# **Economic Impacts of Reducing BSAI Halibut PSC Limits**

Presentation to

The Advisory Panel of the

**North Pacific Fishery Management Council** 

**Marcus L. Hartley** 

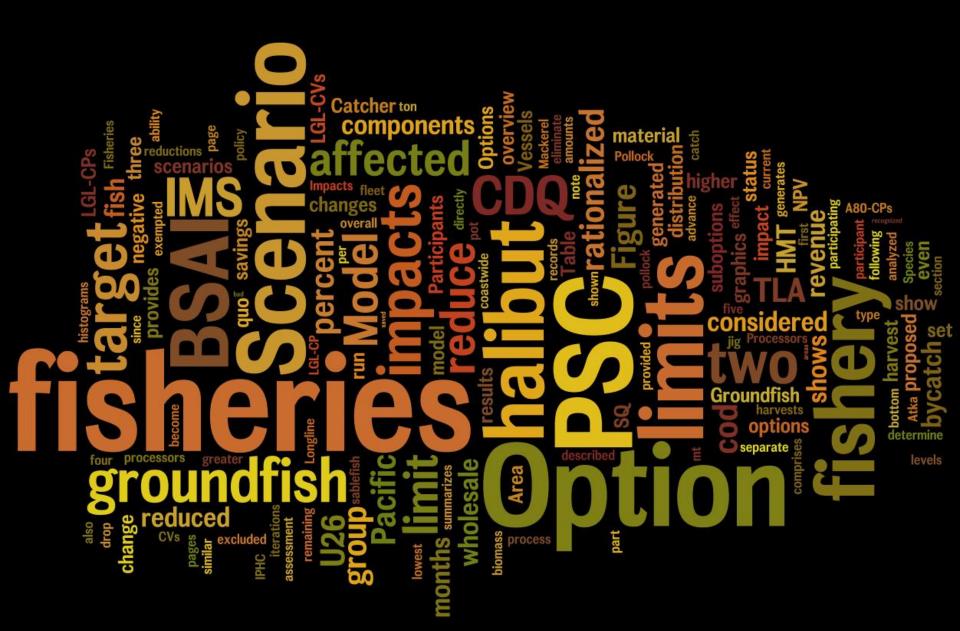
**February 4, 2015** 



## Goals and Objectives of the Presentation

This is a complex and sometimes confusing subject full of specialized acronyms





# Goal: Bring Clarity & Focus to a Difficult Topic





### **Presentation Outline**

- Summarize the Functioning of the Iterated Multi-year Simulation Model—the IMS Model
- Summarize the existing conditions in the groundfish and halibut fisheries
- Summarize the projected impact of the Options to Reduce PSC Limits



## The Iterated Multi-Year Simulation Model

- Projects impacts of the reduction options out 10-years into the future, 2014–2023
- Assumes strict adherence to PSC Limits and Apportionments.
- Assumes that groundfish fisheries from 2008–2013 repeat themselves in the future.
  - Basis Years are drawn randomly to provide groundfish harvests, revenues, and PSC.
- Halibut Total CEYs are held constant at 2014 levels
  - Removals due to subsistence, recreation, and unreported mortality in commercial halibut fishery are held constant
- Fishery CEYs vary in future years with changes in halibut PSC in groundfish fisheries.
- All changes are relative to the Status Quo (SQ) over the 10-years



#### IMS Model Results—For Groundfish Fisheries

- Changes are reported for each affected sector
- Changes in the average annual PSC taken in the 10year future period
- Changes in the net present value (NPV) of wholesale revenue summed over the 10-year future period
- Changes in percentage of revenue generated in primary target fisheries
- Histograms showing the range of variation estimated in the 10,000 iterations of the IMS Model for PSC taken, and for NPV wholesale revenues are provided



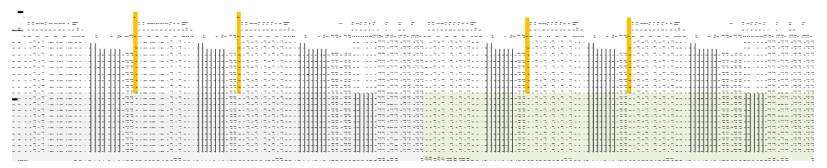
#### **IMS Model Results—For Commercial Halibut**

- Changes in average annual catch over the 10-year future period
- Changes in the NPV of wholesale revenue summed over the 10-year future period
- All changes are reported for each IPHC Subarea and for Area 4 as a whole
- Histograms showing the range of variation estimated in the IMS Model for halibut harvests and NPV of wholesale revenue are provided



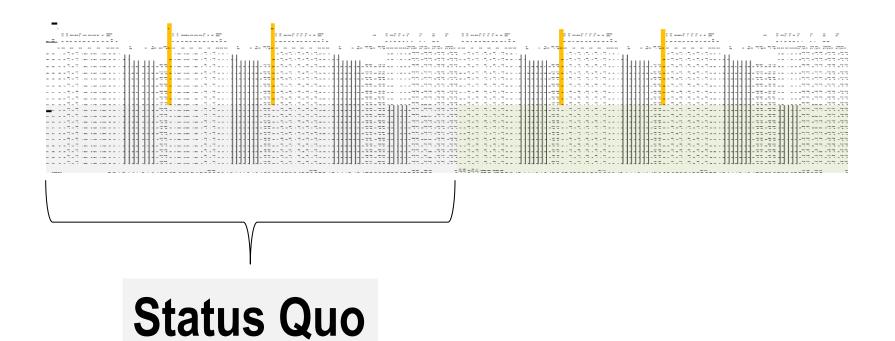
## Overview of Workings of the IMS Model

### A representation of the IMS Model



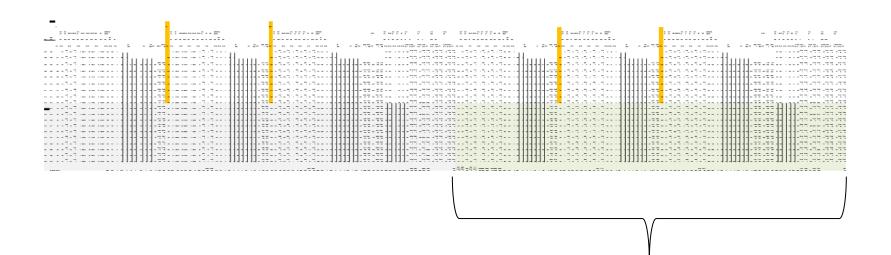


# This section of the IMS Model is for the Status Quo (SQ)





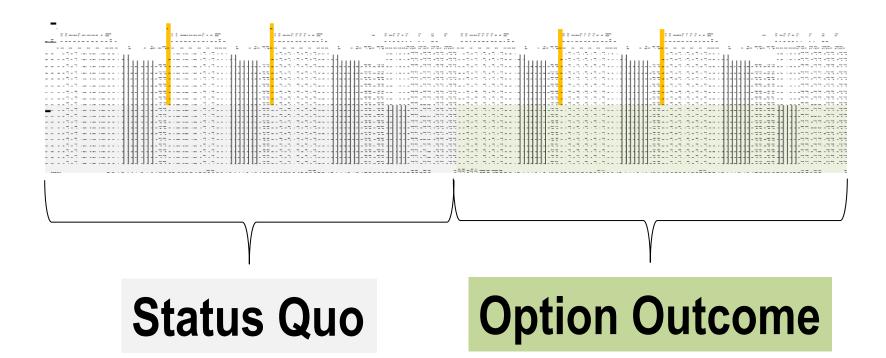
## This section is for the Outcomes under the Option



**Option Outcome** 



## This represents one iteration of the IMS Model





# **Example SQ Calculations for Groundfish**

		<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ	<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ
Year	<b>Basis Year</b>			PSC				Whole	sale Reve	nue	
			Round	d Weight	MT				Millions		
2008	2008	735	1,969	) !	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	3,074	1 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	1 2,254	1 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	7 1,810	) ′	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	3 1,945	5 2	2 55	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



# **Separate Calculations for Each Sector**

		RSALTI A	Δ80-CP	I GI -CV	I GL-CP	CDO	BSAI TLA	Δ80-CP	I GL-CV	I GL -CP	CDQ
Year	Basis Year		A00-01	PSC PSC	LOL-OI	OD.	DOALILA		sale Reve		ODQ
1001	Duoio roui		Round	l Weight I	MT				Millions	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
2008	2008	735				1 214	\$1,475.22		\$2.63	\$191.45	\$241.67
2009			•				\$1,134.72	•	\$0.98		•
2010			•					•	\$0.57		•
2011			•				. ,	•	•	\$176.72	•
2012			•					•	\$1.29	•	•
2013			•					•	\$1.31		•
			,						·	·	·



## PSC (Mortality) are reported in Round Weight MT

		BSAI TLA	480-CP L	GL-CV LGL	-CP	CDQ	<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ
Year I	Basis Year		P	SC				Wholes	sale Reve	nue	
			Round \	Veight MT				N	/lillions		
2008	2008	735	1,969	5	564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	3	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	2	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	458	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



## Wholesale Revenues are reported in \$Millions

		<b>BSAI TLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ	<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ
Year	<b>Basis Year</b>			PSC				Whole	sale Reve	nue	
			Round	d Weight	MT			I	Millions		
2008	2008	735	1,969	) !	5 564	1 214	\$1,475.22	\$320.05	\$2.63	\$191.45	\$241.67
2009	2009	726	5 2,074	1 :	3 556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	1 2	2 489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	7 1,810	) '	1 477	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3 (	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



## Future Years run from 2014–2023, and ...

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	asis Year			PSC				Whole	sale Reve	nue	
			Round	d Weight	MT				Millions		
2008	2008	735	5 1,969	) !	5 564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	3 2,074	. 3	3 556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	1 2,254	. 2	2 489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	7 1,810	) ′	1 477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	5 1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014											
2015											
2016											
2017											
2018											
2019											
2020											
2021											
2022											
2023											



## ... are represented by randomly drawn basis years

	$\wedge$	BSAITLA A	\80-CP L	GL-CV LGL	-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year Bas	is Year		P	SC				Whole	sale Reve	nue	
			Round V	Veight MT				ı	Millions		
2008	2008	735	1,969	5	564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	3	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	2	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	458	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010										
2015	2009										
2016	2009										
2017	2013										
2018	2008										
2019	2010										
2020	2008										
2021	2011										
2022	2012										
2023	2013										



## Here are SQ estimates of PSC and Revenue

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Whole	sale Reve	nue	
			Round	Weight	MT			ľ	Millions		
2008	2008	735	1,969	) 5	5 564	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	3,074	. 3	3 556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	. 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	7 1,810	) 1	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	2,254	. 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2015	2009	726	3,074	. 3	3 556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2016	2009	726	3,074	. 3	3 556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2017	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2018	2008	735	1,969	) 5	5 564	1 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2019	2010	484	2,254	. 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2020	2008	735	1,969	) 5	5 564	1 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2021	2011	637	7 1,810	) 1	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2022	2012	936	3 1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2023	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



# For model year 2015...

		BSAI TLA	A80-CP		LGL-CP	CDQ	BSAI TLA		LGL-CV		CDQ
Year	Basis Year			PSC				Whole	sale Reve	nue	
			Round	d Weight I	MT				Millions		
2008	2008	735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	3,074	1 3	3 550	3 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	1 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	' 1,810	) 1	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3	3 45	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	2,254	1 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2015	2009	726	3,074	1 3	3 550	3 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2016	2009	726	3,074	1 3	3 550	3 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2017	2013	683	3 2,168	3	3 45	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2018	2008	735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2019	2010	484	2,254	1 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2020	2008	735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2021	2011	637	7 1,810	) 1	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2022	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2023	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



## ...2009 was selected as the basis year

			BSAI	TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Y	'ear				PSC				Whole	sale Reve	nue	
					Round	l Weight l	MT				Millions		
2008	2	2008		735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2	2009		726	2,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2	2010		484	2,254	. 2	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2	2011		637	1,810	1	l 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2	2012		936	1,945	5 2	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2	2013		683	2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2	010		484	2,254	. 2	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2015	) (2	2009		726	2,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2016	2	2009		726	2,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2017	2	2013		683	2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2018	2	2008		735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2019	2	2010		484	2,254	. 2	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2020	2	2008		735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2021	2	2011		637	1,810	1	l 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2022	2	2012		936	1,945	5 2	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2023	2	2013		683	2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



# 2009 of course is already in the model...

Voor	Pagia Va		AI TLA	A80-CP		LGL-CP	CDQ	BSAI TLA		LGL-CV		CDQ
rear	Basis Ye	ear			PSC					sale Reve	nue	
				Round	d Weight	MT				Millions		
2008	20	008	735	5 1,969	) !	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	20	009	726	5 2,074	;	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	20	010	484	4 2,254		2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	20	011	637	7 1,810	)	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	20	)12	936	5 1,945	5 2	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	20	)13	683	3 2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	20	110	484	4 2,254	1 :	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2015	20	009	726	5 2,074	ļ ;	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2016	20	009	726	3 2,074	ļ ;	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2017	20	)13	683	3 2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2018	20	800	735	5 1,969	) !	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2019	20	)10	484	4 2,254	1 :	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2020	20	800	735	5 1,969	) !	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2021	20	011	637	7 1,810	)	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2022	20	)12	936	3 1,945	5 :	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2023	20	)13	683	3 2,168	3 ;	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



## ...with its PSCs & Revenues Generated

			BSAI	TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis	Year				PSC				Whole	sale Reve	nue	
					Round	l Weight I	MT				Millions		
2008		2008		735	1,969	) [	5 56	4 214	\$1,475,22	\$320.65	\$2.63	\$191.45	\$241.67
2009		2009	)<	726	5 2,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010		2010		484	2,254	. 2	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011		2011		637	' 1,810	) ′	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012		2012		936	1,945	5 2	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013		2013		683	3 2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014		2010		484	2,254	. 2	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2015	)(	2009		726	3,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2016		2009		726	3 2,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2017		2013		683	3 2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2018		2008		735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2019		2010		484	2,254	. 2	2 48	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2020		2008		735	1,969	) 5	5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2021		2011		637	7 1,810	) 1	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2022		2012		936	1,945	5 2	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2023		2013		683	3 2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



# ... and they are duplicated for 2015

		BSAI TLA	A80-CP		LGL-CP	CDQ	BSAI TLA		LGL-CV		CDQ
Year	Basis Year			PSC				Whole	sale Reve	nue	
			Round	l Weight I	МТ				Millions		
2008	2008	735	1,969	5	5 564	214	\$1,475,22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	. 3	556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	. 2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	) 1	477	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	2,254	. 2	489	159	\$1,083,98	\$323.90	\$0.57	\$125.20	\$167.32
2015	2009	726	2,074	. 3	556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2016	2009	726	2,074	. 3	3 556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2017	2013	683	2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2018	2008	735	1,969	5	5 564	1 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2019	2010	484	2,254	. 2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2020	2008	735	1,969	5	5 564	1 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2021	2011	637	1,810	) 1	477	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2022	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2023	2013	683	2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68



## **Future Year Revenues are Discounted**

- The IMS Model assumes that all revenues in future years are discounted with at a rate of 5% per year.
- Discounting starts in 2015 and thus 2015 unadjusted revenues are multiplied by 0.95 to arrive at the discounted amount.
- Each additional year out into the future is discounted by another 95%

2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
100.00%	95.00%	90.25%	85.74%	81.45%	77.38%	73.51%	69.83%	66.34%	63.02%	

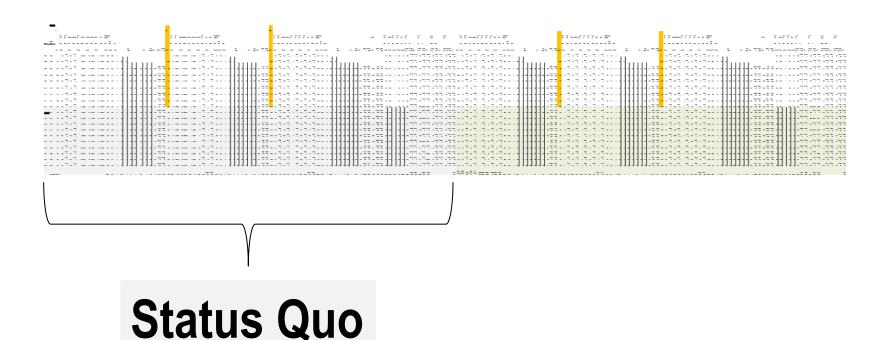


#### Discounted future values of wholesale revenue

			Α.	A80-CP	LGL-CV	LG	L-CP	CDQ	BSAI T	LA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year	•			PSC						Whol	esale Rev	enue	
				Round	d Weight	MT					Mill	lions (\$20	13)	
2008	2008	3	735	1,969	) !	5	564	214	\$1.47	5 22	\$320.60	5 \$2.60	\$191.45	\$ <u>241.67</u>
2009	2009		726	2,074	. 3	3	556	154	\$1,13	4.72	\$284.78	80.98	3 \$130.93	\$166.45
2010	2010	) 4	184	2,254	. 2	2	489	159	\$1,08	3.98	\$323.90	J \$0.57	\$125.20	\$167.32
2011	201	1 6	337	1,810	) ′		477	223	\$1,36	3.58	\$357.3	1 \$0.86	\$176.72	\$219.87
2012	2012	2 9	936	1,945	5 2	2	550	252	\$1,39	9.22	\$375.56	6 <b>\$</b> 1.29	9 \$185.55	\$222.84
2013	2013	3 6	83	2,168	3	3	458	265	\$1,17	9.86	\$289.04	4 \$1.3	1 \$132.50	\$182.68
2014	2010	) 4	184	2,254	. 2	<u> </u>	489	159	\$1,08	3 98	\$323.00	\$0.57	<b>*</b> \$125.20	\$167.32
2015	2009	7	726	2,074	. 3	3	556	151	\$1,07	7.98	\$270.54	4 \$0.93	3 \$124.39	\$158.12
2016	2009	7	726	2,074	. 3	3	556	151	\$1,02	4.08	\$257.0	1 \$0.88	3 \$118.17	\$150.22
2017	2013	3 6	83	2,168	3	3	458	265	\$1,01	1.58	\$247.62	2 \$1.12	\$113.60	\$156.63
2018	2008	3 7	735	1,969	) !	5	564	214	\$1,20	1.58	\$261.17	7 \$2.14	\$155.94	\$196.84
2019	2010	) 4	184	2,254	. 2	<u> </u>	489	159	\$83	8.76	\$250.63	3 \$0.44	\$96.88	\$129.47
2020	2008	3 7	735	1,969	) !	5	564	214	\$1,08	4.42	\$235.70	3 \$1.93	3 \$140.73	\$177.65
2021	201	1 6	337	1,810	)		477	223	\$95	2.24	\$249.52	2 \$0.60	\$123.41	\$153.54
2022	2012	2 (	936	1,945	5 2	2	550	252	\$92	8.27	\$249.16	6 \$0.85	5 \$123.10	\$147.84
2023	2013	3 6	83	2,168	3	3	458	265	\$74	3.60	\$182.17	7 \$0.82	2 \$83.50	\$115.14

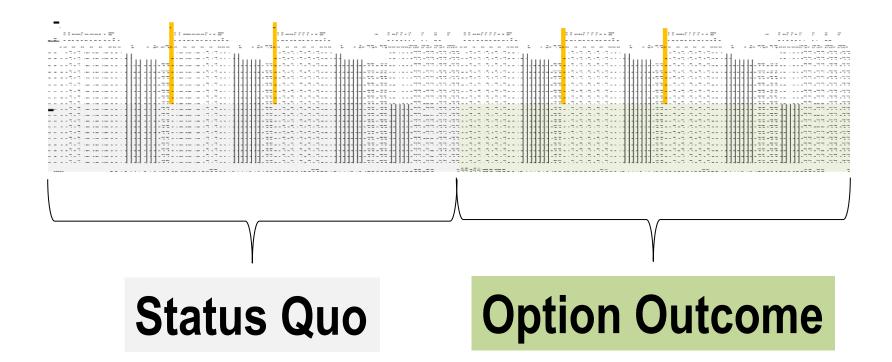


## That was a summary of the SQ for Groundfish





## Now lets look at an Option Outcome for Groundfish





# How do we analyze PSC reductions for Groundfish?

- PSC is reduced in each basis year in each sector based on "scenario specific" protocols.
  - Scenario A generates "smaller" but reasonable impacts
  - Scenario B generates "larger" but reasonable impacts
- In a race-for-fish situation, we use a "standard" protocol, similar to previous bycatch analyses
  - When would the fishery have closed under the reduced PSC limit--i.e. "last-caught first-cut"
- For rationalized sectors, we assume behavioral changes to reduce bycatch and generate small impacts relative to a "last-caught first-cut" scenario



### Scenarios A and B for the BSAI TLA

- The "last-caught first-cut" PSC reduction protocol are applied to BSAI Trawl Limited Access (TLA) for both Scenarios
- BSAI TLA has four target fishery specific PSC Limits
  - 1) Pollock | Atka Mackerel Other species, 2) Pacific cod, 3) Yellowfin sole, and 4) Rockfish
- Different target specific PSC apportionment setting options create different Scenarios (A and B).
- The primary difference is the treatment of the pollock fishery
  - Pollock is unconstrained by PSC Limits—if the PSC limit is exceeded, mid-water pollock remains open, but Atka Mackerel and "Other Species" are closed



### Scenarios A and B for the BSAI TLA

Target fishery PSC Apportionment	2014 Limits	Scenario A	Scenario B
Yellowfin Sole	227.0	204.3	195.2
Rockfish	5.0	4.5	4.3
Pollock Atka Mackerel Other	250.0	225.0	250.0
Pacific Cod	393.0	353.7	338.0

- Scenario A assumes that all four target fishery PSC apportionments are reduced by the "reduction" percentage.
- Scenario B assumes that the PSC apportionment for pollock is not reduced, and that the remaining three are reduced by greater percentages to accomplish the PSC limit reduction.



#### Scenarios for "Rationalized" Sectors

- By virtue of sector-wide cooperative structures, the Amendment 80 CP sector (A80-CP) and the longline CP sector (LGL-CP) are deemed to be "rationalized"
- Scenario A assumes that cooperatives determine the least efficient target-area-month combinations and mandate there will be no fishing in those target-area-months
  - "Efficiency" is measured as wholesale revenue ÷ halibut PSC mortality in the target-area-month. (Note that areas are defined using NMFS Management Zones, e.g. 514, 521, etc.)
- Scenario B assumes each company has it own PSC Limit
  - Trading occurs to match limits to needs. But trading is "sticky" and no company trades below a 5% buffer.
  - After all trades, each company reduces activity of its least efficient vessel on a "last-caught first-cut basis".



# Example Option Outcome—35% PSC Reduction under Scenario A

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ		
Year	<b>Basis Year</b>			PSC				Whole	esale Rev	enue			
			Round	l Weight I	МТ		Millions (\$2013)						
2008	2008	735	1,969	) 5	5 564	1 214	\$1,475.22	\$320.65	5 \$2.63	\$191.45	\$241.67		
2009	2009	726	3 2,074	. 3	556	5 151	\$1,134.72	\$284.78	3 \$0.98	\$130.93	\$166.45		
2010	2010	484	2,254	. 2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32		
2011	2011	637	7 1,810	) 1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87		
2012	2012	936	1,945	5 2	2 550	252	\$1,399.22	\$375.56	§ \$1.29	\$185.55	\$222.84		
2013	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68		
2014	2010	484	1511	2	500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32		
2015	2009	726	1508	3	3 499	151	\$1,077.98	\$235.68	3 \$0.93	\$117.41	\$158.12		
2016	2009	726	5 1508	3	3 499	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22		
2017	2013	600	1510	) 3	3 459	255	\$991.76	\$219.42	2 \$1.12	\$113.60	\$155.23		
2018	2008	682	2 1508	5 5	483	3 214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84		
2019	2010	484	1511	2	500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47		
2020	2008	682	2 1508	5 5	483	3 214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65		
2021	2011	634	1482	! 1	481	223	\$950.67	\$236.47	7 \$0.60	\$123.41	\$153.54		
2022	2012	743	3 1510	) 2	499	252	\$906.12	\$231.22	2 \$0.85	\$118.44	\$147.84		
2023	2013	600	1510	) 3	3 459	255	\$729.03	\$161.29	9 \$0.82	\$83.50	\$114.11		



# Example Option Outcome—35% PSC Reduction under Scenario A

		BSAI	TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	<b>Basis Year</b>				PSC				Whole	esale Rev	enue	
				Round	l Weight I	MT			Mill	ions (\$20 <sup>-</sup>	13)	
2008	2008		735	1,969	5	56	4 214	\$1,475.22	\$320.65	5 \$2.63	\$191.45	\$241.67
2009	2009	)	726	2,074	. 3	3 55	3 151	\$1,134.72	\$284.78	3 \$0.98	\$130.93	\$166.45
2010	2010		484	2,254	. 2	2 489	9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011		637	1,810	1	47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012		936	1,945	5 2	2 55	252	\$1,399.22	\$375.56	§ \$1.29	\$185.55	\$222.84
2013	2013		683	2,168	3	3 45	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010		484	1511	2	2 50	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009		726	1508	3	3 49	9 151	\$1,077.98	\$235.68	3 \$0.93	\$117.41	\$158.12
2016	2009		726	1508	3	3 49	9 151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013		600	1510	) 3	3 45	9 255	\$991.76	\$219.42	2 \$1.12	\$113.60	\$155.23
2018	2008		682	1508	5	48	3 214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010		484	1511	2	2 50	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008		682	1508	5	48	3 214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011		634	1482	! 1	48	1 223	\$950.67	\$236.47	7 \$0.60	\$123.41	\$153.54
2022	2012		743	1510	2	2 49	9 252	\$906.12	\$231.22	2 \$0.85	\$118.44	\$147.84
2023	2013		600	1510	) 3	3 45	9 255	\$729.03	\$161.29	9 \$0.82	\$83.50	\$114.11



## **PSC from Basis Years ...**

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Whole	esale Rev	enue	
			Round	d Weight I	MT			Mill	ions (\$20 <i>°</i>	13)	
2008	2008	73	<del>1,96</del> 5	•	56	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	720	3 2,074	1 3	3 556	5 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,25	1 2		159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	63 <sup>-</sup>	7 1,810	) 1	47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	930	3 1,945	5 2	2 550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3	3 458	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	4 1511	1 2	2 500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009	720	3 1508	3	3 499	151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009	720	3 1508	3	3 499	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013	600	1510	) 3	3 459	255	\$991.76	\$219.42	\$1.12	\$113.60	\$155.23
2018	2008	68	2 1508	3 5	5 483	3 214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010	484	4 1511	1 2	2 500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008	68	2 1508	3 5	5 483	3 214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011	634	4 1482	2 1	l 48 <sup>-</sup>	223	\$950.67	\$236.47	\$0.60	\$123.41	\$153.54
2022	2012	74:	3 1510	) 2	2 499	252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013	600	) 1510	) 3	3 459	255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11



## ... are repeated in future years

		BSAI T	LA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	
Year	Basis Year				PSC			Wholesale Revenue					
				Round	l Weight I	MT			Mill	ions (\$20 <sup>-</sup>	13)		
2008	2008		735	1,969		5 56	4 214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67	
2009	2009	K	726	2,074	. 3	3 55	6 151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45	
2010	2010		484	2,254	2		9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32	
2011	2011		637	1,810	) 1	l 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87	
2012	2012		936	1,945	5 2	2 55	0 252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84	
2013	2013		683	2,168	3	3 45	8 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68	
2014	2010		484	1511	2	2 50	0 159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32	
2015	2009		726	1508	3	3 49	9 151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12	
2016	2009		726	1508	3	3 49	9 151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22	
2017	2013		600	1510	) 3	3 45	9 255	\$991.76	\$219.42	\$1.12	\$113.60	\$155.23	
2018	2008		682	1508	5	5 48	3 214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84	
2019	2010		484	1511	2	2 50	0 159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47	
2020	2008		682	1508	5	5 48	3 214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65	
2021	2011		634	1482	! 1	l 48	1 223	\$950.67	\$236.47	<b>\$0.60</b>	\$123.41	\$153.54	
2022	2012		743	1510	) 2	2 49	9 252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84	
2023	2013		600	1510	) 3	3 45	9 255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11	



### ...but reduced based on PSC Reduction Scenarios set for each Sector

		BSAI T	LA	A80-CP	LGL-CV	LGL-C	PC	DQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	<b>Basis Year</b>				PSC					Whole	esale Rev	enue	
				Round	l Weight l	MT				Mill	ions (\$20 <sup>-</sup>	13)	
2008	2008		735	1,969		)	64	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009		726	2,074	. 3	3 5	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010		484	2,254			ŧŏУ	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011		637	1,810	1	4	177	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012		936	1,945	2	2 5	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013		683	2,168	3	} 4	158	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010		484	1511	-		500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009		726	1508	3	} 4	199	151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009		726	1508	3	} 4	199	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013		600	15 i û	,	2	159	255	\$991.76	\$219.42	2 \$1.12	\$113.60	\$155.23
2018	2008		682	1508	5	5 4	183	214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010		484	1511	2	2 5	500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008		682	1508	5	5 4	183	214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011		634	1482	! 1	4	181	223	\$950.67	\$236.47	<b>30.60</b>	\$123.41	\$153.54
2022	2012		743	1510	2	2	199	252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013		600	1510	) 3	3 4	159	255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11



### Some sectors are never affected by a particular PSC Limit reduction

				$\longrightarrow$							
		<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year		F	SC				Whole	esale Rev	enue	
			Round \	Weight M	T			Mill	ions (\$20	13)	
2008	2008	735	1,969	5	564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	3	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	2	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	458	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	1511	2	500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009	726	1508	3	499	151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009	726	1508	3	499	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013	600	1510	3	459	255	\$991.76	\$219.42	2 \$1.12	\$113.60	\$155.23
2018	2008	682	1508	5	483	214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010	484	1511	2	500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008	682	1508	5	483	214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011	634	1482	1	481	223	\$950.67	\$236.47	' \$0.60	\$123.41	\$153.54
2022	2012	743	1510	2	499	252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013	600	1510	3	459	255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11



## Other sectors aren't affected when particular basis years are drawn

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Whole	esale Rev	enue	
			Round	Weight M	IT			Mill	ions (\$20 <sup>-</sup>	13)	
2008	2008	735	1,969	5	564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	3	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2016	484	2,254	2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	2	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	458	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	1511	2	500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009	726	1508	3	499	151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009	726	1508	3	499	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013	600	1510	3	459	255	\$991.76	\$219.42	\$1.12	\$113.60	\$155.23
2018	2008	682	1508	5	483	214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010	484	1511	2	500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008	682	1508	5	483	214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011	634	1482	1	481	223	\$950.67	\$236.47	<b>30.60</b>	\$123.41	\$153.54
2022	2012	743	1510	2	499	252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013	600	1510	3	459	255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11



#### ... CDQs are only affected when 2013 is drawn

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Whole	esale Rev	enue	
			Round	Weight M	IT			Mill	ions (\$20 <i>°</i>	13)	
2008	2008	735	1,969	5	564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	3	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	2	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	458	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	1511	2	500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009	726	1508	3	499	151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009	726	1508	3	499	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013	600	1510	3	459	255	\$991.76	\$219.42	\$1.12	\$113.60	\$155.23
2018	2008	682	1508	5	483	214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010	484	1511	2	500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008	682	1508	5	483	214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011	634	1482	1	481	223	\$950.67	\$236.47	<b>30.60</b>	\$123.41	\$153.54
2022	2012	743	1510	2	499	252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013	600	1510	3	459	255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11



#### ... and then only under the 35% reduction option

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Whole	esale Rev	enue	
			Round	Weight M	IT			Mill	ions (\$20 <sup>-</sup>	13)	
2008	2008	735	1,969	5	564	214	\$1,475.22	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	2,074	3	556	151	\$1,134.72	\$284.78	\$0.98	\$130.93	\$166.45
2010	2010	484	2,254	2	489	159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	1,810	1	477	223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	2	550	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	2,168	3	458	265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	1511	2	500	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009	726	1508	3	499	151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009	726	1508	3	499	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013	600	1510	3	459	255	\$991.76	\$219.42	\$1.12	\$113.60	\$155.23
2018	2008	682	1508	5	483	214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010	484	1511	2	500	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008	682	1508	5	483	214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011	634	1482	1	481	223	\$950.67	\$236.47	\$0.60	\$123.41	\$153.54
2022	2012	743	1510	2	499	252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013	600	1510	3	459	255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11

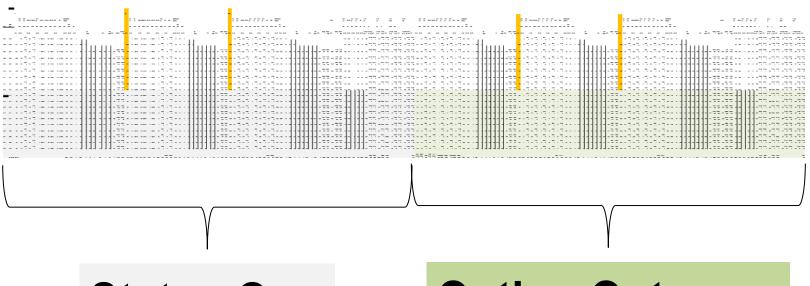


## Revenues are reduced because of bycatch limits, and also vary because of discounting

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Whole	esale Rev	enue	
			Round	l Weight I	MT			Mill	ions (\$20	13)	
2008	2008	735	1,969	;	5 56	1 214	\$1,475 <u>.22</u>	\$320.65	\$2.63	\$191.45	\$241.67
2009	2009	726	5 2,074	. 3	3 55	3 151	\$1,134.72	\$284.78	3 \$0.98	\$130.93	\$166.45
2010	2010	484	2,254			9 159	\$1,083.98	\$323.90	\$0.57	\$125.20	\$167.32
2011	2011	637	' 1,810	) 1	1 47	7 223	\$1,363.58	\$357.31	\$0.86	\$176.72	\$219.87
2012	2012	936	1,945	5 2	2 55	252	\$1,399.22	\$375.56	\$1.29	\$185.55	\$222.84
2013	2013	683	3 2,168	3	3 45	3 265	\$1,179.86	\$289.04	\$1.31	\$132.50	\$182.68
2014	2010	484	1511	2	2 50	159	\$1,082.27	\$280.71	\$0.57	\$125.20	\$167.32
2015	2009	726	1508	3	3 49	9 151	\$1,077.98	\$235.68	\$0.93	\$117.41	\$158.12
2016	2009	726	1508	3	3 49	151	\$1,024.08	\$223.90	\$0.88	\$111.54	\$150.22
2017	2013	600	1510	) 3	3 45	9 255	\$991.76	\$219.42	\$1.12	\$113.60	\$155.23
2018	2008	682	1508	3 5	5 48	3 214	\$1,199.38	\$242.32	2 \$2.14	\$149.56	\$196.84
2019	2010	484	1511	2	2 50	159	\$837.44	\$217.20	\$0.44	\$96.88	\$129.47
2020	2008	682	1508	3 5	5 48	3 214	\$1,082.44	\$218.69	\$1.93	\$134.98	\$177.65
2021	2011	634	1482	2 1	1 48	1 223	\$950.67	\$236.47	<b>30.60</b>	\$123.41	\$153.54
2022	2012	743	3 1510	) 2	2 49	9 252	\$906.12	\$231.22	\$0.85	\$118.44	\$147.84
2023	2013	600	1510	) 3	3 45	9 255	\$729.03	\$161.29	\$0.82	\$83.50	\$114.11



#### **Groundfish Impact Calculations**



**Status Quo** 

**Option Outcome** 

**Option Outcome** 

Status Quo =

= Impact



## Calculated Impacts of 35% PSC Reduction under Scenario A

		BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ	BSAI TLA	A80-CP	LGL-CV	LGL-CP	CDQ
Year	Basis Year			PSC				Wholes	ale Reve	nue	
			Round	Weight M	<b>IT</b>			Millio	ns (\$2013	3)	
2008	2008	-	-	-	-	-	-	-	-	-	-
2009	2009	-	-	-	-	-	-	-	-	-	-
2010	2010	-	-	-	-	-	-	-	-	-	-
2011	2011	-	-	-	-	-	-	-	-	-	-
2012	2012	-	-	-	-	-	-	-	-	-	-
2013	2013	-	-	-	-	-	-	-	-	-	-
2014	2010	-0	-743	-	11	-	(\$1.70)	(\$43.20)	-	-	-
2015	2009	-	-566	-	-57	-	_	(\$34.86)	_	(\$6.98)	-
2016	2009	-	-566	-	-57	-	-	(\$33.12)	-	(\$6.63)	-
2017	2013	-83	-658	-	-	-10	(\$19.82)	(\$28.40)	-	-	(\$1.40)
2018	2008	-53	-461	-	-81	-	(\$2.20)	(\$18.85)	-	(\$6.38)	-
2019	2010	-0	-743	-	11	-	(\$1.32)	(\$33.43)	-	-	-
2020	2008	-53	-461	-	-81	-	(\$1.99)	(\$17.02)	-	(\$5.76)	-
2021	2011	-3	-328	-	-	-	(\$1.56)	(\$13.05)	-	-	-
2022	2012	-193	-435	-	-51	-	(\$22.15)	(\$17.93)	-	(\$4.65)	-
2023	2013	-83	-658	_	_	-10	(\$14.57)	(\$20.88)	-	_	(\$1.03)



## Average annual PSC reductions over 10-year period, and NPV of Change in Wholesale Revenues

		<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ	<b>BSAITLA</b>	A80-CP	LGL-CV	LGL-CP	CDQ
Year	<b>Basis Year</b>			PSC				Wholes	sale Reve	nue	
			Round	Weight M	IT			Millio	ons (\$201	3)	
2008	2008	_	-	-	-	-	-			-	-
2009	2009	_	-	-	-	-	-			-	-
2010	2010	_	-	-	-	-	-			-	-
2011	2011	_	-	-	-	-	-			-	-
2012	2012	_	-	-	-	-	-			-	-
2013	2013	-	-	-	-	-	-			-	-
2014	2010	-0	-743	-	11	-	(\$1.70)	(\$43.20	) -	_	-
2015	2009	-	-566	-	-57	-	-	(\$34.86	) -	(\$6.98)	-
2016	2009	-	-566	-	-57	-	-	(\$33.12	) -	(\$6.63)	-
2017	2013	-83	-658	-	-	-10	(\$19.82)	(\$28.40	) -	-	(\$1.40)
2018	2008	-53	-461	-	-81	-	(\$2.20)	(\$18.85	) -	(\$6.38)	-
2019	2010	-0	-743	-	11	-	(\$1.32)	(\$33.43	) -		-
2020	2008	-53	-461	-	-81	-	(\$1.99)	(\$17.02	) -	(\$5.76)	_
2021	2011	-3	-328	-	-	_	(\$1.56)	(\$13.05	) -	-	_
2022	2012	-193	-435	-	-51	-	(\$22.15)	(\$17.93	) -	(\$4.65)	-
2023	2013	-83	-658	-	-	-10	(\$14.57)	(\$20.88	) -	-	(\$1.03)
Char	nge in Avg.										
	& Total NPV	-47	-562	-	-31	-2	\$65.31)	(\$260.73	) -	(\$30.40)	(\$2.43)



# Commercial Halibut Fishery Model Discussion

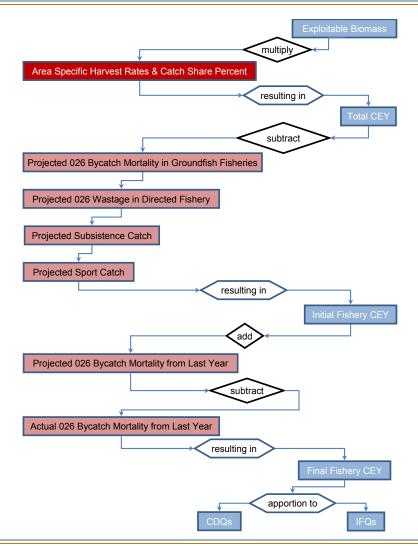


#### **Commercial Halibut Modelling Assumptions**

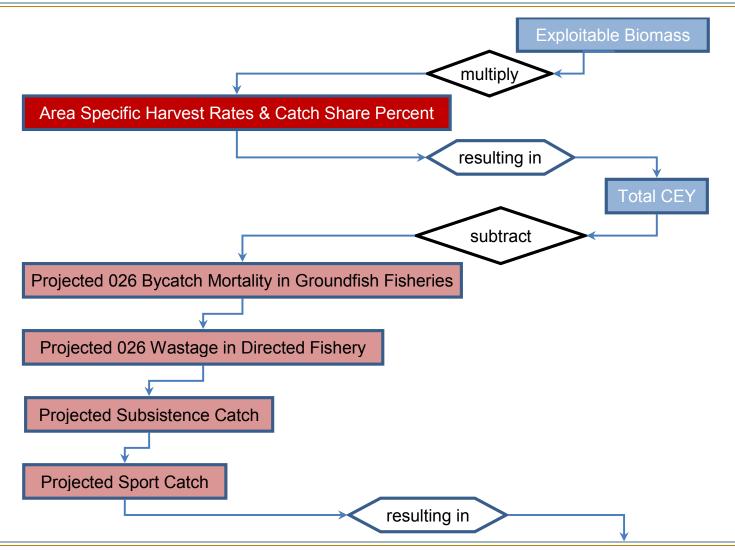
- Total Constant Exploitation Yield (TCEY) from 2014 held constant for 2015–2023
- Recreation, Subsistence, and unreported mortality from commercial fishery held constant
- FCEYs are calculated based on the analysts' interpretation of the algorithm used by IPHC staff
  - Total accounting of "U26" halibut is not applied
- Catch as a percent of FCEY is assumed constant at historical average ≈ 95%



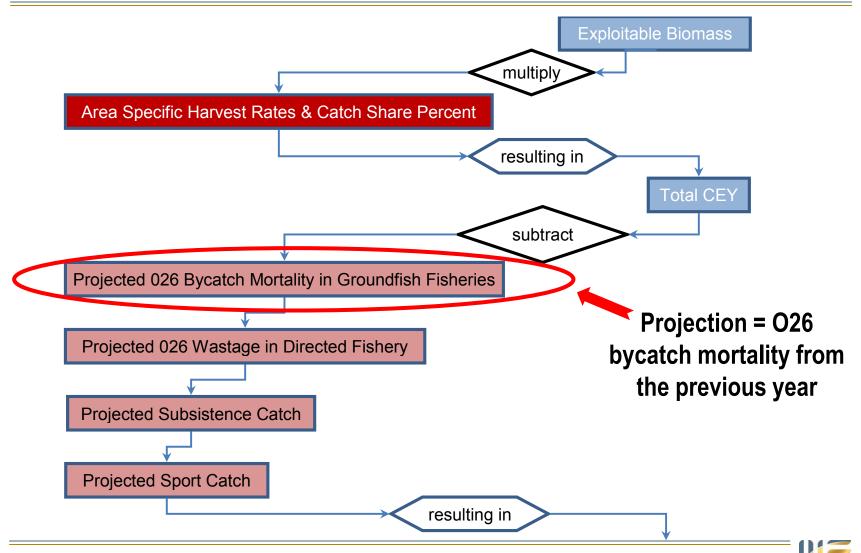
■ See page 123

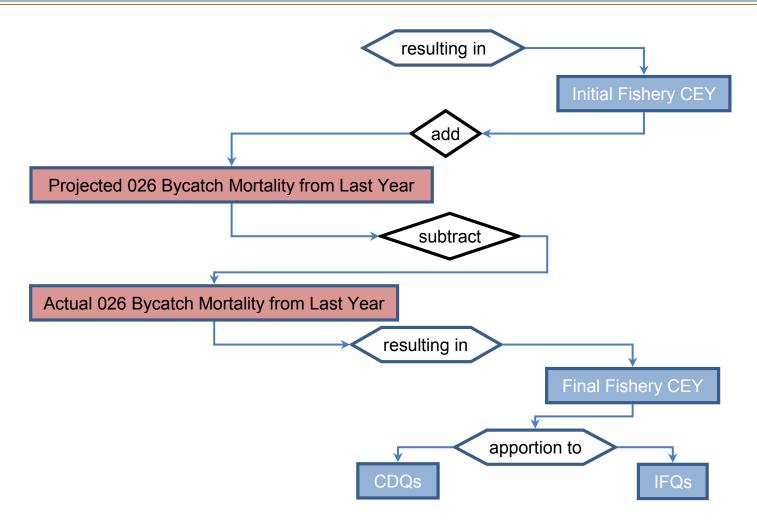




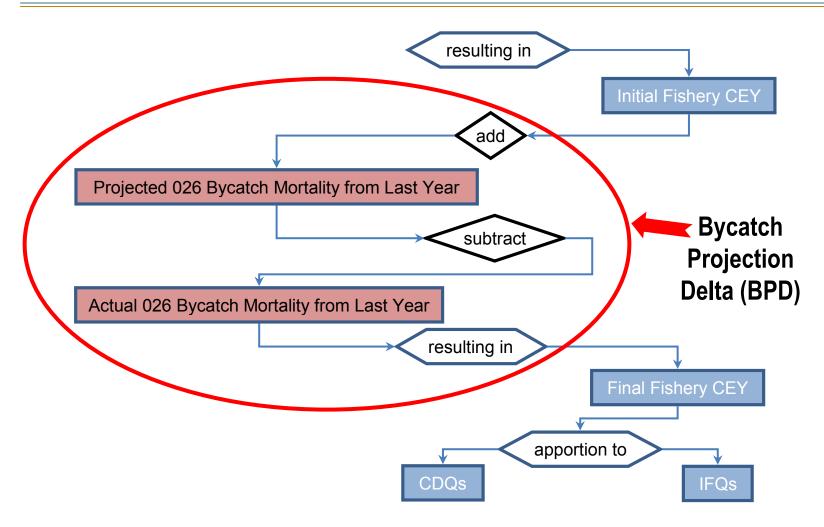






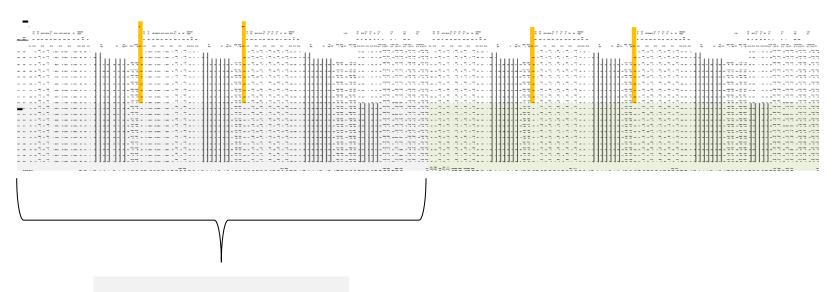








#### **Back to IMS Model—Commercial Halibut Fishery**



**Status Quo** 



#### **IMS Model SQ Halibut Fishery TCEY and Harvests**



#### Start with 2008–2013 TCEYs and Harvests

Year	Basis Year	4A Total C	4B onstant	4CDE Exploitati	Area 4 Total ion Yield	4A Combir	4B ned IFQ an	4CDE	Area 4 Total arvests
						eight MT	·		
2008	2008	1,885	1,025	3,103	6,013	1,336	802	3,814	5,951
2009	2009	1,405	923	2,700	5,028	1,099	806	3,396	5,300
2010	2010	1,656	1,158	2,804	5,617	1,004	931	3,478	5,412
2011	2011	1,231	949	2,914	5,094	1,039	752	3,393	5,183
2012	2012	1,036	968	2,000	4,004	675	805	2,543	4,023
2013	2013	1,223	874	2,156	4,253	573	625	2,052	3,250



#### TCEYs for 2014 are Imputed from 2014 FCEYs

					Area 4			_	Area 4
Year	Basis	4A	4B	4CDE	Total	4A	4B	4CDE	Total
Icui	Year	Total C	onstant	<b>Exploitat</b>	ion Yield	Combir	ned IFQ ar	d CDQ H	larvests
					Net W	leight MT			
2008	2008	1,885	1,025	3,103	6,013	1,336	802	3,814	5,951
2009	2009	1,405	923	2,700	5,028	1,099	806	3,396	5,300
2010	2010	1,656	1,158	2,804	5,617	1,004	931	3,478	5,412
2011	2011	1,231	949	2,914	5,094	1,039	752	3,393	5,183
2012	2012	1,036	968	2,000	4,004	675	805	2,543	4,023
2013	2013	1,223	874	2,156	4,253	573	625	2,052	3,250
2014	2010	591	607	1,899	3,097	366	491	1,411	2,269
2015	2009	691	507	1,899	3,097	322	406	1,326	2,053
2016	2009	691	507	1,899	3,097	95	249	1,145	1,490
2017	2013	691	507	1,899	3,097	521	364	1,465	2,350
2018	2008	691	507	1,899	3,097	50	354	1,057	1,461
2019	2010	691	507	1,899	3,097	217	283	1,266	1,766
2020	2008	691	507	1,899	3,097	212	315	1,235	1,762
2021	2011	691	507	1,899	3,097	204	378	1,173	1,755
2022	2012	691	507	1,899	3,097	451	415	1,445	2,310
2023	2013	691	507	1,899	3,097	404	298	1,375	2,077



#### ... and have been reduced by "other removals"

					Area 4			_	Area 4
Year	Basis	4A	4B	4CDE	Total	4A	4B	4CDE	Total
icui	Year	Total C	onstant	<b>Exploitat</b>	ion Yield	Combir	ned IFQ ar	d CDQ H	larvests
					Net W	leight MT			
2008	2008	1,885	1,025	3,103	6,013	1,336	802	3,814	5,951
2009	2009	1,405	923	2,700	5,028	1,099	806	3,396	5,300
2010	2010	1,656	1,158	2,804	5,617	1,004	931	3,478	5,412
2011	2011	1,231	949	2,914	5,094	1,039	752	3,393	5,183
2012	2012	1,036	968	2,000	4,004	675	805	2,543	4,023
2013	2013	1,223	874	2,156	4,253	573	625	2,052	3,250
2014	2010	591	607	1,899	3,097	366	491	1,411	2,269
2015	2009	691	507	1,899	3,097	322	406	1,326	2,053
2016	2009	691	507	1,899	3,097	95	249	1,145	1,490
2017	2013	691	507	1,899	3,097	521	364	1,465	2,350
2018	2008	691	507	1,899	3,097	50	354	1,057	1,461
2019	2010	691	507	1,899	3,097	217	283	1,266	1,766
2020	2008	691	507	1,899	3,097	212	315	1,235	1,762
2021	2011	691	507	1,899	3,097	204	378	1,173	1,755
2022	2012	691	507	1,899	3,097	451	415	1,445	2,310
2023	2013	691	507	1,899	3,097	404	298	1,375	2,077



#### 2015–2023 TCEYs held constant at 2014 Levels

					Area 4				Area 4
	Basis	4A	4B	4CDE	Total	4A	4B	4CDE	Total
Year	Year			Exploitati			ned IFQ an		
						/eight MT			
2008	2008	1,885	1,025	3,103	6,013		802	3,814	5,951
2009	2009	1,405	923	2,700	5,028	1,099	806	3,396	5,300
2010	2010	1,656	1,158	2,804	5,617	1,004	931	3,478	5,412
2011	2011	1,231	949	2,914	5,094	1,039	752	3,393	5,183
2012	2012	1,036	968	2,000	4,004	675	805	2,543	4,023
2013	2013	1,223	874	2,156	4,253	573	625	2,052	3,250
2014	2010	591	607	1,899	3,097	366	491	1,411	2,269
2015	2009	691	507	1,899	3,097	322	406	1,326	2,053
2016	2009	691	507	1,899	3,097	95	249	1,145	1,490
2017	2013	691	507	1,899	3,097	521	364	1,465	2,350
2018	2008	691	50 <mark>7</mark>	1,899	3,097	50	354	1,057	1,461
2019	2010	691	50 <mark>7</mark>	1,899	3,097	217	283	1,266	1,766
2020	2008	691	507	1,899	3,097	212	315	1,235	1,762
2021	2011	691	507	1,899	3,097	204	378	1,173	1,755
2022	2012	691	507	1,899	3,097	451	415	1,445	2,310
2023	2013	691	507	1,899	3,097	404	298	1,375	2,077



## Variance in halibut harvests is a function of PSC in groundfish fisheries and the FCEY algorithm

				_	Area 4			_	Area 4		
Year	Basis	4A	4B	4CDE	Total	4A	4B	4CDE	Total		
Tour	Year	Total C	onstant	Exploitation	n Yield	Combine	ed IFQ an	d CDQ Ha	rvests		
					Net W	Weight MT					
2008	2008	1,885	1,025	3,103	6,013	1,336	802	3,814	5,951		
2009	2009	1,405	923	2,700	5,028	1,099	806	3,396	5,300		
2010	2010	1,656	1,158	2,804	5,617	1,004	931	3,478	5,412		
2011	2011	1,231	949	2,914	5,094	1,039	752	3,393	5,183		
2012	2012	1,036	968	2,000	4,004	675	805	2,543	4,023		
2013	2013	1,223	874	2,156	4,253	573	625	2,052	3,250		
2014	2010	591	607	1,899	3,097	366	491	1,411	2,269		
2015	2009	691	507	1,899	3,097	322	406	1,326	2,053		
2016	2009	691	507	1,899	3,097	95	249	1,145	1,490		
2017	2013	691	507	1,899	3,097	521	364	1,465	2,350		
2018	2008	691	507	1,899	3,09	50	354	1,057	1,461		
2019	2010	691	507	1,899	3,097	217	283	1,266	1,766		
2020	2008	691	507	1,899	3,097	212	315	1,235	1,762		
2021	2011	691	507	1,899	3,097	204	378	1,173	1,755		
2022	2012	691	507	1,899	3,097	451	415	1,445	2,310		
2023	2013	691	507	1,899	3,097	404	298	1,375	2,071		



### IMS Model Halibut Fishery Wholesale Revenue Calculations—Start with 2008–2013

Year	Basis Year	Year Basis Year	Wholesale Value per Net Weight	4A Unac	4B ljusted W	4CDE holesale V	Area 4 Total alue	4A Disc	4B ounted Wh	4CDE nolesale Va	Area 4 Total lue
		MT		\$ Mil	llions	lillions					
2008	2008	\$30,857	\$58.17	\$31.63	\$95.73	\$185.54	\$58.17	\$31.63	\$95.73	\$185.54	
2009	2009	\$22,383	\$31.45	\$20.66	\$60.43	\$112.53	\$31.45	\$20.66	\$60.43	\$112.53	
2010	2010	\$35,650	\$59.04	\$41.28	\$99.94	\$200.26	\$59.04	\$41.28	\$99.94	\$200.26	
2011	2011	\$34,863	\$42.92	\$33.09	\$101.58	\$177.58	\$42.92	\$33.09	\$101.58	\$177.58	
2012	2012	\$34,179	\$35.40	\$33.10	\$68.37	\$136.86	\$35.40	\$33.10	\$68.37	\$136.86	
2013	2013	\$20,203	\$24.70	\$17.65	\$43.56	\$85.91	\$24.70	\$17.65	\$43.56	\$85.91	



## ... and add future years using the same basis years as used for Groundfish

		Wholesale				Area 4				Area 4	
V	Basis	Value per	4A	4B	4CDE	Total	4A	4B	4CDE	Total	
Year	Year	Net Weight	Unac	ljusted W	holesale V	alue	Discounted Wholesale Value				
		MT		\$ Mil	llions		\$2013 Millions				
2008	2008	\$30,857	\$58.17	\$31.63	\$95.73	\$185.54	\$58.17	\$31.63	\$95.73	\$185.54	
2009	2009	\$22,383	\$31.45	\$20.66	\$60.43	\$112.53	\$31.45	\$20.66	\$60.43	\$112.53	
2010	2010	\$35,650	\$59.04	\$41.28	\$99.94	\$200.26	\$59.04	\$41.28	\$99.94	\$200.26	
2011	2011	\$34,863	\$42.92	\$33.09	\$101.58	\$177.58	\$42.92	\$33.09	\$101.58	\$177.58	
2012	2012	\$34,179	\$35.40	\$33.10	\$68.37	\$136.86	\$35.40	\$33.10	\$68.37	\$136.86	
2013	2013	\$20,203	\$24.70	\$17.65	\$43.56	\$85.91	\$24.70	\$17.65	\$43.56	\$85.91	
2014	2010	\$30,821									
2015	2009	\$22,383									
2016	2009	\$22,383									
2017	2013	\$20,203									
2018	2008	\$30,857									
2019	2010	\$35,650									
2020	2008	\$30,857									
2021	2011	\$34,863									
2022	2012	\$34,179									
2023	2013	\$20,203									



### Wholesale values per net weight ton are from the Basis Years.

		Wholesale				Area 4				Area 4	
V	Basis	Value per	4A	4B	4CDE	Total	4A	4B	4CDE	Total	
Year	Year	Net Weight	Unac	ljusted W	holesale V	/alue	Discounted Wholesale Value				
		MT		\$ Mil	llions		\$2013 Millions				
2008	2008	\$30,857	\$58.17	\$31.63	\$95.73	\$185.54	\$58.17	\$31.63	\$95.73	\$185.54	
2009	2009	\$22,383	\$31.45	\$20.66	\$60.43	\$112.53	\$31.45	\$20.66	\$60.43	\$112.53	
2010	2010	\$35,650	\$59.04	\$41.28	\$99.94	\$200.26	\$59.04	\$41.28	\$99.94	\$200.26	
2011	2011	\$34,863	\$42.92	\$33.09	\$101.58	\$177.58	\$42.92	\$33.09	\$101.58	\$177.58	
2012	2012	\$34.179	\$35.40	\$33.10	\$68.37	\$136.86	\$35.40	\$33.10	\$68.37	\$136.86	
2013	2013	\$20,203	\$24.70	\$17.65	\$43.56	\$85.91	\$24.70	\$17.65	\$43.56	\$85.91	
2014	2010	\$30,821									
2015	2009	\$22,383									
2016	2009	\$22,383									
2017	2013	\$20,203									
2018	2008	\$30,857									
2019	2010	\$35,650									
2020	2008	\$30,857									
2021	2011	\$34,863									
2022	2012	\$34,179									
2023	2013	\$20,203									



### ... Multiply \$ by harvest to derive unadjusted wholesale values

		Wholesale				Area 4				Area 4	
V	Basis	Value per	4A	4B	4CDE	Total	4A	4B	4CDE	Total	
Year	Year	Net Weight	Unac	ljusted W	holesale \	/alue	Discounted Wholesale Value				
		MT		\$ Mil	llions		\$2013 Millions				
2008	3 2008	\$30,857	\$58.17	\$31.63	\$95.73	\$185.54	\$58.17	\$31.63	\$95.73	\$185.54	
2009	2009	\$22,383	\$31.45	\$20.66	\$60.43	\$112.53	\$31.45	\$20.66	\$60.43	\$112.53	
2010	2010	\$35,650	\$59.04	\$41.28	\$99.94	\$200.26	\$59.04	\$41.28	\$99.94	\$200.26	
2011	2011	\$34,863	\$42.92	\$33.09	\$101.58	\$177.58	\$42.92	\$33.09	\$101.58	\$177.58	
2012	2012	\$34,179	\$35.40	\$33.10	\$68.37	\$136.86	\$35.40	\$33.10	\$68.37	\$136.86	
2013	2013	\$20,203	\$24.70	\$17.65	\$43.56	\$85.91	\$24.70	\$17.65	\$43.56	\$85.91	
2014	2010	\$30,821	\$18.21	\$18.72	\$58.52	\$95.45					
2015	2009	\$22,383	\$15.46	\$11.36	\$42.50	\$69.32					
2016	2009	\$22,383	\$15.46	\$11.36	\$42.50	\$69.32					
2017	2013	\$20,203	\$13.95	\$10.25	\$38.36	\$62.57					
2018	3 2008	\$30,857	\$21.31	\$15.66	\$58.59	\$95.56					
2019	2010	\$35,650	\$24.62	\$18.09	\$67.69	\$110.40					
2020	2008	\$30,857	\$21.31	\$15.66	\$58.59	\$95.56					
2021	2011	\$34,863	\$24.08	\$17.69	\$66.19	\$107.97					
2022	2012	\$34,179	\$23.61	\$17.34	\$64.90	\$105.85					
2023	3 2013	\$20,203	\$13.95	\$10.25	\$38.36	\$62.57					

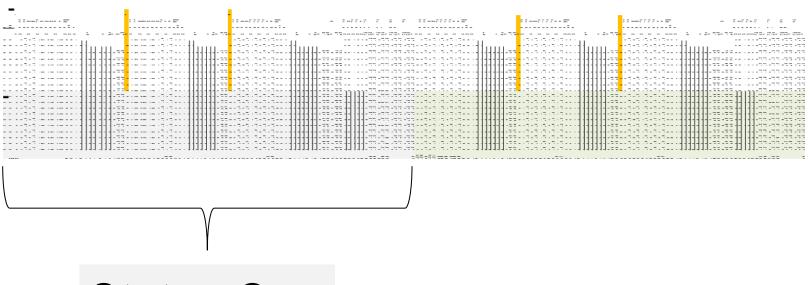


#### ... and then discount the future values to obtain **SQ Future Wholesale Revenues**

Year	Basis	Wholesale Value per	4A	4B	4CDE	Area 4 Total	4A	4B	4CDE	Area 4 Total	
Icui	Year	Net Weight	Total C	onstant E	Exploitatio	n Yield	Discounted Wholesale Value				
		MT		\$ Mil	llions		\$2013 Millions				
2008	2008	\$30,857	\$58.17	\$31.63	\$95.73	\$185.54	\$58.17	\$31.63	\$95.73	\$185.54	
2009	2009	\$22,383	\$31.45	\$20.66	\$60.43	\$112.53	\$31.45	\$20.66	\$60.43	\$112.53	
2010	2010	\$35,650	\$59.04	\$41.28	\$99.94	\$200.26	\$59.04	\$41.28	\$99.94	\$200.26	
2011	2011	\$34,863	\$42.92	\$33.09	\$101.58	\$177.58	\$42.92	\$33.09	\$101.58	\$177.58	
2012	2012	\$34,179	\$35.40	\$33.10	\$68.37	\$136.86	\$35.40	\$33.10	\$68.37	\$136.86	
2013	2013	\$20,203	\$24.70	\$17.65	\$43.56	\$85.91	\$24.70	\$17.65	\$43.56	\$85.91	
2014	2010	\$30,821	\$18.21	\$18.72	\$58.52	\$95.45	\$18.21	\$18.72	\$58.52	\$95.45	
2015	2009	\$22,383	\$15.46	\$11.36	\$42.50	\$69.32	\$14.69	\$10.79	\$40.37	\$65.85	
2016	2009	\$22,383	\$15.46	\$11.36	\$42.50	\$69.32	\$13.95	\$10.25	\$38.35	\$62.56	
2017	2013	\$20,203	\$13.95	\$10.25	\$38.36	\$62.57	\$11.96	\$8.79	\$32.89	\$53.64	
2018	2008	\$30,857	\$21.31	\$15.66	\$58.59	\$95.56	\$17.36	\$12.75	\$47.72	\$77.83	
2019	2010	\$35,650	\$24.62	\$18.09	\$67.69	\$110.40	\$19.05	\$14.00	\$52.38	\$85.43	
2020	2008	\$30,857	\$21.31	\$15.66	\$58.59	\$95.56	\$15.67	\$11.51	\$43.07	\$70.24	
2021	2011	\$34,863	\$24.08	\$17.69	\$66.19	\$107.97	\$16.82	\$12.35	\$46.23	\$75.40	
2022	2012	\$34,179	\$23.61	\$17.34	\$64.90	\$105.85	\$15.66	\$11.51	\$43.05	\$70.22	
2023	2013	\$20,203	\$13.95	\$10.25	\$38.36	\$62.57	\$8.79	\$6.46	\$24.18	\$39.43	



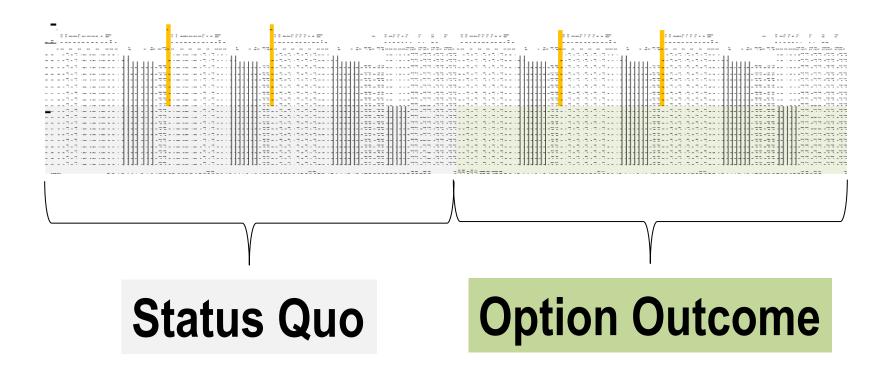
#### That completes the Status Quo Calculations



**Status Quo** 



## Then we move to project outcomes under the Options to reduce PSC Limits





### Calculation of Halibut Fishery Outcomes with a 35% reduction in PSC Limits under Scenario A



#### Start with 2008–2013 Outcomes

Year	Basis	Discounted Wholesale	4A	4B	4CDE	Area 4 Total	4A	4B	4CDE	Area 4 Total	
i eai	Year	Value per Net	Combin	ed IFQ a	ind CDQ Ha	arvests	Disc	counted V	Vholesale V	alue	
		Weight MT		Net We	Net Weight MT			\$2013 Millions			
2008	2008	\$30,857	1,336	802	3,814	5,951	\$41.22	\$24.73	\$117.68	\$183.63	
2009	2009	\$22,383	1,099	806	3,396	5,300	\$24.59	\$18.04	\$76.00	\$118.63	
2010	2010	\$35,650	1,004	931	3,478	5,412	\$35.79	\$33.18	\$123.97	\$192.95	
2011	2011	\$34,863	1,039	752	3,393	5,183	\$36.21	\$26.20	\$118.29	\$180.70	
2012	2012	\$34,179	675	805	2,543	4,023	\$23.08	\$27.53	\$86.91	\$137.52	
2013	2013	\$20,203	573	625	2,052	3,250	\$11.58	\$12.62	\$41.45	\$65.66	



## ... and add Basis Years and discounted wholesale values per net weight MT

-						Area 4				Area 4		
Year	Basis	Discounted Wholesale	4A	4B	4CDE	Total	4A	4B	4CDE	Total		
I Cai	Year	Value per Net	Combin	Combined IFQ and CDQ Harvests				Discounted Wholesale Value				
		Weight MT		Net W	eight MT			\$2013	Millions			
2008	2008	\$30,857	1,336	802	3,814	5,951	\$41.22	\$24.73	\$117.68	\$183.63		
2009	2009	\$22,383	1,099	806	3,396	5,300	\$24.59	\$18.04	\$76.00	\$118.63		
2010	2010	\$35,650	1,004	931	3,478	5,412	\$35.79	\$33.18	\$123.97	\$192.95		
2011	2011	\$34,863	1,039	752	3,393	5,183	\$36.21	\$26.20	\$118.29	\$180.70		
2012	2012	\$34,179	675	805	2,543	4,023	\$23.08	\$27.53	\$86.91	\$137.52		
2013	2013	\$20,203	573	625	2,052	3,250	\$11.58	\$12.62	\$41.45	\$65.66		
2014	2010	\$30,821										
2015	2009	\$21,263										
2016	2009	\$20.200										
2017	2013	\$17,322										
2018	2008	\$25,133										
2019	2010	\$27,585										
2020	2008	\$22,683										
2021	2011	\$24,346										
2022	2012	\$22,675										
2023	2013	\$12,733										



## Estimate harvests using the IPHC algorithm and the reduced PSCs from the groundfish fishery

Vaar	Basis	Discounted Wholesale	4A	4B	4CDE	Area 4 Total	4A	4B	4CDE	Area 4 Total	
Year	Year	Value per Net	Combin	ned IFQ a	and CDQ Ha	arvests	Discounted Wholesale Value				
		Weight MT	Net Weight MT				\$2013 Millions				
2008	2008	\$30,857	1,336	802	3,814	5,951	\$41.22	\$24.73	\$117.68	\$183.63	
2009	2009	\$22,383	1,099	806	3,396	5,300	\$24.59	\$18.04	\$76.00	\$118.63	
2010	2010	\$35,650	1,004	931	3,478	5,412	\$35.79	\$33.18	\$123.97	\$192.95	
2011	2011	\$34,863	1,039	752	3,393	5,183	\$36.21	\$26.20	\$118.29	\$180.70	
2012	2012	\$34,179	675	805	2,543	4,023	\$23.08	\$27.53	\$86.91	\$137.52	
2013	2013	\$20,203	573	625	2,052	3,250	\$11.58	\$12.62	\$41.45	\$65.66	
2014	2010	\$30,821	366	491	1,411	2,269					
2015	2009	\$21,263	430	484	1,787	2,701					
2016	2009	\$20,200	222	271	1,237	1,731					
2017	2013	\$17,322	611	394	1,626	2,632					
2018	2008	\$25,133	37	364	1,447	1,849					
2019	2010	\$27,585	203	280	1,473	1,956					
2020	2008	\$22,683	308	385	1,455	2,147					
2021	2011	\$24,346	175	356	1,425	1,956					
2022	2012	\$22,675	450	407	1,456	2,312					
2023	2013	\$12,733	543	332	1,669	2,544					

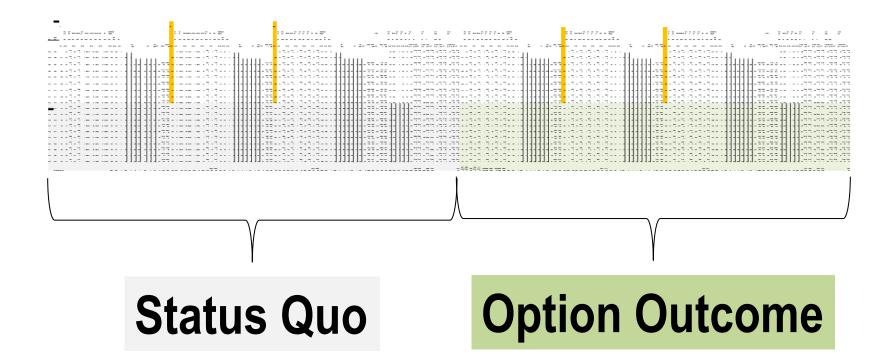


## ... then multiply harvests by Discounted wholesale value per net weight MT

	Basis	Discounted	4A	4B	4CDE	Area 4 Total	4A	4B	4CDE	Area 4 Total
Year	Year	Wholesale Value per Net	Combir	ned IFQ a	and CDQ H	arvests	Disc	counted	Wholesale V	alue
		Weight MT		eight MT		\$2013 Millions				
2008	2008	\$30,857	1,336	802	3,814	5,951	\$41.22	\$24.73	\$117.68	\$183.63
2009	2009	\$22,383	1,099	806	3,396	5,300	\$24.59	\$18.04	\$76.00	\$118.63
2010	2010	\$35,650	1,004	931	3,478	5,412	\$35.79	\$33.18	\$123.97	\$192.95
2011	2011	\$34,863	1,039	752	3,393	5,183	\$36.21	\$26.20	\$118.29	\$180.70
2012	2012	\$34,179	675	805	2,543	4,023	\$23.08	\$27.53	\$86.91	\$137.52
2013	2013	\$20,203	573	625	2,052	3,250	\$11.58	\$12.62	\$41.45	\$65.66
2014	2010	\$30,821	366	491	1,411	2,269	\$11.29	\$15.14	\$43.50	\$69.93
2015	2009	\$21,263	430	484	1,787	2,701	\$9.15	\$10.30	\$38.00	\$57.44
2016	2009	\$20,200	222	271	1,237	1,731	\$4.49	\$5.48	\$24.99	\$34.96
2017	2013	\$17,322	611	394	1,626	2,632	\$10.59	\$6.83	\$28.17	\$45.59
2018	2008	\$25,133	37	364	1,447	1,849	\$0.94	\$9.15	\$36.38	\$46.47
2019	2010	\$27,585	203	280	1,473	1,956	\$5.60	\$7.73	\$40.62	\$53.95
2020	2008	\$22,683	308	385	1,455	2,147	\$6.98	\$8.73	\$32.99	\$48.71
2021	2011	\$24,346	175	356	1,425	1,956	\$4.27	\$8.67	\$34.68	\$47.62
2022	2012	\$22,675	450	407	1,456	2,312	\$10.20	\$9.24	\$33.00	\$52.44
2023	2013	\$12,733	543	332	1,669	2,544	\$6.91	\$4.23	\$21.25	\$32.39

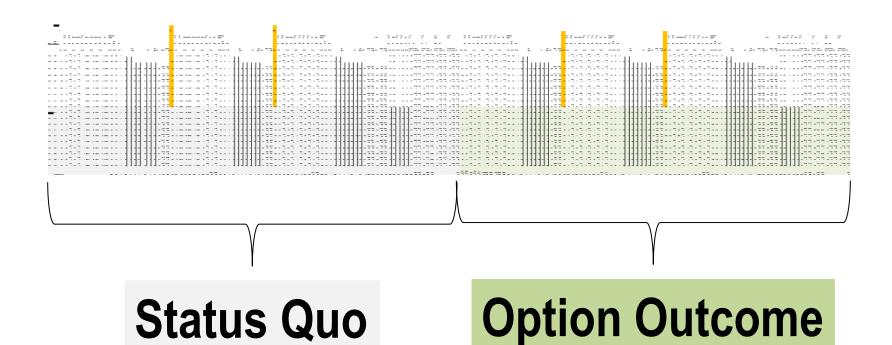


## We've now estimated future outcomes under both SQ and the Reduction Option





### ... and now we calculate the impact of the Option



**Option Outcome** 

Status Quo =

= Impact



# Estimated halibut fishery future year impacts of a 35% reduction of PSC limits under Scenario A

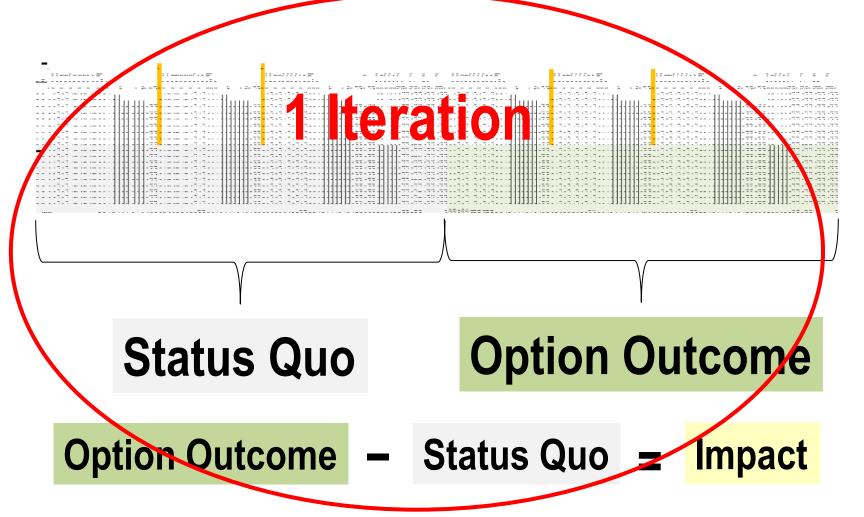
	Dania	4.0	4D	4CDE	Area 4	40	4D	4CDE	Area 4
Year	Basis	4A	4B	4CDE	Total	4A	4B	4CDE	Total
	Year	Combined IFQ and CDQ Harvests  Net Weight Tons				Discounted Wholesale Value \$2013 Millions			
2008	2008	-	-	-	-	-	-	-	-
2009	2009	-	-	-	-	-	-	-	-
2010	2010	-	-	-	-	-	-	-	-
2011	2011	_	-	-	-	-	_	-	-
2012	2012	_	-	-	-	-	-	-	-
2013	2013	-	-	-	_	-	-	-	-
2014	2010	-	-	-	-	-	-	-	-
2015	2009	108	78	461	648	\$2.30	\$1.67	\$9.81	\$13.77
2016	2009	127	22	92	241	\$2.56	\$0.44	\$1.86	\$4.87
2017	2013	90	31	161	282	\$1.57	\$0.53	\$2.79	\$4.89
2018	2008	-12	10	390	388	(\$0.31)	\$0.25	\$9.80	<b>\$9.74</b>
2019	2010	-14	-3	207	190	(\$0.37)	(\$0.09)	\$5.71	<b>\$5.24</b>
2020	2008	95	70	220	385	\$2.17	\$1.59	\$4.99	\$8.74
2021	2011	-29	-22	252	201	(\$0.69)	(\$0.54)	\$6.13	\$4.90
2022	2012	-1	-7	10	2	(\$0.02)	(\$0.17)	\$0.24	\$0.05
2023	2013	139	34	293	466	\$1.77	\$0.43	\$3.74	\$5.94



# ... and then calculate the average annual catch and the NPV of wholesale revenue

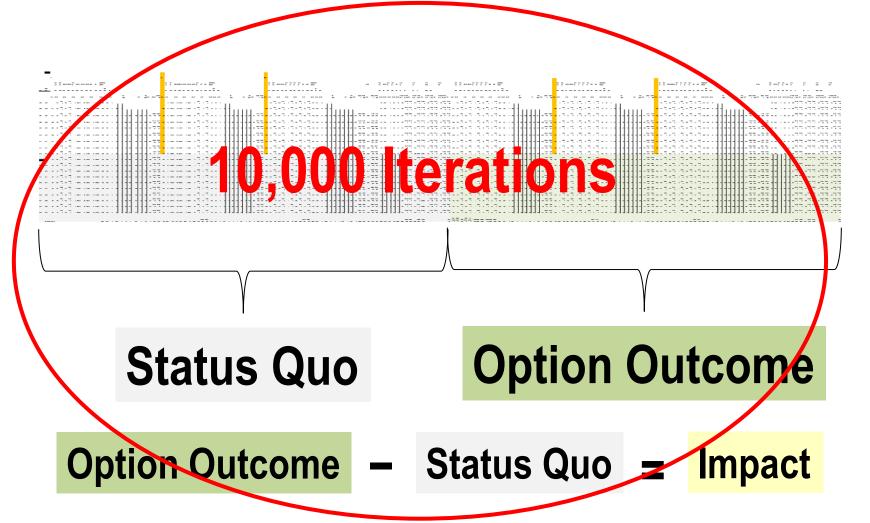
					Area 4				Area 4
Year	Basis	4A	4B	4CDE	Total	4A	4B	4CDE	Total
icai	Year	Combined IFQ and CDQ Harvests  Net Weight Tons				Disc			
2008	2008	-	-	-	-	-	-	-	-
2009	2009	-	-	-	-	-	-	-	-
2010	2010	-	-	-	-	-	-	-	-
2011	2011	-	-	-	-	-	-	-	-
2012	2012	-	-	-	-	-	-	-	-
2013	2013	-	-	-	-	-	-	-	-
2014	2010	-	-	-	-	-	-	-	-
2015	2009	108	78	461	648	\$2.30	\$1.67	\$9.81	<b>\$13.77</b>
2016	2009	127	22	92	241	\$2.56	\$0.44	\$1.86	<b>\$4.87</b>
2017	2013	90	31	161	282	\$1.57	\$0.53	\$2.79	\$4.89
2018	2008	-12	10	390	388	(\$0.31)	\$0.25	\$9.80	<b>\$9.74</b>
2019	2010	-14	-3	207	190	(\$0.37)	(\$0.09)	\$5.71	<b>\$5.24</b>
2020	2008	95	70	220	385	\$2.17	\$1.59	\$4.99	\$8.7 <mark>4</mark>
2021	2011	-29	-22	252	201	(\$0.69)	(\$0.54)	\$6.13	\$4.90
2022	2012	-1	-7	10	2	(\$0.02)	(\$0.17)	\$0.24	\$0.05
2023	2013	139	34	293	466	\$1.77	\$0.43	\$3.74	<b>\$5.94</b>
Change in Avg. Catch									
& Total NPV		50	21	209	280	\$8.97	\$4.10	\$45.07	\$58.14

# We have now completed 1 iteration of the IMS Model for one option under one scenario



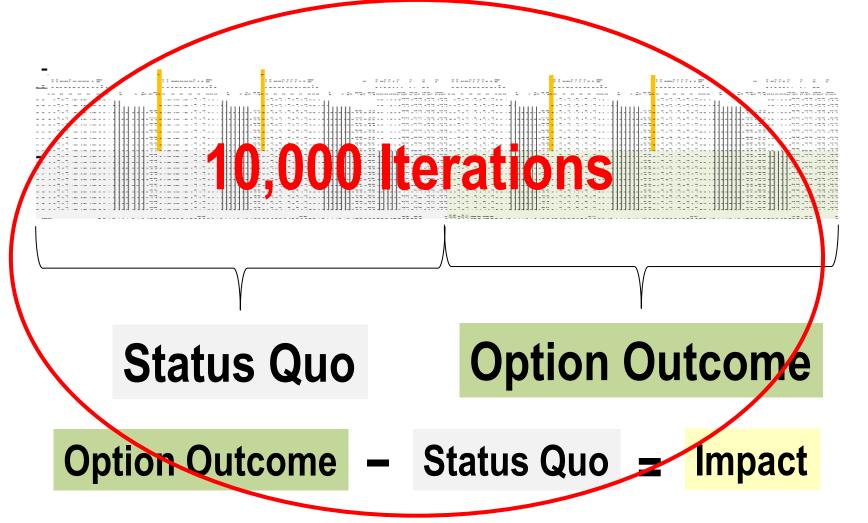


# We then repeat the process for 10,000 iterations...



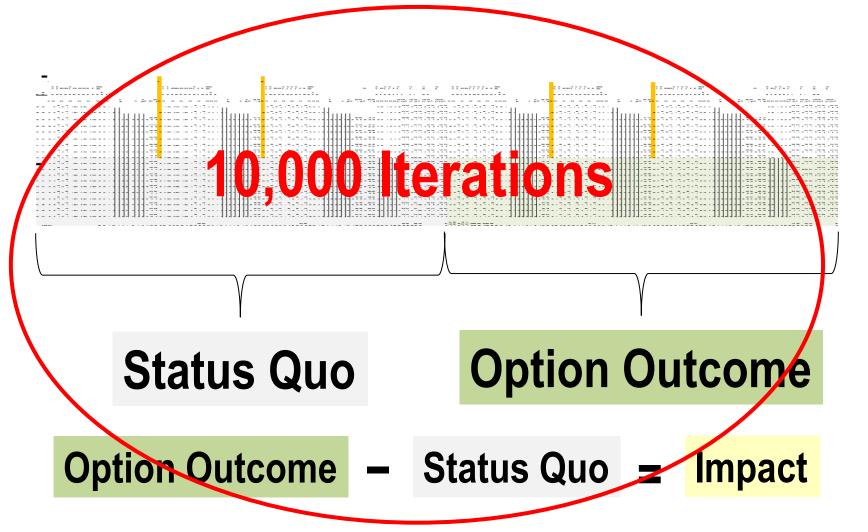


# ... with each iteration getting a new random draw of Basis Years



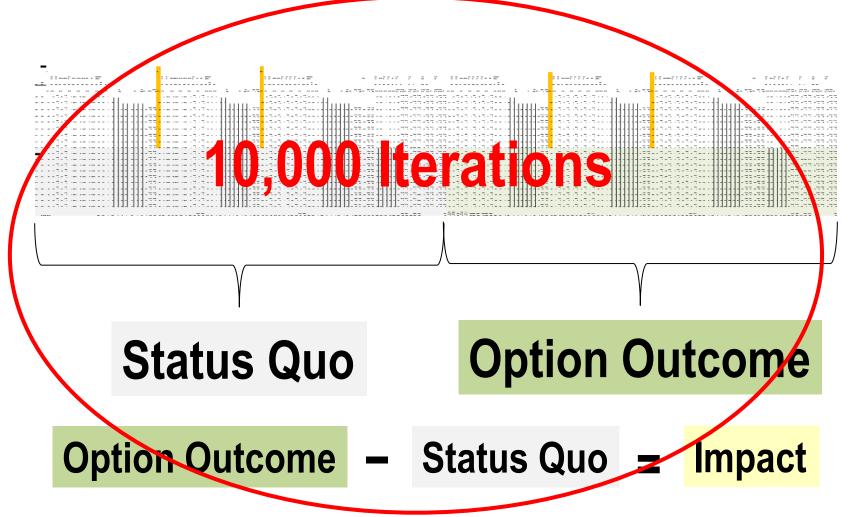


## We then repeat the entire process for Scenario B





# ... and then repeat again for each of the other three reduction options





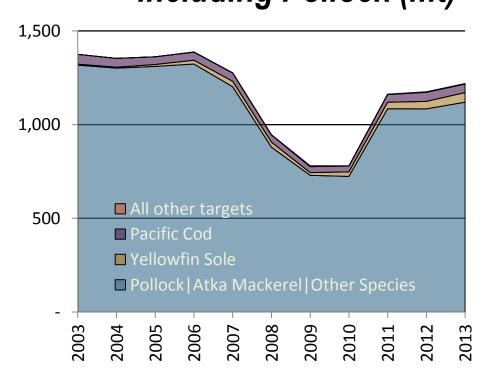
# Overview of Existing Conditions in the Groundfish Fisheries

- BSAI TLA
- A80-CPs
- Longline CVs (LGL-CV)
- **■** Longline CPs (LGL-CPs)
- Groundfish CDQ fisheries

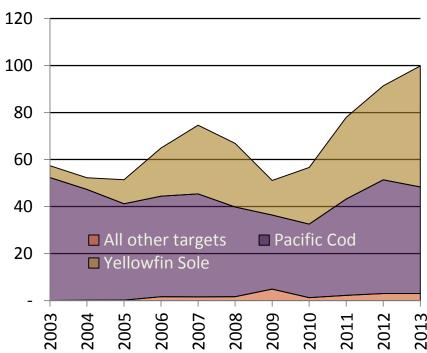


## **Bering Sea Trawl Limited Access**

# Groundfish harvests, 2003-2013 Including Pollock (mt)



#### Excluding pollock (mt)

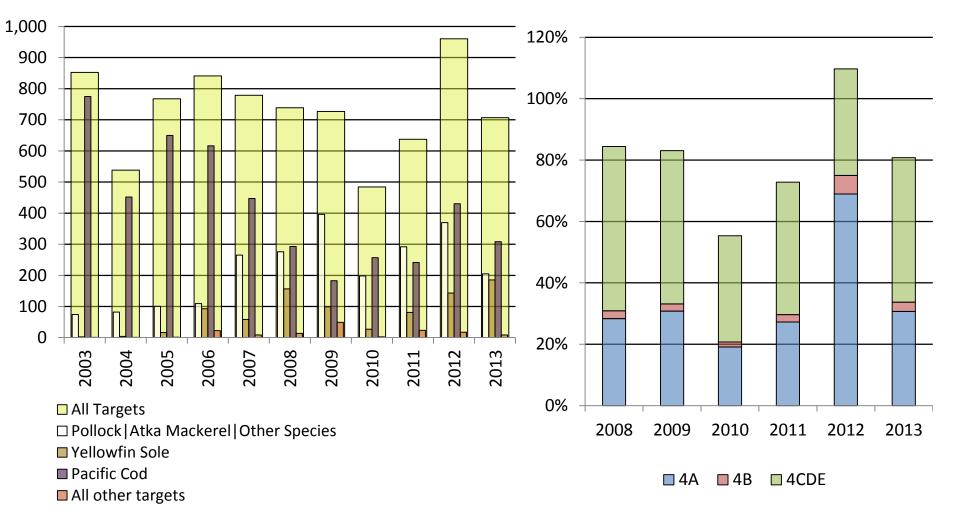




## Halibut Mortality in BSAI TLA Fisheries

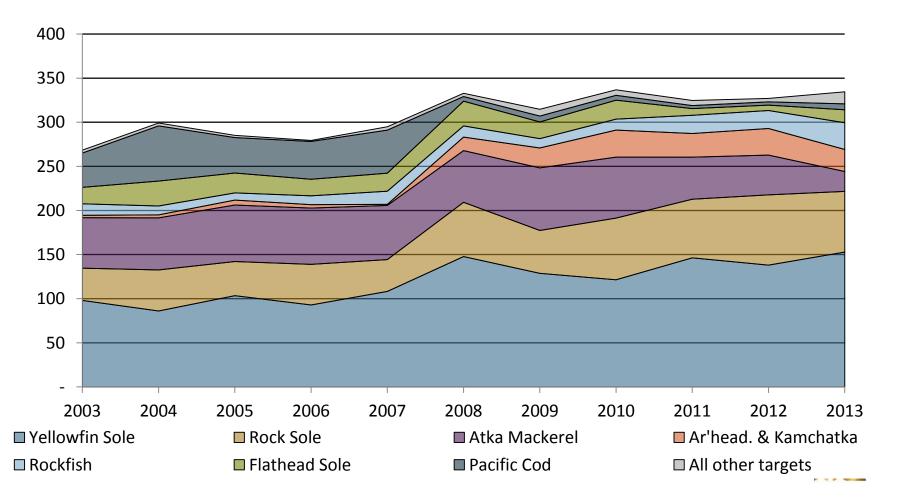
#### By target fishery (mt)

#### Percent of 2014 PSC Limit



#### **Amendment 80 Catcher Processors**

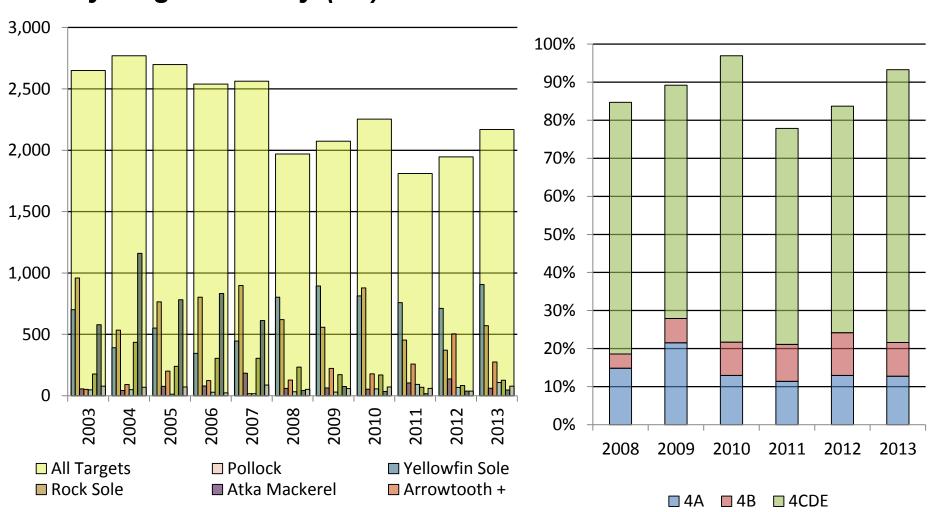
#### ■ Groundfish harvests, 2003-2013



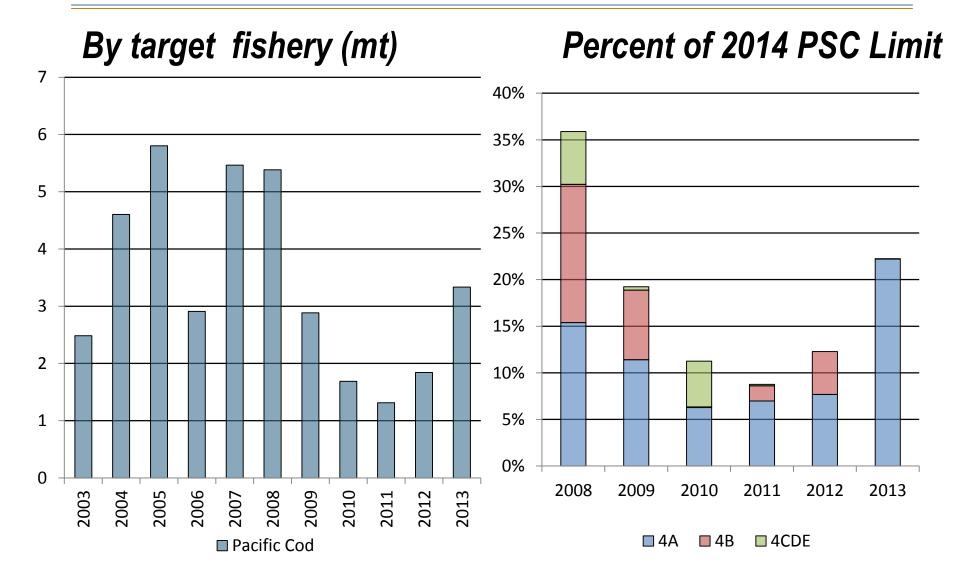
## Halibut Mortality of A80 CPs

#### By target fishery (mt)

#### Percent of 2014 PSC Limit

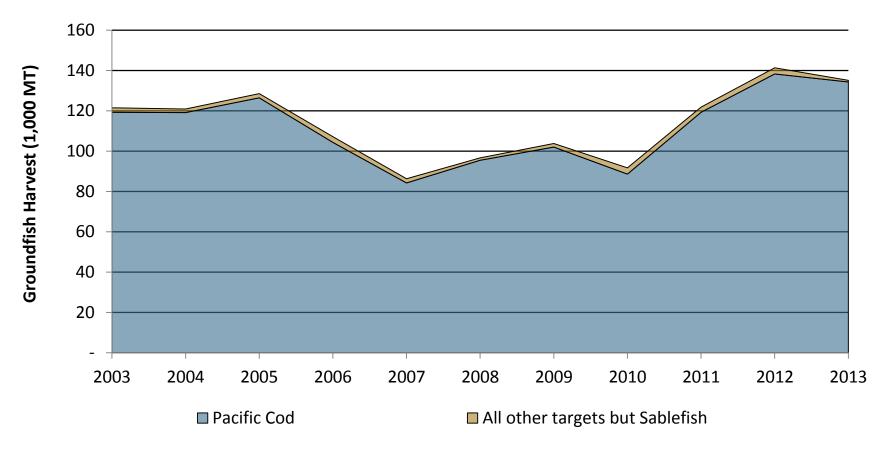


## Halibut Mortality of Longline Catcher Vessels



## **Longline Catcher Processors**

#### ■ Groundfish harvests, 2003-2013

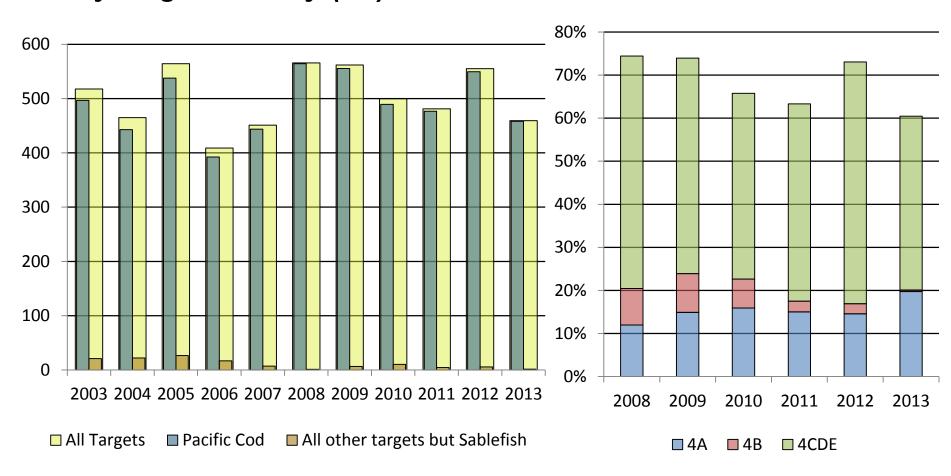




### Halibut Mortality of Longline Catcher Processors

#### By target fishery (mt)

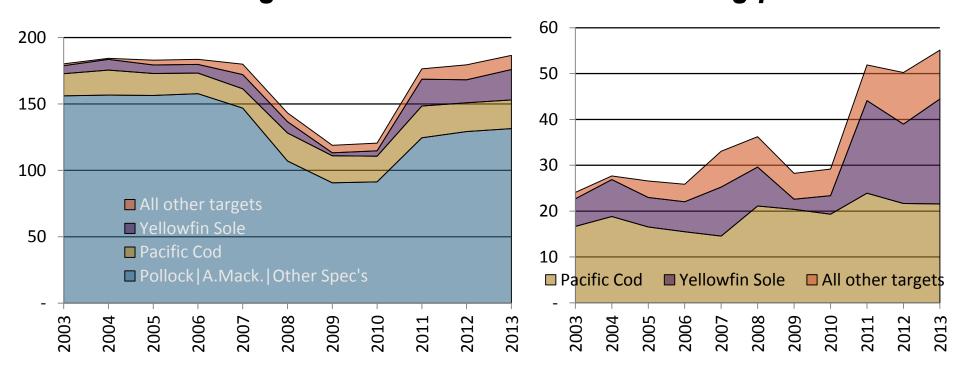
#### Percent of 2014 PSC Limit





## **CDQ** Fisheries

Groundfish harvests, 2003-2013 (MT)
Including Pollock
Excluding pollock

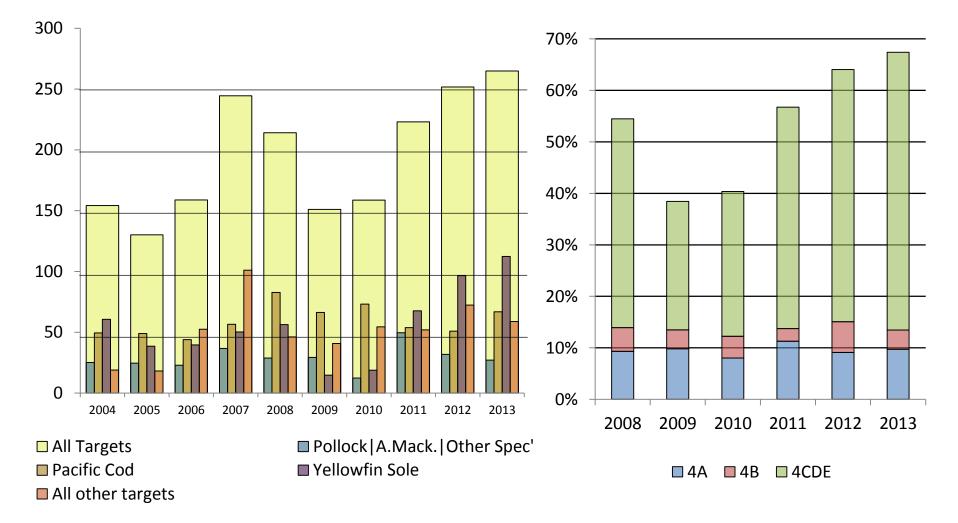




## Halibut Mortality in CDQ Fisheries

#### By target fishery (MT)

#### **Percent of 2014 Limit**



## **Overview of the Area 4 Halibut Fishery**



#### IFQ and CDQ Harvests of Halibut in the BSAI (Table 5-74)

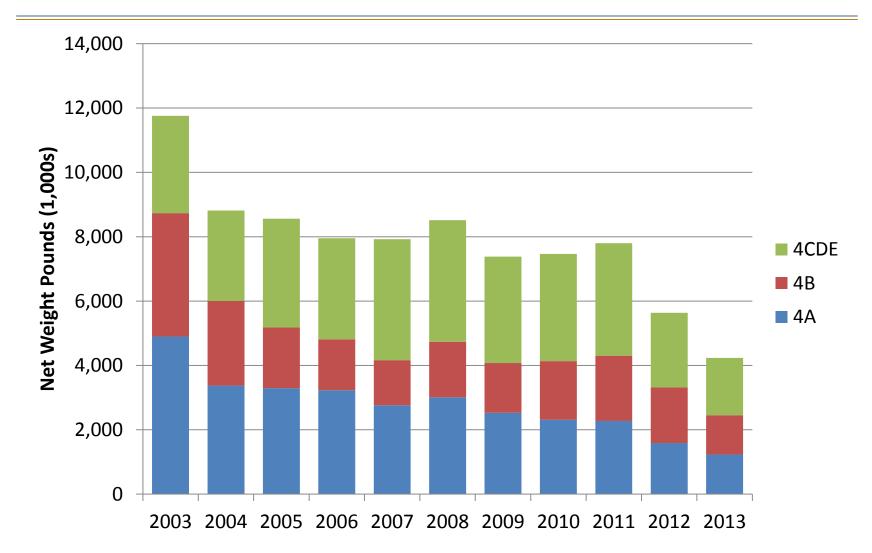
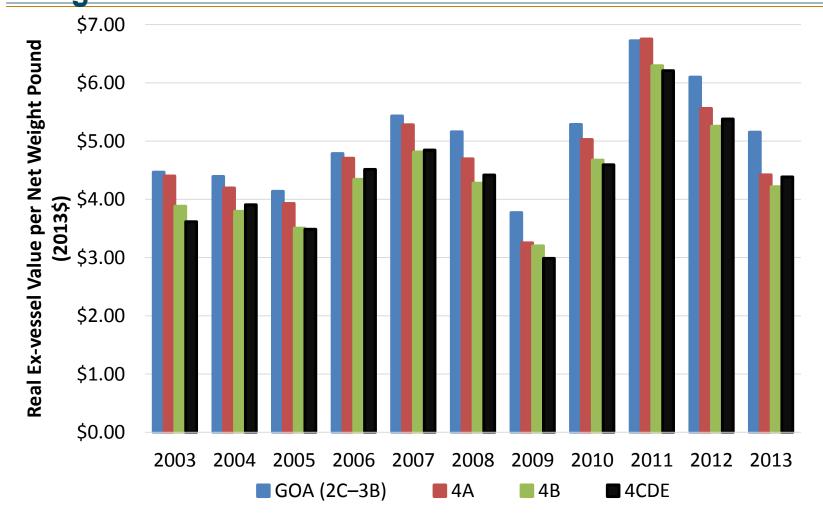




Figure 5-50. Estimated Real Ex-Vessel Value per Net Weight Pound Harvested





# Estimated Real Ex-vessel Revenue Area 4 Halibut Harvests (See Table 5-77)

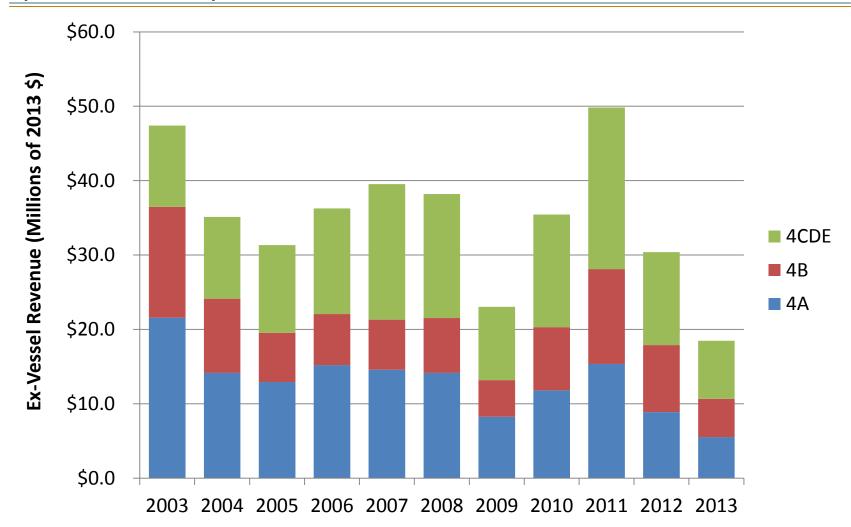
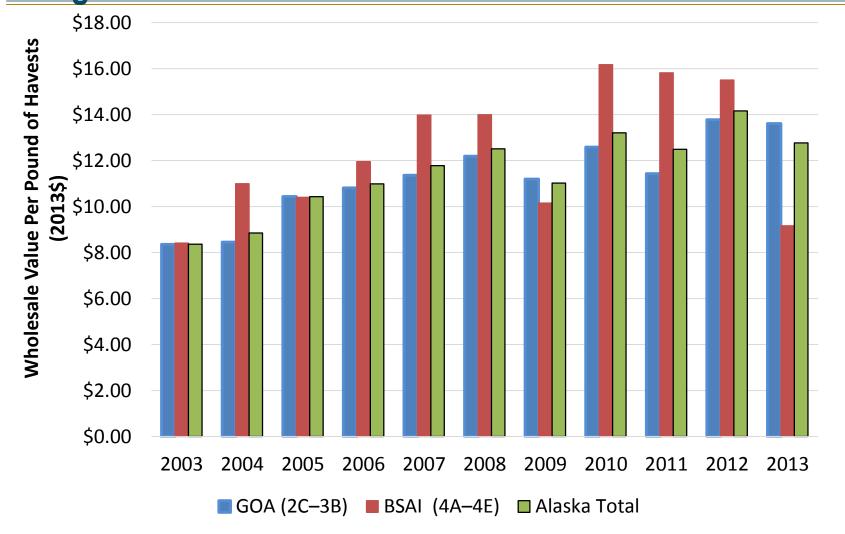


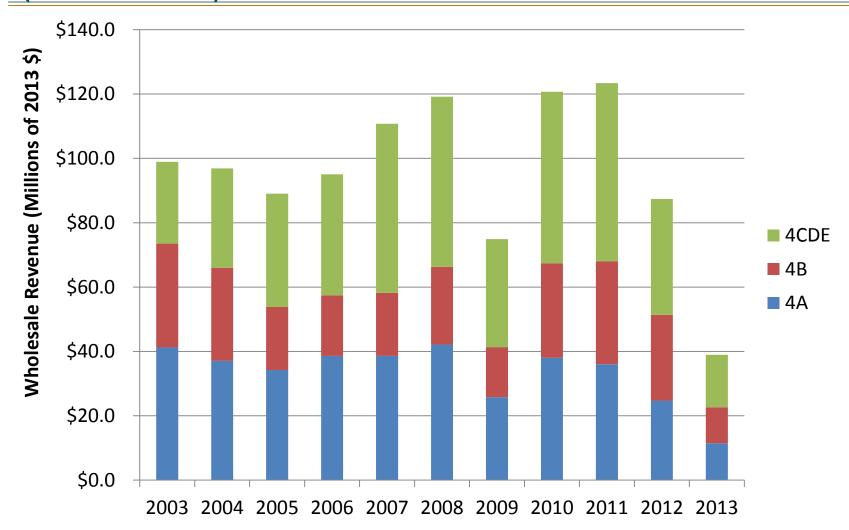


Figure 5-51. Estimated Real Wholesale Value per Net Weight Pound Harvested





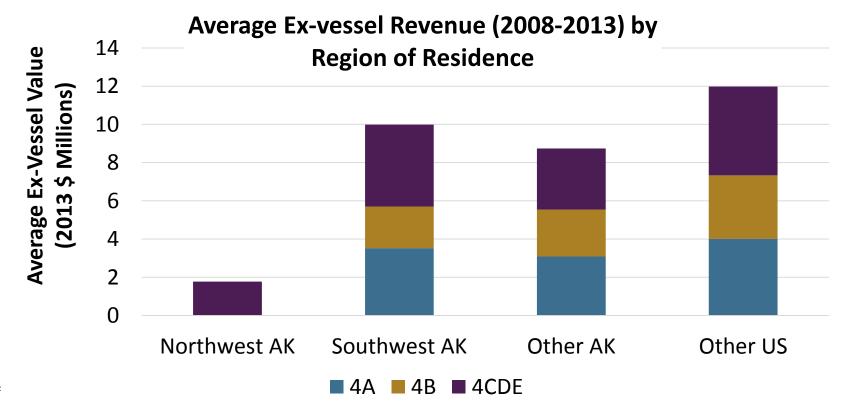
# **Estimated Real Wholesale Revenue of Area 4 Halibut Harvest** (See Table 5-79)



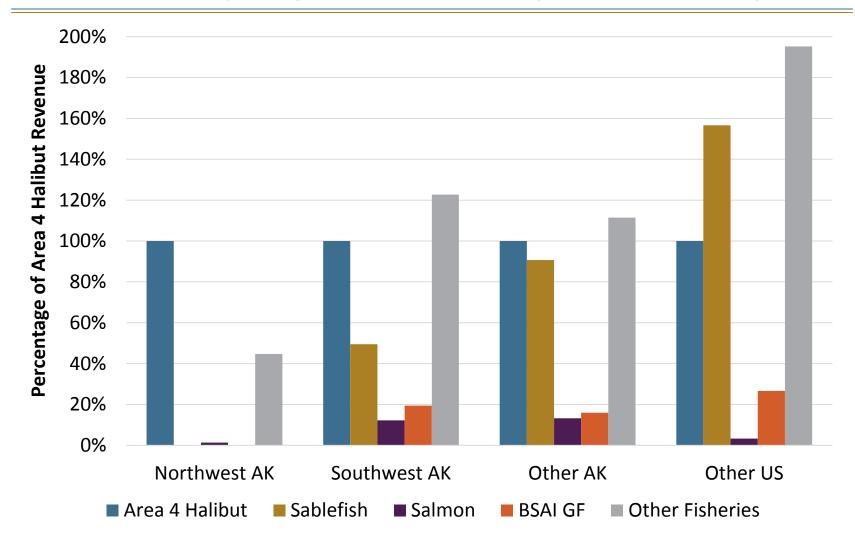


## Halibut Harvest by Region of Residence

- Analysis includes several tables and figures summarizing landings and revenue by owner region of residence.
- In the figure below (see Table 5-81) Southwest AK includes Kodiak Bristol Bay including the Pribilofs



# Relative Dependence on Area 4 Halibut of Active Participants by Region, 2008–2013 (See Table 5-85)





# Impacts of Options to Reduce PSC Limits for BSAI Trawl Limited Access



Figure 5-57 Impacts to BSAI TLA Vessels under Option 2.1—10% Reductions in Halibut PSC Limits

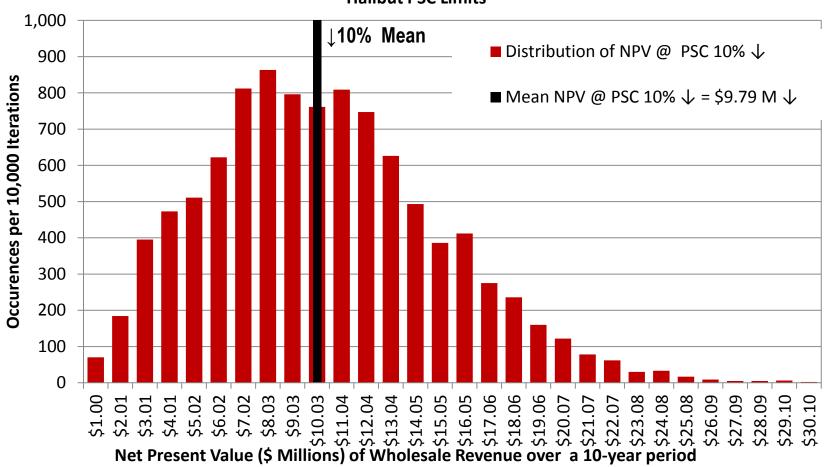




Figure 5-59 Impacts to BSAI TLA Vessels under Option 2.2—20% Reductions in Halibut PSC Limits

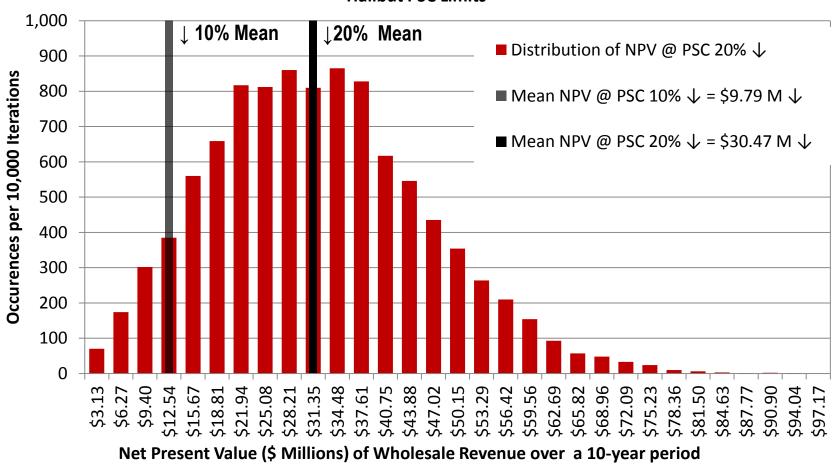




Figure 5-61 Impacts to BSAI TLA Vessels under Option 2.3—30% Reductions in **Halibut PSC Limits** 

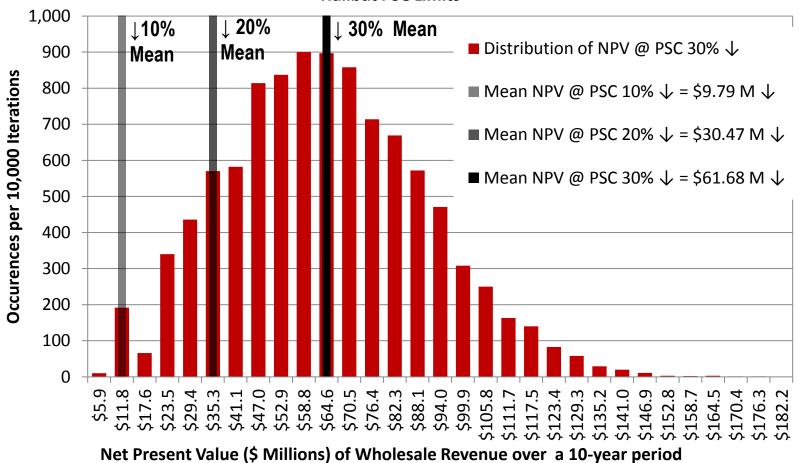




Figure 5-63 Impacts to BSAI TLA Vessels under Option 2.4—35% Reductions in Halibut PSC Limits

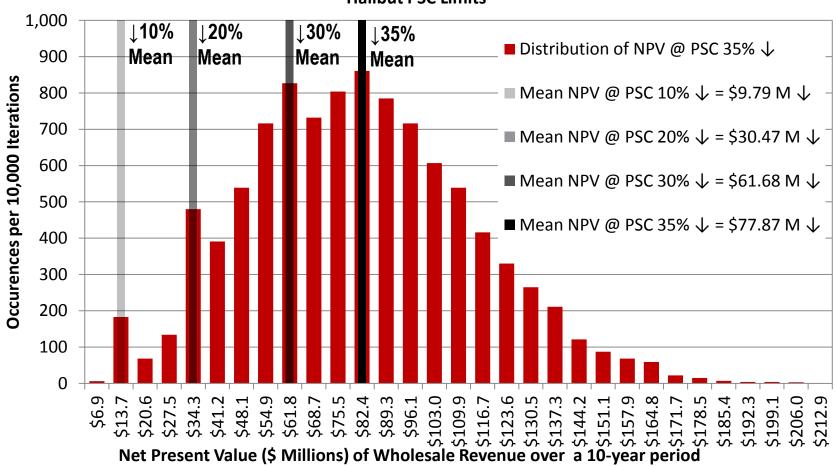




Figure 5-58 10-year Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 2.1

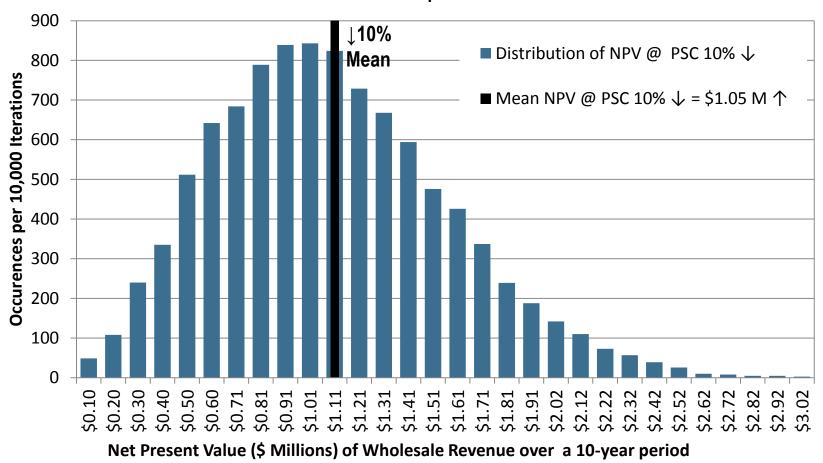




Figure 5-60 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 2.2

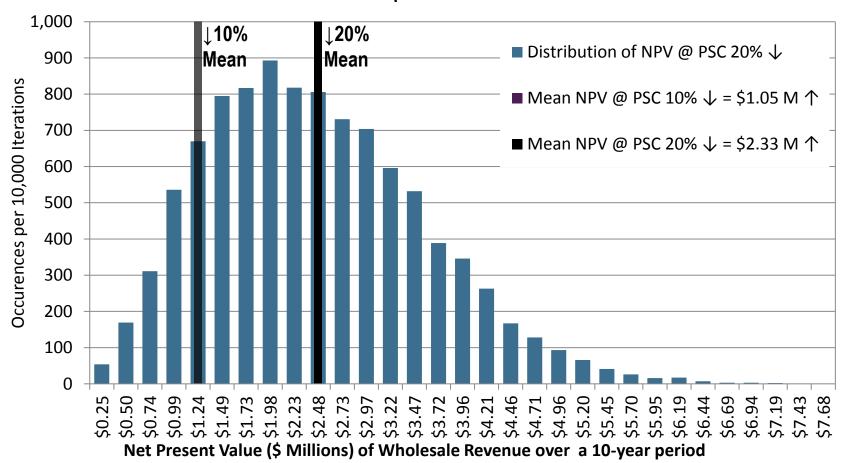
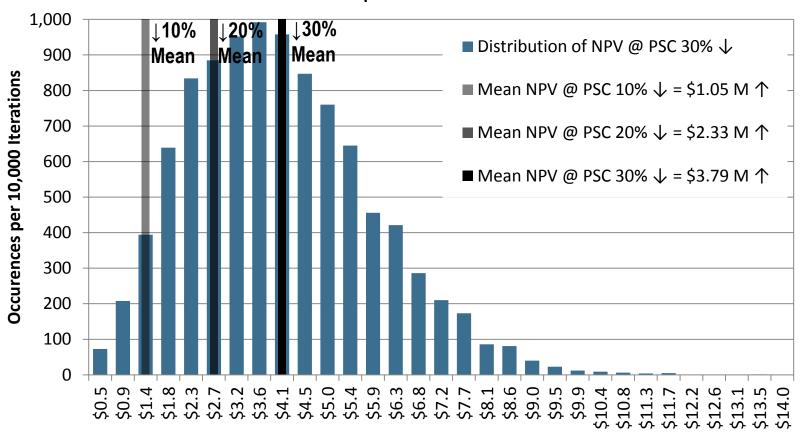




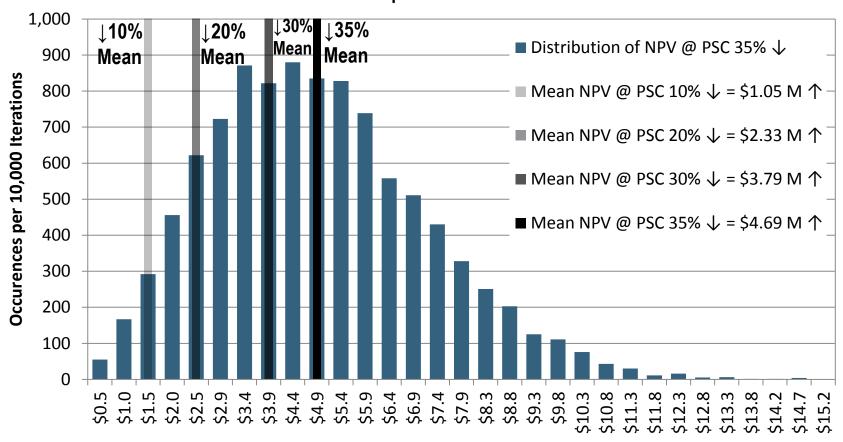
Figure 5-62 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 2.3



Net Present Value (\$ Millions) of Wholesale Revenue over a 10-year period



Figure 5-64 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 2.4



Net Present Value (\$ Millions) of Wholesale Revenue over a 10-year period



## Changes in BSAI TLA Target Fishery Revenues under Scenarios A and B, Compared to Status Quo

Figure 5-57 Impacts to BSAI TLA Vessels under Option 2.1—10% Reductions in **Halibut PSC Limits** All Targets All other targets Pacific Cod Yellowfin Sole PLCK | AMCK | OTHR 70% 75% 80% 85% 90% 95% 100% 105% 110% Percent of Status Quo Revenue by Target Fishery A: Whole-Fleet Shutdown & ■ B: Whole-Fleet Shutdown & Pollock PSC Limit Reduced Pollock PSC Limit Held Constant



Figure 5-59 Impacts to BSAI TLA Vessels under Option 2.2—20% Reductions in **Halibut PSC Limits All Targets** All other targets Pacific Cod Yellowfin Sole PLCK|AMCK|OTHR 70% 75% 80% 85% 90% 95% 100% 105% 110% Percent of Status Quo Revenue by Target Fishery A: Whole-Fleet Shutdown & B: Whole-Fleet Shutdown & Pollock PSC Limit Reduced Pollock PSC Limit Held Constant



Figure 5-61 Impacts to BSAI TLA Vessels under Option 2.3—30% Reductions in **Halibut PSC Limits All Targets** All other targets Pacific Cod Yellowfin Sole PLCK | AMCK | OTHR 90% 70% 75% 80% 85% 95% 100% 105% 110% Percent of Status Quo Revenue by Target Fishery A: Whole-Fleet Shutdown & B: Whole-Fleet Shutdown & Pollock PSC Limit Reduced Pollock PSC Limit Held Constant



Figure 5-63 Impacts to BSAI TLA Vessels under Option 2.4—35% Reductions in **Halibut PSC Limits All Targets** All other targets Pacific Cod Yellowfin Sole PLCK | AMCK | OTHR 70% 75% 80% 85% 90% 95% 100% 105% 110% Percent of Status Quo Revenue by Target Fishery A: Whole-Fleet Shutdown & B: Whole-Fleet Shutdown & Pollock PSC Limit Reduced Pollock PSC Limit Held Constant



#### Overall Results Table in the Executive Summary

	Current	i Mean HMT	New PSC	I I	Groundfish Fishery	Savings to	Commercial H	alibut Fishery	Potential U26	Halibut Fishery
	HMT Limit	1	Limit	Reductions	Foregone NPV	4A	¦ 4B	4CDE	Savings	gain of NPV
		Halibut Morta	ality (round n	nt)	2013\$ Million		•	2013\$ Million		
Options Affec	cting BSAI TLA	1				•				
2.1 @ 10%		! !	788	12 – 17	\$10 – \$16	4.0 – 6.4	0.4 – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	875	700	700	27 – 39	\$30 – \$50	8.9 – 11.9	1.6 – 2.4	11.1 – 16.7	3.5 – 5.0	\$2 – \$3
2.3 @ 30%	8/3	, /00 !	613	44 – 70	\$62 – \$92	15.0 – 24.8	3.4 – 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%		 	569	55 – 99	\$78 – \$145	17.4 – 37.2	4.2 – 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Affect	cting A80-CPs					-				
3.1 @ 10%		 	2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	2,325	2,037	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,323	1 2,03 <i>1</i>	1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	51.2 – 54.4	\$44 – \$46
3.4 @ 35%		! ! !	1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Affect	cting LGL-CVs									
All options	15	3	10–14		Th	ere are no mate	erial impacts und	ler any of the option	ns	
Options Affect	cting LGL-CPs		-							
5.1 @ 10%		 	684			There are no n	naterial impacts	under this option		
5.2 @ 20%	760	521	608			There are no n	naterial impacts	under this option		
5.3 @ 30%	700	1 321 !	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%		! ! !	494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6
Options Affect	cting CDQs									
6.1 @ 10%		 	354			There are no n	naterial impacts	under this option		
6.2 @ 20%	393	210	314			There are no n	naterial impacts	under this option		
6.3 @ 30%	აყა	1 Z IV	275			There are no n	naterial impacts	under this option		
6.4 @ 35%		!	255	2-2	\$0.5 – \$2	0.5 – 1.2	0.0 – 0.0	1.7 – 0.3	0.3 – 0.2	\$0.23 – \$0.16
Options Affect	cting Hook and	Line for Othe	r Targets			-				
All options	58	5	38–52		Th	ere are no mate	erial impacts und	ler any of the option	ns	

#### Results Categorized by Sector/Suboption

	Current	Mean HMT	New PSC	 	Groundfish Fishery Foregone	Savings	to Commerc Fishery		Potential U26	Halibut Fishery
	HMT Limit	Used	Limit	Reductions	NPV	4A	4B	4CDE	Savings	gain of NPV
	На	alibut Mort	ality (round	mt)	2013\$ Million		net weight	pounds (1,000	s)	2013\$ Million
Options Affe	ecting BSAI	TLA								
2.1 @ 10%			788	12 – 17	\$10 – \$16	4.0 – 6.4	0.4 – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	875	700	700	27 – 39	\$30 – \$50	8.9 – 11.9	1.6 – 2.4	11.1 – 16.7	3.5 – 5.0	\$2 – \$3
2.3 @ 30%	613	700	613	44 – 70	\$62 – \$92	15.0 – 24.8	3.4 – 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%			569	55 – 99	\$78 – \$145	17.4 – 37.2	4.2 – 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Affe	ecting A80-C	Ps	_				_		_	
3.1 @ 10%			2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	2,325	325 2,037	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,323	2,037	1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	51.2 – 54.4	\$44 – \$46
3.4 @ 35%	! !	 	1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Affe	ecting LGL-0	CVs	_							
All options	15	3	10–14		There a	are no materi	al impacts un	der any of the o	ptions	
Options Affe	ecting LGL-0	CPs								
5.1 @ 10%	 	 	684		The	ere are no ma	aterial impacts	s under this opti	on	
5.2 @ 20%	760	521	608	_	The	ere are no ma	aterial impact	s under this opti	on	
5.3 @ 30%	100	321	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%	ļ		494	¦ 34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6

#### Reductions in BSAI PSC, and Savings to Halibut Fishery by area

		·		1	I		4- 0	2-111-19-1	 	
	_	Mean	 		Groundfish	Savings	to Commerc Fishery	i		
	Current	HMT	New PSC		Fishery Foregone		ı		Potential U26	_
	HMT Limit	ı	Limit	Reductions	1	4A	H 4B	4CDE	Savings	gain of NPV
	Ha	alibut Mort	ality (round	int)	2013\$ Million		net weight	pounds (1,000s	<u>s)</u>	2013\$ Million
Options Aff	ecting BSAI	TLA		1		-	•			
2.1 @ 10%			788	12 – 17	\$10 – \$16	4.0 – 6.4	0.4 – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	875	700	700	27 – 39	\$30 – \$50	8.9 – 11.9	1.6 – 2.4	11.1 – 16.7	3.5 - 5.0	\$2 – \$3
2.3 @ 30%	013	700	613	44 – 70	\$62 – \$92	15.0 – 24.8	3.4 – 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%			569	55 – 99	\$78 – \$145	17.4 – 37.2	4.2 – 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Aff	ecting A80-C	Ps								
3.1 @ 10%		 	2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	2 225	2,325 2,037	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,323		1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	51.2 – 54.4	\$44 – \$46
3.4 @ 35%			1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Aff	ecting LGL-0	CVs								
All options	15	3	10–14		There a	are no materi	al impacts un	der any of the o	ptions	
Options Aff	ecting LGL-0	CPs								
5.1 @ 10%			684		The	ere are no ma	aterial impact	s under this opti	on	
5.2 @ 20%	760	F24	608		The	ere are no ma	aterial impact	s under this opti	on	
5.3 @ 30%	760	521	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%	 	 	494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6
O-4: Aff				•			•			

# The first number in the range represents Scenario A

	Current   HMT Limit		1	Reductions		Savings 4A	to Commerc Fishery	4CDE	Savings	Halibut Fishery gain of NPV
			ality (round	mt)	2013\$ Million		net weight	pounds (1,000s	s)	2013\$ Million
Options Affe	ecting BSAI	TLA		. ^		$\wedge$		^	1	
2.1 @ 10%	İ		788	12 – 17	\$10 – \$16	4.0 – 6.4	<b>1.4</b> – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	875	700	700	27 - 39	\$30 – \$50	8.9 - 11.9	1.6 - 2.4	11.1 – 16.7	3.5 – 5.0	\$2 – \$3
2.3 @ 30%	0/3	700	613	44 - 70	\$62 – \$92	5.0 – 24.8	3.4 - 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%			569	;   55 <u> –</u> 99	\$78 – \$145	7.4 – 37.2	1.2 - 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Affe	ecting A80-C	Ps								
3.1 @ 10%	 		2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	2 225	2.027	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,325	2,037	1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	51.2 – 54.4	\$44 – \$46
3.4 @ 35%	 		1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Affe	ecting LGL-C	Vs								
All options	15	3	10–14		There a	are no materi	al impacts un	der any of the c	ptions	
Options Affe	ecting LGL-C	Ps								
5.1 @ 10%	 		684		The	ere are no ma	aterial impact	s under this opti	on	
5.2 @ 20%	700	504	608		The	ere are no ma	aterial impact	s under this opti	on	
5.3 @ 30%	760	521	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%	1		494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 <b>–</b> 40.2	4.6 – 7.0	\$4 – \$6

# Histograms of revenue for both Scenario A & Scenario B are summarized here

	Current HMT Limit	Mean HMT Used	New PSC	Reductions	Groundfish Fishery Foregone NPV	Savings 4A	to Commer Fishery	cial Halibut	Potential U26	Halibut Fishery gain of NPV
	Ha	libut Mort	ality (round	mt)	2043\$ Million		net weight	pounds (1,000	s)	2013\$ Million
Options Aff	ecting BSAI	TLA								$\rightarrow$
2.1 @ 10%	 		788	12 – 17	\$10 – \$16	4.0 - 6.4	0.4 – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	875	700	700	27 – 39	\$30 – \$50	8.9 – 11.9	1.6 – 2.4	11.1 – 16.7	3.5 – 5.0	\$2 – \$3
2.3 @ 30%	6/5	700	613	44 – 70	\$62 – \$92	15.0 – 24.8	3.4 – 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%	 		569	55 – 99	\$78 – \$145	17.4 – 37.2	4.2 – 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Affe	ecting A80-C	Ps								
3.1 @ 10%	 		2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	1 225	2.027	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,323	2,325   2,037	1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	51.2 – 54.4	\$44 – \$46
3.4 @ 35%	 		1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Aff	ecting LGL-C	CVs								-
All options	15	3	10–14		There a	are no mater	ial impacts ur	nder any of the	options	
Options Affe	ecting LGL-C	Ps								
5.1 @ 10%	 		684		The	ere are no ma	aterial impact	s under this opt	ion	
5.2 @ 20%	760	E24	608		The	ere are no ma	aterial impact	s under this opt	ion	
5.3 @ 30%	760 ¦	521	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%	 		494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6

# Not in model, but additional Area 4 halibut fishery yield from U26 halibut PSC estimated

	Current ¦	Mean HMT Used	New PSC	Reductions	Groundfish Fishery Foregone NPV	Savings 4A	to Commerc Fishery	cial Halibut	Potential U26 Savings	Halibut Fishery gain of NPV
	Ha	libut Mort	ality (round	mt)	2013\$ Million		net weight	: pounds (1,00		2013\$ Million
Options Affe	ecting BSAI	TLA					<del>-</del>	-		
2.1 @ 10%	 		788	12 – 17	\$10 – \$16	4.0 – 6.4	0.4 – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	875	700	700	27 – 39	\$30 – \$50	8.9 – 11.9	1.6 – 2.4	11.1 – 16.7	3.5 – 5.0	\$2 – \$3
2.3 @ 30%	0/0	700	613	44 – 70	\$62 – \$92	15.0 – 24.8	3.4 – 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%	 		569	55 – 99	\$78 – \$145	17.4 – 37.2	4.2 – 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Aff	ecting A80-C	Ps								
3.1 @ 10%	 		2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	2,325	2,037	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	6 23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,323	2,037	1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	3 51.2 – 54.4	\$44 – \$46
3.4 @ 35%	 		1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Aff	ecting LGL-C	Vs								
All options	15	3	10–14		There a	are no materi	al impacts un	der any of the	options	
Options Affe	ecting LGL-C	Ps								
5.1 @ 10%	 		684		The	ere are no ma	aterial impact	s under this op	otion	
5.2 @ 20%	760	700 504	608		The	ere are no ma	aterial impact	s under this op	otion	
5.3 @ 30%	100	521	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%	 		494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6

# Impacts of Options to Reduce PSC Limits for Amendment 80 CPs



Figure 5-65 Impacts to A80-CPs under Option 3.1—10% Reductions in Halibut PSC Limits

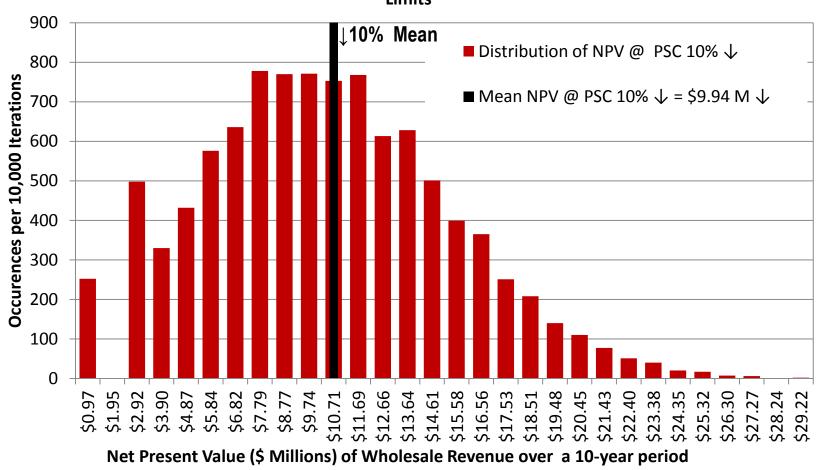




Figure 5-67 Impacts to A80-CPs under Option 3.2—20% Reductions in Halibut PSC Limits

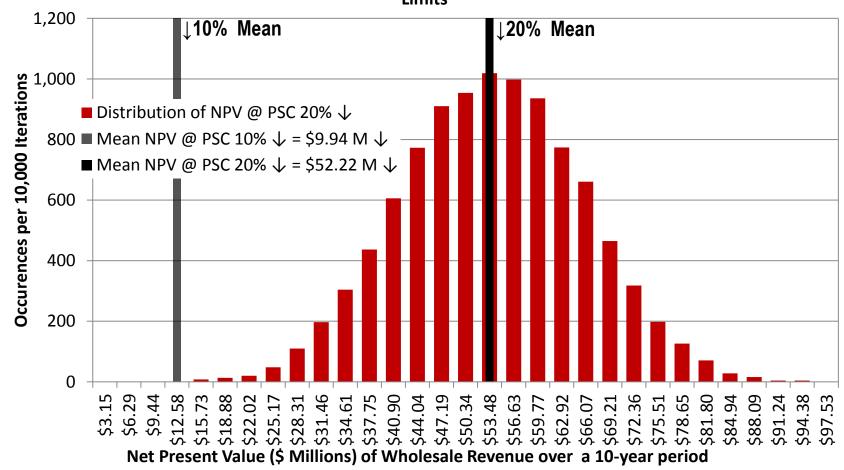




Figure 5-69 Impacts to A80-CPs under Option 3.3—30% Reductions in Halibut PSC Limits

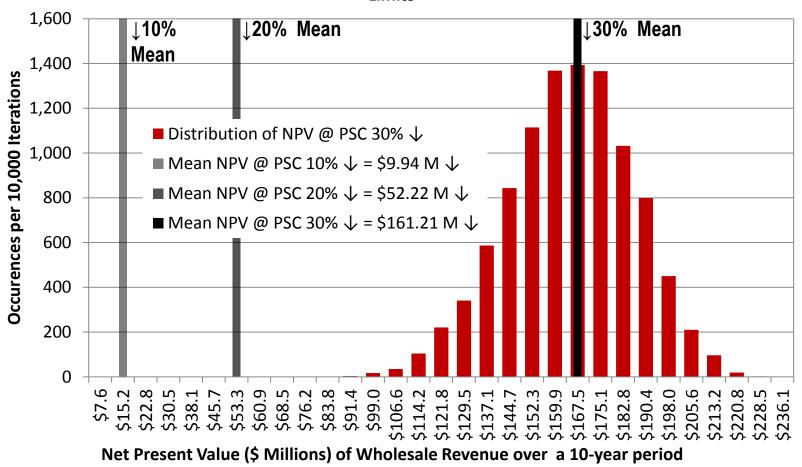
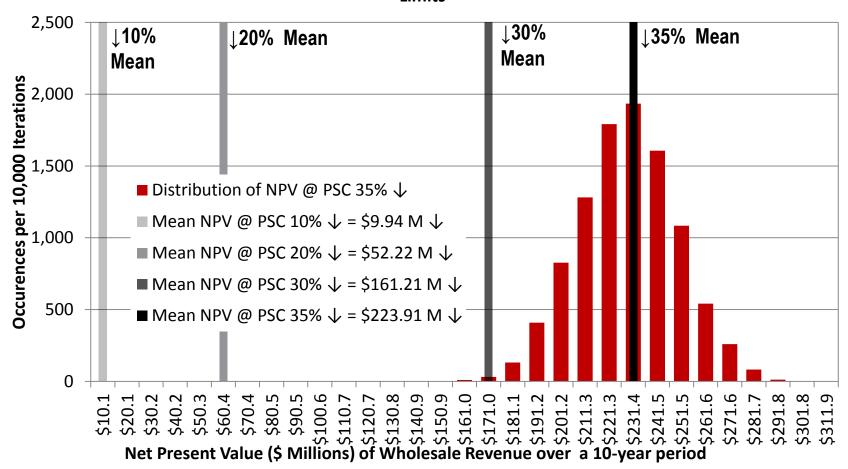




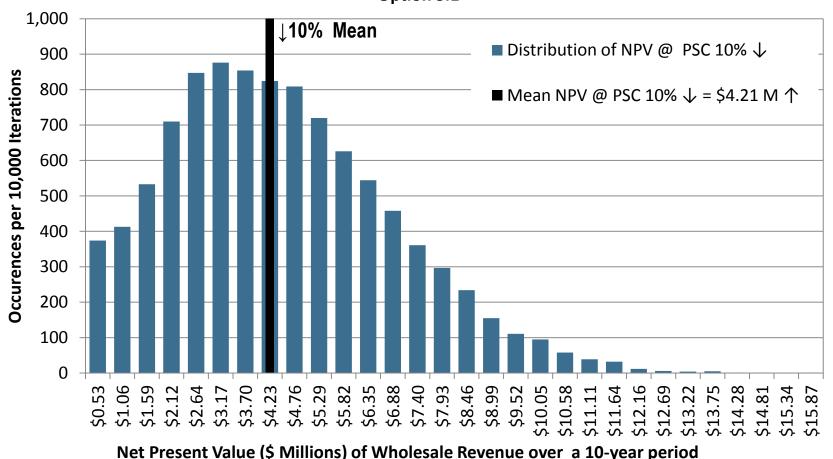
Figure 5-71 Impacts to A80-CPs under Option 3.4—35% Reductions in Halibut PSC Limits





# Halibut Fishery NPVs – A80-CPS PSC Reductions under Scenario A

Figure 5-66 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 3.1

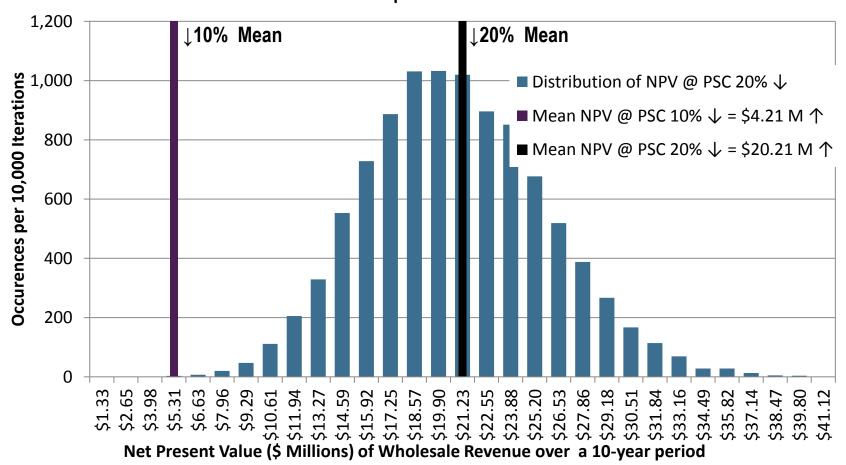






# Halibut Fishery NPVs – With A80-CPS PSC Reductions under Scenario A

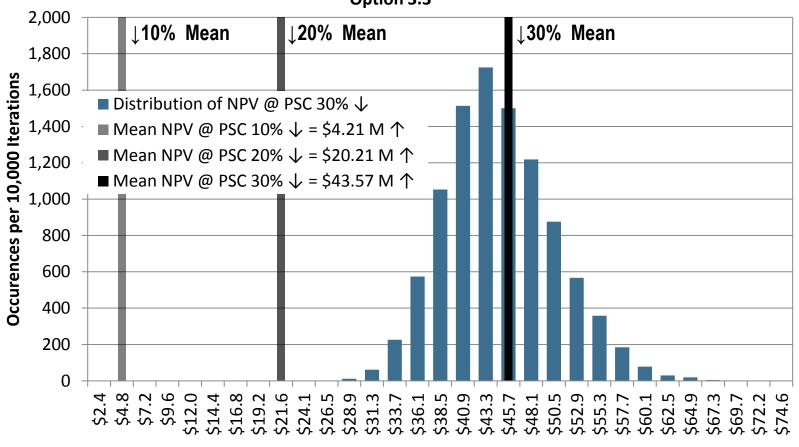
Figure 5-68 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 3.2





# Halibut Fishery NPVs – With A80-CPS PSC Reductions under Scenario A

Figure 5-70 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 3.3



Net Present Value (\$ Millions) of Wholesale Revenue over a 10-year period



# Halibut Fishery NPVs – With A80-CPS PSC Reductions under Scenario A

Figure 5-70 Net Present Value of Revenue Impacts to Commercial Halibut Fisheries of Option 3.4

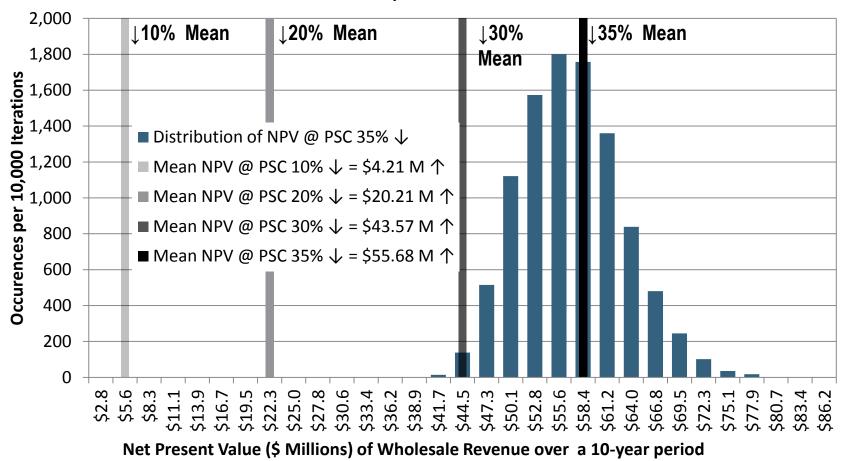


Figure 5-65 Impacts to A80-CPs under Option 3.1—10% Reductions in Halibut PSC Limits **All Targets Other Targets** Pacific Cod **Flathead** Rockfish Arrowtooth Atka Mack **Rock Sole** Yellowfin 70% 80% 85% 90% 60% 65% 75% 95% 100% 105% **Percent of Status Quo Revenue by Target Fishery** 

■ A: Drop Historically Worst Fleet-wide Target-Months ■ B: Each Company Complies with Own Limit



Figure 5-67 Impacts to A80-CPs under Option 3.2—20% Reductions in Halibut PSC Limits **All Targets Other Targets** Pacific Cod Flathead Rockfish Arrowtooth Atka Mack **Rock Sole** Yellowfin 60% 65% 70% 75% 80% 85% 90% 95% 100% 105% Percent of Status Quo Revenue by Target Fishery

■ A: Drop Historically Worst Fleet-wide Target-Months ■ B: Each Company Complies with Own Limit



Figure 5-69 Impacts to A80-CPs under Option 3.3—30% Reductions in Halibut PSC Limits **All Targets Other Targets** Pacific Cod Flathead Rockfish Arrowtooth Atka Mack **Rock Sole** Yellowfin

Percent of Status Quo Revenue by Target Fishery

■ A: Drop Historically Worst Fleet-wide Target-Months

■ B: Each Company Complies with Own Limit

80%

85%

90%

95%

75%

65%

70%

60%



105%

100%

Figure 5-69 Impacts to A80-CPs under Option 3.3—30% Reductions in Halibut PSC Limits **All Targets Other Targets** Pacific Cod Flathead Rockfish Arrowtooth Atka Mack **Rock Sole** Yellowfin 65% 75% 80% 85% 100% 60% 70% 90% 95% 105% **Percent of Status Quo Revenue by Target Fishery** 

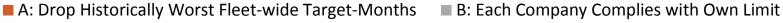
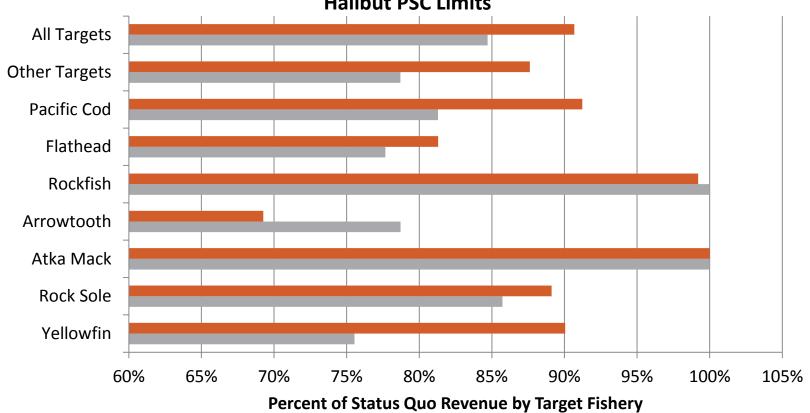




Figure 5-71 Impacts to A80-CPs under Option 3.4—35% Reductions in Halibut PSC Limits

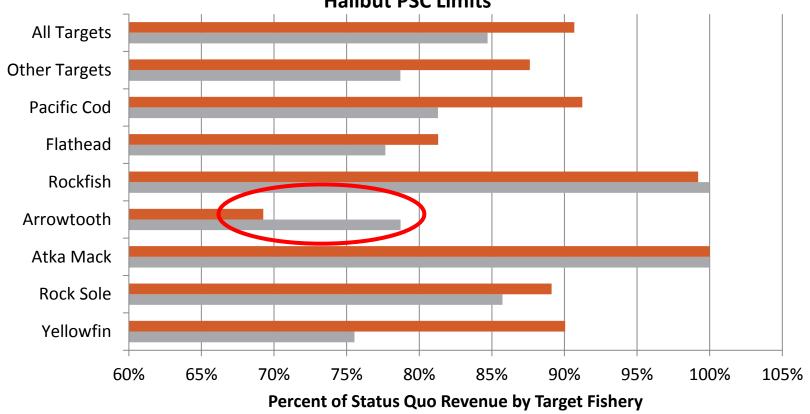


referred Status Quo Neveride by farget in

■ A: Drop Historically Worst Fleet-wide Target-Months ■ B: Each Company Complies with Own Limit



Figure 5-71 Impacts to A80-CPs under Option 3.4—35% Reductions in Halibut PSC Limits



■ A: Drop Historically Worst Fleet-wide Target-Months

■ B: Each Company Complies with Own Limit



#### **Amendment 80 Options Summary**

	Current	Mean HMT	New PSC	 	Groundfish Fishery Foregone		to Commer Fishery		Patential II26	Halibut Fishery
	HMT Limit		Limit Reduction		, ,	4A	H 4B H 4CDE		Savings	gain of NPV
	Ha	libut Mort	tality (round	mt)	2013\$ Million		: net weight	: pounds (1,000:		2013\$ Million
Options Affe	ecting BSAI	TLA								
2.1 @ 10%	 		788	12 – 17	\$10 – \$16	4.0 – 6.4	0.4 – 0.5	5.3 – 6.3	1.6 – 2.1	\$1 – \$1.4
2.2 @ 20%	075	700	700	27 – 39	\$30 – \$50	8.9 – 11.9	1.6 – 2.4	11.1 – 16.7	3.5 – 5.0	\$2 – \$3
2.3 @ 30%	875	700	613	44 – 70	\$62 – \$92	15.0 – 24.8	3.4 – 4.0	17.0 – 25.6	5.7 – 8.8	\$4 – \$6
2.4 @ 35%			569	55 – 99	\$78 – \$145	17.4 – 37.2	4.2 – 5.2	22.0 – 35.9	7.1 – 12.7	\$5 – \$8
Options Affe	ecting A80-C	Ps								
3.1 @ 10%			2093	40 – 57	\$10 – \$19	3.0 – 1.6	0.1 – 0.0	36.2 – 54.3	5.0 – 7.1	\$4 – \$6
3.2 @ 20%	2 225	2,325 2,037	1860	191 – 212	\$52 – \$115	25.7 – 23.9	0.1 – 0.0	162.6 – 184.6	23.8 – 26.3	\$20 – \$22
3.3 @ 30%	2,323	2,037	1628	414 – 441	\$161 – \$285	59.3 – 66.6	18.7 – 11.6	327.5 – 352.8	51.2 – 54.4	\$44 – \$46
3.4 @ 35%			1511	531 – 555	\$224 – \$368	79.6 – 87.9	32.4 – 14.2	406.5 – 439.6	65.5 – 68.5	\$56 – \$58
Options Affe	ecting LGL-C	CVs	_							
All options	15	3	10–14		There a	are no materi	al impacts un	der any of the o	ptions	
Options Affe	ecting LGL-C	CPs .								
5.1 @ 10%	 		684		The	ere are no ma	aterial impact	s under this opti	ion	
5.2 @ 20%	760	521	608		The	ere are no ma	aterial impact	s under this opti	ion	
5.3 @ 30%	100	JZ I	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%	 		494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6

#### Impacts of Options to Reduce PSC Limits for Longline CVs

■ PSC limit reduction options have no material effect on longline CVs



# Impacts of Options to Reduce PSC Limits for Longline CPs



C5 AP Northern Economics Presentation February 2015

# Impacts of Options to Reduce PSC Limits for Longline CPs

- Longline CPs are not materially affected by options that would reduce PSC Limits by 10% or by 20%
- These options would limit significant increases in PSC by Longline CPs



#### **Bottom Half of the Summary Table**

	Current	Mean HMT	New PSC	 	Groundfish Fishery Foregone		to Commerc Fishery	cial Halibut		Halibut Fisher
	HMT Limit	Used	Limit	Reductions	NPV	4A	¦ 4B	L 4CDE	Savings	gain of NPV
	Ha	libut Mort	tality (round	d mt)	2013\$ Million		net weight	pounds (1,000	s)	2013\$ Million
<b>Options Aff</b>	ecting LGL-0	Ps								
5.1 @ 10%			684		The	ere are no ma	aterial impact	s under this op	tion	
5.2 @ 20%	760	<b>524</b>	608		The	ere are no ma	aterial impact	s under this op	tion	
5.3 @ 30%	760	521	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%			494	34 – 51	\$27 – \$50	3.3 – 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6
Options Aff	ecting CDQs			•			•		•	•
6.1 @ 10%	I I		354		The	ere are no ma	aterial impact	s under this op	tion	
6.2 @ 20%	202	240	314		The	ere are no ma	aterial impact	s under this op	tion	
6.3 @ 30%	393	210	275		The	ere are no ma	aterial impact	s under this op	tion	
6.4 @ 35%	 		255	2-2	\$0.5 – \$2	0.5 – 1.2	0.0 - 0.0	1.7 – 0.3	0.3 – 0.2	\$0.23 - \$0.16
Options Aff	ecting Hook	and Line	for Other Ta	rgets			•		•	•
All options	58	5	38–52		There a	are no mater	ial impacts un	der any of the	options	



#### Impacts of Options to Reduce PSC Limits for **CDQ Groundfish Fisheries**



C5 AP Northern Economics Presentation ebruary 2015

# Impacts of Options to Reduce PSC Limits for CDQ Groundfish Fisheries

- The CDQ Groundfish fisheries are not materially affected options that would reduce PSC Limits by 10%, 20%, or by 30%
- CDQ Groundfish fisheries (particularly for flatfish species) have not been fully utilized
- These option would limit increases in groundfish harvests and PSC in CDQ fisheries.



#### **Bottom Half of the Summary Table**

		Mean	!	i !	Groundfish	Savings	s to Commer	cial Halibut		
	Current	НМТ	New PSC	! ! !	Fishery Foregone		Fishery	ı	P tential U26	Halibut Fishery
	HMT Limit	Used	Limit	Reductions	NPV	4A	4B	4CDE	Savings	gain of NPV
	На	alibut Mort	ality (round	l mt)	2013\$ Million		net weight	pounds (1,00	Os)	2013\$ Million
Options Affe	ecting LGL-0	CPs								
5.1 @ 10%		 	684		The	ere are no m	aterial impact	s under this op	tion	
5.2 @ 20%	760	5 <b>21</b>	608		The	ere are no m	aterial impact	s under this op	tion	
5.3 @ 30%	760	; 321 !	532	13 – 30	\$10 – \$24	2.0 – 5.4	0.7 – 4.1	11.5 – 22.9	1.8 – 4.1	\$1.5 – \$3.5
5.4 @ 35%			494	34 – 51	\$27 – \$50	3.3 - 8.5	5.9 – 6.5	26.8 – 40.2	4.6 – 7.0	\$4 – \$6
Options Aff	ecting CDQs	;		-						
6.1 @ 10%	$\overline{}$		354		The	ere are no m	aterial impact	s under this op	tion	
6.2 @ 20%	393	210	314		The	ere are no m	aterial impact	s under this op	tion	
6.3 @ 30%	393	, Z10	275		The	ere are no m	aterial impact	s under this op	tion	
6.4 @ 35%		I I I	255	2-2	\$0.5 – \$2	0.5 – 1.2	0.0 – 0.0	1.7 – 0.3	0.3 – 0.2	\$0.23 – \$0.16
Options Aff	ecting Hook	and Line	for Other Ta	rgets						
All options	58	5	38–52		There a	are no mater	ial impacts un	nder any of the	options	



# **Economic Impacts of Reducing BSAI Halibut PSC Limits**

#### **Questions?**

Marcus L. Hartley

**February 4, 2015** 

