

Pre-Take Reduction Team Meeting  
Nov 19-20, 2009 - Honolulu, Hawaii

Understanding the underlying data, analyses issues -  
Mortality and serious injury estimation



Presented by  
Karin Forney (Southwest Fisheries Science Center)

# History of marine mammal take estimation (HI longline)

<p><b>Kleiber 1999</b> (1994-1998) ~4% coverage</p>	<ul style="list-style-type: none"> <li>• Rough, fleet-wide estimate (sampling uneven)</li> <li>• No distinction between swordfish/tuna/mixed</li> <li>• Estimated total mortality and injury for 5 years</li> </ul>
<p><b>Forney 2004</b> (1994-2002) 4-25% coverage</p>	<ul style="list-style-type: none"> <li>• Preliminary estimates with details required by MMPA</li> <li>• Simple separation of swordfish, tuna, mixed sets</li> <li>• Ratio estimate using sets as the unit of effort</li> <li>• Serious/not serious injury determinations</li> <li>• Separate estimates for HI &amp; Palmyra EEZs, high seas</li> </ul>
<p><b>Forney and Kobayashi 2007</b> (1994-2005) 4-34% coverage</p>	<ul style="list-style-type: none"> <li>• Updated estimates through 2005</li> <li>• More sophisticated method (CART) to separate set types based on new regulatory definitions (shallow/deep, other)</li> <li>• Otherwise as above</li> </ul>
<p><b>Forney and McCracken 2008</b> (2002-2006) Coverage: 100% shallow-set ≥20% deep-set</p>	<ul style="list-style-type: none"> <li>• New method of placing observers on deep-set vessels</li> <li>• Trip-based estimation to match observer placement</li> <li>• Estimates similar to previous, but more accurate</li> <li>• Uncertainties remained because of difficulty allocating rare marine mammal takes by EEZ region and as dead/seriously injured/not seriously injured</li> </ul>
<p><b>McCracken and Forney 2009</b></p>	<ul style="list-style-type: none"> <li>• As above, for period 2003-2007</li> </ul>

# Cetacean Takes (1994-2008)

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- 119 cetaceans (13 species) reported hooked or entangled by observers, 1994-2008
- Most common: false killer whale, Risso's dolphin, short-finned pilot whale
- Depredation of catch or bait in ~5-6% of sets
- Most cetaceans released alive but injured, often with gear attached



*Photo: NOAA-PIRO Observer Program*

# Cetacean Mortality and Serious Injury Estimation Process

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- Review all observer data on cetacean takes
- Make serious injury determinations
- Estimate proportions killed, seriously injured, or not seriously injured by species/species group
- Conduct analysis to estimate fleet-wide M&SI
- Assign M&SI by stock / EEZ area
- Calculate 5-yr average annual M&SI, by stock for comparison to PBR in stock assessment report

# Mortalities and Serious Injuries of All Cetaceans (1994-2008)

- 119 takes observed
  - 12 animals dead upon retrieval
  - 107 reported as injured
- Injuries examined on a case-by-case basis using observer notes (nature of injury, behavior, gear attached when animal released)



*Photo: NOAA-PIRO Observer Program*

- Using Andersen et al. 2008 criteria:

**86 serious** (e.g. hooked in mouth, substantial gear left attached with potential to wrap around appendages or head)

**21 not serious** (e.g. hooked in flipper, completely freed from gear)

# Serious Injury Determination - Examples

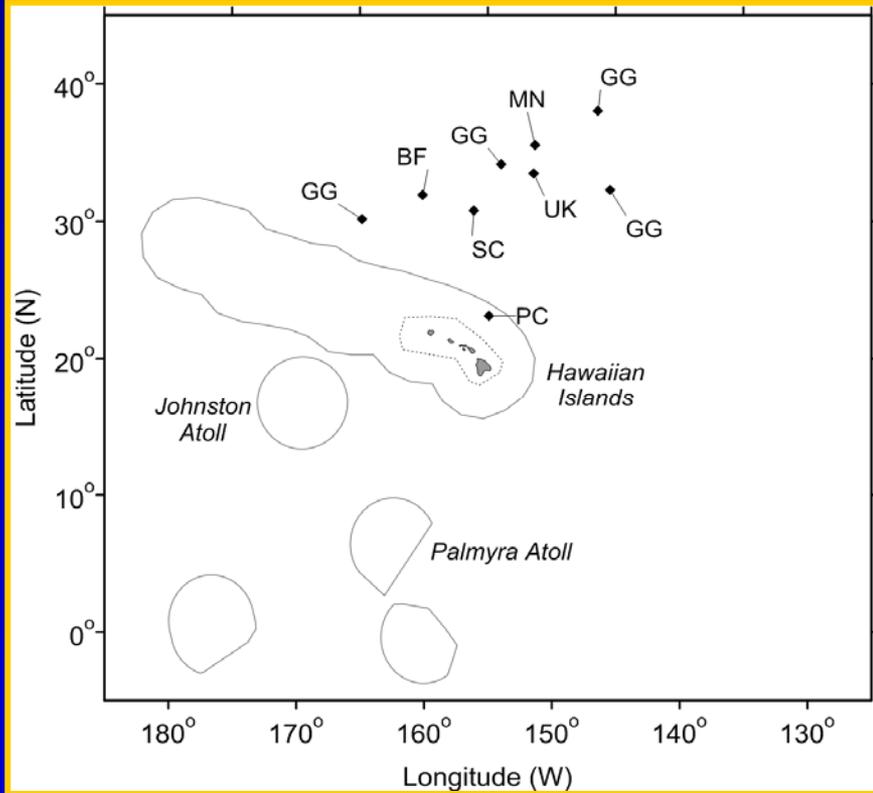
Species	Observer Description	Determination
False killer whale	Hooked in mouth, pulled free, hook and line retrieved.	Not Serious
Short-finned pilot whale	Hooked in mouth, hook, leader and 7m line remained	Serious
Risso's dolphin	Hooked inside mouth; 18/0 offset circle hook and approx 14.5 m of clear monofilament line with 80g wt left attached	Serious
Striped dolphin	18/0 Offset circle hook and ~2ft line wrapped tightly around beak, preventing beak from opening; Hook presumed inside mouth / swallowed. Dolphin struggled during attempt to cut line; came loose and slowly swam down/away. Not seen again	Serious
False killer whale	Hooked/entangled @ head area; 15 or 18 offset circle hook, 0.5m leader, 45g weight and 7m branchline attached when line cut	Serious
False killer whale	Hooked and entangled @ fluke; <1ft line left attached to hook after line cut	Not Serious

# Mortalities and Serious Injuries of all cetaceans (1994-2008)

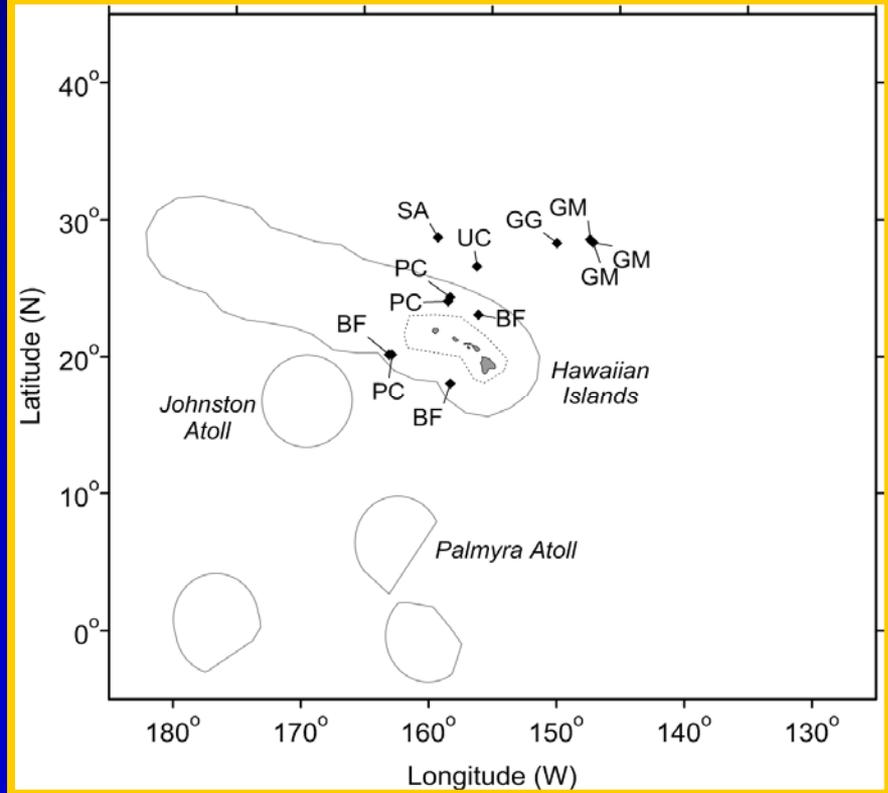
SPECIES	Deep-set				Shallow-set				Other
	Dead	Serious	Not Serious	Total	Dead	Serious	Not Serious	Total	Serious
False killer whale	2	24	3	29		1	1	2	1
Pilot whale	1	7	3	11	1	1		2	
'Blackfish'		11		11		1		1	
Risso's dolphin	1	4		5	2	15		17	
Bottlenose dolphin	1	1		2		6		6	
Spotted dolphin	2			2					
Striped dolphin	1			1		1		1	
Spinner dolphin							1	1	1
Common dolphin							1	1	
Mesoplodon beaked whale	1		1	2					
Unidentified beaked whale		1		1			1	1	
Pygmy or dwarf sperm whale							1	1	
Humpback whale			3	3		1	1	2	
Sperm whale							1	1	
Bryde's whale							1	1	
Unidentified whale/dolphin		7	2	9		3	1	4	
All species	9	55	12	76	3	29	9	41	2

# Cetacean Mortality and Serious Injury in Hawaii-based Longline Fisheries (2008)

Swordfish (Shallow Set)  
100% coverage

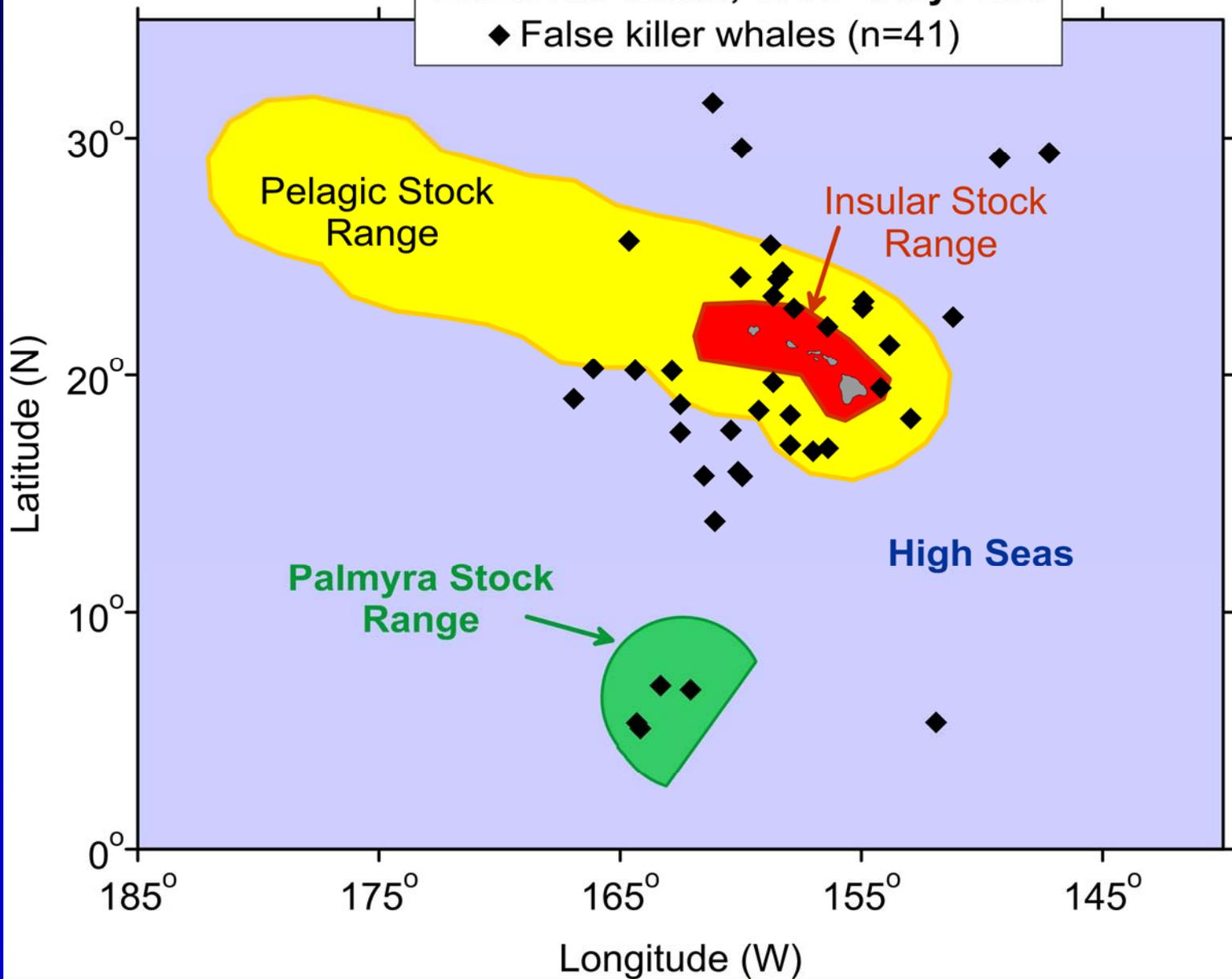


Tuna (Deep Set)  
≥20% coverage



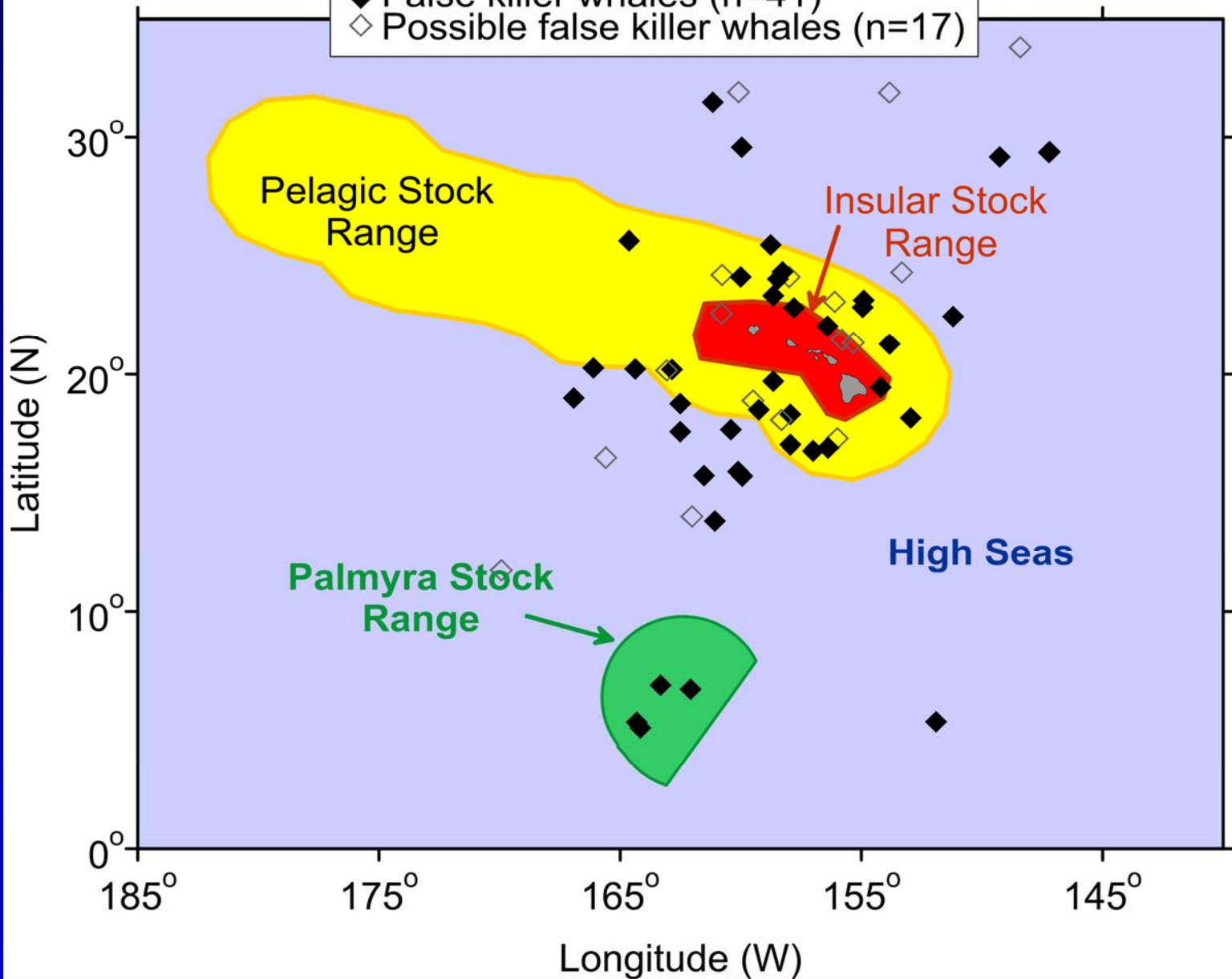
**Observed Takes, 1994 - July 2009**

◆ False killer whales (n=41)



# Observed Takes, 1994 - July 2009

- ◆ False killer whales (n=41)
- ◇ Possible false killer whales (n=17)



# Data details and results

## "The early years"

False killer whale - mortality and serious injury  
Hawaii-based longline fishery

Year	Covg	<u>Hawaiian EEZ</u>		<u>High Seas</u>		<u>Palmyra EEZ</u>	
		Observed	Estimated	Observed	Estimated	Observed	Estimated
1994	5%	0	0	0	0	0	0
1995	5%	0	0	0	0	0	0
1996	4%	0	0	0	0	0	0
1997	4%	1	74	0	0	0	0
1998	5%	1	12	0	0	0	0
1999	4%	0	0	0	0	0	0
2000	11%	0	0	0	0	0	0
2001	23%	0	0	2	11	1	4
2002	25%	0	0	3	12	2	5
<b>Average</b>			10		3		1

# Data details and results

## Deep-Set Fishery, 2003-2007

False killer whale - mortality and serious injury

	Covg	<u>HI EEZ</u>		<u>High Seas</u>		<u>Palmyra EEZ</u>	
		Observed	Estimated	Observed	Estimated	Observed	Estimated
2003	22%	2	7	0	0	0	0
2004	25%	3	12	3	14	0	0
2005	28%	1	3	1	3	0	0
2006	22%	1	7	1	7	0	0
2007	20%	1	8	0	3	1	2
<b>5-yr Avg</b>			<b>7.4</b>		<b>5.4</b>		<b>0.4</b>
CV (Avg)			0.19		0.45		1.01

PBR:

2.5 (Pelagic)

(5.2)

6.4

0.8 (Insular)

*(Draft 2009 Stock Assessment Report)*

# Data details and results

## Shallow-Set Fishery, 2003-2007

False killer whale - mortality and serious injury

	Covg	<u>All areas</u>	
		Observed	Estimated
2003		(Fishery closed)	
2004	100%	0	0
2005	100%	0	0
2006	100%	0	0
2007	100%	0	0

In 2008, one false killer whale was not seriously injured

# Future of cetacean bycatch estimation (HILL)

- McCracken 2009 (2004-2008)
  - Allocation of estimated takes (mortality, serious injury, not serious injury)
  - Stock attribution when takes are rare
  - New variance estimation method to reduce uncertainty
- To be incorporated into Draft 2010 Stock Assessment Reports
- Incorporating 'blackfish' into analysis to take into account that some portion of these were likely false killer whales

Questions?

