

# 2019 Southern District Trawl Survey Summary (DRAFT)

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*September 1st, 2019*

The 2019 Southern District large-mesh bottom trawl survey was completed between May 22nd and 26th. A total of 38 successful 0.5 nmi tows were completed, all in core stations. No ancillary stations were sampled this year. A total of 1,682 male and 2,661 female Tanner crab were captured.

The recruit class size definitions for male Tanner crab in Cook Inlet were revised in 2017, coinciding with a reduction in the legal size limit from 140 mm (5.5 in) to 114 mm (4.5 in) (Table 1). For historical comparison the entire time series of survey data (1990 to 2019) is summarized using both sets of recruit classes herein.

Using the new legal size (114 mm), 420 legal males were captured in the 2019 survey. Mean legal male CPUE was 22.2 crab/nmi ( $CV = 190\%$ ) and ranged from 0 to 146. The estimated abundance of legal males using the new legal size was 273,511 crab ( $\pm 170,281$  @ 95% CI), a 23% increase from 2018. While the legal male abundance has increased in 2 consecutive years since 2017, it remains less than what was observed prior to 2010 (Table 2; Figure 2).

Using the old legal size (140 mm), 6 legal males were captured in the 2019 survey. When analyzed using the old size categories, the 2019 survey produced the lowest legal male abundance estimate on record, 4,135 crab ( $\pm 5,149$ ) (Table 3; Figure 3).

Legal male Tanners were found predominately in deep water west of the spit (Figures 4 and 5).

## List of Tables

1	Male Tanner crab recruit class size definitions (carapace width in millimeters) used in the Southern District trawl surveys. . . . .	2
2	Male Tanner crab abundance estimates using the 2017 size class definitions from trawl surveys in the Southern District, 1990-2019. Parenthetical size limits are carapace width in millimeters. . . . .	4
3	Male Tanner crab abundance estimates using the pre-2017 size class definitions from trawl surveys in the Southern District, 1990-2019. Parenthetical size limits are carapace width in millimeters. . . . .	5
4	Female Tanner crab abundance estimates from trawl surveys in the Southern District, 1990-2019. . . . .	6
5	Number of Tanner crab caught in the 2019 Southern District trawl survey categorized using the 2017 size classes. . . . .	9

## List of Figures

1	2019 Southern District large-mesh trawl survey grid and tow paths. . . . .	3
2	Legal male Tanner crab abundance estimates and 95% confidence intervals using the 2017 legal size (114 mm) from trawl surveys in the Southern District, 1990-2019. . . . .	7
3	Legal male Tanner crab abundance estimates and 95% confidence intervals using the pre-2017 legal size (140 mm) from trawl surveys in the Southern District, 1990-2019. . . . .	8
4	Legal male Tanner crab CPUE (crab/nmi) using the new legal size (114 mm) in the 2019 Southern District trawl survey. . . . .	10
5	Total male Tanner crab CPUE (crab/nmi) in the 2019 Southern District trawl survey. . . . .	11
6	Chela height vs carapace width of male Tanner crab captured in the Southern District trawl survey, 2011-2019. . . . .	12

Table 1: Male Tanner crab recruit class size definitions (carapace width in millimeters) used in the Southern District trawl surveys.

Recruit category	pre-2017	post-2017
Prerecruit-4	< 70	< 66
Prerecruit-3	70-91	66-79
Prerecruit-2	92-114	80-95
Prerecruit-1	115-139	96-113
Recruit	140-165	114-134
Postrecruit	> 165	> 134

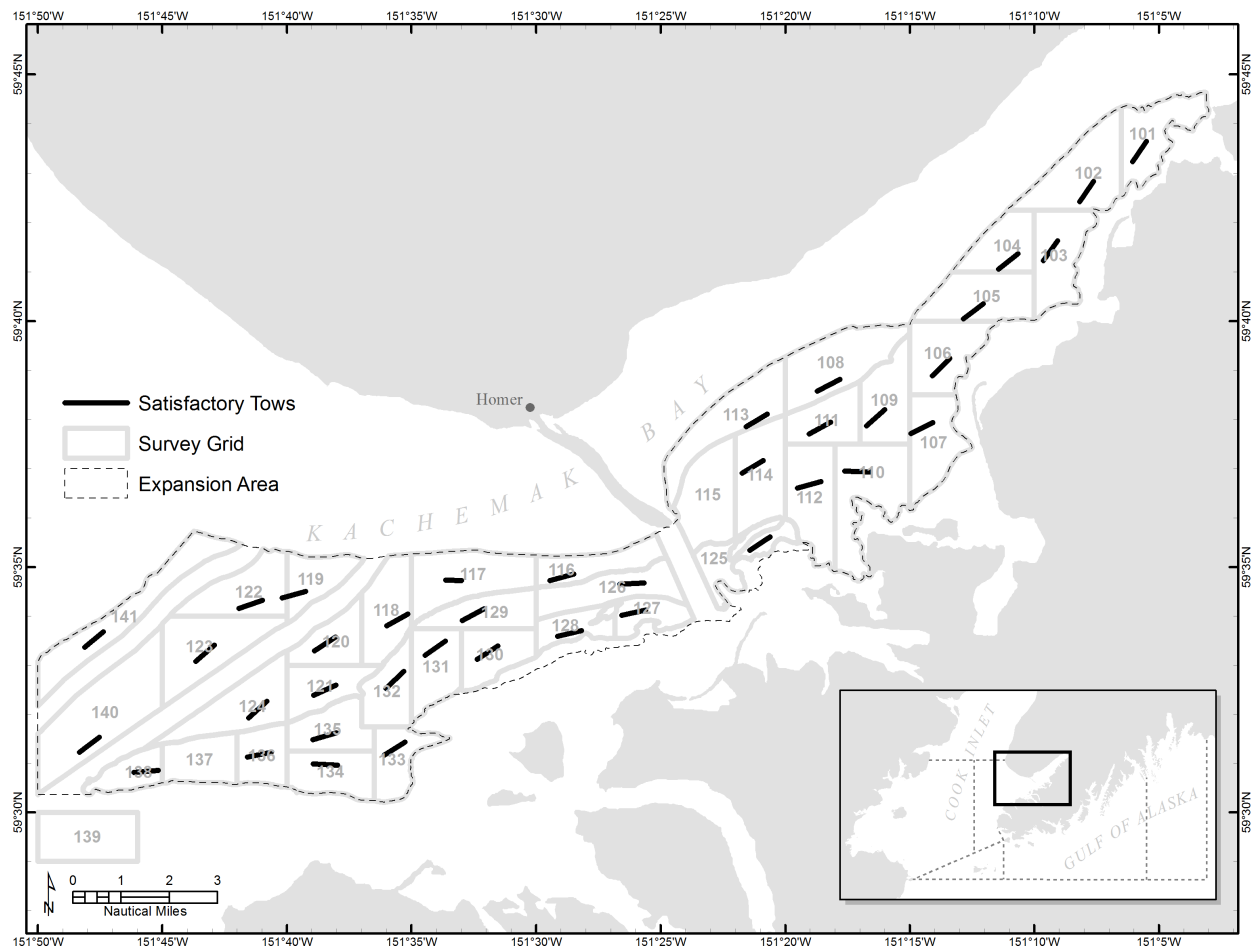


Figure 1: 2019 Southern District large-mesh trawl survey grid and tow paths.

Table 2: Male Tanner crab abundance estimates using the 2017 size class definitions from trawl surveys in the Southern District, 1990-2019. Parenthetical size limits are carapace width in millimeters.

Year	Tows	Pre-Recruits				Legal Males		Total Males	
		Pre-4 (<66)	Pre-3 (66-79)	Pre-2 (80-95)	Pre-1 (96-113)	Abund. (>114)	95% CI	Abund.	95% CI
1990	14	434,468	336,711	556,501	493,498	893,456	674,240	2,714,634	1,145,882
1991	15	252,510	131,374	273,576	685,422	1,379,426	453,670	2,722,308	879,693
1992	15	209,831	71,948	134,688	381,086	1,978,010	1,054,687	2,775,565	1,097,301
1993	16	558,464	59,025	73,378	107,855	848,810	363,005	1,647,532	430,628
1994	16	260,137	127,473	161,944	101,303	356,246	156,693	1,007,104	451,486
1995	16	300,509	198,207	301,598	484,296	811,734	807,143	2,096,344	1,299,465
1996	16	176,841	32,054	49,592	454,902	742,974	595,718	1,456,364	1,174,485
1997	16	134,484	87,749	107,112	244,618	478,196	211,890	1,052,159	323,702
1998	16	320,868	16,134	9,216	20,131	403,196	347,716	771,087	373,615
1999	16	713,951	699,162	830,294	518,904	312,049	239,298	3,074,360	2,743,906
2000	16	446,734	231,376	345,433	316,831	480,494	261,368	1,820,868	754,144
2001	16	1,508,596	470,833	344,754	255,343	504,698	318,804	3,084,224	1,995,590
2002	14	1,673,386	908,731	838,260	369,526	311,822	244,971	4,101,726	2,098,934
2003	16	884,933	861,700	806,086	553,965	358,230	201,368	3,464,914	1,726,501
2004	16	635,416	355,266	1,041,375	723,209	868,018	460,041	3,623,284	1,875,763
2005	15	986,832	174,394	87,049	155,515	405,890	452,079	1,809,679	1,083,062
2006	17	970,276	133,257	114,110	192,503	447,102	576,578	1,857,249	1,827,892
2007	16	326,276	38,953	100,798	116,841	561,046	909,757	1,143,914	1,252,423
2008	16	524,767	87,035	187,152	121,164	344,112	423,371	1,264,232	784,561
2009	15	818,177	439,944	547,114	636,899	752,945	548,314	3,195,079	2,338,396
2010	-	-	-	-	No_Survey	-	-	-	-
2011	37	4,005,798	190,619	78,819	32,244	139,901	121,721	4,448,010	1,983,150
2012	37	1,528,350	2,375,884	722,118	123,414	81,945	55,527	4,831,710	1,795,663
2013	37	778,423	390,244	716,835	1,098,146	192,637	105,523	3,179,046	975,058
2014	-	-	-	-	No_Survey	-	-	-	-
2015	-	-	-	-	No_Survey	-	-	-	-
2016	-	-	-	-	No_Survey	-	-	-	-
2017	38	180,159	369,070	274,479	187,270	124,965	132,255	1,135,943	806,870
2018	39	410,009	1,597,348	2,153,925	3,608,940	222,852	197,861	7,993,072	13,363,159
2019	38	153,687	112,222	223,280	342,991	273,511	170,281	1,105,691	518,574

Table 3: Male Tanner crab abundance estimates using the pre-2017 size class definitions from trawl surveys in the Southern District, 1990-2019. Parenthetical size limits are carapace width in millimeters.

Year	Tows	Pre-Recruits				Legal Males		Total Males	
		Pre-4 (<70)	Pre-3 (70-91)	Pre-2 (92-114)	Pre-1 (115-139)	Abund. (>140)	95% CI	Abund.	95% CI
1990	14	496,674	722,894	613,950	492,692	388,422	403,617	2,714,634	1,145,882
1991	15	293,894	277,640	802,800	848,159	499,815	226,608	2,722,308	879,693
1992	15	237,159	125,034	455,057	902,459	1,055,855	734,287	2,775,565	1,097,301
1993	16	578,321	89,958	135,248	325,507	518,498	254,074	1,647,532	430,628
1994	16	312,332	210,142	132,840	158,590	193,199	106,304	1,007,104	451,486
1995	16	356,090	389,839	565,725	506,325	278,365	296,245	2,096,344	1,299,465
1996	16	186,397	44,644	522,916	601,084	101,322	69,836	1,456,364	1,174,485
1997	16	171,929	123,219	287,862	326,037	143,111	80,729	1,052,159	323,702
1998	16	325,474	19,208	24,005	195,049	205,808	190,004	771,087	373,615
1999	16	911,483	1,160,291	697,642	200,663	104,282	91,894	3,074,360	2,743,906
2000	16	513,366	453,588	390,984	380,557	82,374	72,974	1,820,868	754,144
2001	16	1,619,958	655,741	319,106	392,469	96,951	61,266	3,084,224	1,995,590
2002	14	2,027,607	1,275,475	499,598	211,036	88,010	69,895	4,101,726	2,098,934
2003	16	1,228,442	1,188,614	710,246	288,894	48,717	52,980	3,464,914	1,726,501
2004	16	671,544	1,119,199	1,037,689	683,921	110,930	75,834	3,623,284	1,875,763
2005	15	1,043,700	185,975	186,987	347,339	45,676	41,786	1,809,679	1,083,062
2006	17	1,029,633	154,867	230,906	227,322	214,520	278,492	1,857,249	1,827,892
2007	16	339,466	92,716	176,167	373,061	162,504	238,989	1,143,914	1,252,423
2008	16	548,050	223,927	153,893	234,827	103,535	130,587	1,264,232	784,561
2009	15	1,000,556	643,343	852,512	554,785	143,882	141,993	3,195,079	2,338,396
2010	-	-	-	-	No_Survey	-	-	-	-
2011	37	4,110,124	159,347	40,492	94,758	42,660	40,810	4,448,010	1,983,150
2012	37	2,032,095	2,532,729	188,265	57,213	21,408	20,993	4,831,710	1,795,663
2013	37	925,729	680,678	1,390,554	141,245	38,077	34,026	3,179,046	975,058
2014	-	-	-	-	No_Survey	-	-	-	-
2015	-	-	-	-	No_Survey	-	-	-	-
2016	-	-	-	-	No_Survey	-	-	-	-
2017	38	234,313	553,408	230,471	110,673	7,078	8,329	1,135,943	806,870
2018	39	563,675	2,997,244	4,232,571	194,070	5,512	7,993	7,993,072	13,363,159
2019	38	171,855	243,678	429,931	256,093	4,135	5,149	1,105,691	518,574

Table 4: Female Tanner crab abundance estimates from trawl surveys in the Southern District, 1990-2019.

Year	Tows	Juvenile		Mature		Total Females	
		Juvenile	95% CI	Abund.	95% CI	Abund.	95% CI
1990	14	986,132	435,566	437,762	471,302	1,423,894	597,299
1991	15	485,795	350,909	848,952	827,100	1,334,746	1,092,684
1992	15	287,743	188,991	748,755	908,911	1,036,498	914,538
1993	16	568,171	323,143	578,012	610,110	1,146,183	594,572
1994	16	643,345	524,200	384,757	329,104	1,028,103	697,829
1995	16	675,120	424,282	863,188	805,917	1,538,308	945,949
1996	16	223,512	145,814	506,237	533,304	729,750	589,474
1997	16	188,883	91,602	305,560	316,959	494,443	345,855
1998	16	399,268	303,830	78,481	155,168	477,749	320,493
1999	16	1,237,351	1,087,752	566,811	595,051	1,804,162	1,377,638
2000	16	692,520	549,354	250,751	301,589	943,271	592,957
2001	16	2,161,815	2,321,558	447,251	437,516	2,609,066	2,353,086
2002	14	2,750,107	1,524,651	435,209	410,903	3,185,316	1,718,798
2003	16	1,315,229	976,196	244,512	134,582	1,559,741	1,081,698
2004	16	1,244,052	618,088	1,888,886	2,164,265	3,132,939	2,526,689
2005	15	985,618	829,221	224,362	356,513	1,209,980	840,474
2006	17	937,529	1,319,050	29,068	36,427	966,597	1,325,638
2007	16	603,481	604,255	1,509,612	3,184,135	2,113,093	3,767,243
2008	16	567,254	339,559	229,603	310,934	796,856	403,518
2009	15	1,416,060	1,161,372	1,530,501	1,167,925	2,946,561	2,007,361
2010	-	-	-	No Survey	-	-	-
2011	37	4,089,772	2,235,923	248,923	177,514	4,338,695	2,231,119
2012	37	4,638,687	2,187,999	662,728	451,871	5,301,416	2,526,810
2013	37	1,175,307	465,649	1,957,902	1,353,766	3,133,209	1,541,356
2014	-	-	-	No Survey	-	-	-
2015	-	-	-	No Survey	-	-	-
2016	-	-	-	No Survey	-	-	-
2017	38	839,202	727,415	297,126	302,289	1,136,328	1,019,282
2018	39	1,669,575	2,891,966	1,014,869	955,411	2,684,444	3,020,705
2019	38	249,782	173,394	1,488,880	1,226,166	1,738,661	1,229,575

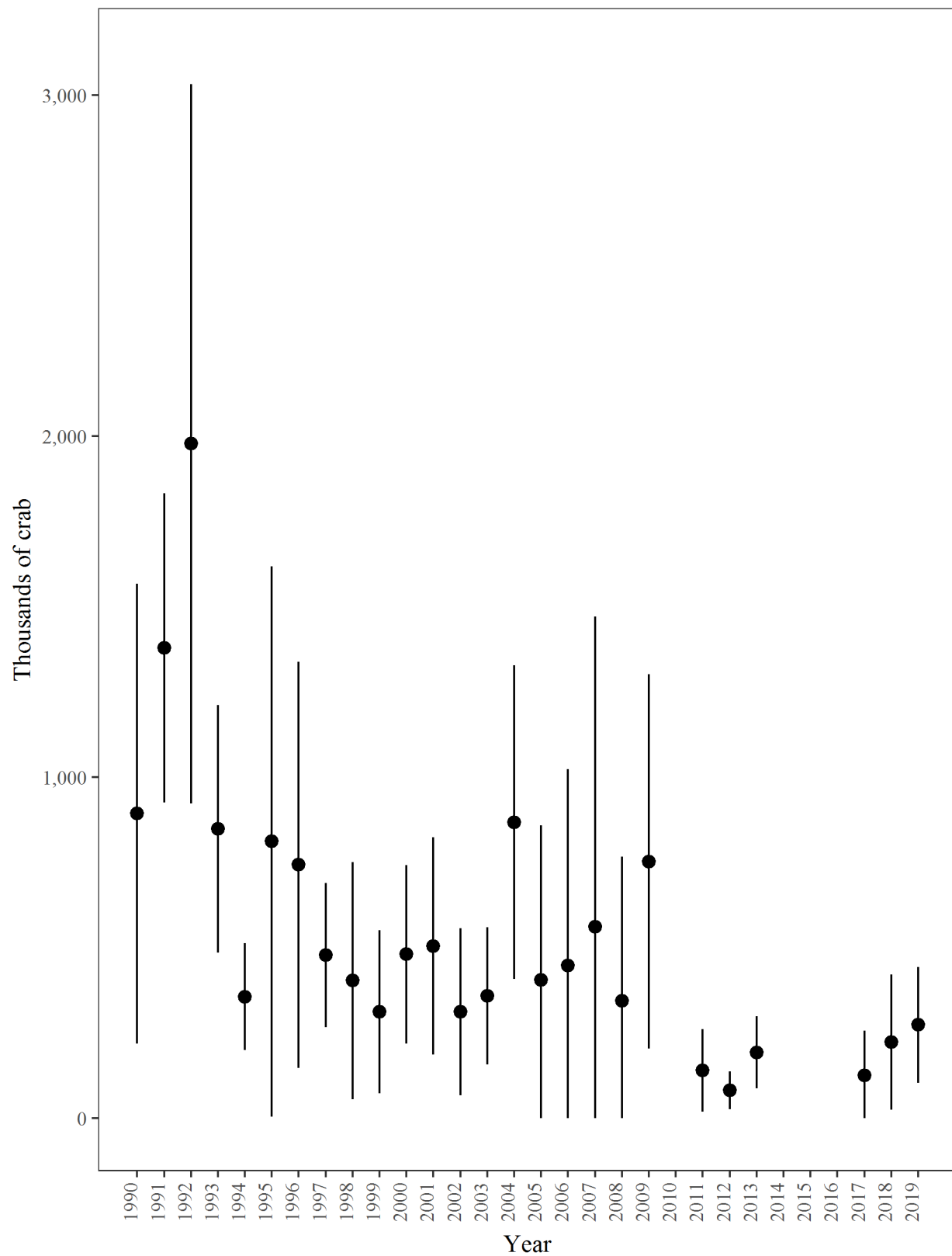


Figure 2: Legal male Tanner crab abundance estimates and 95% confidence intervals using the 2017 legal size (114 mm) from trawl surveys in the Southern District, 1990-2019.

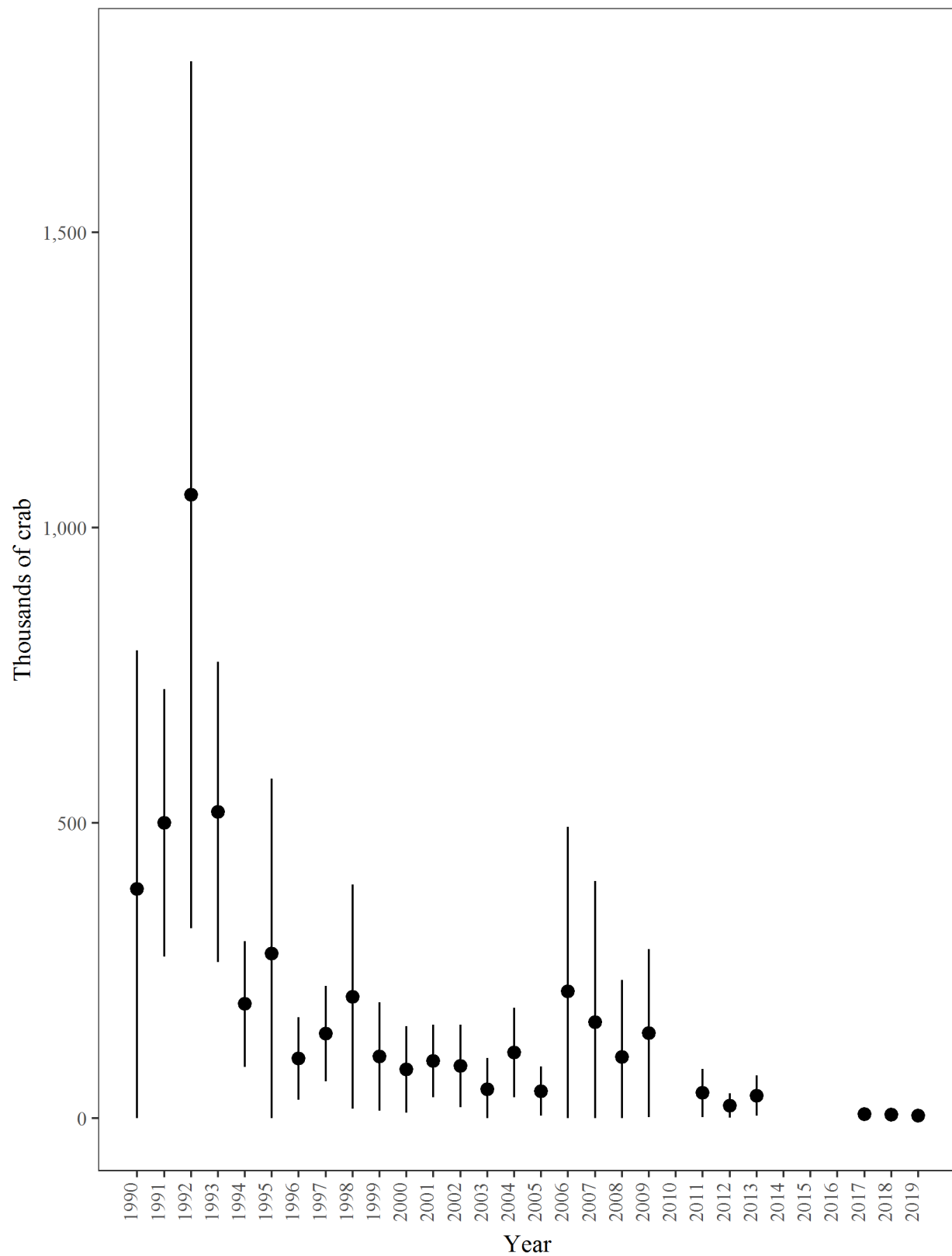


Figure 3: Legal male Tanner crab abundance estimates and 95% confidence intervals using the pre-2017 legal size (140 mm) from trawl surveys in the Southern District, 1990-2019.



Table 5: Number of Tanner crab caught in the 2019 Southern District trawl survey categorized using the 2017 size classes.

Station	nmi	Males							Females		
		Sublegal				Legal		Total	Juvenile	Mature	Total
		Pre-4	Pre-3	Pre-2	Pre-1	Recruit	Post-Rec.				
101	0.50	3.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	1.00	1.00
102	0.49	8.00	1.00	5.00	4.00	2.00	0.00	20.00	0.00	7.00	7.00
103	0.49	3.00	1.00	0.00	1.00	0.00	0.00	5.00	0.00	4.00	4.00
104	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.51	1.00	1.00	2.00	0.00	0.00	0.00	4.00	0.00	1.00	1.00
106	0.50	4.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	6.00	6.00
107	0.50	0.00	3.00	2.00	1.00	0.00	0.00	6.00	0.00	7.00	7.00
108	0.52	2.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
109	0.50	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00
110	0.52	1.97	11.80	15.73	21.63	5.90	1.97	59.00	26.00	25.00	51.00
111	0.50	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00
112	0.50	3.00	0.00	6.00	18.00	11.00	1.00	39.00	2.00	0.00	2.00
113	0.49	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
114	0.50	31.00	6.00	7.00	17.00	8.00	0.00	69.00	28.00	0.00	28.00
116	0.50	0.00	1.00	5.00	11.00	10.00	1.00	28.00	1.00	61.00	62.00
117	0.32	35.00	0.00	1.00	1.00	1.00	0.00	38.00	35.00	3.00	38.00
118	0.49	13.00	0.00	3.00	0.00	1.00	0.00	17.00	7.00	5.00	12.00
119	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.51	10.00	0.00	0.00	0.00	1.00	0.00	11.00	3.00	1.00	4.00
121	0.50	5.00	1.00	3.00	1.00	0.00	0.00	10.00	9.00	6.00	15.00
122	0.50	2.00	2.00	0.00	1.00	0.00	0.00	5.00	1.00	0.00	1.00
123	0.50	3.00	2.00	0.00	1.00	0.00	0.00	6.00	7.00	0.00	7.00
124	0.50	33.03	72.26	105.29	41.29	4.13	0.00	256.00	110.83	102.17	213.00
125	0.50	27.02	12.28	24.57	35.62	13.51	0.00	113.00	23.00	7.00	30.00
126	0.50	0.00	12.08	32.61	39.86	8.45	0.00	93.00	23.00	30.00	53.00
127	0.50	7.34	34.26	56.29	44.05	39.16	4.89	186.00	49.66	46.34	96.00
128	0.50	2.50	0.00	12.50	32.50	55.00	17.50	120.00	8.00	70.00	78.00
129	0.51	0.00	0.00	1.00	6.00	8.00	1.00	16.00	1.00	39.00	40.00
130	0.50	0.00	0.00	21.48	100.24	50.12	7.16	179.00	0.00	500.00	500.00
131	0.50	0.00	2.17	8.68	69.43	30.38	4.34	115.00	0.00	553.00	553.00
132	0.50	0.00	3.12	12.50	25.00	46.88	12.50	100.00	1.81	148.19	150.00
133	0.50	2.00	1.00	1.00	1.00	0.00	0.00	5.00	1.00	0.00	1.00
134	0.50	8.00	2.00	4.00	3.00	1.00	0.00	18.00	17.00	38.00	55.00
135	0.50	6.44	3.22	12.89	51.56	54.78	16.11	145.00	0.00	621.00	621.00
136	0.50	2.00	0.00	1.00	0.00	2.00	0.00	5.00	8.00	14.00	22.00
138	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.50	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
141	0.48	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00

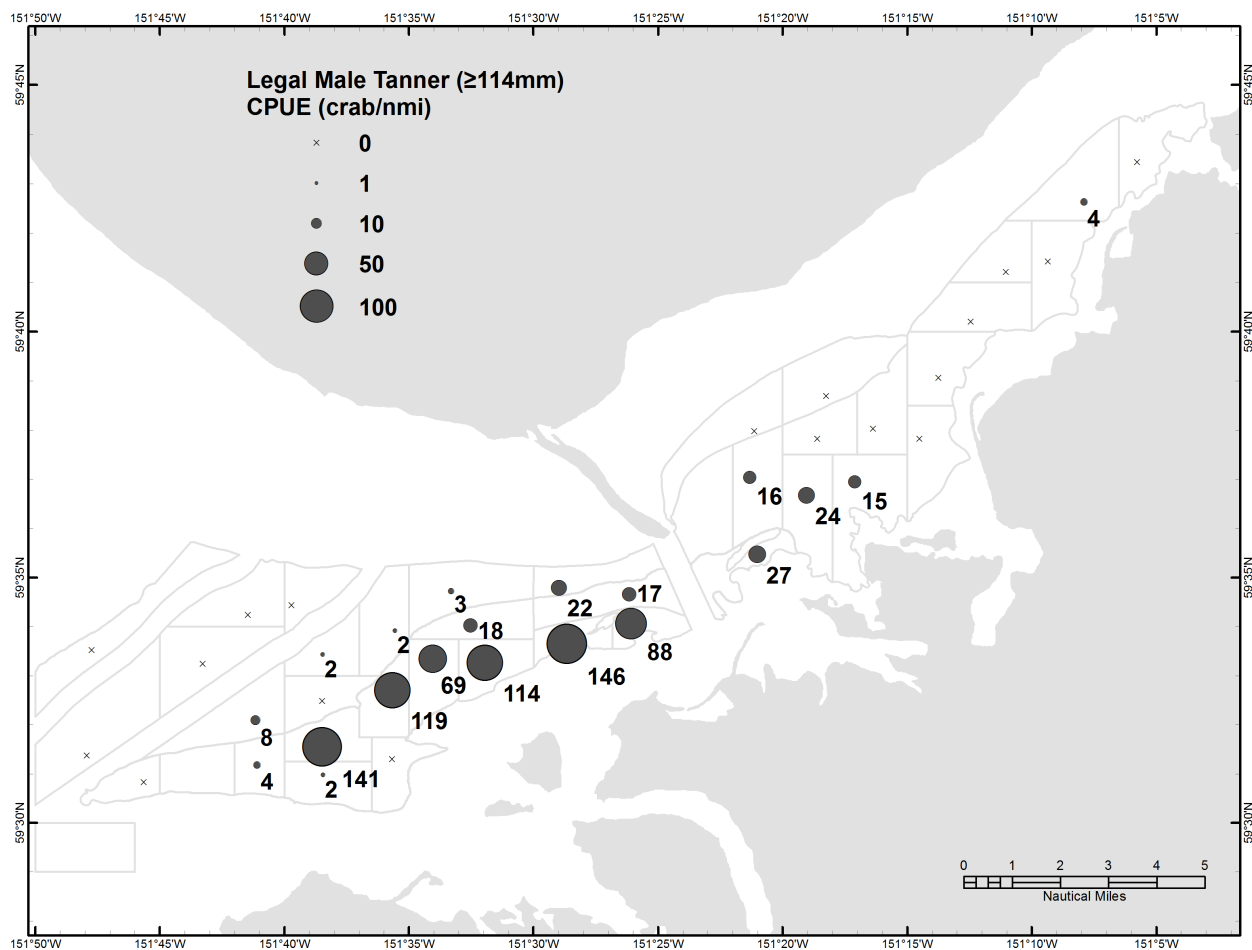


Figure 4: Legal male Tanner crab CPUE (crab/nmi) using the new legal size (114 mm) in the 2019 Southern District trawl survey.

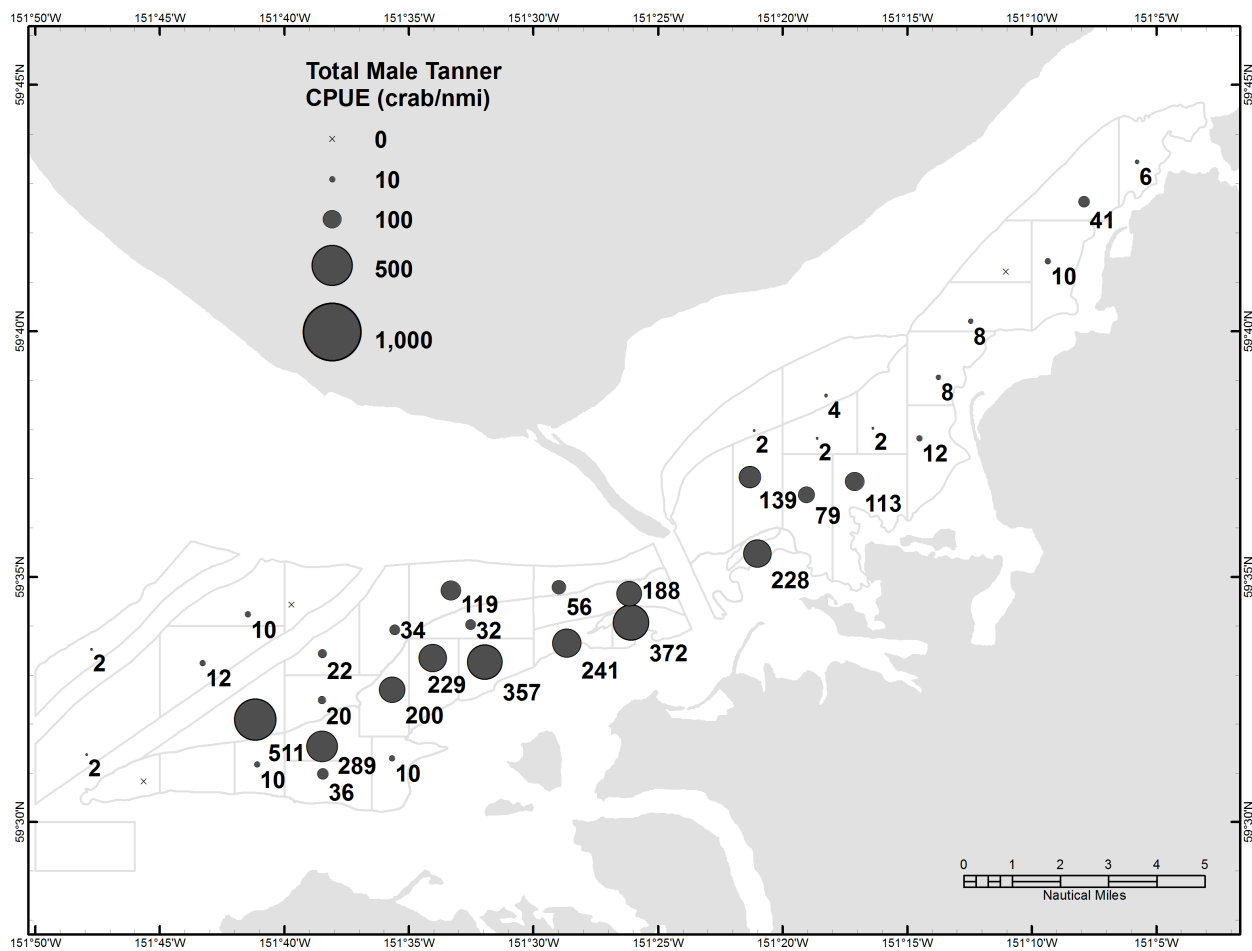


Figure 5: Total male Tanner crab CPUE (crab/nmi) in the 2019 Southern District trawl survey.

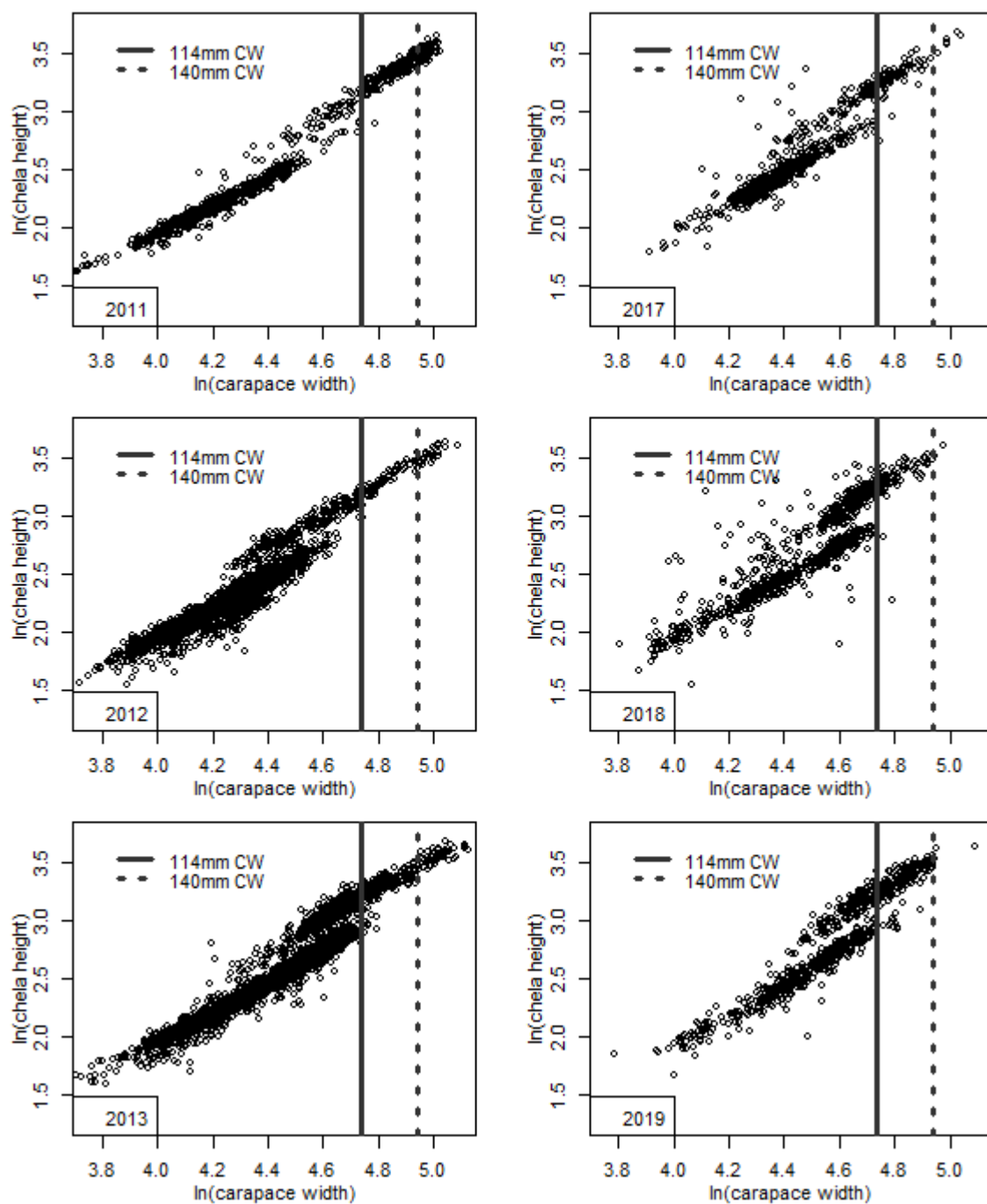


Figure 6: Chela height vs carapace width of male Tanner crab captured in the Southern District trawl survey, 2011-2019.