



**NOAA  
FISHERIES**

# Council Request 6889 – Presentation on the Use of Discards in Stock Assessment

**SEFSC Staff**

# Council Request Objectives:

- The Council would like to better understand the methods by which dead discards are accounted for, and the uncertainty inherent in these estimates.
- We will discuss:
  - 1) How discards are accounted for in the models
  - 2) Describe uncertainty
  - 3) Whether dead discards are included in the OFL, ABC and ACL
  - 4) Differences in treatment of recreational and commercial discards and implications for management



# MRIP Discard Definitions

- **Type A** = fish landed whole, retained and observed by interviewers
- **Type B1** = fish reported as killed by the fishers, and not observed by interviewers. All dead. Can be retained but not observed, used for bait, partially eaten by predator etc, or discarded dead.
- **Type B2** = fish reported as released alive by the fishers, not observed by interviewers.
- For assessment purposes:
  - Recreational landings assumed to equal  $A+B1$ .
  - Recreational discards modeled using B2
  - **Dead discards** are  $B2 \times \text{discard mortality rate}$

# Commercial Discard Definitions

- Estimated using information from the GOM Reef Fish Commercial Observer Program
- **Disposition**
  - kept, used as bait, released
- **Condition** of released fish ***at arrival to vessel***
  - alive good, alive barotrauma, dead, not recorded

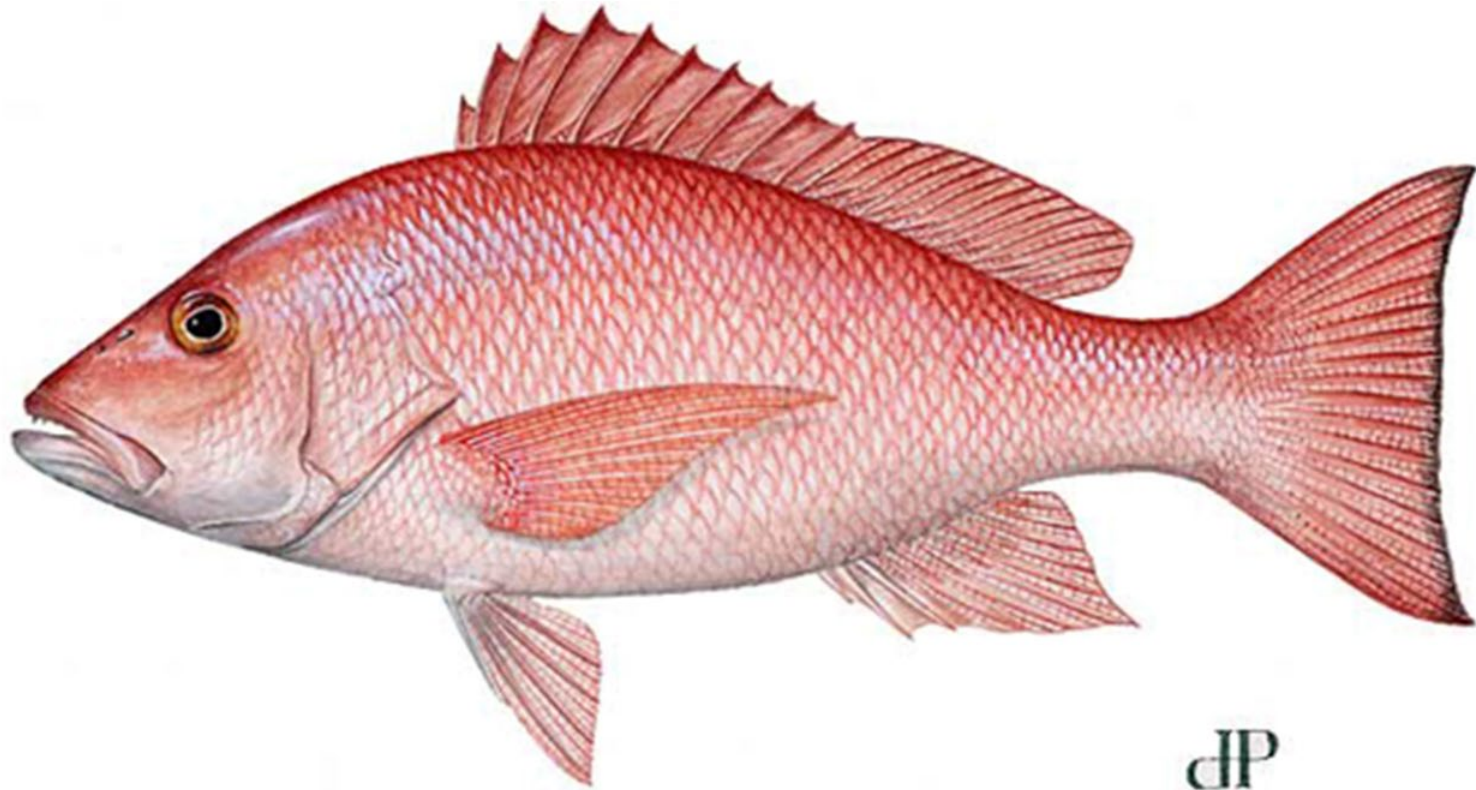
For assessment purposes:

- Landings not derived from the GOM Reef Fish Observer Program
- Discards = fish not kept (e.g. released alive, discarded dead and used as bait)
- Dead discards = discards\*discard mortality rate
- This method underestimates the commercial dead discards to an extent. To make the approach fully comparable to that applied to recreational discards, only fish that are alive upon release should be included in the discards.
- However, we'll show that this is a small difference because few fish are reported dead before release.

# Federal Regulation:

- **50 CFR § 622.9 (e) *Use of Gulf reef fish as bait prohibited.*** Gulf reef fish may not be used as bait in any fishery, except that, when purchased from a fish processor, the filleted carcasses and offal of Gulf reef fish may be used as bait in trap fisheries for blue crab, stone crab, deep-water crab, and spiny lobster. Effective 9/08/2006.
- **Recreational:** B1 is a small fraction of the harvest for charter (e.g. <5%, but can be larger for private vessels (e.g. ~20%). Most B1s are harvest unavailable to the dockside sampler. Fish kept for bait or discarded dead are a small fraction of the B1 component (R. Cody, pers comm. 4/5/2021).
- **Commercial:** “Used for Bait” is a standard disposition code. The observer program training manual lists the use of reef fish as bait/filleting at sea as a violation. It occurs very rarely (e.g. generally <<1%).

# Red Snapper (SEDAR 52)

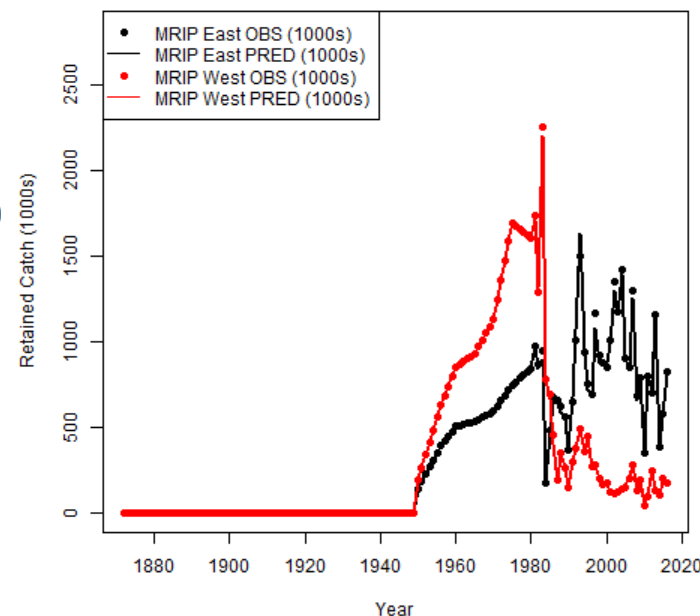


# Data fit and uncertainty

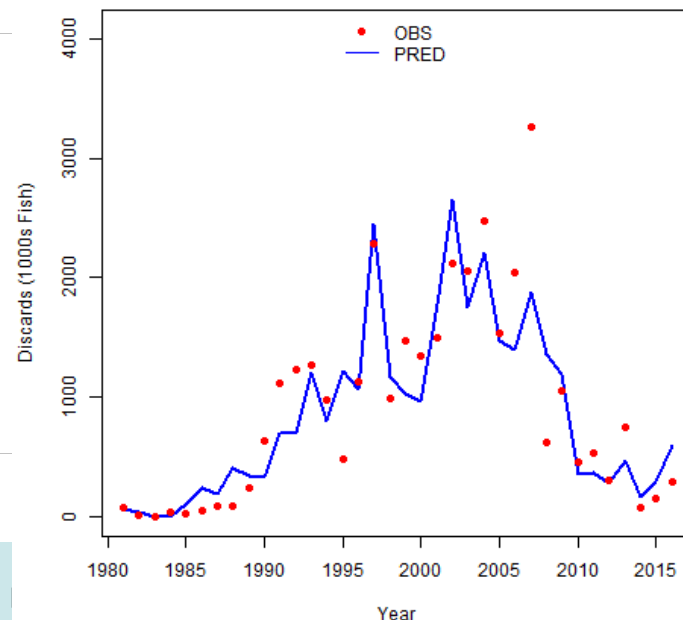
- Fit to recreational **landings** (A+B1, numbers)
  - Near perfect fit because CV assumed to be 0.05
- Fit to recreational **discards** (B2, released alive)
  - Not identical because CV was assumed to be 0.3
  - Dead discards obtained by applying time-varying retention and discard mortality estimates

Sector	Venting (Y/N)	Year (Pre/Post 2008)	East		West	
			Closed	Open	Closed	Open
Recreational	N	Pre	0.21	0.21	0.22	0.22
Recreational	Y	Post	0.118	0.118	0.118	0.118
Commercial vertical line	N	Pre	0.74	0.75	0.87	0.78
Commercial vertical line	Y	Post	0.55	0.56	0.74	0.6
Commercial longline	N	Pre	0.74	0.81	0.87	0.91
Commercial longline	Y	Post	0.55	0.64	0.74	0.81

Landings example



Live Discards example



# Rec. catch data in red snapper assessment

- Red Snapper has 6 recreational fleets

Name	Fleets	A	B1 (Open + Closed)	B2
Open season MRIP (East Gulf)	CH, P	✓	✓	✓
Open season MRIP (West Gulf)	CH, P	✓	✓	✓
Open Season Headboat (East Gulf)	Hbt	✓	✓	✓
Open season Headboat (West Gulf)	Hbt	✓	✓	✓
Closed season Rec. (East)	CH, P, Hbt			✓
Closed season Rec. (West)	CH, P, Hbt			✓

\*CH = For-hire Charter, P = Private vessels, Hbt = For-hire Headboat

\* A = Landed catch, B1 = Released Dead (Discard), B2 = Released Alive (Discard)

- Open and Closed Season B1's are included in the OPEN season fleets



# Commercial Discards: Red Snapper VL

Year	n_fish	Disposition %			Further Breakdown of Released Fish: Condition % Upon Arrival to Vessel			
		Kept	Used as		Alive, Good	Alive, Barotrauma	Dead	Not Recorded
			Bait	Released				
2007	11036	69.94	0.01	30.05	19.11	9.48	0.04	1.42
2008	7388	73.70	0.01	26.29	11.91	14.23	0.01	0.14
2009	2508	53.87	0.24	45.89	27.63	17.86	0.04	0.36
2010	4575	73.49	0.02	26.49	8.81	16.98		0.70
2011	10984	74.85	0.01	25.14	11.98	12.75	0.07	0.34
2012	24021	78.31	0.03	21.65	11.28	9.86	0.14	0.37
2013	14220	88.50	0.07	11.43	5.80	5.45	0.13	0.04
2014	18101	91.06		8.94	5.52	3.08	0.18	0.17
2015	32315	90.77	0.08	9.15	6.10	2.83	0.12	0.10
2016	27848	89.71	0.01	10.27	7.06	3.08	0.11	0.03
2017	12874	82.79	0.08	17.13	10.77	6.25	0.06	0.05
2018	7319	87.25	0.04	12.71	8.29	4.29	0.07	0.05
2019	11532	91.72	0.01	8.27	6.06	1.93	0.22	0.06

50 CFR § 622.9 (e) *Use of Gulf reef fish as bait prohibited.*



# Commercial Discards: Red Snapper LL

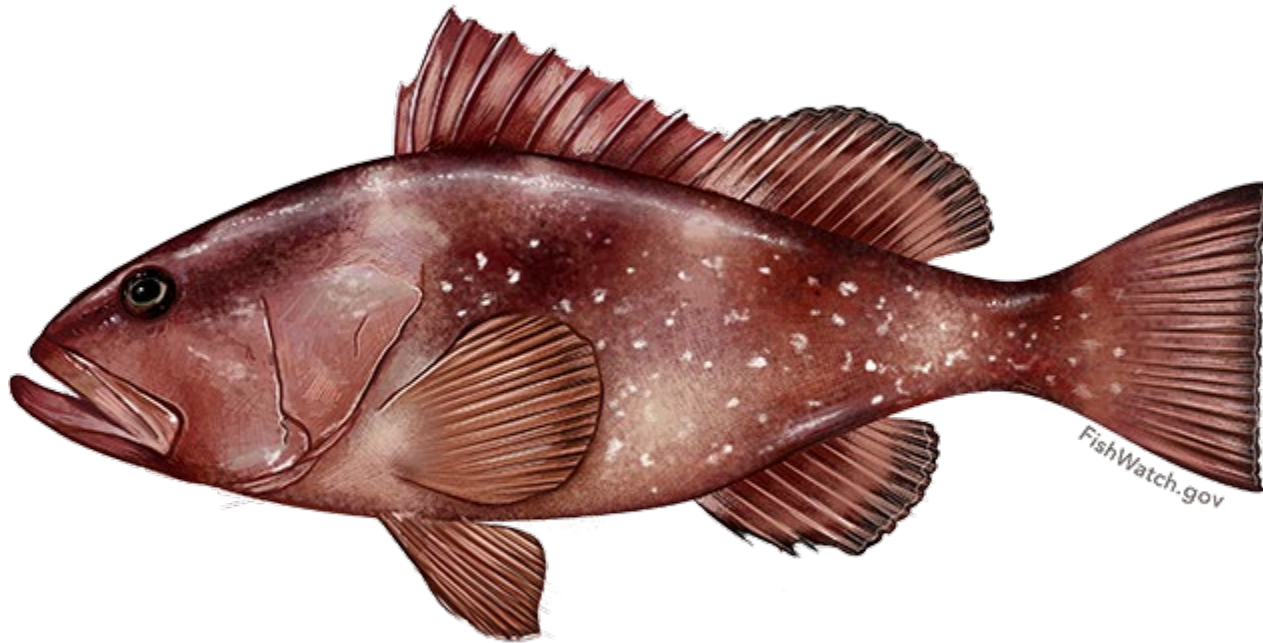
		Disposition %			Further Breakdown of Released Fish: Condition % Upon Arrival to Vessel			
Year	n_fish	Kept	Used as Bait	Released	Alive, Good	Alive, Barotrauma	Dead	Not Recorded
2007	284	4.23		95.77	47.18	30.63	7.39	10.56
2008	163	70.55	0.61	28.83	6.13	17.18	3.68	1.84
2009	1710	33.10		66.90	18.60	44.91	3.22	0.18
2010	3100	40.35		59.65	24.68	31.77	1.94	1.26
2011	5416	31.92	0.02	68.06	26.98	37.52	0.98	2.58
2012	1756	21.64		78.36	45.62	28.08	0.63	4.04
2013	4601	34.64		65.36	28.67	33.97	1.04	1.67
2014	1681	45.21		54.79	26.41	26.89	1.43	0.06
2015	1814	61.91		38.09	23.87	9.65	3.20	1.38
2016	4557	58.96		41.04	29.71	8.87	2.37	0.09
2017	921	49.73		50.27	41.26	6.19	2.71	0.11
2018	977	68.88		31.12	11.36	11.98	7.78	
2019	1805	98.73		1.27	0.06		1.22	

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# Red Grouper (SEDAR 61)

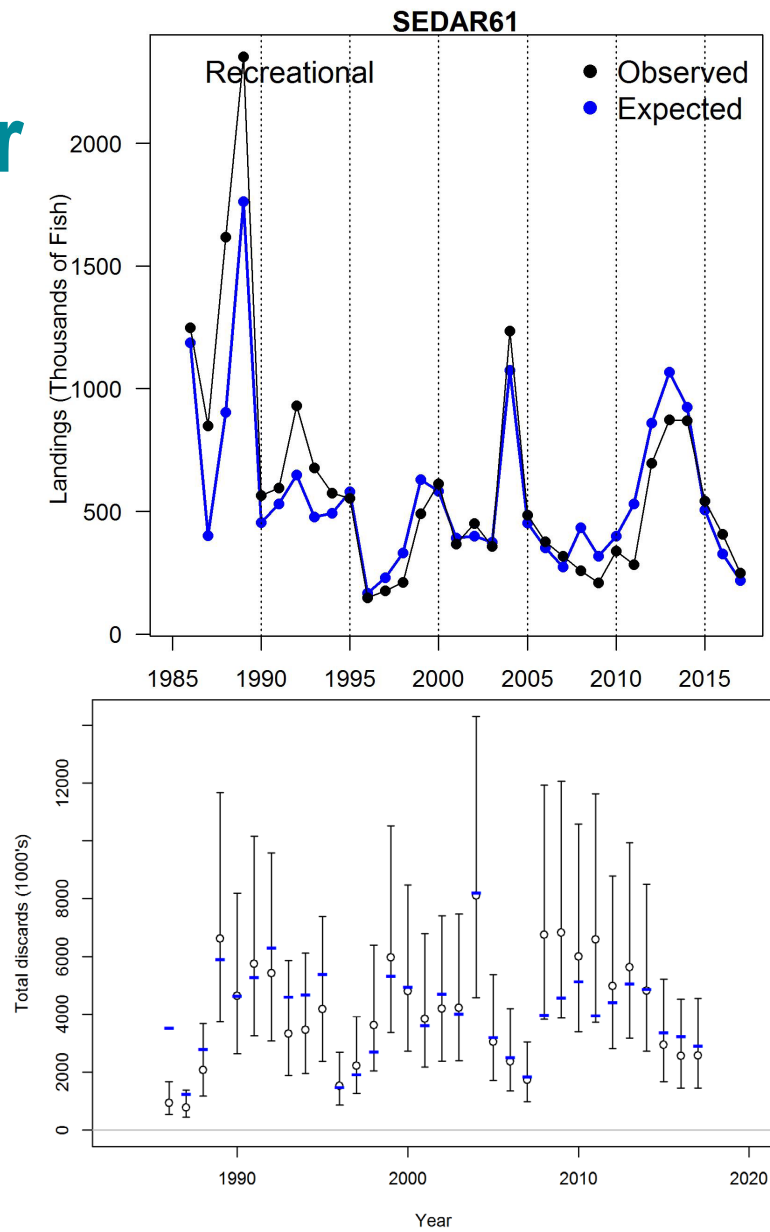
- This is the most common approach for Gulf of Mexico stock assessments. CVs applied to landings and discards are species-specific.



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# SEDAR 61 Gulf red grouper

- Fit to recreational **landings** (**A+B1, numbers**)
  - Difference in observed and predicted due to  $CV = 0.3$  (i.e., not perfect fit)
- Fit to recreational **discards** (**B2, numbers released alive**)
  - Not identical because  $CV = 0.29$
  - Dead discards obtained by multiplying by discard mortality
    - 11.6% - mean overall depth integrated estimate from Sauls et al. 2014 (SEDAR41-RD16)



# Uncertainty of Discards

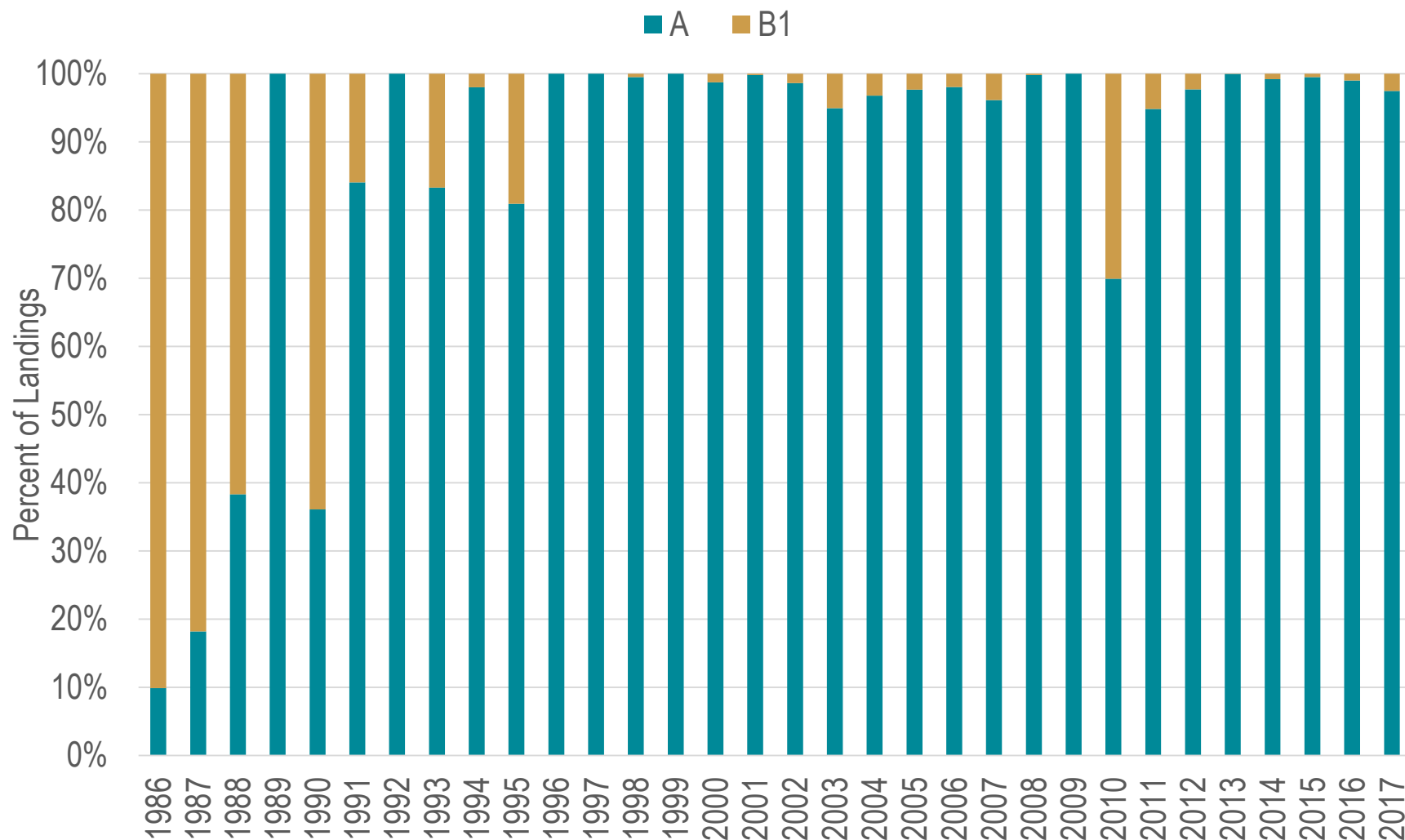
Fleet	Data Input	Error
Recreational	Numbers (B2)	0.29 (expert opinion, reduced from 0.5 by SEDAR42 Review Panel)

Fleet	Data Input	Error
Commercial Vertical Line	Numbers	0.29 (expert opinion, reduced from 0.5 by SEDAR42 Review Panel)
Commercial Longline	Numbers	0.29 (expert opinion, reduced from 0.5 by SEDAR42 Review Panel)
Commercial Trap	Numbers	0.29 (expert opinion, reduced from 0.5 by SEDAR42 Review Panel)

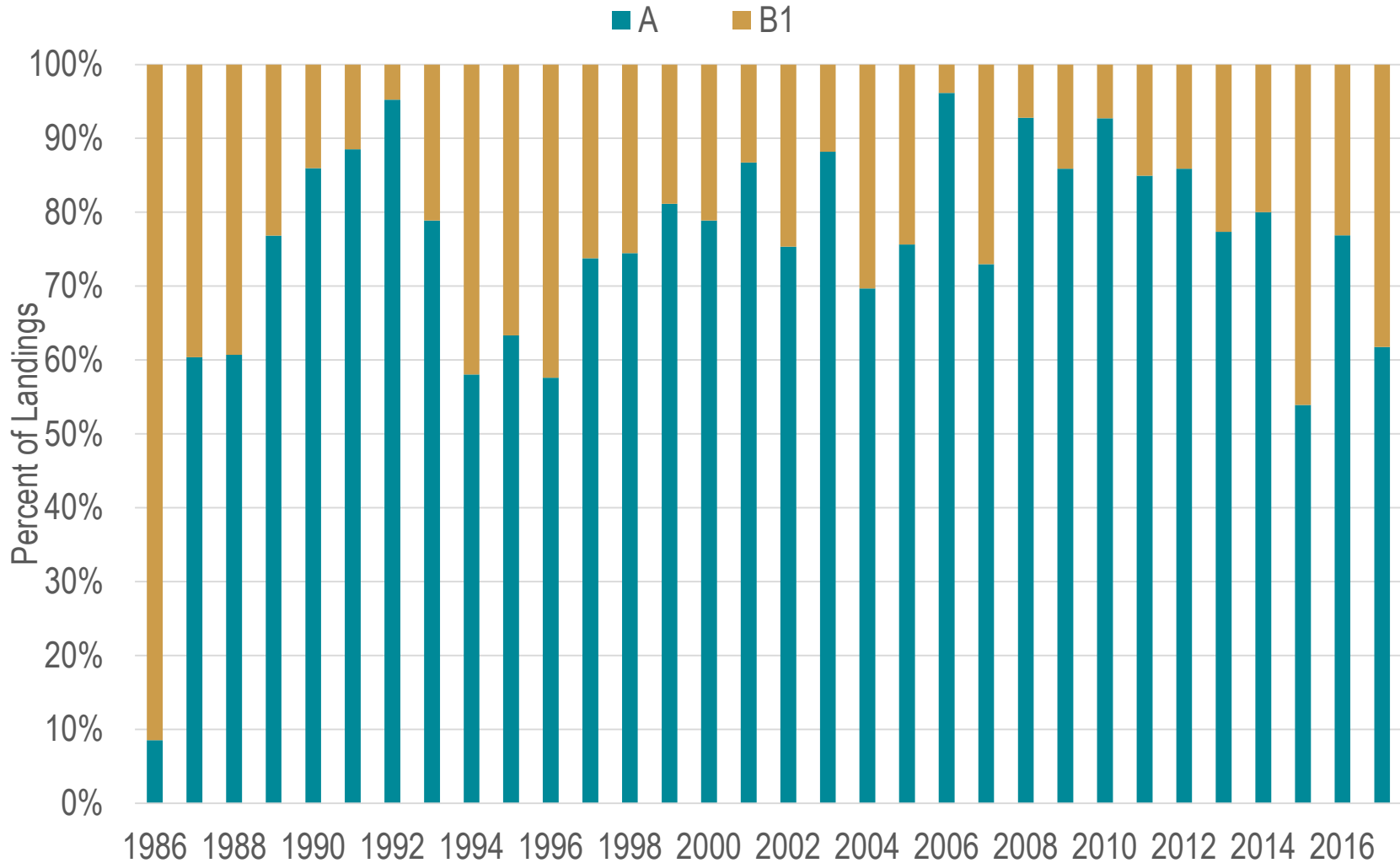
# Gulf red grouper - headboat discards

- Single recreational fleet used for Gulf red grouper; headboat discards were added to charter/private discards
  - 1986-2003: estimated using MRIP CH:SRHS discard ratio from 2004-2006 as a proxy for the SRHS discards
  - 2007-2017: used SRHS discard estimates
- No CV provided for headboat discards

# Gulf red grouper - charter A vs B1 (numbers)



# Gulf red grouper - private A vs B1 (numbers)





# Commercial Discards – Red Grouper VL

Year	n_fish	Disposition %			Further Breakdown of Released Fish: Condition % Upon Arrival to Vessel			
		Kept	Used as		Alive, Good	Alive, Barotrauma	Dead	Not Recorded
			Bait	Released				
2007	5312	57.00	0.04	42.96	14.89	24.83		3.24
2008	2606	55.10		44.90	13.66	31.16	0.04	0.04
2009	3548	55.81		44.19	9.75	34.13	0.08	0.23
2010	4982	40.55	0.02	59.43	18.27	40.63	0.04	0.50
2011	13475	60.19	0.01	39.79	12.22	27.18		0.39
2012	30552	69.53	0.01	30.45	9.49	20.70	0.05	0.23
2013	8983	73.46	0.28	26.26	11.07	14.97	0.06	0.17
2014	5806	79.93		20.07	7.25	12.66	0.12	0.03
2015	12412	70.87		29.13	14.54	14.42	0.11	0.05
2016	6978	64.59		35.41	18.29	17.00	0.09	0.04
2017	2577	63.33		36.67	16.61	20.02	0.04	
2018	1048	43.61		56.39	20.13	35.78	0.10	0.38
2019	1107	55.28		44.72	17.80	26.92		

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# Commercial Discards – Red Grouper LL

Year	n_fish	Disposition %			Further Breakdown of Released Fish: Condition % Upon Arrival to Vessel			
		Kept	Used as		Alive, Good	Alive, Barotrauma	Dead	Not Recorded
			Bait	Released				
2007	6075	40.81	0.02	59.18	12.46	33.70	2.83	10.19
2008	1862	46.13		53.87	3.17	46.35	2.95	1.40
2009	13085	46.54		53.46	10.10	42.15	1.16	0.05
2010	36395	45.62		54.38	14.37	38.41	1.13	0.47
2011	94111	52.96		47.04	9.90	35.99	0.50	0.65
2012	28305	53.29		46.71	11.20	30.32	0.60	4.59
2013	74071	66.45	<0.01	33.54	9.92	22.47	0.75	0.41
2014	34364	64.58		35.42	9.69	25.17	0.55	0.01
2015	18459	65.77	0.01	34.22	14.70	12.27	0.90	6.34
2016	45534	66.08		33.92	15.38	17.52	0.95	0.07
2017	6835	47.30		52.70	27.48	23.19	1.92	0.12
2018	4206	45.58		54.42	23.30	29.05	2.07	
2019	4214	38.23		61.77	36.88	23.64	1.26	

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# King Mackerel (SEDAR 38U)



# SEDAR 38U Gulf King Mackerel

- Similar to Red Grouper, except
  - Four Directed Fleets: COM\_VL, COM\_GN, REC PR+CH, REC HB.
  - Landings assumed to be near certain ( $CV \cong 0.0$ ).
  - For HB discards, used MRIP CH discard ratio as a proxy 1981-2003. Used SRHS discards for 2004-2017
  - Discards used  $CV = 0.2$  (COM) and  $CV = 0.4$  (REC)
  - Discard mortality assumptions:
    - 25% discard mortality from commercial vertical line fisheries,
    - 22% discard mortality for the recreational headboat fishery
    - 20% discard mortality for recreational private and charter.

# Commercial Discards: King Mackerel VL

Year	n_fish	Disposition %			Further Breakdown of Released Fish: Condition % Upon Arrival to Vessel			
		Kept	Used as		Alive, Good	Alive, Barotrauma	Dead	Not Recorded
			Bait	Released				
2007	495	98.79	0.20	1.01	0.81		0.20	
2008	13	100.00						
2009	283	96.11	0.35	3.53	2.47		1.06	
2010	477	97.27	0.21	2.52	2.52			
2011	455	87.03		12.97	12.75		0.22	
2012	745	95.44	0.81	3.76	2.28		0.27	1.21
2013	733	97.82	0.55	1.64	0.82		0.82	
2014	319	96.55		3.45	1.88			1.57
2015	404	95.79	0.50	3.71	3.71			
2016	650	97.23		2.77	2.15		0.62	
2017	93	98.92		1.08	1.08			
2018	1			100.00	100.00			
2019	4	100.00						

# Conclusions

- OFL, ABC and ACL do not include recreational dead discards – defined as live release ( $B2 \times \text{discard mortality}$ )
- OFL, ABC and ACL do include recreational A's (retained) and B1's (retained but not observed, used for bait, partially eaten by predators, etc.)
- OFL, ABC and ACL do not include a small amount of commercial discards that are dead on arrival or used for bait.
- Recreational B1s are added to the recreational landings, included in the catch recommendations, and used to monitor ACL while commercial discards that are used as bait or dead on arrival to the vessel are not.
- The implications for management are quite small for the three species examined because very few fish were dead on arrival to the vessels or used for bait according to the commercial observers.
- Revisions could be made to further reduce these inconsistencies.