2017 Kachemak Bay Trawl Survey Summary (DRAFT)

Joshua Mumm

September 19, 2017

The 2017 Kachemak Bay large-mesh trawl survey was conducted between August 29th and September 6th. A total of 39 successful 0.5 nmi tows were completed, including 38 core stations and 1 ancillary station (station 139).

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). The 2017 definitions are anticipated to be the focus here and in the future. However, the entire time series of survey data (1990 to 2017) were analyzed using both sets of recruit class definitions, for historical comparative purposes.

The 2017 survey captured 1,481 male and 1,350 female Tanner crab. Of these males, 137 were legal using the 2017 revised legal limit and 8 would have been legal according to the historical legal definition. Mean legal male CPUE using the 2017 size limit was 10.12 crab/nmi (CV = 3.22) and ranged from 0 to 186. The estimated abundance of legal males using the 2017 legal size was 124,965 crabs (95% CI = 132,244) (Table 2; Figure 2). When the revised size limits were retroactively applied to the historical survey data, the 2017 legal abundance estimate was the 2nd lowest on record, surpassing only 2012 (Table 2, Figure 2). When analyzed using the old size classe definitions the 2017 survey produced the lowest legal male abundance estimate on record 7,078 crab (+/- 8,329) less than half of the 2012 estimate (Table 3; Figure 3).

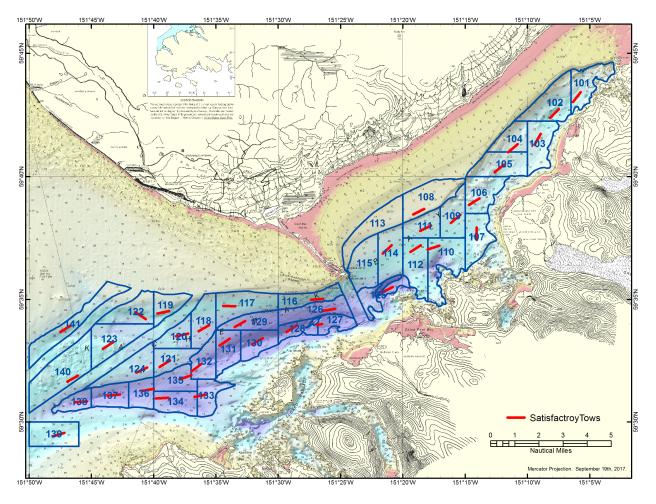


Figure 1: 2017 Kachemak Bay large-mesh trawl survey grid and tow paths.

Table 1: Male Tanner crab carapace width (mm) by recruit category for the Southern Distric trawl surveys.

() 0		0 0
Recruit category	pre-2017	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

Table 2: Male Tanner crab abundance estimates using the 2017 size class revisions from trawl surveys in the Southern District, 1990-2017. No survey

14 434,468 336,711 556,501 493,498 893,456 15 222,510 131,374 273,576 685,422 1,379,426 16 558,464 59,025 73,378 107,855 848,810 16 260,137 127,473 161,944 101,303 356,246 16 300,509 198,207 301,598 484,296 811,734 16 176,841 32,054 49,592 454,902 742,974 16 176,841 32,054 49,592 454,902 742,974 16 134,484 87,749 107,042 244,548 478,055 16 320,688 107,1042 244,548 478,055 16 446,734 330,294 518,904 478,055 16 446,734 231,376 344,734 316,493 16 1,508,596 470,833 344,734 359,526 311,822 16 1,508,596 470,833 444,534 369,526 311,822 <th>Year</th> <th>Tows</th> <th>Year Tows Pre-4 (<66mm) F</th> <th>Pre-3 (66-79mm)</th> <th>Pre-2 (80-95mm)</th> <th>Pre-1 (96-113mm)</th> <th>Legal (>114mm)</th> <th>Legal CI</th> <th>Total</th> <th>Total CI</th>	Year	Tows	Year Tows Pre-4 (<66mm) F	Pre-3 (66-79mm)	Pre-2 (80-95mm)	Pre-1 (96-113mm)	Legal (>114mm)	Legal CI	Total	Total CI
15 252,510 131,374 273,576 685,422 1,379,426 16 558,464 59,025 73,378 107,855 848,810 16 260,137 127,473 161,944 101,303 356,246 16 300,509 198,207 301,598 484,296 811,734 16 176,841 32,054 49,592 484,296 742,974 16 134,484 87,749 107,042 244,548 478,055 16 320,868 16,134 9,216 20,131 403,196 16 713,951 699,162 830,294 518,904 312,049 16 1,508,596 470,833 344,744 251,343 463,494 16 1,508,596 470,833 344,754 255,343 504,698 16 1,508,596 470,833 344,774 255,343 504,698 16 1,508,596 470,833 344,774 253,396 353,230 16 884,933 861,700 </td <td>1990</td> <td>14</td> <td>434,468</td> <td>336,711</td> <td>556,501</td> <td>493,498</td> <td>893,456</td> <td>674,240</td> <td>2,714,634</td> <td>1,145,882</td>	1990	14	434,468	336,711	556,501	493,498	893,456	674,240	2,714,634	1,145,882
15 209,831 71,948 134,688 381,086 1,978,010 16 558,464 59,025 73,378 107,855 848,810 16 260,137 127,473 161,944 101,303 356,246 16 176,841 32,054 49,592 454,206 811,734 16 176,841 32,054 49,592 445,902 742,974 16 176,841 32,054 49,592 445,902 742,974 16 173,484 87,749 107,042 244,548 478,055 16 446,734 16,134 9,216 20,131 403,196 16 446,734 231,376 344,754 403,196 16 1,508,596 470,833 344,754 255,343 504,698 16 1,508,596 470,833 344,754 255,365 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375	1991	15	252,510	131,374	273,576	685,422	1,379,426	453,670	2,722,308	879,693
16 558,464 59,025 73,378 107,855 848,810 16 260,137 127,473 161,944 101,303 356,246 16 300,509 198,207 301,598 484,296 811,734 16 176,841 32,054 49,592 445,902 742,974 16 134,484 87,749 107,042 244,548 478,055 16 713,951 699,162 830,294 518,904 403,196 16 713,951 699,162 830,294 518,904 403,196 16 446,734 231,376 345,433 312,049 403,196 16 1,508,596 470,833 344,754 255,343 504,698 16 884,933 861,700 806,086 553,965 358,230 16 884,933 861,700 806,086 553,965 358,230 16 884,933 174,394 87,049 155,515 405,890 17 986,832 174,394	1992	15	209,831	71,948	134,688	381,086	1,978,010	1,054,687	2,775,565	1,097,301
16 260,137 127,473 161,944 101,303 356,246 16 300,509 198,207 301,598 484,296 811,734 16 176,841 32,054 49,592 454,902 742,974 16 134,484 87,749 107,042 244,548 478,055 16 320,868 16,134 9,216 20,131 403,196 16 713,951 699,162 830,294 518,904 478,049 16 713,951 699,162 830,294 518,394 480,494 16 1,508,596 470,833 344,754 255,343 504,698 16 1,508,596 470,833 344,754 255,343 504,698 16 1,673,386 908,731 838,260 369,526 311,822 16 834,933 861,700 806,086 553,965 358,230 17 970,276 133,238 113,845 191,802 456,127 16 836,832 174,394 <td>1993</td> <td>16</td> <td>558,464</td> <td>59,025</td> <td>73,378</td> <td>107,855</td> <td>848,810</td> <td>363,005</td> <td>1,647,532</td> <td>430,628</td>	1993	16	558,464	59,025	73,378	107,855	848,810	363,005	1,647,532	430,628
16 300,509 198,207 301,598 484,296 811,734 16 176,841 32,054 49,592 454,902 742,974 16 134,484 87,749 107,042 244,548 478,055 16 320,868 16,134 9,216 20,131 403,196 16 713,951 699,162 830,294 518,904 312,049 16 713,951 699,162 830,294 518,904 312,049 16 1,508,596 470,833 344,754 255,343 504,698 16 1,508,596 470,833 344,754 255,343 504,698 16 884,933 861,700 806,086 553,965 358,230 16 884,933 861,700 806,086 553,965 358,230 16 884,933 861,700 806,086 553,965 358,230 16 884,933 174,394 87,049 1155,41 405,890 16 326,276 38,953	1994	16	260,137	127,473	161,944	101,303	356,246	156,693	1,007,104	451,486
16 176,841 32,054 49,592 454,902 742,974 16 134,484 87,749 107,042 244,548 478,055 16 320,868 16,134 9,216 20,131 403,196 16 713,951 699,162 830,294 518,904 312,049 16 446,734 231,376 345,433 316,831 480,494 16 1,508,596 470,833 344,754 255,343 504,698 14 1,673,386 908,731 838,260 369,526 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 17 970,276 133,238 113,845 191,802 456,127 16 528,442 87,852 187,970 125,792 351,461 15 811,77 439,944 547,114 636,899 752,945 15 818,177 439,944	1995	16	300,509	198,207	301,598	484,296	811,734	807,143	2,096,344	1,299,465
16 134,484 87,749 107,042 244,548 478,055 16 320,868 16,134 9,216 20,131 403,196 16 713,951 699,162 830,294 518,904 312,049 16 446,734 231,376 345,433 316,831 403,196 16 1,508,596 470,833 344,754 255,343 504,698 14 1,673,386 908,731 838,260 369,526 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 17 970,276 133,238 113,845 191,802 456,127 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 1,527,582 2,375,372 723,414 80,920 38 180,159 274,479 193,44<	1996	16	176,841	32,054	49,592	454,902	742,974	595,718	1,456,364	1,174,485
16 320,868 16,134 9,216 20,131 403,196 16 713,951 699,162 830,294 518,904 312,049 16 446,734 231,376 345,433 316,831 480,494 16 1,508,596 470,833 344,754 255,343 504,698 14 1,673,386 908,731 838,260 369,526 311,822 16 844,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 17 986,832 174,394 87,049 155,515 405,890 18 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372	1997	16	134,484	87,749	107,042	244,548	478,055	211,981	1,051,879	323,965
16 713,951 699,162 830,294 518,904 312,049 16 446,734 231,376 345,433 316,831 480,494 16 1,508,596 470,833 344,754 255,343 504,698 14 1,673,386 908,731 838,260 369,526 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 17 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375	1998	16	320,868	16,134	9,216	20,131	403,196	347,716	771,087	373,615
16 446,734 231,376 345,433 316,831 480,494 16 1,508,596 470,833 344,754 255,343 504,698 14 1,673,386 908,731 838,260 369,526 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 15 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 15 818,177 439,944 547,114 636,899 752,945 15 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	1999	16	713,951	699,162	830,294	518,904	312,049	239,298	3,074,360	2,743,906
16 1,508,596 470,833 344,754 255,343 504,698 14 1,673,386 908,731 838,260 369,526 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 15 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 38 180,159 369,070 274,479 187,270 124,965	2000	16	446,734	231,376	345,433	316,831	480,494	261,368	1,820,868	754,144
14 1,673,386 908,731 838,260 369,526 311,822 16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 15 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,653 38 180,159 274,479 187,270 124,965	2001	16	1,508,596	470,833	344,754	255,343	504,698	318,804	3,084,224	1,995,590
16 884,933 861,700 806,086 553,965 358,230 16 635,416 355,266 1,041,375 723,209 868,018 15 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,776 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2002	14	1,673,386	908,731	838,260	369,526	311,822	244,971	4,101,726	2,098,934
16 635,416 355,266 1,041,375 723,209 868,018 15 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2003	16	884,933	861,700	806,086	553,965	358,230	201,368	3,464,914	1,726,501
15 986,832 174,394 87,049 155,515 405,890 17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2004	16	635,416	355,266	1,041,375	723,209	868,018	460,041	3,623,284	1,875,763
17 970,276 133,238 113,845 191,802 456,127 16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2005	15	986,832	174,394	87,049	155,515	405,890	452,079	1,809,679	1,083,062
16 326,276 38,953 100,798 116,841 561,046 16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2006	17	$970,\!276$	133,238	113,845	191,802	456,127	583,967	1,865,289	1,828,893
16 528,442 87,852 187,970 125,792 351,461 15 818,177 439,944 547,114 636,899 752,945 37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2007	16	326,276	38,953	100,798	116,841	561,046	909,757	1,143,914	1,252,423
15 818,177 439,944 547,114 636,899 752,945 8 37 4,005,798 190,619 78,819 32,032 139,263 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2008	16	528,442	87,852	187,970	125,792	351,461	425,347	1,281,516	787,437
37 4,005,798 190,619 78,819 32,032 139,263 37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2009	15	818,177	439,944	547,114	636,899	752,945	548,314	3,195,079	2,338,396
37 1,527,582 2,375,372 721,862 123,414 80,920 37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2011	37	4,005,798	190,619	78,819	32,032	139,263	121,689	4,447,159	1,983,355
37 778,423 390,244 716,835 1,098,146 192,637 38 180,159 369,070 274,479 187,270 124,965	2012	37	1,527,582	2,375,372	721,862	123,414	80,920	55,218	4,829,149	1,796,356
38 180.159 369.070 274.479 187.270 124.965	2013	37	778,423	390,244	716,835	1,098,146	192,637	105,523	3,179,046	975,058
	2017	38	180,159	369,070	274,479	187,270	124,965	132,255	1,135,943	806,870

Table 3: Male Tanner crab abundance estimates using the pre-2017 size class definitions from trawl surveys in the Southern District, 1990-2017. No survey was conducted in 2010 or 2014-2016

survey	was con	survey was conducted in 2010 or 2014-2016	2014-2016						
Year	Tows	Pre-4 (<70mm)	Pre-3 (70-91mm)	Pre-2 (92-114mm)	Pre-1 (115-139mm)	Legal $(>140 \text{mm})$	Legal CI	Total	Total 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	89,928	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	287,722	325,897	143,111	80,729	1,051,879	323,965
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	154,678	230,111	226,338	224,530	286,932	1,865,289	1,828,893
2007	16	339,466	92,716	176,167	373,061	162,504	238,989	1,143,914	1,252,423
2008	16	552,269	224,880	159,200	239,726	105,440	130,955	1,281,516	787,437
2009	15	1,000,556	643,343	852,512	554,785	143,882	141,993	3,195,079	2,338,396
2011	37	4,109,517	159,347	40,208	94,797	42,660	40,810	4,447,159	1,983,355
2012	37	2,031,199	2,532,088	188,265	57,085	20,512	20,105	4,829,149	1,796,356
2013	37	925,729	820,089	1,390,554	141,245	38,077	34,026	3,179,046	975,058
2017	38	234,313	553,408	230,471	110,673	7,078	8,329	1,135,943	806,870

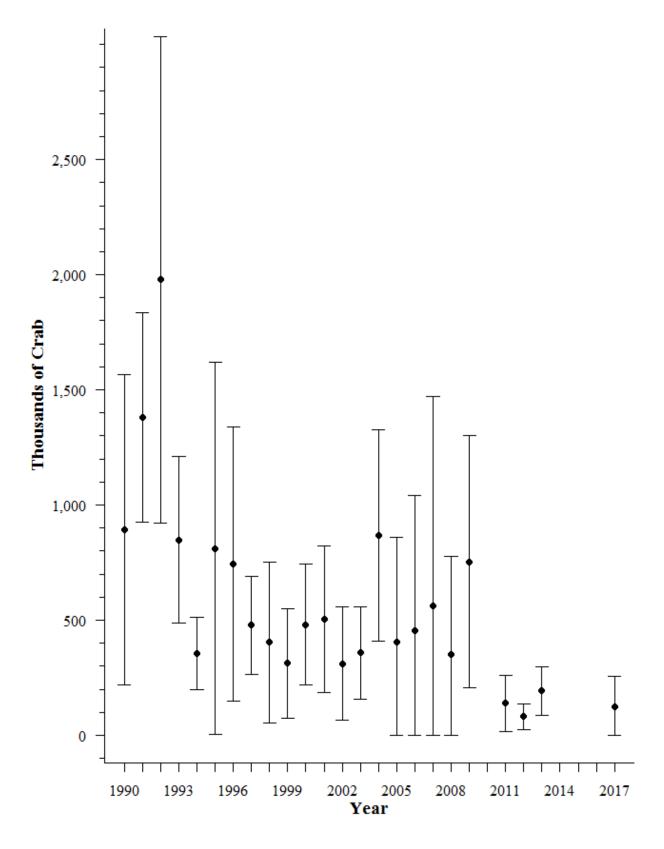


Figure 2: Legal male Tanner crab abundance estimates and 95% confidence intervals using the 2017 legal size (114 mm or 4.5 in) from trawl surveys in the Southern District, 1990-2017.

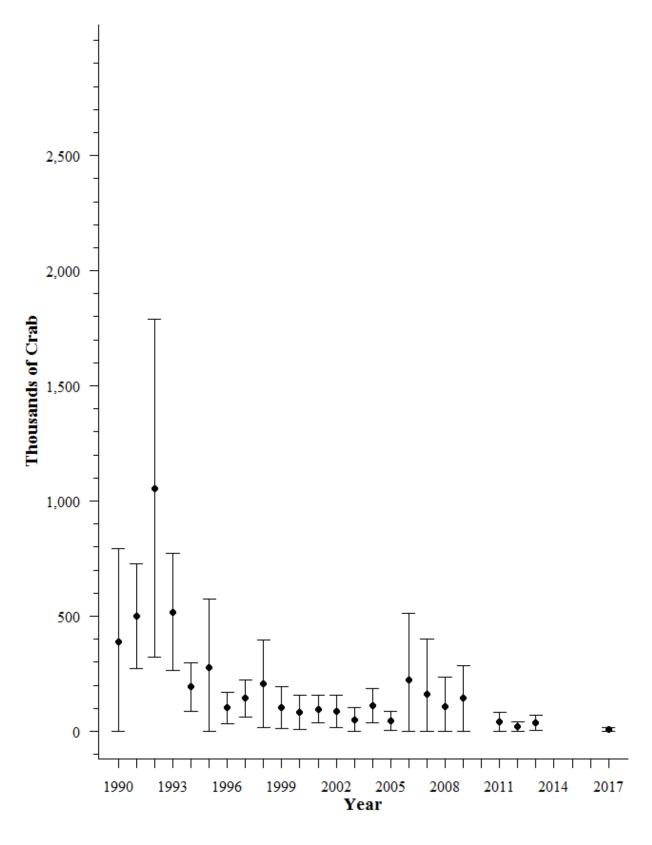


Figure 3: Legal male Tanner crab abundance estimates and 95% confidence intervals using the pre-2017 legal size (140 mm or 5.5 in) from trawl surveys in the Southern District, 1990-2017.