

A total 562 crab pot pulls were conducted in eight fixed locations in Auke Bay during from April 28 to October 2, 2019. Protocol followed permit CF-19-066 issued by the Alaska Department of Fish and Game. Location map with coordinates is included on the last page. **No European green crab was identified in any of the pots.**

## Location

Location	Pots pulled	Location	Pots pulled
Coghlan 1 (FAA beach N)	94	Portland 1 (north end of main island)	65
Coghlan 2 (FAA beach N)	77	Portland 2 (north end of SE beach)	56
Coghlan 3 (middle beach)	78	Portland 3 (middle of SE beach)	42
Coghlan 4 (south beach)	47	Portland 4 (south end of SE beach)	36
Missing location	67		

## 2019 Subtidal Life Survey Results

Count by Species			
Species	# of Pulls	%of pulls	Total count
Green Sea Urchin	267	47.4%	3737
Double Ugly	233	42.8%	492
Widehand Hermit	209	38.4%	1345
Mottled Seastar	111	20.4%	202
Sunflower Seastar	75	13.8%	131
Lyre Crab	50	9.2%	162
Snails-unid	38	7.0%	113
Fish-unid	26	4.8%	1
Pollock	26	4.8%	30
Crab-unid	19	3.5%	25
Yellow-fin Sole	19	3.5%	29
Dungeness Crab	17	3.1%	22
Helmet Crab	17	3.1%	65
Northern Seastar	10	1.8%	13
Oregon Triton	9	1.7%	38
Jellyfish-unid	6	1.1%	6
Pacific Red Octopus	6	1.1%	3
Ribbon Prickleback	3	0.6%	30
Gunnel	3	0.6%	4
Blue Mussel	3	0.6%	9
Irish Lord	3	0.6%	7
Seastar-unid	2	0.4%	2
Shrimp-unid	2	0.4%	5
Acorn Barnacle	1	0.2%	3
Sea Squirt-unid	1	0.2%	1
Chiton-unid	1	0.2%	1

Photographs were taken of each pot and all the contents were returned to the ocean, alive, in the spot collected. The only exception to the live release were some unidentified remains that were obviously eaten by other creatures in the pot. Data for each collection is included in a spreadsheet matched to the naturalist on board as well as the photographs taken.

This data is being provided to Gary Freitag, MAP Agent and Associate Professor at UAF as a part of the Alaska Sea Grant Marine Advisory Program for a subtidal life survey.

*Identifications should be considered tentative for all.*

A careful review of our data by fisheries biologist Dan Michrowski found that most of the sculpin captured are Pacific staghorn sculpin, (*Leptocottus armatus*) and not the great or spiny sculpin (*Myoxocephalus polyacanthocephalus*). That species shows up in the “fish-unid” category twice in 2019. We continue to use the wonderful common name “double ugly” for these sculpin.

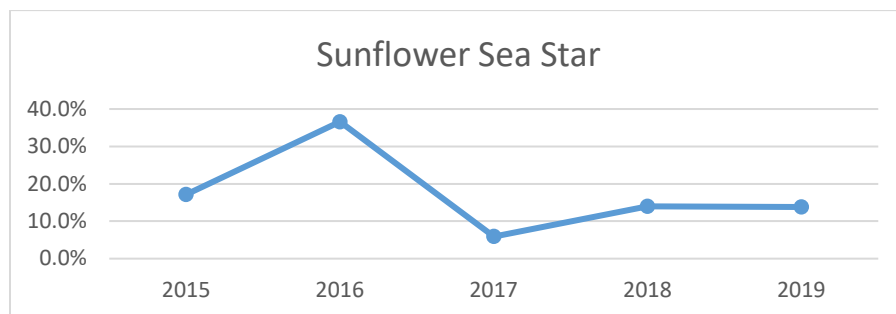
The exact species of the northern sea star is not determined but is likely *Solaster endeca*.

There may be some starry flounder included in the yellowfin sole photographs and this species is very likely common in our sampled waters.

## Notable Observations

### Sunflower Sea Star

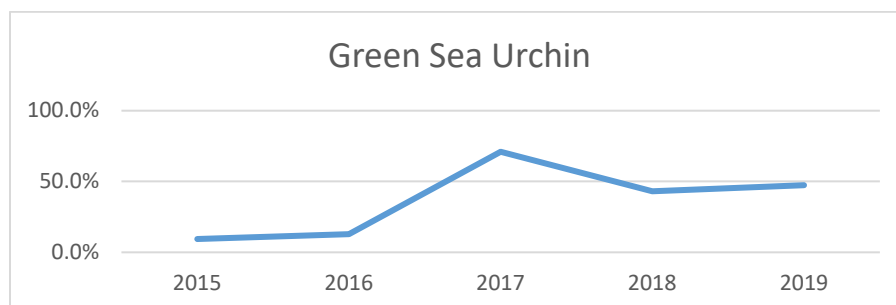
The effect of sea star wasting disease on the sunflower sea star continues to play out.



The precipitous drop in both the catch rate and raw number of individuals of the sunflower sea star of 2017 recovered some in 2018 and remains essential the same in 2019 at about a third the size of the peak. Their size remains small with most under 10 inches diameter. The “white slime” encountered in 2017 has disappeared. Photographs show a definite increase in size from 2018 to 2019.

### Green Sea Urchin

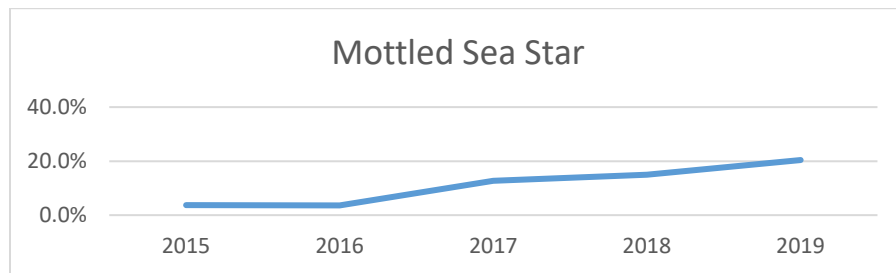
The effect of sea star wasting disease on the sunflower sea star continues to play out in the urchin population.



With the collapse of the sunflower sea star as a major predator, the urchin population skyrocketed in 2017 with 71.0% of pulls with urchin, up from 9.4% in 2015. With the slow return of the sea star, the urchin population dropped in 2018 to 43.0% and is essentially the same in 2019 with 47.4%. This number remains substantially higher than the 9.4% of 2015, a population almost five times higher! The effect on the subtidal ecology is unfolding beneath in unknown ways. Bull kelp (*Nereocystis luetkeana*), a major food of urchin, is not common in Auke Bay and we only have a few, small, forests in the waters around Shelter Island. With the dramatic increase in urchins, it seems reasonable to expect significant foraging and mortality on it. The reports of sea otter (*Enhydra lutris*) continue and in 2019 a single individual was sighted many times in the kelp forest at the north end of Shelter Island and on two days two otter we seen. With a decline in bull kelp, will the otter stop wandering into Juneau water?

### Mottled Sea Star

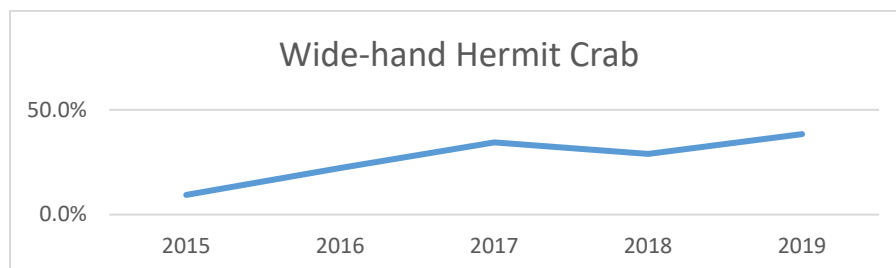
The effect of sea star wasting disease on the mottled sea star seems muted.



Our numbers of mottled sea star show only a very small decline from 2015 to 2016, both at very low numbers. The rise from 2016 to 2017 from 3.6% to 12.7% is significant, but as the graph shows the rate of increase has become steady but slow. It may well be this species suffered from sea star wasting disease before we began our study and had already collapsed. No mottled sea star showed any sign of SSWD in any year.

### Wide-hand Hermit Crab

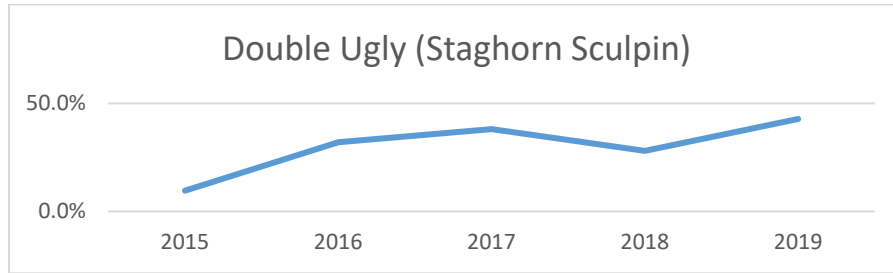
The catch rate of this species continues a steady increase after a small dip in 2018.



The connection with the collapse of the sunflower sea star on them is undetermined, but the graph suggests a connection.

### Sculpin

The catch rate of this species shows a steady increase from 9.6% in 2015 to 32.1% in 2016 and 38.1% in 2017 with a dip to 28% for 2018, back to a rise to 38.4% in 2019.



### Unidentified things

We are working on our ability to correctly identify snails and other species. This data makes it difficult to make year-to-year comparisons. Fortunately, all these numbers remain low.

### Conclusion

Sea star wasting disease has been well documented from the nearshore waters from southern British Columbia to California, with only a small number of stations reporting from Southeast Alaska. This project is providing valuable information in a region not included in any of the recent reports. A copy of this report is being provided to C. D. Harvell, lead author of the 2019 article "Disease epidemic and a marine heat wave are associated with the continental-scale collapse of a pivotal predator (*Pycnopodia helianthoides*)" with the offer of providing the raw data underlying it.

Aside from the scientific value this sampling of shallow waters might have, the educational value to the guests of Gastineau Guiding is immense. This activity ranked with most as high as whale identification.

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## APPENDIX 1: Year-to-Year Comparison 2014-2019

Number of crab pot pulls with each species and the percentage of pulls with that species, by 2019 numbers.

CONTENT	2014	2015		2016		2017		2018		2019	
Total Pots	185	375	%pulled	418	%pulled	441	%pulled	541	%pulled	562	%pulled
Empty pots	25	92	24.6%	91	21.8%	27	6.1%	29	5%	34	6%
Urchin, green sea	X	35	9.4%	54	12.9%	313	71.0%	234	43%	267	47.4%
Double Ugly (staghorn sculpin)	X	36	9.6%	134	32.1%	168	38.1%	154	28%	233	42.8%
Hermit crab, wide-hand	X	35	9.4%	93	22.2%	152	34.5%	159	29%	209	38.4%
Sea star, mottled	X	14	3.7%	15	3.6%	56	12.7%	84	15%	111	20.4%
Sea star, sunflower	X	64	17.1%	153	36.6%	26	5.9%	74	14%	75	13.8%
Crab, Pacific lyre	0	7	1.9%	54	12.9%	31	7.0%	27	5%	50	9.2%
Snail (unidentified to species)	X	15	4.0%	27	6.5%	51	11.6%	30	6%	38	7.0%
Fish-unidentified	0	1	0.3%	**		7	1.6%	0	0%	26	4.8%
Pollock	X	12	3.2%	9	2.2%	24	5.4%	5	1%	26	4.8%
Crab (unidentified to species)										19	3.5%
Crab, Dungeness	X	2	0.5%	7	1.7%	13	2.9%	24	3%	17	3.5%
Sole, yellowfin	0	4	1.1%	21	5.0%	15	3.4%	9	2%	19	3.5%
Crab, helmet	0	1	0.3%	5	1.2%	13	2.9%	0	0%	17	3.1%
Sea star, northern	X	8	2.1%	12	2.9%	8	1.8%	13	2%	10	1.8%
Jellyfish (unidentified to species)										6	1.1%
Octopus, Pacific	0	1	0.3%	1	0.2%	1	0.2%	1	0%	6	1.1%
Triton, Oregon										6	1.1%
Gunnel (unidentified to species)	0	2	0.5%	2	0.5%	1	0.2%	14	3%	3	0.6%
Mussel, blue	0	0	0.0%	0	0.0%	6	1.4%	0	0%	3	0.6%
Prickleback (unidentified to species)	X	2	0.5%	4	1.0%	0	0.0%	2	0%	3	0.6%
Sea star (unidentified to species)										2	0.4%
Shrimp (unidentified to species)	X	2	0.5%	20	4.8%	5	1.1%	3	1%	2	0.4%
Barnacle, acorn	X	0	0.0%	0	0.0%	0	0.0%	0	0%	1	0.2%
Cucumber, sea (unidentified to species)	0	2	0.5%	0	0.0%	0	0.0%	0	0%	1	0.2%
Cod (unidentified to species)	0	2	0.5%	0	0.0%	1	0.2%	0	0%	0	0%
Crab, decorator	X	3	0.8%	*		6	1.4%	0	0%	0	0%
Hermit crab, red	X	1	0.3%	0	0.0%	0	0.0%	0	0%	0	0%

APPENDIX 2: Crab Pot Locations

<b>Coghlan 1</b>	<b>Portland 1</b>
58°21.514' N	58° 20.455' N
134° 41.715' W	134° 44.673' W
<b>Coghlan 2</b>	<b>Portland 2</b>
58° 21.429' N	58° 20.148' N
134° 41.720' W	134° 44.233' W
<b>Coghlan 3</b>	<b>Portland 3</b>
58° 21.180' N	58° 20.073' N
134° 41.545' W	134° 44.150' W
<b>Coghlan 4</b>	<b>Portland 4</b>
58° 21.014' N	58°19.938' N
134° 41.498' W	134° 44.025' W

