Updated Gulf of Mexico Lane Snapper OFL and ABC using the Itarget Model application with MRIP_FES estimates and for MRIP_MRFSS estimates of recreational Landings

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Executive Summary

This document updates the DLMtool 'Itarget' data-limited results for ABC and OFL advice for lane snapper since the SEDAR 49 OFL/ABC estimates and also provides an overall summary of the previous updates provided by Cummings (January 2020) and Cummings and Sagarese (September 2019). The Itarget DLM method was used in the updates and followed the procedures described in Cummings and Sagarese (September 2019) and the SEDAR 49 Gulf of Mexico Data Limited Stock Evaluation (SEDAR 49 SAR). The Itarget method uses the recent (2014-2018) headboat index (Cummings 2019), which showed a 57% increase over the reference period (1999-2008) and uses estimates of total commercial and recreational catches. The previous OFL/ABC updates provided by Cummings and Sagarese (September 2019) and those provided by Cummings (January 2020) are also provided herein and a history of the updates is given. Additionally, OFL/ABC estimates in landings only are provided.

SEDAR 49 Itarget Model Update History

1. Cummings and Sagarese (September 2019) provided updated OFL/ABC estimates in total removals for the SEDAR 49 Itarget model estimates using MRIP_MRFSS units for the recreational data and presented the results to the September 2019 meetings of the Gulf of Mexico Fishery Management Council (GMFMC), Science and Statistical Committee (SSC) Meeting and the GMFMC September meeting.
2. The results of Cummings and Sagarese (September 2019) were further presented to the October GMFMC Reeffish Advisory Panel.
3. Cummings (January 2020) further updated the SEDAR 49 OFL/ABC estimates however, for this update, estimates of recreational data were taken from the MRIP_FES set of estimates. All other inputs into the Itarget model were identical to the inputs from the September 2019 model runs (i.e., commercial landings and the updated headboat CPUE index). Recently, the MRIP_FES recreational data has been determined to be the best available and most appropriate data available for the recreational fleets for GMFC stocks.
4. The January 2020 OFL/ABC results were presented to the January 2020 GMFMC Meeting. OFL/ABC results were in units of total landings including dead discards.
5. Subsequent to the Cummings January 2020 update the Council requested the SEDAR 49 update of OFL/ABC be available in units of landings only (i.e., without dead discards).
6. The purpose of this document is to provide the updated SEDAR 49 OFL/ABC estimates in units of landings only. It is important to note that the two previous updates of lane snapper OFL/ABC from Cummings and Sagarese (September 2019) and Cummings (January 2020) were in units of recreational (AB1+B2 dead discards) and commercial landings. Further, it should be noted that in the application of the Itarget model inputs are in units of total removals (i.e., total recreational (AB1 + B2 dead discards) and commercial landings).

7. The need to provide OFL/ABC estimates in units of 'landings' only was necessary as the current annual catch limits (ACLs) are defined using the Generic ACL/AM amendment using MRFSS landings data (i.e., AB1 landed fish) and thus this additional update was carried out at the request of the NMFS, Southeast Regional Office (SERO) and Council staff.

Methods for OFL/ABC Calculations

Procedures used in the September 2019 (Cummings and Sagarese) and the January 2020 (Cummings) updates of the SEDAR 49 estimates of lane snapper OFL and ABC, using the data limited Itarget model (i.e., 'Itarget_0.5_0.7_1.0'), were identical and followed Cummings and Sagarese (2019). The only change between the September 2019 and January 2020 updates was the source inputs for the recreational data. As detailed by Cummings and Sagarese, the September update used MRIP_MRFSS units of recreational inputs while the January 2020 update used the MRIP_FES units of recreational data. Further, the Itarget model results provide estimates of OFL/ABC in units of total removals. Thus, in the lane snapper application, recreational estimates of AB1 and B2 dead discards were incorporated. For the SEDAR 49 lane snapper application of the Itarget model, commercial discards were assumed zero and that assumption was carried forward in the September 2019 and January 2020 updates.

The commercial landings data component and the updated standardized catch per unit of effort (CPUE) index of abundance was identical between the September 2019 and the January 2020 updates. Appendix Table 1 and Appendix Figure 1 provides the updated CPUE index presented by Cummings, 2019 and that same CPUE index was used in the September 2020 and the January 2020 OFL/ABC updates.

Finally as noted above, in this summary of the SEDAR 49 OFL/ABC update using the Itarget model, the resulting OFL/ABC estimates were adjusted to provide OFL/ABC in units of landed fish. The OFL/ABC outputs from the Itarget model were multiplied by the recent three-year (2016-2018) average of the ratio of AB1 landings to total recreational landings (AB1 + B2-dead discards).

As in Cummings and Sagarese (2019) and Cummings (2020), all references herein to the SEDAR 49 SAR refer to the SEDAR 49 Stock Assessment Report.

Results

Table 1 and Figure 1 provide updated estimates of recreational landings (AB1, B2-dead discards) and commercial landings of Gulf of Mexico lane snapper 1986-2018. The source of the recreational data component for this update of OFL/ABC was the MRIP_FES data source, which is recognized as the best practice source of input for recreational data. The data indicate that since 1986 that from 94 to 99 % of the total recreational (AB1 + B2-dead discards) landings was AB1 landed fish and the three-year (2016-2018) average for the MRIP_FES data source was 96.3%.

The resulting updated OFL/ABC values in units of total removals, are presented in Table 2 resulting from two separate applications of the Itarget model varying only the source of recreational catches (AB1 + B2 dead discards), i.e., MRIP_FES vs MRIP_MRFSS. As mentioned earlier, the Itarget model provides OFL/ABC in native units of total removals (i.e., recreational AB1+B2- dead discards and commercial landings) therefore, it was necessary to adjust the values to provide estimates of OFL/ABC in units of landed catch only (AB1). This adjustment was added at the request of the NOAA, Southeast Regional Office (SERO) as the annual catch is monitored in landed catch only (AB1 recreational + commercial landings). The adjustments were performed by multiplying the OFL/ABC values output from each separate application of the Itarget model by the three-year (2016-2018) average estimate of the ratio of AB1 landings to total (AB1 + B2-dead discards) recreational landings (i.e., 96.3% MRIP_FES and 98.3% MRIP_MRFSS respectively).

Table 3 provides the adjusted updated OFL and ABC in landings only for the two separate sources of recreational landings (i.e., MRIP_FES estimates and the MRIP_MRFSS estimates) after applying the AB1/AB1+B2 ratios.

Appendices Tables 2 – 4 provide detailed inputs on data inputs and OFL/ABC results for the September 2019 update. As in SEDAR 49, the ABC was set at the 30th percentile of the OFL.

References

Cummings, Nancie J. and Skyler Sagarese. September 2019. Updated Calculations of OFL and ABC for Gulf of Mexico Lane Snapper using the Itarget Data Limited Method (DLM). NOAA Fisheries, SEFSC, SFD, 11pp. Manuscript prepared for September 2019 GMFMC SSC Meeting, Tampa FL.

Cummings, Nancie J. September 2019. Updated Catch per Unit of Effort (CPUE) Indices and Effort Time-series for Lane Snapper from the Gulf of Mexico Recreational Headboat Fishery (1986 - 2018). 6pp. Manuscript prepared for September 2019 GMFMC SSC Meeting, Tampa FL.

SEDAR 49 Stock Assessment Report. Gulf of Mexico Data-limited Species: Red Drum, Lane Snapper, Wenchman, Yellowmouth Grouper, Speckled Hind, Snowy Grouper, Almaco Jack, Lesser Amberjack. December 2016. SEDAR 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 618pp.

Table 1.Gulf of Mexico Lane Snapper landings (Commercial and Recreational (AB1 and B2 dead discards)) for 1986-2018. Source for MRIP_FES landings was NOAA Fisheries, SEFSC, Fishery Statistics Division. Source for 1986-2014 commercial landings was SEDAR 49 SAR. Source for 2015-2018 commercial landings was Ryan Rindone pers. com. Units are pounds, whole weight (ww).

Year	MRIP_FES AB1 Landings	MRIP_FES B2 Dead Discards	Total Recreational (AB1+B2 Dead Discards)	Commercial Landings	Total Pounds
1986	368,194	3,290	371,484	60,174	431,658
1987	589,309	11,786	591,689	51,972	643,661
1988	966,750	19,335	975,118	57,659	1,032,777
1989	2,657,650	53,153	2,669,926	93,596	2,763,522
1990	415,682	8,314	417,665	81,358	499,023
1991	2,067,207	41,344	2,067,207	119,289	2,186,496
1992	1,133,906	22,678	1,164,508	99,127	1,263,635
1993	876,845	17,537	917,953	107,136	1,025,089
1994	637,160	12,743	667,067	91,729	758,796
1995	557,726	11,155	589,514	71,294	660,808
1996	428,450	8,569	449,532	54,581	504,113
1997	1,334,461	26,689	1,359,131	61,251	1,420,382
1998	771,827	15,437	783,858	31,750	815,608
1999	460,715	9,214	472,977	49,233	522,210
2000	224,367	4,487	239,008	47,684	286,692
2001	809,588	16,192	823,665	48,782	872,447
2002	448,574	8,971	472,208	52,970	525,178
2003	538,859	10,777	553,157	50,584	603,741
2004	566,717	11,334	582,440	50,755	633,195
2005	582,079	11,642	592,756	39,951	632,707
2006	511,238	10,225	517,641	49,340	566,981
2007	536,277	10,726	551,619	29,222	580,841
2008	361,438	7,229	381,171	25,475	406,646
2009	521,135	10,423	539,728	35,848	575,576
2010	175,207	3,504	181,427	17,262	198,689
2011	152,319	3,046	158,236	14,365	172,601
2012	413,331	8,267	421,075	28,928	450,003
2013	454,495	9,090	472,615	23,189	495,804
2014	458,953	9,179	476,534	29,948	506,482
2015	433,851	8,677	451,991	44,840	496,831
2016	603,892	12,078	636,202	34,142	670,344
2017	1,256,278	25,126	1,285,436	42,419	1,327,855
2018	795,045	15,901	826,366	25,974	852,340

Table 2. Updated Lane Snapper OFL and ABC (Pounds, ww) in total removals from the Itarget_0.5_0.7_1.0 data limited model using MRIP_FES landings and MRIP_MRFSS. OFL and ABC are as defined in Cummings and Sagarese (2019). Recreational inputs are in units of AB1+B2-dead discards.

	ABC					
OFL/ABC Source	**30%**	**40%**	**OFL**	**SD**	**SE**	**CV**
Updated Itarget0.5_0.7_1.0, Cummings January 2020: Using MRIP_FES Recreational Catch Estimates	1,068,508	1,081,903	1,094,324	50,102	501	0.046
Updated Itarget0.5_0.7_1.0, Cummings and Sagarese 2019: Using MRIP_MRFSS Recreational Catch Estimates	588,965	596,349	603,195	27,616	276	0.046
Itarget0.5_0.7_1.0 SEDAR 49, March 2017	355,501	360,059	364,082	16,965	170	0.047

Table 3. Adjusted Lane Snapper OFL and ABC (Pounds, ww) in landings only from the Itarget_0.5_0.7_1.0 data limited model using two sources of recreational data: MRIP_FES and MRIP_MRFSS landings. OFL/ABC Units are in landed fish, Pounds, Whole weight. Adjustments were made by multiplying the OFL/ABC estimates in Table 2 by the three-year (2016-2018) average of the ratio of AB1 landings to total (AB1 + B2-dead discards) recreational landings (i.e., 96.3% MRIP_FES and 98.3% MRIP_MRFSS respectively).

	ABC					
OFL/ABC Source	**30%**	**40%**	**OFL**	**SD**	**SE**	**CV**
January 2020: Using MRIP_FES Recreational Catch Estimates	1,028,973	1,041,873	1,053,834	50,102	501	0.046
Updated Itarget0.5_0.7_1.0, Cummings and Sagarese 2019: Using MRIP_MRFSS Recreational Catch Estimates	578,953	586,211	592,941	27,616	276	0.046

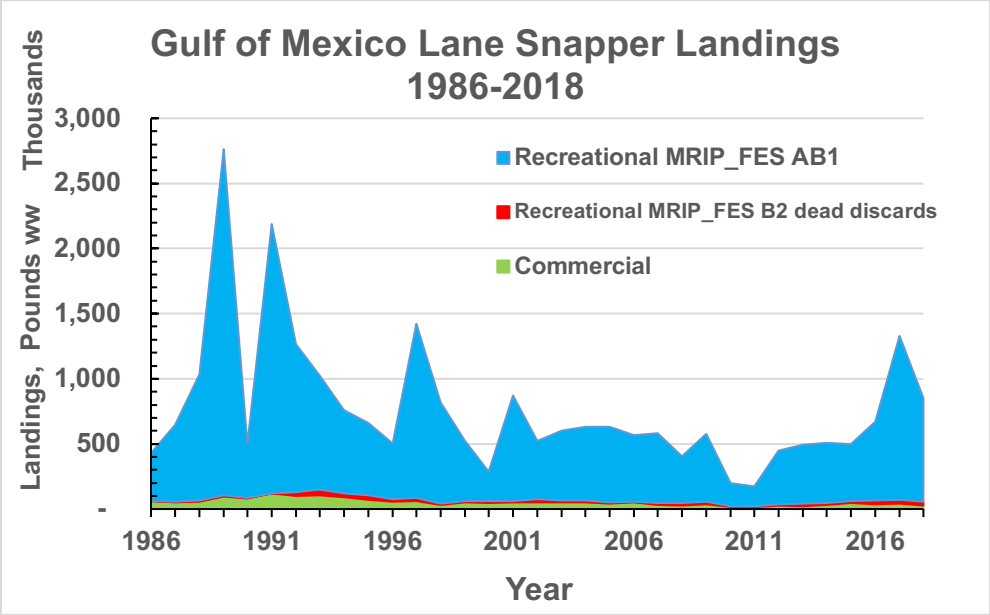


Figure 1. Updated Gulf of Mexico lane snapper recreational (AB1, B2-dead discards) and commercial landings 1986-2018. Recreational landings are in MRIP_FES units. Source for MRIP_FES and commercial landings was NOAA Fisheries, SEFSC, Fishery Statistics Division. Units are pounds, whole weight.

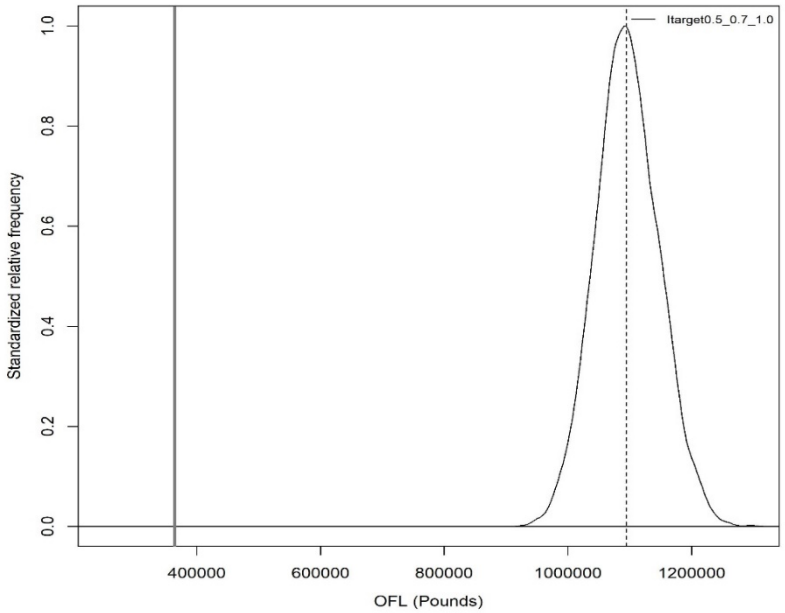


Figure 2. Standardized relative frequency of TAC for lane snapper output for the updated Itarget0.5_0.7_1.0 data limited method using the Cummings (2019) updated headboat standardized CPUE index for 1986-2018 and substituting the MRIP_FES recreational landings for recreational component of the total landings (Commercial landings time series remained unchanged). Thick gray line represents the calculated OFL (estimated TAC= 364,082 pounds ww) at the 50% probability of exceeding OFL from the March 2017 SSC Review of the SEDAR 49 data limited evaluation. Units are in total removals (recreational AB1 landings + B2 dead discards and commercial landings)

Appendix Tables and Figures.

Appendix Table 1. Source: Cummings, 2019.

"Updated lane snapper catch per unit of effort (CPUE) standardized indices of abundance from the headboat fishery 1986-2018. Indices from Smith and Rios (2016, SEDAR 49) included for comparison."

YEAR	SEDAR 49 Standardized CPUE	SEDAR 49 Updated Standardized CPUE	SEDAR 49 Updated Nominal CPUE	SEDAR 49 Update Normalized Effort
1986	0.730	0.738	0.454	0.571
1987	0.860	0.881	0.371	0.677
1988	0.420	0.433	0.228	0.941
1989	0.650	0.620	0.392	0.822
1990	1.040	1.102	0.721	1.116
1991	1.330	1.324	0.898	1.212
1992	1.270	1.269	1.148	1.342
1993	1.570	1.602	1.819	1.442
1994	1.250	1.347	1.198	1.202
1995	0.860	0.880	0.821	0.964
1996	0.660	0.697	0.543	0.813
1997	0.600	0.584	0.351	0.804
1998	0.590	0.599	0.515	0.688
1999	0.510	0.515	0.243	0.641
2000	0.760	0.793	0.438	0.805
2001	0.590	0.589	0.399	0.846
2002	0.880	0.888	0.617	0.891
2003	1.150	1.134	1.076	0.817
2004	1.140	1.123	0.701	0.967
2005	1.520	1.549	1.125	0.945
2006	1.110	1.002	0.965	0.856
2007	1.090	0.980	0.751	0.954
2008	1.230	1.169	0.812	0.948
2009	1.410	1.330	1.134	1.108
2010	1.110	1.043	0.998	0.727
2011	1.050	1.063	1.328	1.027
2012	1.100	1.098	1.301	1.072
2013	1.120	1.093	1.425	1.209
2014	1.130	1.133	1.424	1.308
2015	1.270	1.422	1.833	1.359
2016		1.857	2.467	1.441
2017		1.812	2.743	1.228
2018		1.417	1.761	1.261

Appendix Table 2. Source. Cummings and Sagarese (2019).

Commercial and recreational data inputs used in the Cummings and Sagarese (September 2019) updates of SEDAR 49 lane snapper OFL/ABC from the Itarget model.

"Updated commercial and recreational landings of Gulf of Mexico lane snapper 1986-2018. Source of data: SEDAR 49 SAR (1986-2014 for recreational and commercial components) and Ryan Rindone (email of 7 August 2019 from NMFS, SEFSC ACL data files). Recreational dead discards for 2015-2018 estimated as average for 2012-2014 using inputs from SEDAR 49. Recreational landings are in MRIP_MRFSS units.

	Landings (whole weight)		
Year	Commercial	Recreational	Total
1986	60,174	337,741	397,915
1987	51,972	503,523	555,495
1988	57,659	389,105	446,764
1989	93,596	726,910	820,506
1990	81,358	199,003	280,361
1991	119,289	689,172	808,461
1992	99,127	501,489	600,616
1993	107,136	419,689	526,825
1994	91,729	428,976	520,705
1995	71,294	462,958	534,252
1996	54,581	210,779	265,360
1997	61,251	450,618	511,869
1998	31,750	284,505	316,255
1999	49,233	197,024	246,257
2000	47,684	149,614	197,298
2001	48,782	346,925	395,707
2002	52,970	213,264	266,234
2003	50,584	315,508	366,092
2004	50,755	309,772	360,527
2005	39,951	368,364	408,315
2006	49,340	297,855	347,195
2007	29,222	226,375	255,597
2008	25,475	234,931	260,406
2009	35,848	292,569	328,417
2010	17,262	100,942	118,204
2011	14,365	110,074	124,439
2012	28,928	215,811	244,739
2013	23,189	269,524	292,713
2014	29,948	294,521	324,469
2015	44,840	239,579	284,419
2016	34,142	272,610	306,752
2017	42,419	542,273	584,692
2018	25,974	339,454	365,428

Appendix Table 3. Gulf of Mexico Lane Snapper landings for recreational (AB1 and B2 dead discards)) for 1986-2018. Source for MRIP_MRFSS landings was NOAA Fisheries, SEFSC, and Fishery Statistics Division. Units are pounds, whole weight (ww).

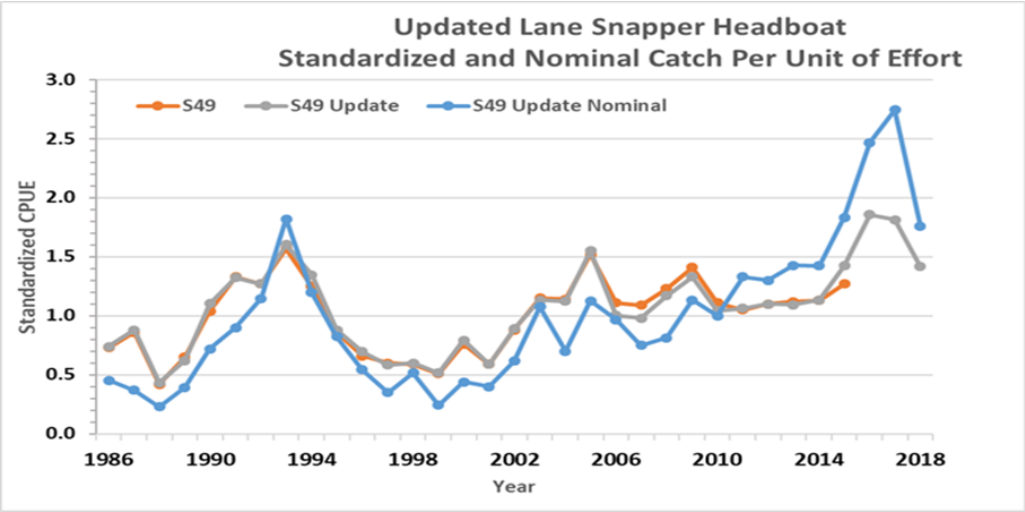
Year	MRIP_MRFSS (AB1) Pounds	MRIP_MRFSS B2 Discards	MRIP_MRFSS Total Pounds	Commercial Landings	Total Landings Pounds
1986	336,131	1,610	337,741	60,174	397,915
1987	502,056	1,467	503,523	51,972	555,495
1988	386,803	2,302	389,105	57,659	446,764
1989	722,596	4,314	726,910	93,596	820,506
1990	198,216	787	199,003	81,358	280,361
1991	674,031	15,141	689,172	119,289	808,461
1992	493,230	8,259	501,489	99,127	600,616
1993	406,980	12,709	419,689	107,136	526,825
1994	417,652	11,324	428,976	91,729	520,705
1995	453,172	9,786	462,958	71,294	534,252
1996	202,538	8,241	210,779	54,581	265,360
1997	443,230	7,388	450,618	61,251	511,869
1998	280,810	3,695	284,505	31,750	316,255
1999	193,570	3,454	197,024	49,233	246,257
2000	144,029	5,585	149,614	47,684	197,298
2001	342,576	4,349	346,925	48,782	395,707
2002	206,380	6,884	213,264	52,970	266,234
2003	312,097	3,411	315,508	50,584	366,092
2004	305,294	4,478	309,772	50,755	360,527
2005	363,554	4,810	368,364	39,951	408,315
2006	295,007	2,848	297,855	49,340	347,195
2007	219,537	6,838	226,375	29,222	255,597
2008	227,689	7,242	234,931	25,475	260,406
2009	285,426	7,143	292,569	35,848	328,417
2010	99,125	1,817	100,942	17,262	118,204
2011	108,201	1,873	110,074	14,365	124,439
2012	214,281	1,530	215,811	28,928	244,739
2013	262,068	7,456	269,524	23,189	292,713
2014	285,875	8,646	294,521	29,948	324,469
2015	233,702	5,877	239,579	44,840	284,419
2016	266,733	5,877	272,610	34,142	306,752
2017	536,396	5,877	542,273	42,419	584,692
2018	333,577	5,877	339,454	25,974	365,428

Appendix Table 4. Source Cummings and Sagarese (September 2019).

Results of OFL/ABC updates for Cummings and Sagarese (September 2019) Update of SEDAR 49 lane snapper OFL/ABC from the Itarget model. Recreational data inputs were from the MRIP_MRFSS data source and refer to landings on AB1+dead discards. OFL/ABC units are in total removals including B2-dead discards for recreational component for both September 2019 update and the SEDAR 49 evaluation of 2016.

"Updated Lane snapper catch levels (pounds whole weight) at 30%, 40% and 50% probabilities of exceeding OFL for the Itarget 0.5_0.7_1.0 data-limited methods."

Method	**ABC**		**OFL**	**SD**	**SE**	**CV**
	30%	**40%**	**50%**			
Updated Itarget0.5_0.7_1.0 September 2019	588,965	596,349	603,195	27,616	276	0.046
Itarget0.5_0.7_1.0 SEDAR 49, March 2017	355,501	360,059	364,082	16,965	170	0.047



Appendix Figure 1.Source Cummings (2019)

"Figure 1. Updated Lane snapper standardized catch per unit of effort from the headboat fishery 1986 - 2018 (SEDAR 49 Update line). The standardized CPUE index from Smith and Rios (SEDAR 49) is included for comparison (S49 line). All time series scaled to the mean of the overlapping years (1986-2014)."