

Discussion Paper: Considerations of appropriate level of conservation and management for sculpins in the BSAI and GOA FMPs April 2019¹

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1 Introduction / Background

In December 2018, the North Pacific Fishery Management Council (Council) directed staff to produce a discussion paper evaluating the appropriate level of conservation and management required for sculpins in the Bering Sea and Aleutian Islands Management Area (BSAI) and the Gulf of Alaska (GOA) consistent with the Magnuson-Stevens Act (MSA) and National Standard (NS) guidelines. The Council’s motion directed staff to assess whether the best available scientific information indicates that sculpins could be managed as non-target species, specifically whether sculpins could be identified as “non-target ecosystem component species not in need of conservation and management.” In addition, staff were asked to assess regulations to prohibit directed fishing for sculpins, establish maximum retainable amounts for sculpins, and require recordkeeping and reporting to monitor catch and discards if sculpins were reclassified as non-target species.

Target stocks in a fishery management plan (FMP), where sculpins are now classified, are stocks or stock complexes that fishermen seek to catch for sale or personal use, including such fish that are discarded for economic or regulatory reasons as defined under MSA Section 3(9) and 3(38). Non-target stocks are fish caught incidentally during the pursuit of target stocks in a fishery. Non-target stocks may require conservation and management and, if so, must be included in a FMP and be identified at the stock or stock complex level. If non-target species are not in need of conservation and management, they may be identified in a FMP as ecosystem component (EC) species. EC species or stocks are stocks that are not targeted and a Regional Fishery Management Council (council) or the Secretary has determined do not require conservation and management, but desire to list in a FMP to achieve ecosystem management

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objectives. This discussion paper explores the best available science as it applies to the appropriate classification of sculpins.

2 Sculpins

2.1 Status

2.1.1 Life History and Role in Ecosystem

Sculpins are relatively small, demersal, teleost fishes with modified pectoral fins that allow them to grip the substrate, and they lack swim bladders. They consist of 4 diverse families off Alaska (Cottidae, Hemitripterae, Psychrolutidae, and Rhamphocottidae). Sculpins are found in both freshwater and marine habitats, and are distributed throughout the BSAI and GOA where they occupy all benthic habitats along continental shelf and slope areas. Sculpins occupy depths from nearshore sand and mud bottoms at 20 m to below 1,000 m along broad sloping and steep canyon areas. Sizes for sculpins range from <10 cm to 80 cm. Forty-eight species of sculpins have been identified in waters off the coast of Alaska (Table 1). Most sculpins lay adhesive eggs in nests, and many exhibit parental care for eggs (Eschemeyer et al. 1983). This type of reproductive strategy may make sculpin populations more sensitive to changes in benthic habitats than other groundfish species such as walleye pollock, which are broadcast spawners with pelagic eggs.

Sculpins are predators of the shelf and slope ecosystems (TenBrink and Aydin 2009), consuming a wide variety of benthic prey including commercially important crabs and fishes. Larger sculpin species prey on shrimp, crabs, and fishes including juvenile walleye pollock. Smaller sculpin species feed mainly on shrimp and benthic amphipods.

Little is known about stock structure of sculpin species, and little research on stock structure has been done for sculpins in general. The diversity of sculpins in Alaska suggests that different components of the sculpin complex would react differently to natural or anthropogenic environmental changes. Within each sculpin species, observed spatial differences in fecundity, egg size, and other life history characteristics point to the existence of local population structures (Tokranov 1985). In the BSAI, yellow Irish lord has been found to exhibit spatial differences in fecundity between the eastern Bering Sea (EBS) and Aleutians Islands (AI) (TenBrink and Buckley 2013). TenBrink and Buckley (2012) found evidence for habitat partitioning among plain, great, and shorthorn sculpins, and they found that within species, larger individuals tend to be found in deeper water and that diet composition differed among and within species.

Table 1 Sculpin species observed in the waters off Alaska.

Family	Scientific name	Common name
Cottidae	<i>Artediellus pacificus</i>	Pacific hookear sculpin
	<i>Artedius lateralis</i>	Smoothhead sculpin
	<i>Bolinia euryptera</i>	Broadfin sculpin
	<i>Enophrys bison</i>	Buffalo sculpin
	<i>Enophrys diceraus</i>	Antlered sculpin
	<i>Gymnocanthus galeatus</i>	Armorhead sculpin
	<i>Gymnocanthus pistilliger</i>	Threaded sculpin
	<i>Hemilepidotus</i>	Red Irish lord

<i>Hemilepidotus jordani</i>	Yellow Irish lord	
<i>Hemilepidotus papilio</i>	Butterfly sculpin	
<i>Hemilepidotus spinosus</i>	Brown Irish lord	
<i>Hemilepidotus zaqpus</i>	Longfin Irish lord	
<i>Icelinus borealis</i>	Northern sculpin	
<i>Icelinus burchami</i>	Dusky sculpin	
<i>Icelinus filamentosus</i>	Threadfin sculpin	
<i>Icelinus tenuis</i>	Spotfin sculpin	
<i>Icelus spatula</i>	Spatulate sculpin	
<i>Icelus spiniger</i>	Thorny sculpin	
<i>Icelus uncinialis</i>	Uncinate sculpin	
<i>Jordania zonope</i>	Longfin sculpin	
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	
<i>Microcottus sellaris</i>	Brightbelly sculpin	
<i>Myoxocephalus joak</i>	Plain sculpin	
<i>Myoxocephalus polyacanthocephalus</i>	Great sculpin	
<i>Myoxocephalus verrucosus</i>	Warty sculpin	
<i>Paricelinus hopliticus</i>	Thornback sculpin	
<i>Radulinus asprellus</i>	Slim sculpin	
<i>Rastrinus scutiger</i>	Roughskin sculpin	
<i>Thecopterus aleuticus</i>	Whitetail sculpin	
<i>Thyriscus anoplus</i>	Sponge sculpin	
<i>Triglops forficatus</i>	Scissortail sculpin	
<i>Triglops macellus</i>	Roughspine sculpin	
<i>Triglops metopias</i>	Crescent-tail sculpin	
<i>Triglops pingelii</i>	Ribbed sculpin	
<i>Triglops septicus</i>	Spectacled sculpin	
<hr/> Hemitripteridae	<hr/> <i>Blepsias bilobus</i>	<hr/> Crested sculpin

	<i>Hemitripterus bolini</i>	Bigmouth sculpin
	<i>Nautichthys oculofasciatus</i>	Sailfin sculpin
	<i>Nautichthys pribilovius</i>	Eyeshade sculpin
Psychrolutidae	<i>Dasycottus setiger</i>	Spinyhead sculpin
	<i>Eurymen gyrinus</i>	Smoothcheek sculpin
	<i>Malacocottus zonurus</i>	Darkfin sculpin
	<i>Psychrolutes paradoxus</i>	Tadpole sculpin
	<i>Psychrolutes phrictus</i>	Blob sculpin
Rhamphocottidae	<i>Rhamphocottus richardsoni</i>	Grunt sculpin

Source: Spies et al. 2016

2.1.2 Size Composition

Length measurements (fork length) have been collected for a variety of sculpin species during Alaska Fisheries Science Center trawl surveys. Size compositions of the five most abundant sculpin species in the EBS are shown in Figure 1, and for the three most abundant sculpin species in the AI in Figure 2. Size composition for the four most abundant sculpin species in the GOA are shown in Figure 3.

In the BSAI, the length compositions by species have not changed throughout the years data has been collected, with few small sculpins caught by the survey (Spies et al. 2016). Similarly, length compositions in the GOA have remained fairly stable with no strong trends apparent (Spies et al. 2017). The length composition data for blob, bigmouth, and spinyhead sculpins show two size modes, which are unrelated to gender but may indicate that two separate life stages inhabit the EBS slope. The length frequency of great and bigmouth sculpin sampled in the AI does not yield a complete representation of the sculpin species population's size composition, whereas yellow Irish lords show a consistent size composition. Specimens smaller than 70 mm have not been collected for many sculpins, which may be due to size selectivity of the survey gear.

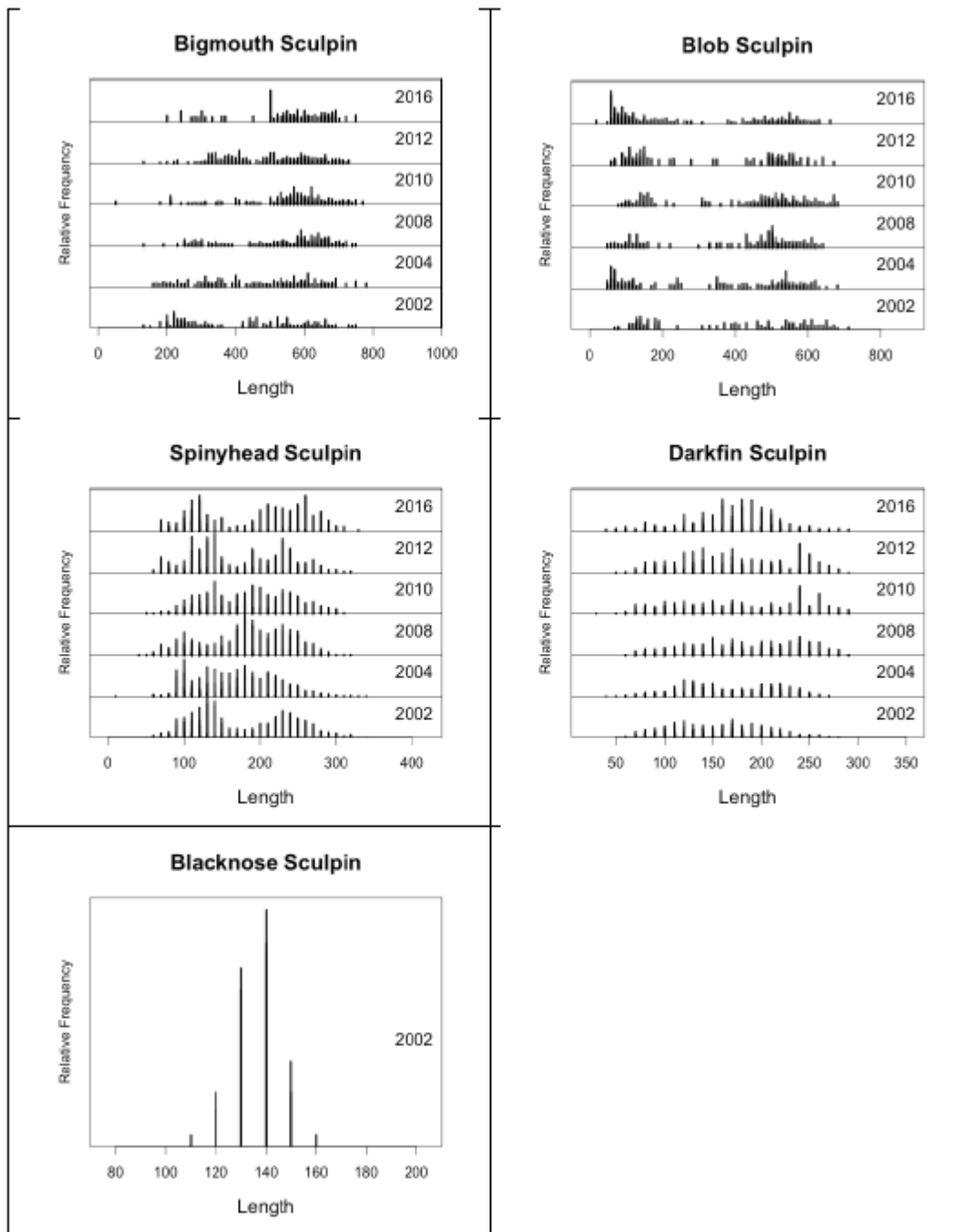


Figure 1 Length frequencies (fork length, FL in mm) from the EBS slope survey data for the five most abundant sculpin species sampled through 2016. Year range determined by available data. (Spies et al. 2016)

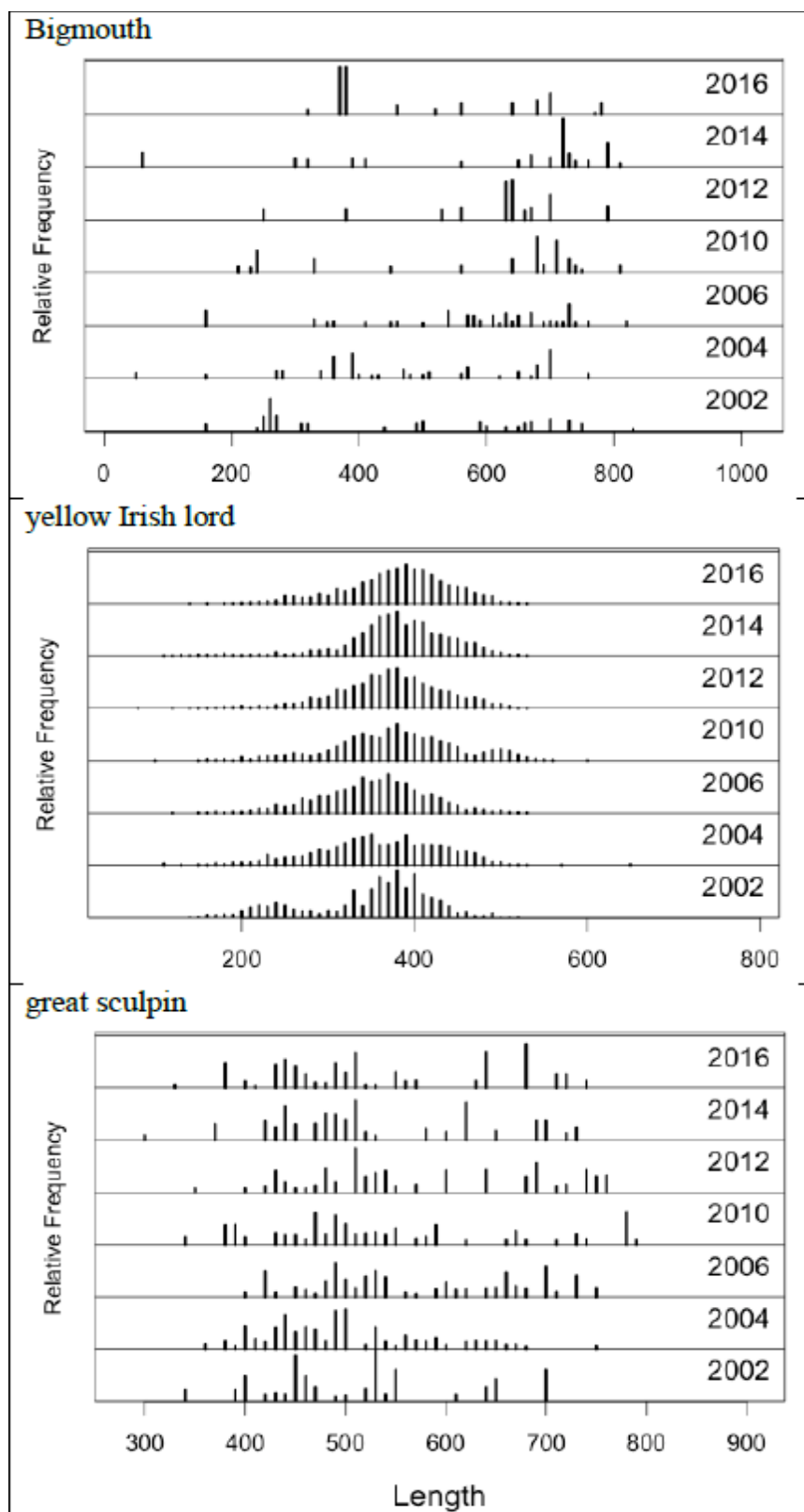


Figure 2 Length frequencies (fork length, FL in mm) for the three most abundant sculpin species in the AI, through 2016. Year range determined by available data. (Spies et al. 2016)

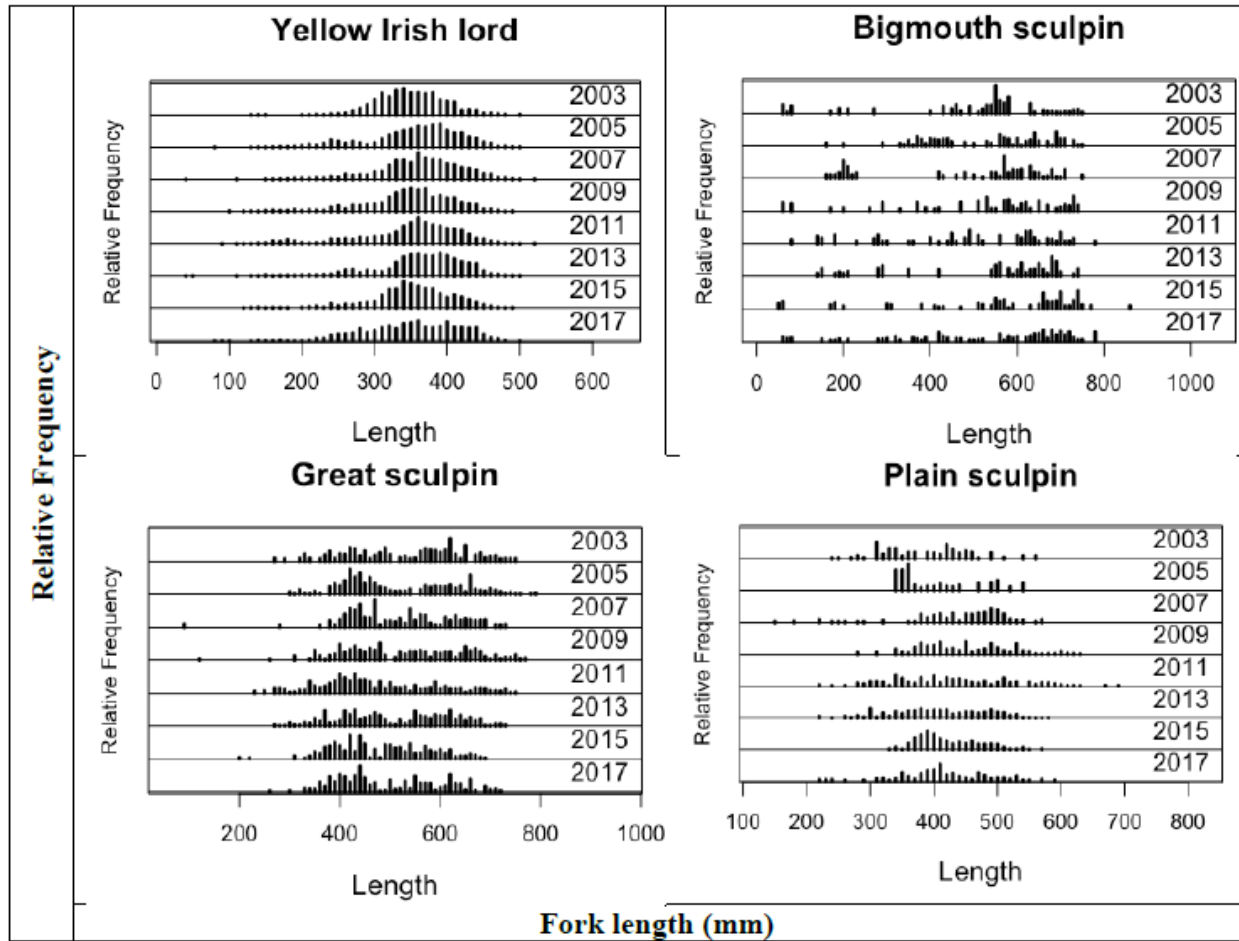


Figure 3 Length frequencies (fork length, FL in mm) from survey data for the 4 most abundant sculpin species in the GOA. Year range determined by available data. (Spies et al. 2017)

2.1.3 Trawl Survey Biomass Estimates

2.1.3.1 EBS and AI Survey

The five most abundant species of sculpin from the EBS shelf survey are measured annually: plain and great sculpin since 1998, warty and bigmouth sculpin since 2000, and yellow Irish lord since 2003. Size compositions of blob, bigmouth, spinyhead, and darkfin sculpin are measured on the slope survey, and size compositions of bigmouth yellow Irish lord, and great sculpin are measured on the AI survey.

Research surveys provide biomass estimates for sculpin species in the BSAI. All three regions of the BSAI (EBS shelf, EBS slope, and AI) were sampled in 2004, 2010, 2012, and 2016 (Figure 4). The EBS shelf survey is performed annually, and the AI and slope surveys are typically biennial, although there was no slope survey in 2014. The low coefficient of variation for most of the biomass estimates of the more abundant species suggests that the EBS shelf bottom trawl survey adequately estimates the biomass of these species (Spies et al. 2016).

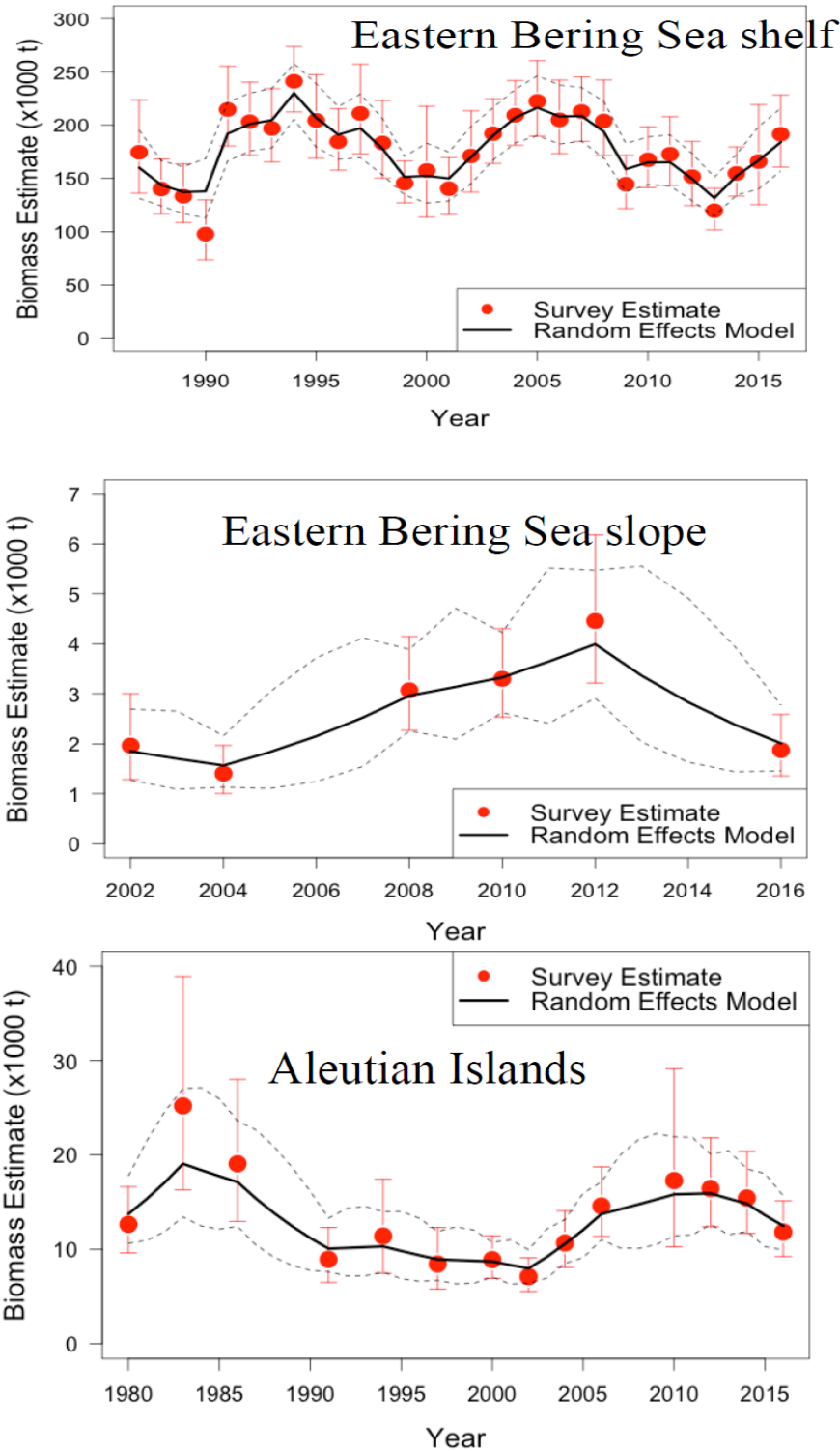


Figure 4 Random effects model estimates of biomass by region for the six most common shelf sculpins (top), slope (middle), and Aleutian Islands (bottom). Error bars represent 95% confidence intervals for survey estimates of biomass, and dotted lines represent 95% confidence intervals from the random effects model. (Spies et al. 2016).

2.1.3.2 GOA Survey

Aggregate sculpin biomass estimates in the GOA are derived from the GOA bottom trawl surveys (Figure 5). In the GOA, approximately 97% of the sculpin biomass is comprised of the larger sculpin species: great, plain, bigmouth, and yellow Irish lord. Yellow Irish lord is currently the most abundant (59% of all sculpin biomass) followed by great sculpin (23%), bigmouth sculpin (14%), and plain sculpin (4%). The low coefficients of variation for the survey biomass estimates of the four most abundant species suggest that the GOA survey is doing an adequate job assessing the biomass of the more abundant species (Spies et al. 2017).

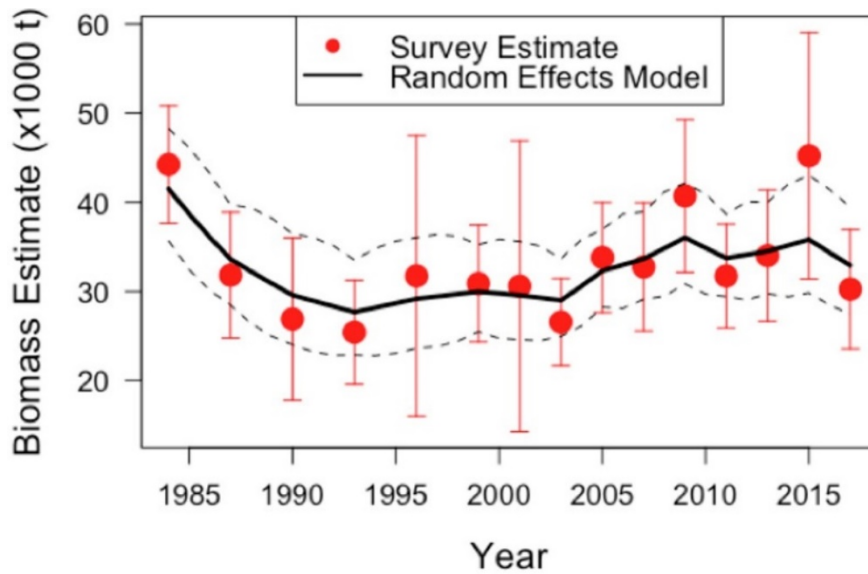


Figure 5 Random effects model estimates of biomass for the five most common sculpins in the GOA complex. Error bars represent 95% confidence intervals for survey estimates of biomass, and dotted lines represent 95% confidence intervals from the random effects model. (Spies et al. 2017).

Sculpins are currently taken only as bycatch in fisheries directed at other target species in the BSAI and GOA, and it is likely that future sculpin catch will continue to be dependent on the distribution and limitations placed on other target fisheries, rather than on any harvest level established for this category (Spies et al. 2016). Since 2011, the sculpin complex total catch (retained and discarded) has ranged from 2% to 6% of the total estimated biomass in the BSAI and GOA (Table 2).

Table 2 Biomass (Random effects model estimate), total allowable catch (TAC), acceptable biological catch (ABC), Overfishing Limit (OFL), catch of the BSAI (top) and GOA (bottom), and catch/biomass ratio for the sculpin complex 2011 to 2019. *Catch estimated through February 2019.

Year	Bering Sea and Aleutian Islands					
	Biomass (mt)	OFL (mt)	ABC (mt)	TAC (mt)	Catch (mt)	Catch/Biomass
2011	199,348	58,300	43,700	5,200	5,377	0.03
2012	183,942	58,300	43,700	5,200	5,798	0.03
2013	171,523	56,400	42,300	5,600	5,864	0.03

2014	189,359	56,400	42,300	5,600	4,902	0.03
2015	186,386	52,365	39,725	4,700	5,003	0.03
2016	199,937	52,365	39,725	4,500	4,911	0.02
2017	188,656	56,582	42,387	4,500	5,338	0.03
2018	188,656	53,201	39,995	5,000	5,105	0.03
2019	188,656	53,201	39,995	5,000	771*	0.00

Year	Gulf of Alaska					
	Biomass (mt)	OFL(mt)	ABC(mt)	TAC (mt)	Catch (mt)	Catch/Biomass
2011	33,729	7,328	5,496	5,496	774	0.02
2012	34,112	7,641	5,731	5,731	794	0.02
2013	34,500	7,641	5,731	5,731	1,964	0.06
2014	35,155	7,448	5,569	5,569	1,182	0.03
2015	35,823	7,448	5,569	5,569	1,018	0.03
2016	34,340	7,338	5,591	5,591	1,330	0.04
2017	32,918	7,338	5,591	5,591	1,316	0.04
2018	34,943	6,958	5,301	5,301	610	0.02
2019	33,124	6,958	5,301	5,301	43*	0.00

Source: NMFS AKRO Catch Accounting System, accessed March 2019

Table 2 shows that in the BSAI catch has slightly exceeded the total allowable catch (TAC) in all years since 2011 except 2014. Catch in the GOA has been below the TAC since 2011. Sculpins in the BSAI were moved to prohibited species status and required to be discarded on October 6, 2017, but not in any other year. Sculpin catch was still substantially below ABC, OFL, and was a small proportion of the biomass in each year.

2.2 Targeting, Catch, and Retention of Sculpins

Before 2010, sculpins were managed in each area as part of the BSAI and GOA “Other Species Complex” but have since been managed as an independent sculpins complex in both groundfish FMPs with their own catch limits in the harvest specifications (Table 2). For both the BSAI and GOA, sculpins are managed as a Tier 5 complex, which is the least preferred method of specifying an overfishing limit when limited biological reference points are available. Only Tier 6 species, for which no biological reference points are available, are below Tier 5 in terms of limited information available. Nonetheless, specification of OFL for Tier 5 species reflects the best estimate possible for sculpins with the available data. Harvest specifications for the BSAI in the latest assessment were based on the 2016 random effects model

estimate of the 6 most common sculpin species in the BSAI and the 2016 random effect estimate of the other sculpin species. Random effects model estimates of the sculpin complex and the six most common sculpin species in the EBS shelf, EBS slope, and AI have been fairly stable since the late 1980s on the EBS shelf, 2002 on the EBS slope, and 1980 in the AI (Spies et al. 2016). Similarly in the GOA, random effects model estimates of the sculpin complex have been fairly stable since 1984 (Spies et al. 2017).

There is no directed fishery for sculpin species in the BSAI or GOA at this time. Sculpins are caught primarily:

- In the BSAI by:
 - trawl gear in fisheries targeting yellowfin sole, rock sole, and Atka mackerel, and
 - the Pacific cod hook-and-line, pot, and trawl fisheries (Table 3, Table 4).
- In the GOA by:
 - the Pacific cod, shallow water flatfish, and IFQ halibut fisheries (Table 5).

Sculpins, in general, are not retained, and fishery observer data indicate that the retention rate has been below 10% in the BSAI, and below 20% in the GOA. Since 2013, the retention rate has been below 5% in both the BSAI and GOA (Table 6). As noted section 2.1.3 above, sculpin catch has been substantially below ABC and OFL, and has been a small proportion of the biomass each year. Sculpins are not experiencing overfishing. It is not possible to determine whether the sculpin complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 5. In the absence of a directed fishery, they are very unlikely to be overfished.

Table 3 Total catch in metric tons (t) of all sculpins by target fishery in the Aleutian Islands, 2004 – 2018.

Aleutian Islands – Sculpin Catch (mt)															
Target fishery	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alaska plaice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
arrowtooth flounder	0	0	1	0	0	6	43	38	5	31	26	0	5	0	0
Atka mackerel	476	372	488	554	459	710	574	226	350	141	176	379	304	417	378
flathead sole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
greenland turbot	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0
halibut	5	1	4	0	5	0	0	2	0	11	26	49	19	14	24
Kamchatka flounder	0	0	0	0	0	0	0	19	22	34	5	5	4	0	1
other flatfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
other target	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Pacific cod	360	213	374	406	400	492	722	114	359	291	69	370	101	288	230
bottom pollock	0	0	0	1	0	0	2	0	0	2	0	0	0	0	3
pelagic pollock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rock sole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rockfish	49	34	40	56	72	61	52	103	71	116	88	121	81	113	75
sablefish	0	0	1	2	1	4	2	1	0	0	1	0	0	0	1
yellowfin sole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (t)	890	620	909	1,019	941	1,276	1,395	503	807	626	390	924	514	886	712

Source: NMFS AKRO Catch Accounting System, accessed March 2019

Table 4 Total catch in metric tons (t) of all sculpins by target fishery in the Eastern Bering Sea, 2004 – 2018.

Eastern Bering Sea – Sculpin Catch (mt)															
Target fishery	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Alaska plaice	0	0	3	14	3	3	2	28	12	46	0	17	7	2	33
arrowtooth flounder	46	122	79	31	78	64	12	92	110	103	73	57	79	54	9
Atka mackerel	50	168	44	109	5	6	0	1	4	1	0	0	0	6	7
flathead sole	573	499	515	463	619	409	242	117	35	57	149	154	110	180	172
greenland turbot	5	1	1	1	1	1	1	1	1	0	2	2	21	33	30
halibut	1	0	1	0	4	0	0	2	0	44	35	57	89	48	47
Kamchatka flounder	0	0	0	0	0	0	0	29	1	0	14	27	16	7	10
other flatfish	55	59	10	26	1	1	2	0	1	1	0	2	9	12	3
other target	7	0	2	8	0	0	0	0	0	0	0	0	0	0	0
Pacific cod	3,157	2,533	2,277	2,333	1,663	1,255	1,123	1,562	1,618	1,545	1,972	2,040	2,296	2,082	1,995
bottom pollock	10	10	5	23	66	143	124	118	114	108	105	28	23	12	13
pelagic pollock	141	140	172	171	255	152	147	198	172	111	86	159	102	70	47
rock sole	268	463	675	760	1,090	1,292	918	903	955	1,286	807	447	689	614	748
rockfish	1	0	3	0	0	0	8	19	30	13	8	6	6	22	30
sablefish	1	0	0	0	1	1	1	0	0	1	0	0	0	0	0
yellowfin sole	941	1,147	1,124	2,432	2,896	2,562	1,631	1,804	1,937	1,921	1,260	1,083	949	1,309	1,248
Total (t)	5,255	5,142	4,911	6,372	6,681	5,889	4,211	4,874	4,990	5,237	4,511	4,079	4,396	4,451	4,392

Source: NMFS AKRO Catch Accounting System, accessed March 2019

Table 5 Total catch in metric tons (t) of all sculpins by target fishery in the Gulf of Alaska, 2004 – 2018.

Gulf of Alaska – Sculpin Catch (mt)															
Target Fishery	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
arrowtooth flounder	7	19	36	38	16	16	27	69	21	52	149	36	56	105	35
Atka mackerel	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1
deep flatfish	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0
flathead sole	10	3	1	0	16	3	5	14	5	3	0	1	1	0	0
IFQ halibut	41	29	13	31	134	165	53	96	0	934	162	175	180	154	308
other target	0	0	0	0	0	11	0	12	2	0	0	0	0	1	0
Pacific cod	430	320	361	442	740	556	591	342	449	477	541	631	857	916	84
rex sole	19	11	7	8	4	31	11	3	11	9	1	6	0	4	2
rockfish	58	27	32	31	23	35	62	39	55	70	33	44	43	45	65
sablefish	2	16	4	7	2	20	1	3	5	41	6	12	7	11	5
shallow flatfish	129	200	125	376	959	515	155	143	227	357	251	87	165	55	94
walleye pollock	0	0	2	22	15	5	6	53	20	17	39	27	21	26	16
Total (t)	698	325	581	955	1,909	1,357	911	775	795	1,963	1,182	1,019	1,330	1,317	610

Source: NMFS AKRO Catch Accounting System, accessed March 2019

Table 6 Total catch in metric tons (mt) of sculpin complex, and proportion retained 2003 – 2018 in the BSAI and GOA groundfish fisheries.

Year	BSAI		GOA	
	Sculpin catch (t)	% sculpins retained	Sculpin catch (t)	% sculpins retained
2003	5,614	1%	629	7%
2004	6,020	1%	701	9%
2005	5,642	2%	626	16%
2006	5,733	3%	583	16%
2007	7,702	5%	960	19%
2008	7,368	6%	1,925	14%
2009	7,036	9%	1,374	18%
2010	5,624	4%	911	12%
2011	5,373	5%	763	10%
2012	5,798	5%	795	13%
2013	5,828	3%	1,966	1%
2014	4,865	3%	1,187	3%
2015	4,980	2%	1,016	1%
2016	4,410	2%	1,330	3%
2017	5,338	1%	1,316	1%
2018	5,105	2%	610	2%
2019	771	2%	43	3%

Source: NMFS AKRO Catch Accounting System, accessed March 2019

2.3 Value of Sculpins and Potential for Markets

Table 7 provides ex vessel price per pound of catcher vessel (CV)-caught sculpins for both the BSAI and GOA from 2006 through 2017. For product forms other than fish meal (e.g. headed and gutted), the ex vessel price in the BSAI has ranged from a low of \$0.00 for 2008, 2010, 2011, and 2013 to a high of \$0.15 in 2014. In the GOA, ex vessel price for product forms other than fish meal has ranged from a low of \$0.00 in 2008, 2010, 2013, 2015, and 2017 to a high of \$0.15 in 2014. Ex vessel price for fish meal has routinely been \$0.02 per pound in the BSAI and GOA.

Table 7 Ex vessel price per pound of catcher vessel (CV) caught sculpin for both all product forms combined (not including fish meal) and fish meal for both BSAI and GOA groundfish fisheries from 2006 through 2017.

Year	Ex vessel price per pound of CV sculpins (not including fish meal) (\$)		Ex vessel price per pound of CV sculpins that was processed into fish meal (\$)	
	BSAI	GOA	BSAI	GOA
2006	0.05	0.07	0.02	0.02
2007	0.07	0.07	0.02	0.02
2008	0.00	0.00	0.01	0.02
2009	0.07	0.07	0.01	0.02
2010	0.00	0.00	0.02	0.02
2011	0.00	0.07	0.02	0.02
2012	0.07	0.07	0.02	0.02
2013	0.00	0.00	0.02	0.02
2014	0.15	0.15	0.02	0.00
2015	0.09	0.00	0.02	0.02
2016	0.05	0.04	0.02	0.00
2017	0.02	0.00	0.02	0.00

Source: AKFIN accessed 3/6/2019

A few Kodiak processors have experimented with processing and marketing sculpins between 2006 and 2010, with one selling headed and gutted sculpins to market in Eastern Europe. However, most processors find them too bony and difficult to process; thus, there is no current interest in developing a market for sculpins at this time. Retention and sale of sculpins is currently allowed, subject to maximum retainable amounts (MRAs). MRAs allow vessels fishing for groundfish to retain a quantity of sculpins equal to, but no more than, a specified percent of the round weight or round weight equivalent of groundfish species open to directed fishing and retained on board the vessel at any time during a fishing trip. It is possible for fishermen and processors to experiment with markets within those MRAs should an interest arise. It would still be possible if sculpins were moved to the EC and an MRA was retained.

3 Requirements for Ecosystem Component Species

The following section walks through the requirements for non-target EC species, and then applies those requirements to sculpins.

Section 302(h)(1) of the MSA requires a council to prepare a FMP for each fishery under its authority that requires conservation and management. Section 3(5) of the MSA defines “conservation and management” as “all of the rules, regulations, conditions, methods, and other measures:

- A. which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and
- B. which are designed to assure that:
 - i. a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis;
 - ii. irreversible, or long-term adverse effects on fishery resource and the marine environment are avoided; and
 - iii. there will be a multiplicity of options available with respect to future uses of these resources.”

NMFS has recently published guidelines to aid the councils as they consider whether a stock requires conservation and management, and if so, how the councils should meet the requirements of the NS in section 301(a) of the MSA. Revised NS guidelines describe the fact that FMPs typically include certain target species and certain non-target species that the councils and/or the Secretary believe require conservation and management. The NS general guidelines in 50 CFR §600.305(d) define how stocks should be classified in a FMP:

(11) *Target stocks* are stocks or stock complexes that fishers seek to catch for sale or personal use, including such fish that are discarded for economic or regulatory reasons as defined under Magnuson-Stevens Act Section 3(9) and 3(38).

(12) *Non-target species* and *non-target stocks* are fish caught incidentally during the pursuit of target stocks in a fishery. Non-target stocks may require conservation and management and, if so, must be included in a FMP and be identified at the stock or stock complex level. If non-target species are not in need of conservation and management, they may be identified in a FMP as ecosystem component species.

(13) *Ecosystem Component Species* (see §§600.305(c)(5) and 600.310(d)(1)) are stocks that a council or the Secretary has determined do not require conservation and management, but desire to list in a FMP in order to achieve ecosystem management objectives.

Although sculpins are currently classified as a target species in both the BSAI and GOA FMPs, NMFS has not established any directed fishery for sculpins. They are not actively targeted, and could be considered to be non-target species. If the Council or Secretary determine that sculpins in the BSAI or GOA do not require conservation and management, but that maintaining sculpins in the FMPs will assist

in achievement of ecosystem management objectives, then sculpins could be classified as an EC species. The NS guidelines under section 600.305(c) provide direction for determining which stocks require conservation and management as well as provide direction to councils for how to consider these factors in making this determination.

(1) Not every fishery requires Federal management. Any stocks that are predominately caught in Federal waters and are overfished or subject to overfishing, or likely to become overfished or subject to overfishing, are considered to require conservation and management. Beyond such stocks, Councils may determine that additional stocks require “conservation and management.” (See Magnuson-Stevens Act definition at 16 U.S.C. 1802(5)). Based on this definition of conservation and management, and other relevant provisions of the Magnuson-Stevens Act, a Council should consider the following non-exhaustive list of factors when deciding whether additional stocks require conservation and management:

- i. The stock is an important component of the marine environment.*
- ii. The stock is caught by the fishery.*
- iii. Whether a FMP can improve or maintain the condition of the stock.*
- iv. The stock is a target of a fishery.*
- v. The stock is important to commercial, recreational, or subsistence users.*
- vi. The fishery is important to the Nation or to the regional economy.*
- vii. The need to resolve competing interests and conflicts among user groups and whether a FMP can further that resolution.*
- viii. The economic condition of a fishery and whether a FMP can produce more efficient utilization.*
- ix. The needs of a developing fishery, and whether a FMP can foster orderly growth.*
- x. The extent to which the fishery is already adequately managed by states, by state/Federal programs, or by Federal regulations pursuant to other FMPs or international commissions, or by industry self-regulations, consistent with the requirements of the Magnuson Stevens Act and other applicable law.*

(2) In evaluating factors in paragraphs (c)(1)(i) through (x) of this section, a Council should consider the specific circumstances of a fishery, based on the best scientific information available, to determine whether there are biological, economic, social, and/or operational concerns that can and should be addressed by Federal management.

(3) When considering adding a stock to a FMP, no single factor is dispositive or required. One or more of the above factors, and any additional considerations that may be relevant to the particular stock, may provide the basis for determining that a stock requires conservation and management. Based on the factor in paragraph (c)(1)(ii) of this section, if the amount and/or type of catch that occurs in Federal waters is a significant contributing factor to the stock’s status, such information would weigh heavily in favor of adding a stock to a FMP. However, Councils should consider the factor in paragraph (c)(1)(x) of this section before deciding to include a stock in a FMP. In many circumstances, adequate management of a fishery by states, state/Federal programs, or another Federal FMP would weigh heavily against a Federal FMP action. See, e.g., 16 U.S.C. 1851(a)(7)² and 1856(a)(3).³

(4) When considering removing a stock from, or continuing to include a stock in, an FMP, Councils should prepare a thorough analysis of factors in paragraphs (c)(1)(i)

² “Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.”

³ “A State may regulate a fishing vessel outside the boundaries of the State in the following circumstances...”

through (x) of this section, and any additional considerations that may be relevant to the particular stock. As mentioned in paragraph (c)(3) of this section, if the amount and/or type of catch that occurs in Federal waters is a significant contributing factor to the stock's status, such information would weigh heavily in favor of continuing to include a stock in an FMP. Councils should consider weighting the factors as follows. Factors in paragraphs (c)(1)(i) through (iii) of this section should be considered first, as they address maintaining a fishery resource and the marine environment. See 16 U.S.C. 1802(5)(A). These factors weigh in favor of continuing to include a stock in an FMP. Councils should next consider factors in paragraphs (c)(1)(iv) through (ix) of this section, which set forth key economic, social, and other reasons contained within the MSA for an FMP action. See 16 U.S.C. 1802(5)(B). Finally, a Council should consider the factor in paragraph (c)(1)(x) of this section before deciding to remove a stock from, or continue to include a stock in, an FMP. In many circumstances, adequate management of a fishery by states, state/Federal programs, or another Federal FMP would weigh in favor of removing a stock from an FMP. See e.g., 16 U.S.C. 1851(a)(7) and 1856(a)(3).

(5) Councils may choose to identify stocks within their FMPs as ecosystem component (EC) species (see §§ 600.305(d)(13) and 600.310(d)(1)) if a Council determines that the stocks do not require conservation and management based on the considerations and factors in paragraph (c)(1) of this section. EC species may be identified at the species or stock level, and may be grouped into complexes. Consistent with National Standard 9, MSA section 303(b)(12), and other applicable MSA sections, management measures can be adopted in order to, for example, collect data on the EC species, minimize bycatch or bycatch mortality of EC species, protect the associated role of EC species in the ecosystem, and/or to address other ecosystem issues.

(6) A stock or stock complex may be identified in more than one FMP. In this situation, the relevant Councils should choose which FMP will be the primary FMP in which reference points for the stock or stock complex will be established. In other FMPs, the stock or stock complex may be identified as "other managed stocks" and management measures that are consistent with the objectives of the primary FMP can be established.

(7) Councils should periodically review their FMPs and the best scientific information available and determine if the stocks are appropriately identified. As appropriate, stocks should be reclassified within an FMP, added to or removed from an existing FMP, or added to a new FMP, through an FMP amendment that documents the rationale for the decision.

3.1 Ecosystem Component Requirements Applied to Sculpins

Table 8, below, considers the NS non-exhaustive list of ten factors a council should consider when deciding whether stocks require conservation and management, and their relevance to sculpins in the BSAI and GOA.

Table 8 National Standard factors a council should consider when deciding whether stocks require conservation and management, and their relevance to sculpins in the BSAI and GOA.

NS Factor	Relevance to sculpins in Alaska
i. The stock is an important component of the marine environment.	<ul style="list-style-type: none"> • Sculpins are predators of the shelf and slope ecosystems in the BSAI and GOA (section 2.1.1).
ii. The stock is caught by the fishery.	<ul style="list-style-type: none"> • Sculpins are caught incidentally to other groundfish fisheries in the BSAI and GOA (section 2.2).
iii. Whether a FMP can improve or maintain the condition of the stock	<ul style="list-style-type: none"> • Sculpins are not experiencing overfishing and fishing related mortality is low in both the BSAI and GOA (Table 2). • There is no directed fishery for sculpins in either the BSAI or GOA. • In the absence of a directed fishery, sculpins are very unlikely to become overfished in either the BSAI or GOA.
iv. The stock is a target of a fishery.	<ul style="list-style-type: none"> • There is no directed fishery for sculpins in either the BSAI or GOA.
v. The stock is important to commercial, recreational, or subsistence users.	<ul style="list-style-type: none"> • Sculpins are not considered important to commercial, recreational, or subsistence users in either the BSAI or GOA; however, there is some limited ongoing use of sculpins for fish meal (section 2.3).
vi. The fishery is important to the Nation or to the regional economy.	<ul style="list-style-type: none"> • Sculpins have limited economic value relative to other BSAI and GOA groundfish, and are not considered important to the National or regional economy (Table 7).
vii. The need to resolve competing interests and conflicts among user groups, and whether a FMP can further that resolution.	<ul style="list-style-type: none"> • There is no directed fishery for sculpins in either the BSAI or GOA, no allocations to user groups, and no competing interests or conflicts among user groups relative to sculpins.
viii. The economic condition of a fishery and whether a FMP can produce more efficient utilization.	<ul style="list-style-type: none"> • Sculpins have limited economic value relative to other BSAI and GOA groundfish (Table 7). • Retention of sculpins has varied, but is currently less than 5% in both the BSAI and GOA.
ix. The needs of a developing fishery, and whether a FMP can produce more efficient utilization.	<ul style="list-style-type: none"> • There is currently no developing fishery for sculpins in either the BSAI or GOA. • Existing FMPs could adequately manage any new fishery.
x. The extent to which the fishery is already adequately managed by states, by state/Federal programs, or by Federal regulations pursuant to other FMPs or	<ul style="list-style-type: none"> • Currently, there is no directed fishery for sculpins in either the BSAI or GOA in state or Federal waters.

international commissions, or by industry self-regulation, consistent with the requirements of the Magnuson-Stevens Act and other applicable law.

The NS guidelines in paragraph (4), above, state that factors i – iii should be considered first when councils consider whether species are in need of conservation and management. Regarding factor i, sculpins occur throughout the BSAI and GOA, and undoubtedly have an important niche in the BSAI and GOA ecosystems. However, the same could be said for all species or species complexes in any marine ecosystem. Looking further, it does not appear that sculpins are a major prey item for Steller sea lions (Sinclair et al. 2013), northern fur seals (e.g., Call and Ream 2012), or other threatened or endangered marine mammals in either the BSAI or GOA. Sculpins do play a role as a predator of smaller fish, shrimp, and benthic amphipods; however, it does not appear that the sculpin complexes in the BSAI or GOA are uniquely important components of the marine ecosystem.

Regarding factor ii, sculpins are caught incidentally to other target species in several fisheries in the BSAI and GOA. Sculpins are not, however, a target species for any fishery in the BSAI or GOA. Regarding factor iii, there is no directed fishery for sculpins in either the BSAI or GOA, and fishing related mortality is low in both areas. Because there is no directed fishery and incidental fishing-related mortality is low, there is very little probability that sculpins will become overfished under current management structure. Sculpins are not in need of rebuilding, and are not targeted as a major food product in Alaska. There are no conservation concerns, and future uses of sculpins remain available. Therefore, maintaining sculpins as a target species in the BSAI and GOA Groundfish FMPs is not likely to improve or maintain stock condition.

The NS guidelines next direct councils to consider factors iv – ix which set forth key economic, social, or other reasons which, if answered positively, would argue for maintaining a stock within a FMP. There is no directed fishery for sculpins because there is no existing market. However, should a market develop in either the BSAI or GOA, the Council could reconsider whether management in the fishery or as an EC species is appropriate. At present, there are no economic, social, or other reasons to maintain the sculpin complex as target species in either the BSAI or GOA FMPs, as explained in Table 8, above.

Finally, the NS guidelines direct councils to consider factor x, whether the fishery is adequately managed by states, state/Federal programs, other FMPs, international commissions, or industry self-regulation. Currently, sculpins are adequately managed by the existing BSAI and GOA FMPs, but factors i-ix suggest that maintaining the sculpin complex as a target group does not improve management of the sculpin complex in either the BSAI or GOA.

Any decision by the Council as to whether conservation and management is needed for sculpins in the BSAI and GOA would need to be consistent with the NS of the MSA. Because there is no directed fishery, and there are few economic benefits to be gained by managing sculpins as a target stock, moving the sculpin complex to EC status would likely be consistent with all NS. However, the Council should consider measures for the fishery to minimize incidental catch and mortality of EC species, consistent with NS 9, and to protect their role in the ecosystem. The Council has multiple tools to manage incidental catch, including maintaining a Maximum Retainable Amount (MRA) to meet Council objectives. Current MRAs for sculpins⁴ in the BSAI are 20% for most basis species, except for arrowtooth flounder (3%) and Kamchatka flounder (3%), and 20% for all basis species in the GOA. The Council may choose whether to consider other MRA amounts for sculpins in the BSAI or GOA if they consider moving sculpins to EC status in either FMP.

⁴ Sculpins are managed as “other species” for MRA amounts in both the BSAI and GOA.

4 Management Considerations

4.1 Prohibiting Directed Fishing for Sculpins

Currently, there are no directed fisheries for sculpins in the waters off Alaska. Sculpins are managed as a target species under status quo. An annual OFL, ABC, and TAC for sculpins is specified separately for the BSAI and GOA. If the total TAC for sculpin is caught in one area (BSAI or GOA), retention of sculpins in that area is prohibited for the remainder of the year.

If sculpins were to be moved to the non-target category, in which case conservation and management would still be needed, TAC would no longer be required, but OFL and ABC would still be required. If sculpins were moved to the non-target EC category, conservation and management would not be considered necessary and OFL, ABC, and TAC would no longer be required. If sculpins were to be moved to either the non-target category or to the non-target EC category, regulations at 50 CFR 679.20 and 679.22 would have to be revised to prohibit directed fishing for sculpins at all times in the BSAI and GOA groundfish fisheries. Table 9 below summarizes different management measures for target vs. non-target categories.

At present, the optimum yield (OY) cap established in the Groundfish FMP for the GOA is substantially greater than the total of all GOA TACs. Therefore, managing sculpins as a target species group in the GOA does not require “funding” of sculpin TAC via reductions in TACs of any other groundfish species. In contrast, managing sculpins as a target species group in the BSAI FMP may have adverse effects on fishery total revenue. The BSAI Groundfish FMP specifies a total OY cap of 2 million mt, and the total of all BSAI groundfish TACs may not exceed this 2 million mt cap. Thus, continuing to manage BSAI sculpins as a target fishery means that sculpins incidental catch would continue to be “funded” from reduced TAC of other, presently more valuable, BSAI groundfish species. A reclassification of sculpins to a non-target category would have the effect of freeing up about 5,000 mt of TAC in the BSAI.

4.2 Maximum Retainable Amounts

As noted above, current MRAs for sculpins in the BSAI are 20% for most basis species, except for Arrowtooth flounder (3%) and Kamchatka flounder (3%), and 20% for all basis species in the GOA. If sculpins were to be moved to a non-target or non-target EC category, regulations would need to be amended to move sculpins out of the target basis species category and into the incidental catch species category consistent with a prohibition on directed fishing. However, MRAs could still be maintained. MRAs for sculpins caught incidentally by other BSAI and GOA groundfish fisheries would be derived pursuant to Tables 10 and 11 of 50 CFR 679.

4.3 Recordkeeping and Reporting

If sculpins were to be moved to the non-target or non-target EC category, regulations would prohibit directed fishing for sculpins, but recordkeeping and recording would still be required to monitor incidental catch of sculpins annually. Therefore, any change to the classification of sculpins would not change NMFS’ ability to monitor the catch, retention, and discard of sculpins.

4.4 Enforcement and Observer Program

As noted in the recordkeeping and reporting section above, any change to the sculpins classification would not change NMFS’ ability to monitor the catch, retention, and discard of sculpins, therefore the North Pacific Observer Program (Observer Program) is unlikely to be impacted by any changes. In addition, the role of enforcement is unlikely to change unless the Council chooses to set an MRA lower than status quo, in which case NOAA Office of Law Enforcement’s (OLE) enforcement burden could increase.

One possible issue to note is that some species of sculpins could be mistaken for other species with a similar appearance (e.g. rockfish or greenlings), and that has the potential to put MRA limits in dispute.

Collaboration between OLE and the Observer Program on species identification could help to address this.

Table 9 below provides a summary of associated management and enforcement issues depending on target vs. non-target category.

Table 9 Summary of Management Measures

Management Measure	Target Species	Non-Target Species	Non-Target EC
Prohibit Directed Fishing	Sculpins would remain at status quo as target species, despite no directing fishing.	Directed fishing would be prohibited in regulations at 50 CFR 679.20 and 679.22.	Directed fishing would be prohibited in regulations at 50 CFR 679.20 and 679.22.
Retention and Sale	Retention and sale allowed, subject to MRA.	Retention and sale allowed, subject to MRA.	Retention and sale allowed, subject to MRA.
Harvest Specifications	OFL, ABC, and TAC required.	OFL and ABC required. TAC not required.	OFL, ABC, and TAC not required.
Incidental Catch Management	MRAs for sculpins in the BSAI are 20% for most basis species, except for arrowtooth flounder (3%) and Kamchatka flounder (3%), and 20% for all basis species in the GOA.	Sculpins would be moved to incidental catch, and MRAs could be maintained or changed.	Sculpins would be moved to incidental catch, and MRAs could be maintained or changed.
Recordkeeping and Reporting	Require catch reporting.	Require catch reporting.	Require catch reporting.

5 Next Steps

Any action to move sculpins to EC status in the BSAI or GOA FMP would require a National Environmental Policy Act (NEPA) analysis. If the Council chooses to move forward with this action, it should identify a purpose and need statement and develop an alternative(s) for consideration in an initial review draft analysis.

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