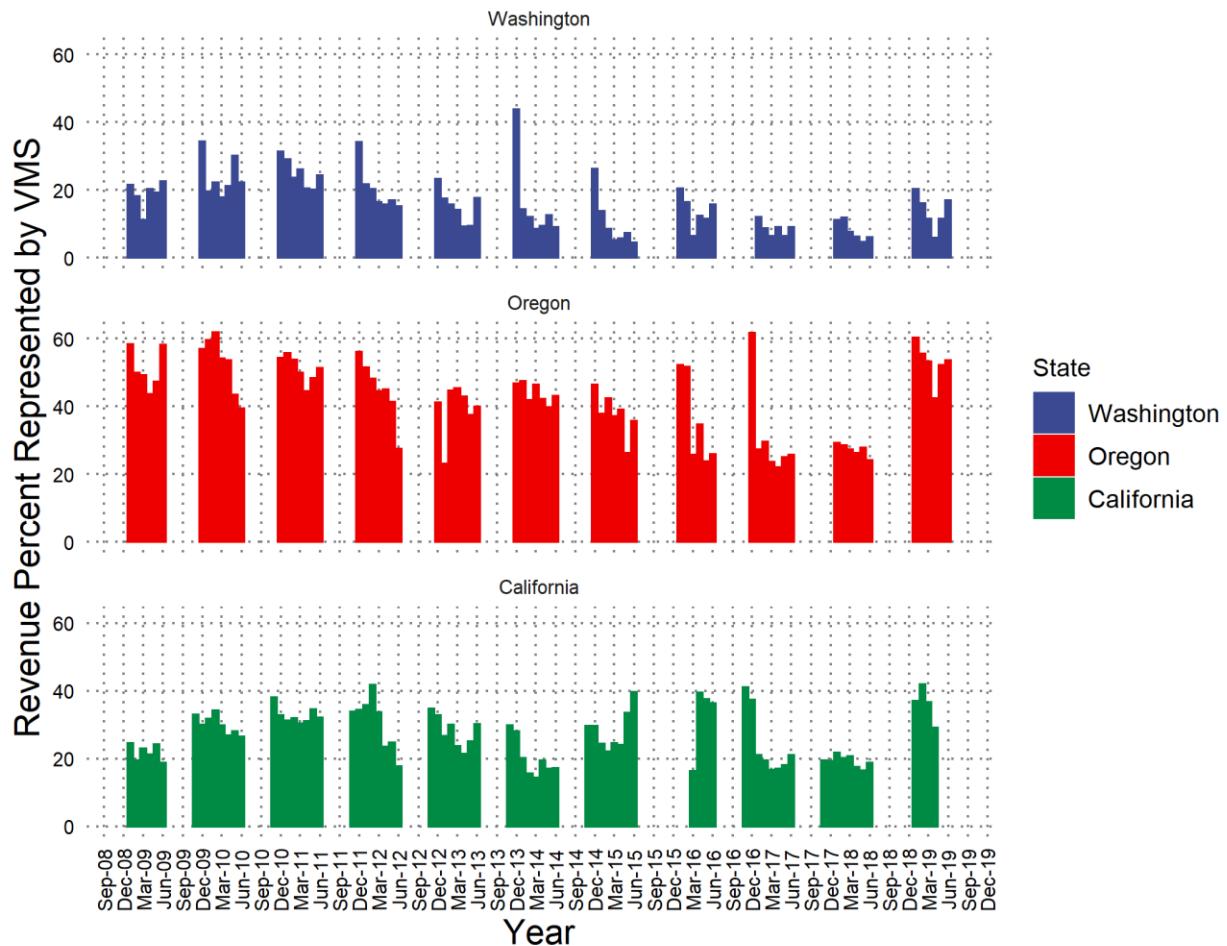
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74 Figure A.9 Percent of fleet-wide Dungeness crab vessels represented by VMS.



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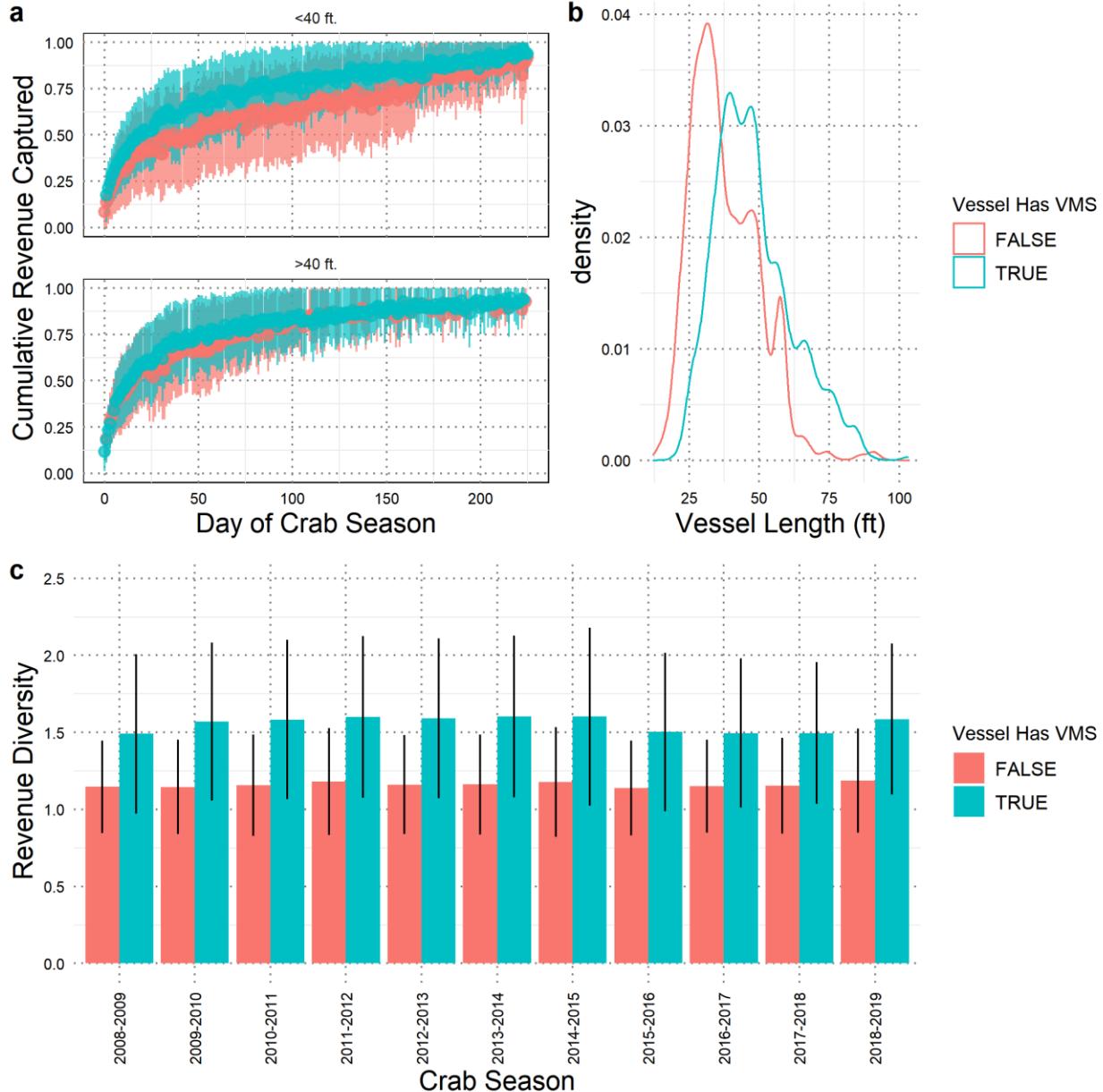
76 Figure A.10 Percent of fleet-wide Dungeness crab revenue represented by VMS-tracked
77 vessels.



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80 Figure A.11 Comparisons for key non-VMS-based metrics between vessels with (blue) and
 81 without (red) VMS transponders. a) Cumulative revenue captured by day of the fishing season
 82 for small (<40 ft., top panel) and large (>40 ft., bottom panel) vessels. Points show mean values
 83 across all vessels and seasons for a given day during the season, and lines are $\pm 1\text{SD}$. b)
 84 Distribution (smoothed histogram) of vessel size for all Dungeness crab fishing vessels with and
 85 without VMS transponders. c) Inverse Simpson index of revenue diversity across species groups
 86 (mean $\pm 1\text{SD}$)

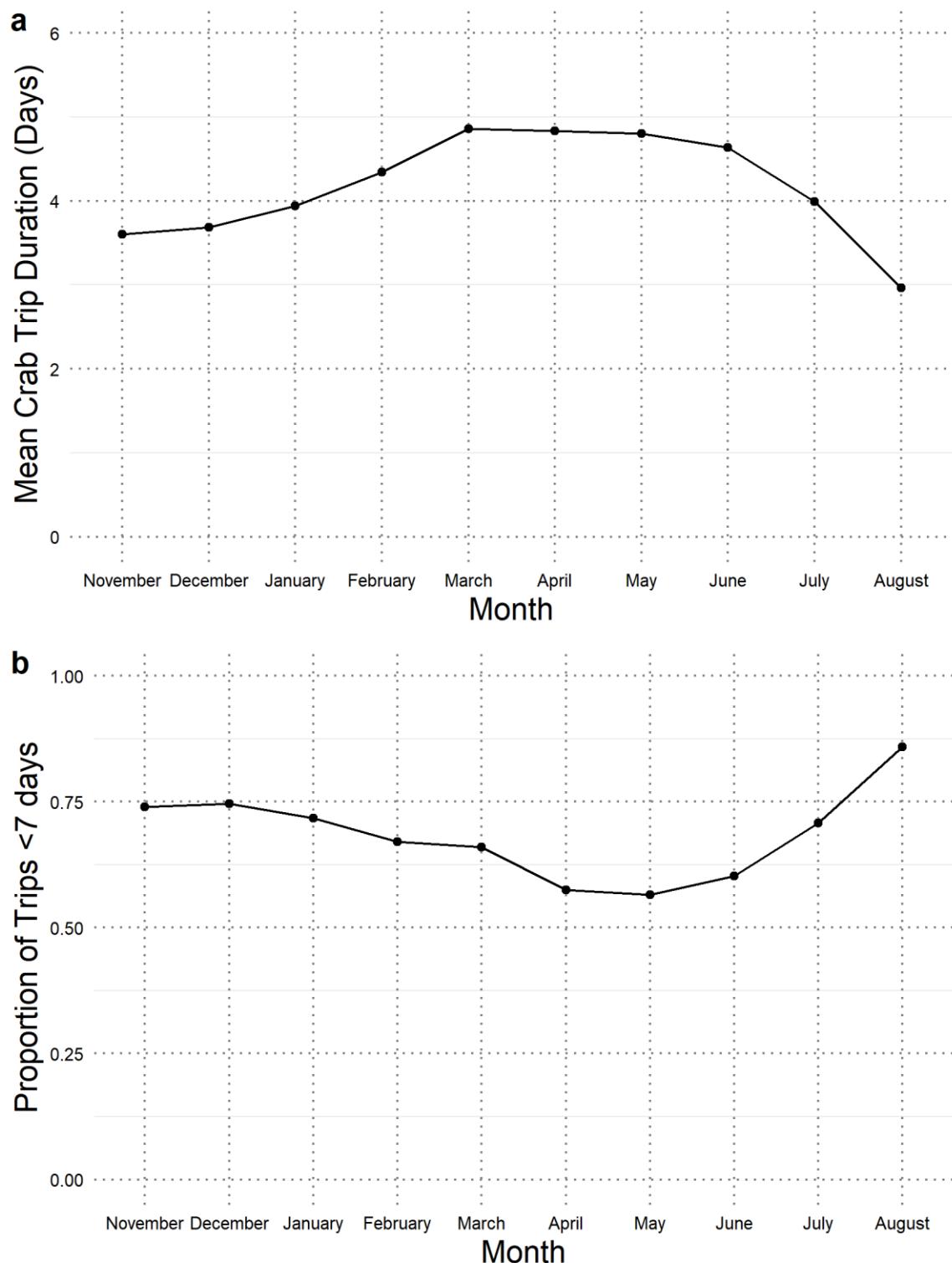
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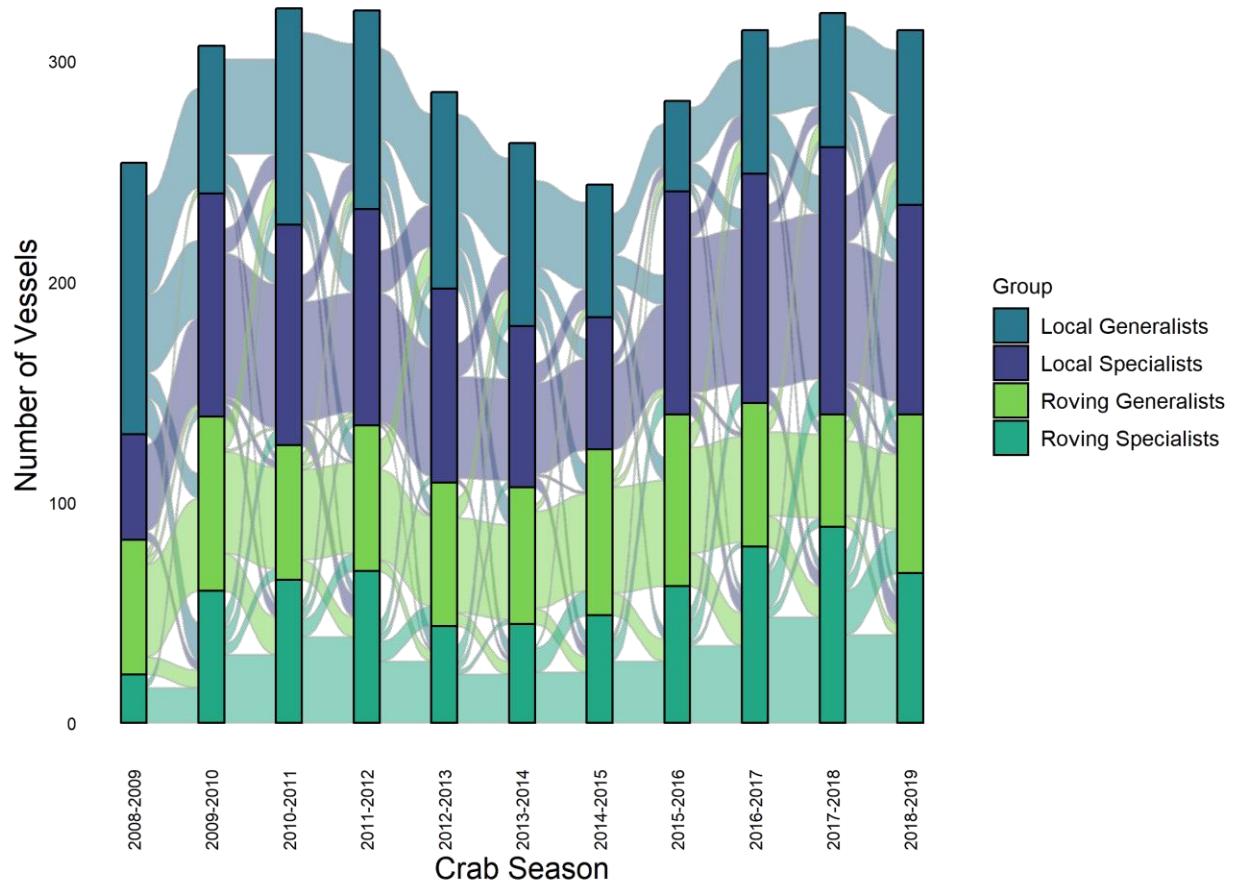
89 Figure A.12. (a) Mean duration in days of Dungeness crab trips across all recorded trips. (b)
90 Proportion of trips with a duration of less than 7 days (our cutoff for maximum length of a crab
91 trip).

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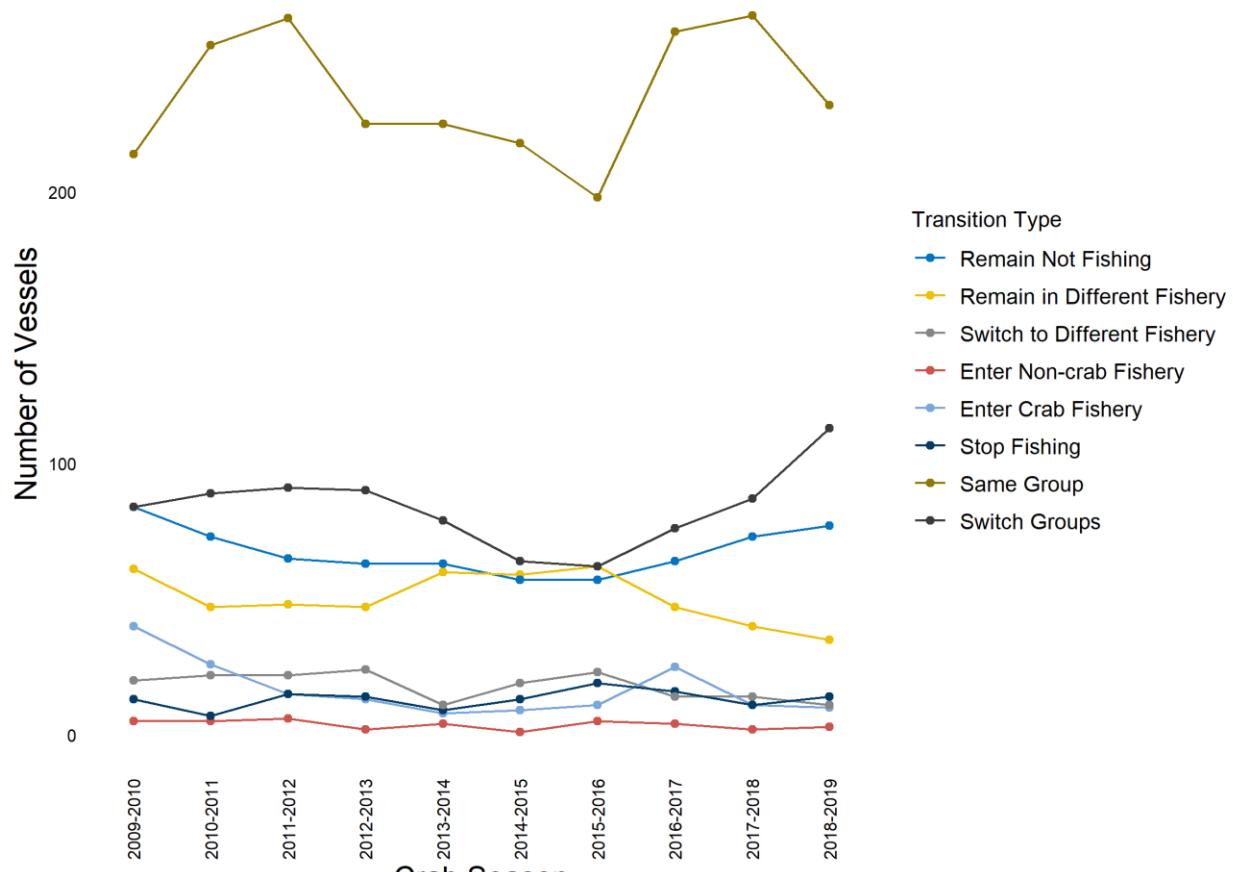
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94 Figure A.13. Flows of individual vessels between behavioral groups over time. Total bar height
95 indicates the total number of vessels recorded in the study in each crab season, while line
96 thickness indicates the number of vessels staying within or moving between groups between
97 seasons.



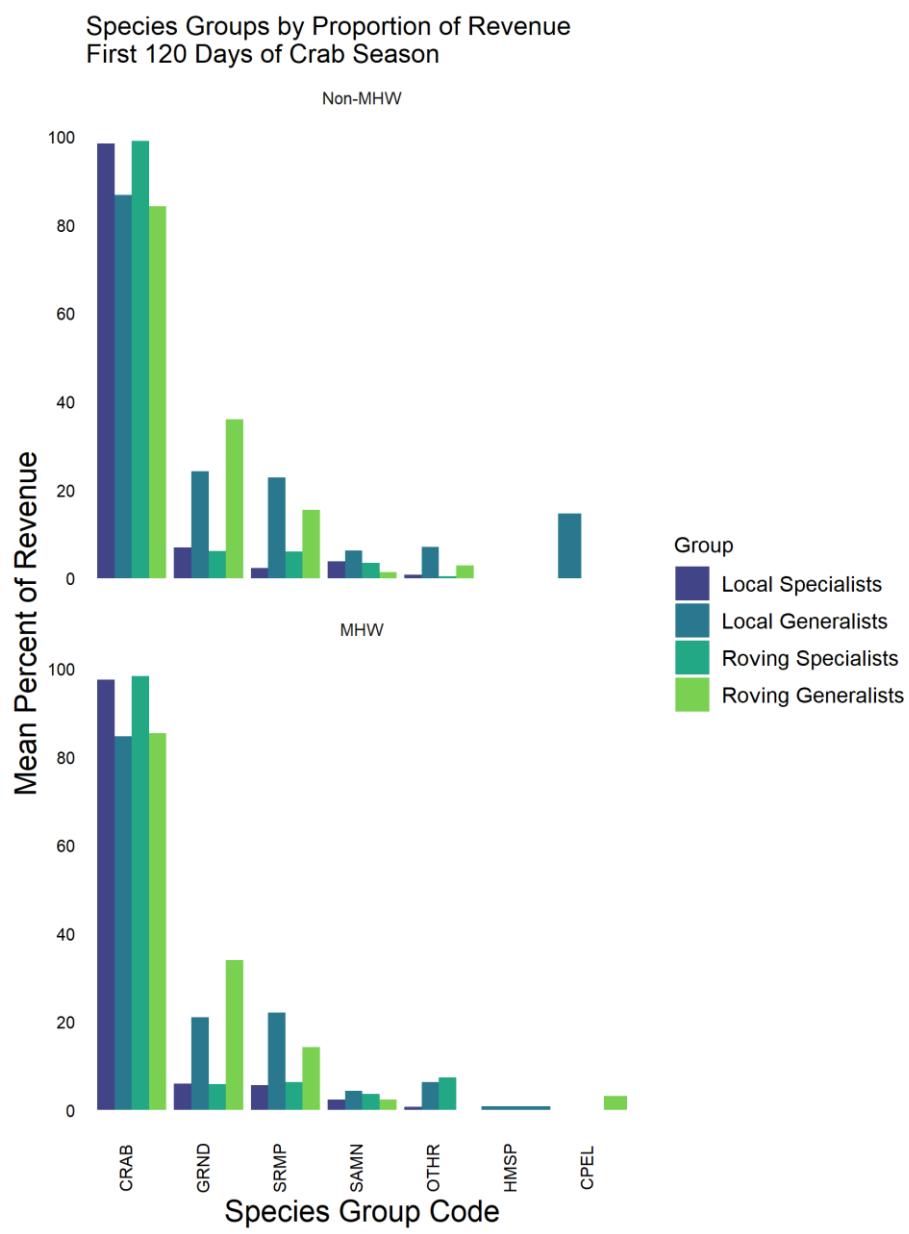
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100 Figure A.14. Number of vessels in the sample making transitions between fisheries, and
101 between fishing and not fishing, across the crab seasons of the study. All vessels represented
102 were included in our Dungeness crab sample in at least one season.



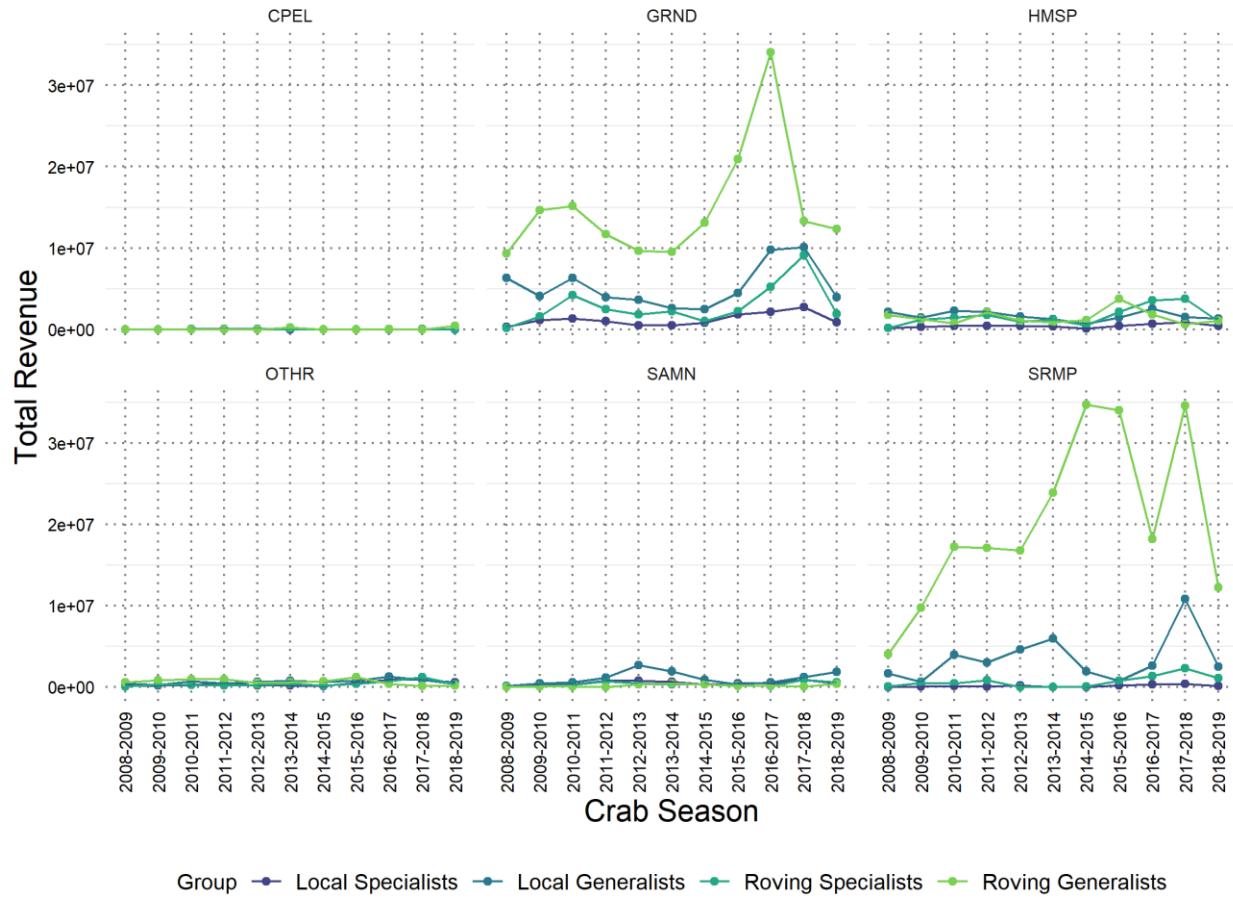
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105 Figure A.15. Percent of revenue derived from groups of species for vessels in each behavioral
 106 group, aggregated across the first 120 days of each Dungeness crab season, during which the
 107 majority of annual landings are caught. The top panel shows the mean percent of revenue by
 108 species group in non-MHW seasons, and the bottom panel shows MHW seasons. Species
 109 group designations are based on management groupings defined by the Pacific Fisheries
 110 Management Council (https://pacfin.psmfc.org/pacfin_pub/codes.php) (CRAB: Dungeness crab;
 111 GRND: Groundfish species; HMSP: highly migratory species, in this case mostly albacore tuna;
 112 SRMP: shrimp species; SAMN: salmon species; OTHR: species not captured in other groups;
 113 CPEL: coastal pelagic species like sardine and anchovy; SHLL: bivalves and gastropods).
 114 These species groups were used in the derivation of the revenue diversity behavioral metric
 115 (see Methods).



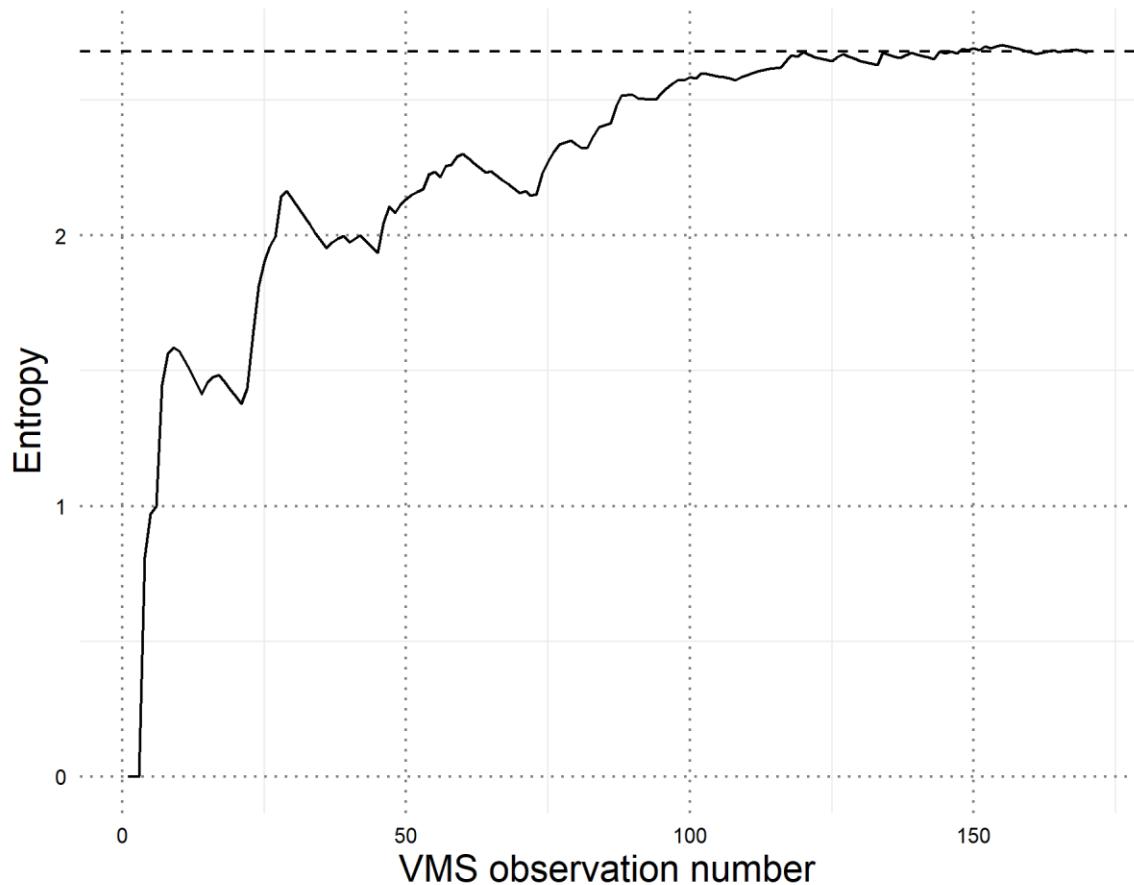
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118 Figure A.16. Time series of total landings of species other than Dungeness crab by vessels in
 119 each behavioral group in each crab season. Species groupings are based on management
 120 groupings defined by the Pacific Fisheries Management Council
 121 (https://pacfin.psmfc.org/pacfin_pub/codes.php) (GRND: Groundfish species; HMSP: highly
 122 migratory species, in this case mostly albacore tuna; SRMP: shrimp species; SAMN: salmon
 123 species; OTHR: species not captured in other groups; CPEL: coastal pelagic species like
 124 sardine and anchovy; SHLL: bivalves and gastropods)



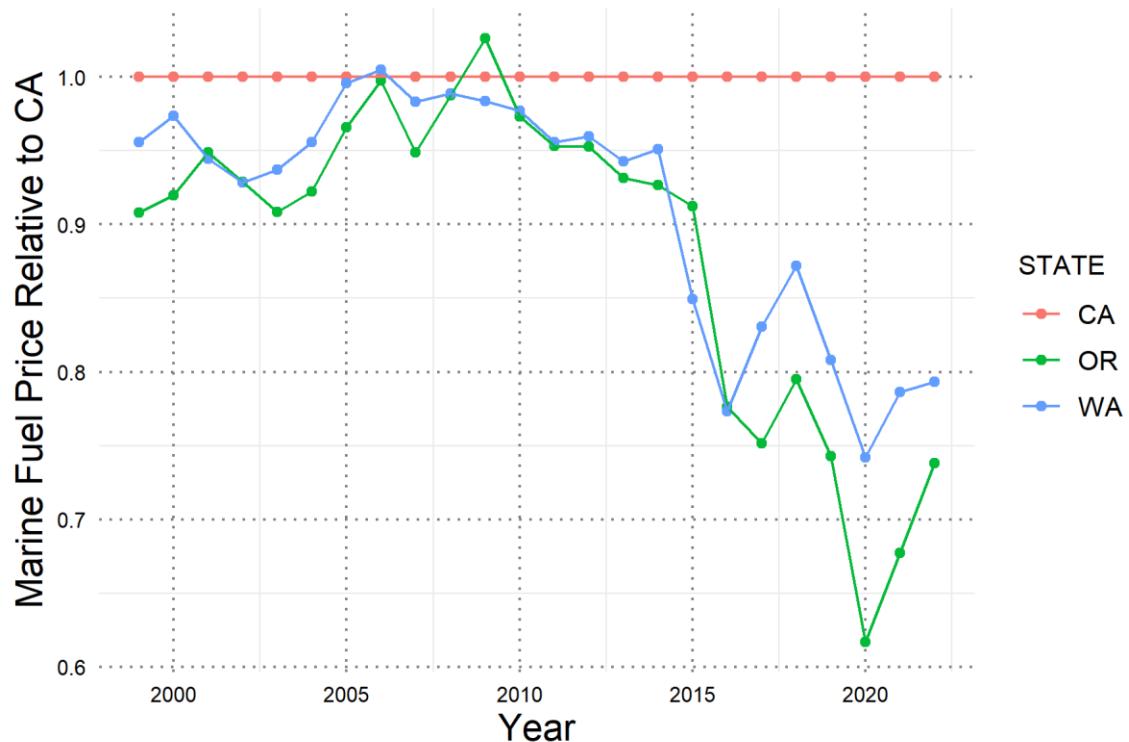
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127 Figure A.17. Example location choice entropy time series (see equation in Construction of
128 Fishing Behavioral Metrics in Materials and Methods). Within a vessel-season (x-axis), location
129 choice entropy (y-axis) increases as the vessel visits novel locations, but decreases if those
130 locations are revisited repeatedly. The metric for location choice entropy (i.e., exploration) was
131 defined as the 90th percentile of the maximum location choice entropy observed in a vessel-
132 season, shown here as the horizontal dashed line.



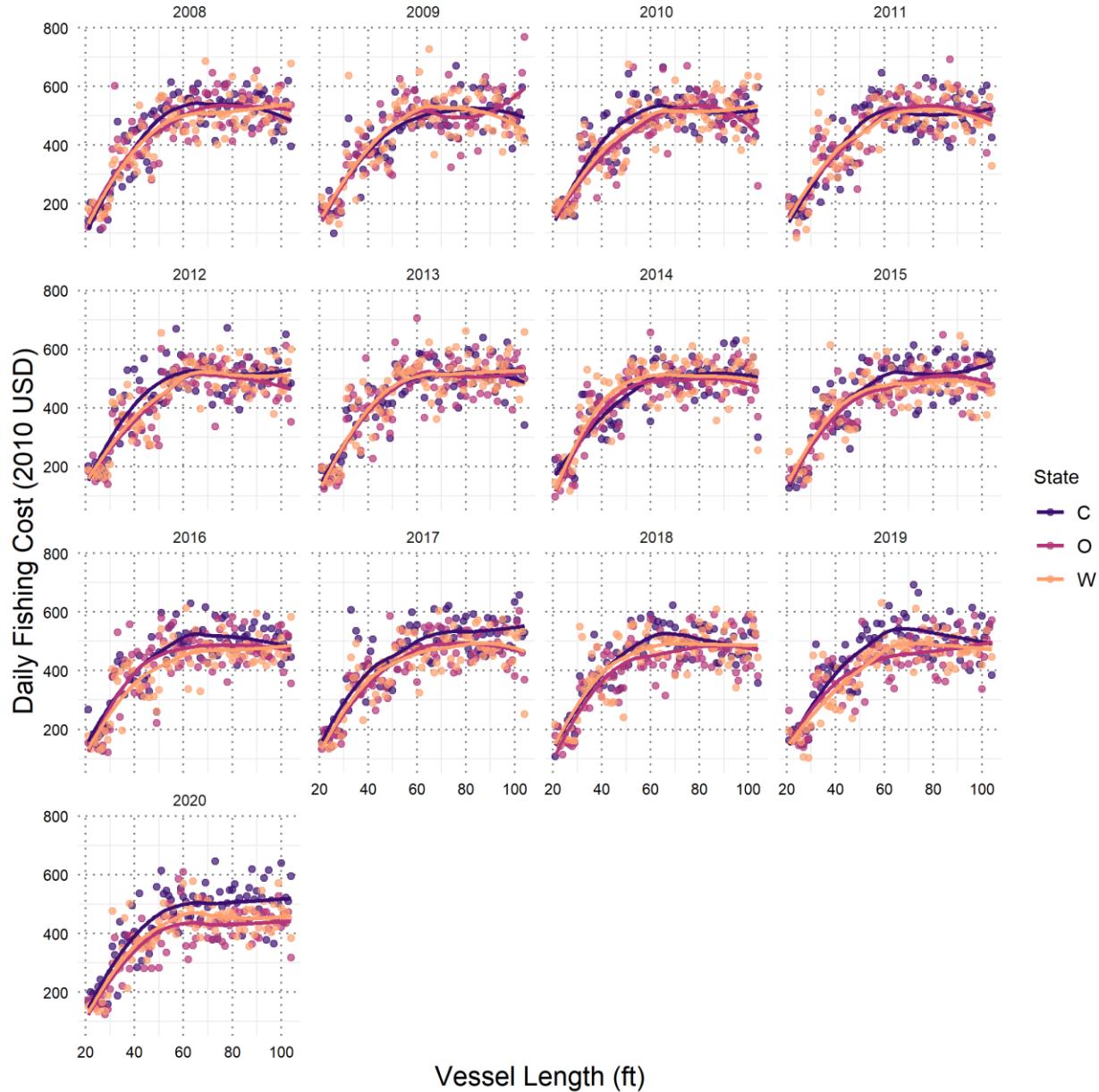
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135 Figure A.18. Relative fuel prices used in each state, extracted from
136 <http://www.psmfc.org/efin/data/fuel.html>. Used for calculation of fishing trip costs (see main
137 manuscript (Materials and Methods, Dungeness Fishing Profitability).



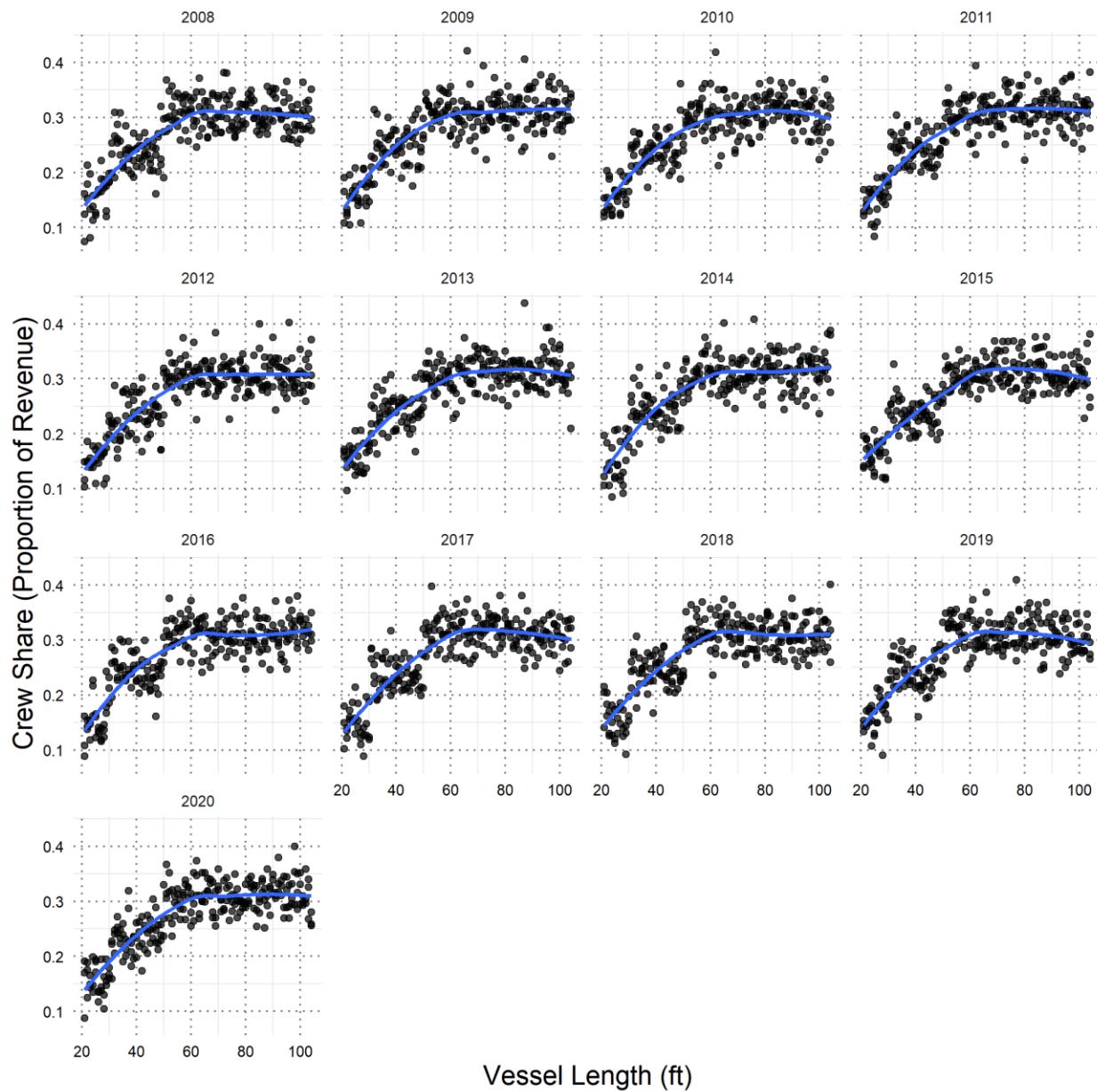
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140 Figure A.19 Simulation of daily fishing costs in 2010 USD, by vessel length, state, and year,
141 based on Dewees et al. (2004). See equations in main text (Materials and Methods, Dungeness
142 Fishing Profitability). Daily fishing cost varies slightly by state as a result of different fuel prices
143 (Fig. A.16).



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146 Figure A.20 Simulation of crew share as a proportion of trip revenue, based on Dewees et al.
147 (2004). See equations in main text (Materials and Methods, Dungeness Fishing Profitability).



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