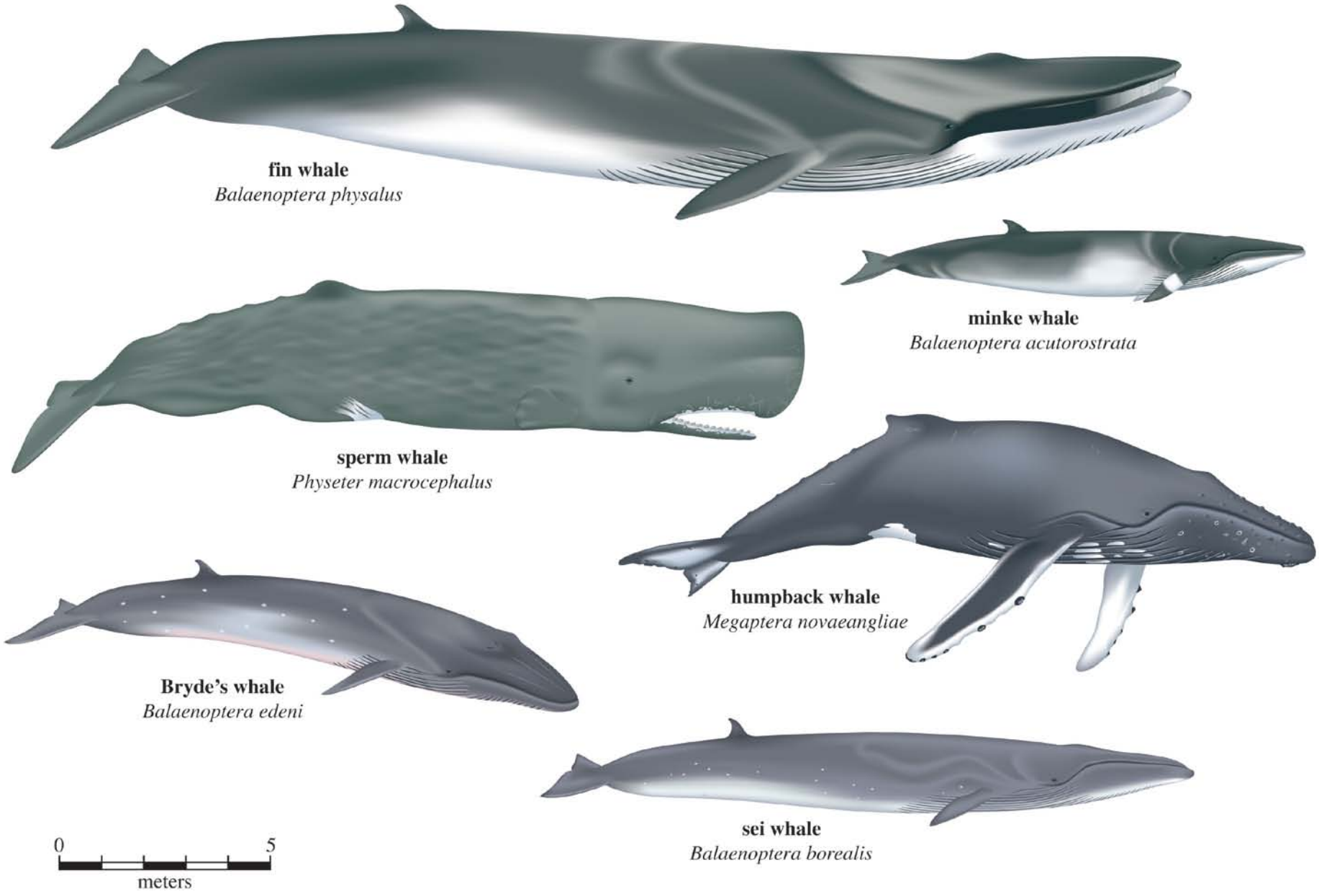
IN SEARCH OF OCEANIA'S LOST WHALES

Mike Donoghue on behalf of the Secretariat for the Pacific Regional Environment Programme (SPREP), with data provided by the South Pacific Whale Research Consortium



Illustrations courtesy of Uko Gorter

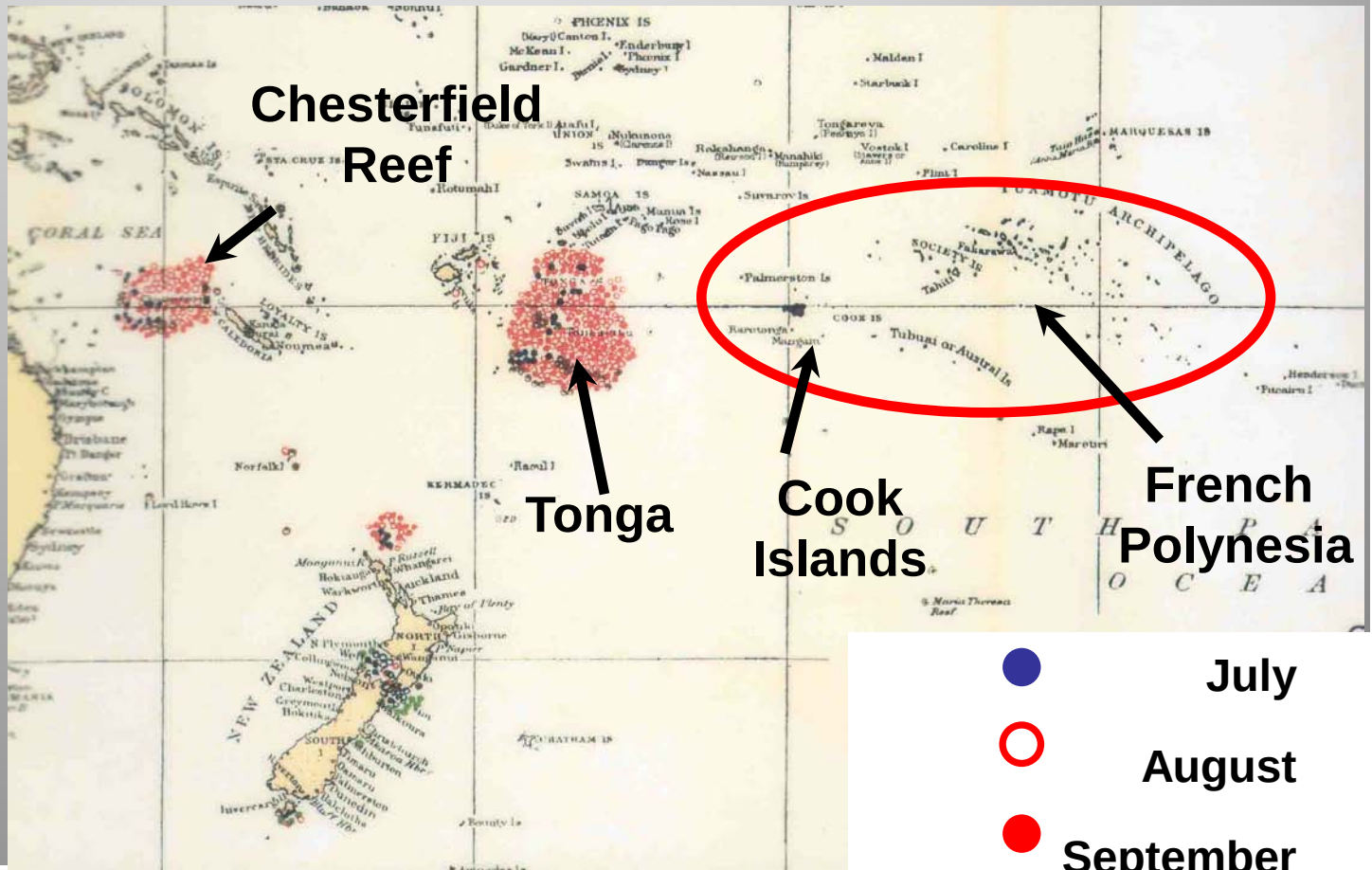
Whales and whaling of the past

The primary targets of 19th century whaling were southern right and sperm whales

Both species were driven to near extinction in the Pacific Islands by sail whalers and are only now making a slow recovery

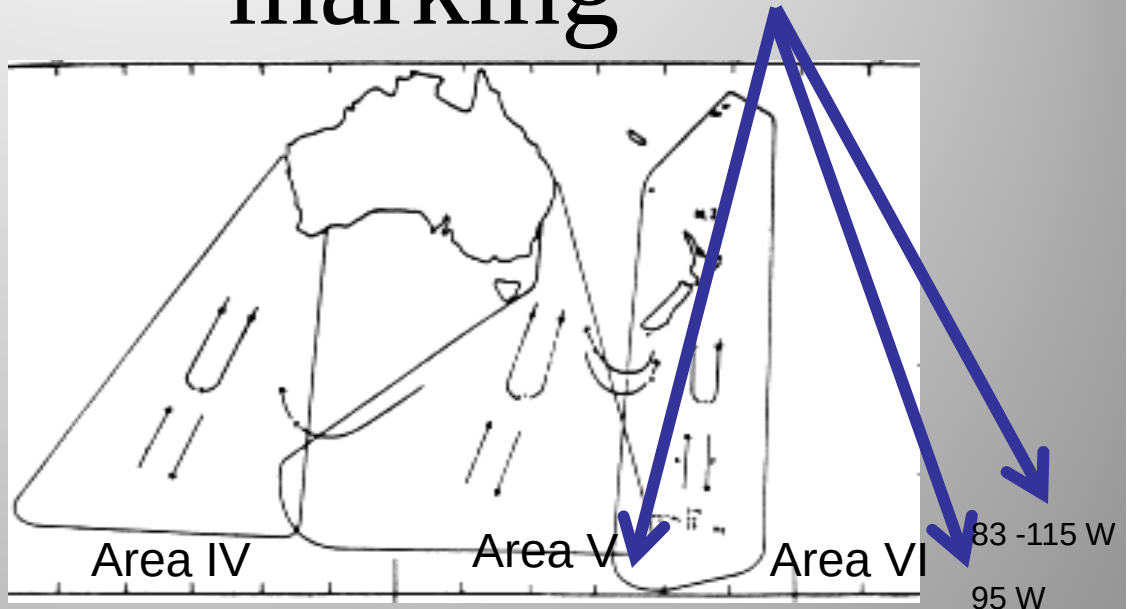
19th century catches of humpback whales

Whaling logbooks from 1805 - 1909 suggest about 3,000 humpbacks were killed, mostly in Tonga and the Chesterfield Reef.

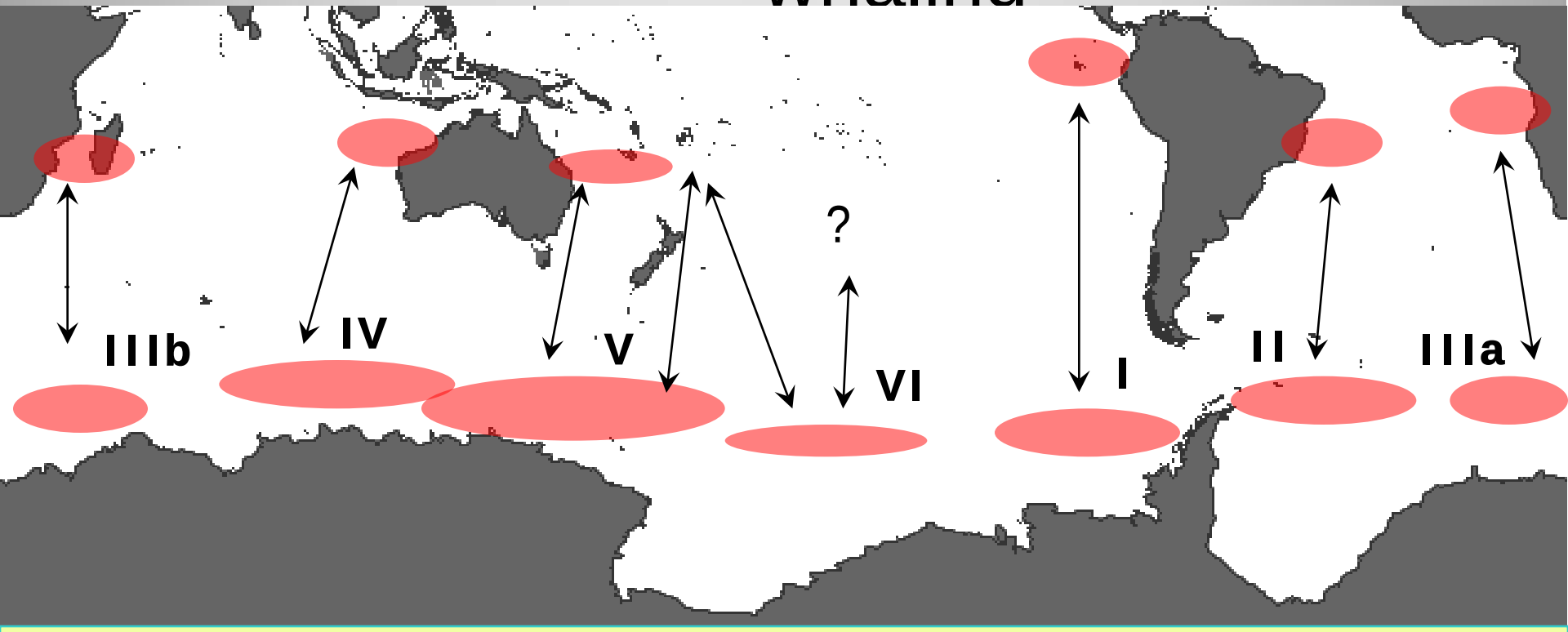


Townsend 1935,
Richards 2000

Migratory interchange as described by *Discovery* marking



Distribution and migrations of humpback whales based on modern whaling



Feeding ground distributions were once the basis for 5 - 6 stocks

Rough Estimates of Initial Abundance in the Southern Hemisphere

Blue Whale	**200,000**
Fin Whale	**350,000**
Sei Whale	**150,000**
Humpback Whale	**120,000**

20th century whaling in the Southern Hemisphere

	Reported catches	Unreported Soviet catches	Total catch
Blue	351,645	8,999	360,644
Fin	735,087	-9,971	725,116
Sei	179,923	23,615	203,538
Bryde's	6,310	1,447	7,757
Minke	117,469	-901	116,568
Humpback	**162,528**	**45,831**	**208,359**
Sperm	380,013	21,657	401,670
Right	988	3,350	4,338
Uncertain	11,631	-	11,631
Total	1,945,594	94,027	**2,039,621**

Source: Clapham and Baker 2001

20th century shore-based whaling

Perano whaling station, Tory Channel, Cook Strait, New Zealand (1912 – 1964)

Catches from shore-based stations totalled about 13,500 humpbacks.

Regional hunting in Area V

(excluding illegal Soviet catches)

Year	NZ	Ant.	E Aus	Norfolk Island	Total
1912-1928	N/A	1478			1478
1929-1931	N/A	289	816		1105
1932-1937	N/A	292	0		292
1938-1941	N/A	348	225		573
1942-1949	N/A	794	0		794
1950	79	903			982
1951	111	162			273
1952	122	146	600		868
1953	109	504	700		1313
1954	180	0	718		898
1955	112	1097*	720		1929
1956	143	194	720	150	1207
1957	184	0	721	120	1025
1958	183	0	720	120	1023
1959	318	885	810	150	2272
1961	80	293	731	170	1274
1962	32	0	173	4	209
1963	9	0	0	0	9
Total	**5,224**	**6,156**	**7,423**	**884**	**19,687**

13500

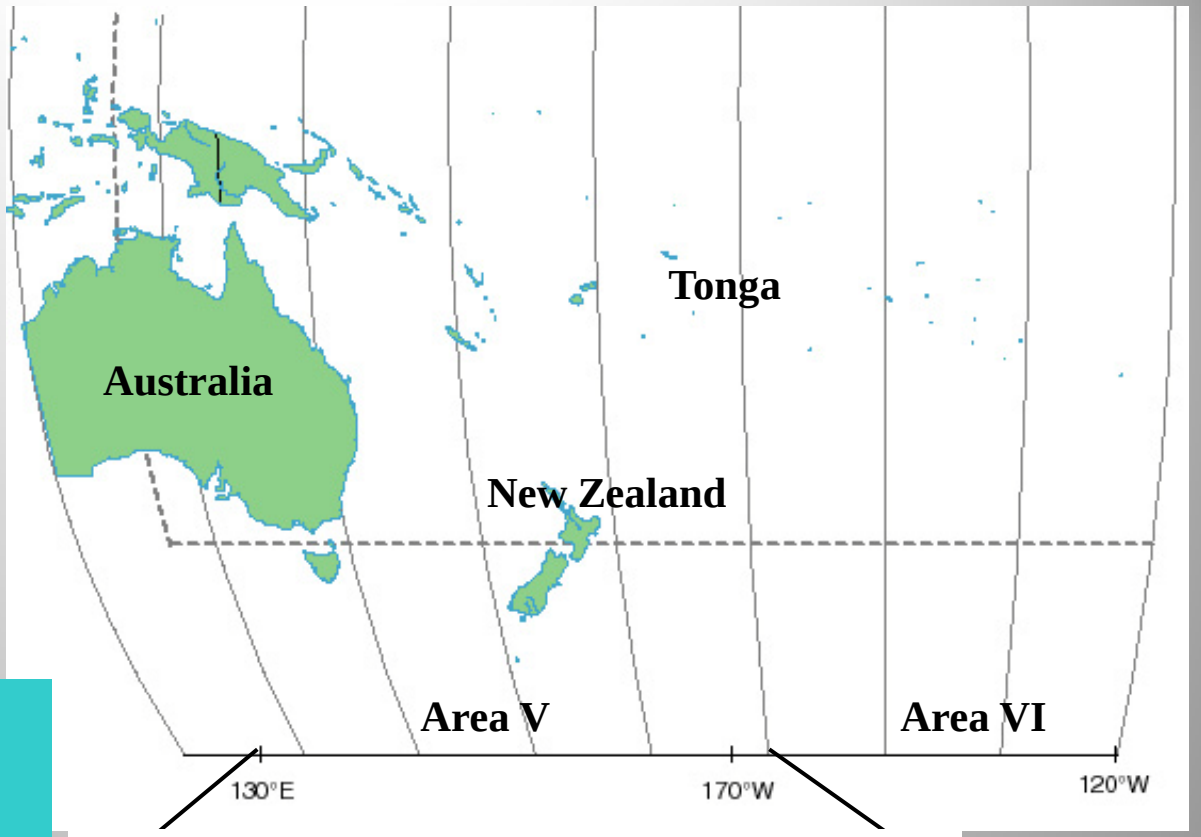
Number of Humpbacks Taken by Soviet Pelagic Fleets in the Southern Hemisphere 1959 - 1968 (Mikhalev 2000)

Season	Number of Fleets	Humpbacks Taken	Reported to BIWS
1959/60	2	12,945	720
1960/61	3	12,529	302
1961/62	4	5,507	270
1962/63	4	2,925	263

Season	Number of Fleets	Humpbacks Taken	Reported to BIWS
1963/64	4	368	0
1964/65	4	940	0
1965/66	4	1,830	0
1966/67	3	729	0
1967/68	3	748	0

Soviet whaling in Area V/VI, 1959/60

- A total of **12,945** humpbacks killed directly south of New Zealand and Tonga during this single summer.



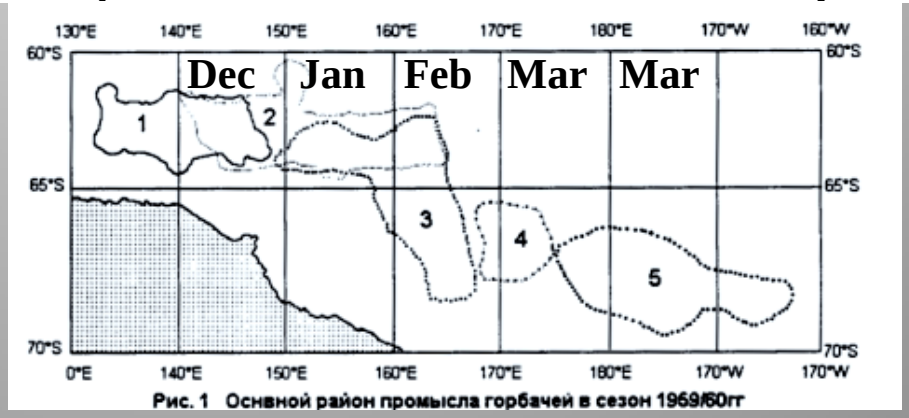


Рис. 1 Основной район промысла горбачей в сезон 1959/60гг

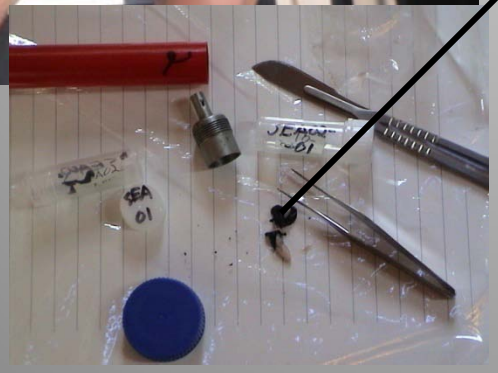
(Source: Mikhalev, 2000)

Rough estimates of current abundance in the Southern Hemisphere

Blue Whale	1,255 - 3,300
Fin Whale	8,000 - 15,000
Sei Whale	10,000 – 12,000
Humpback Whale	20,000 – 30,000

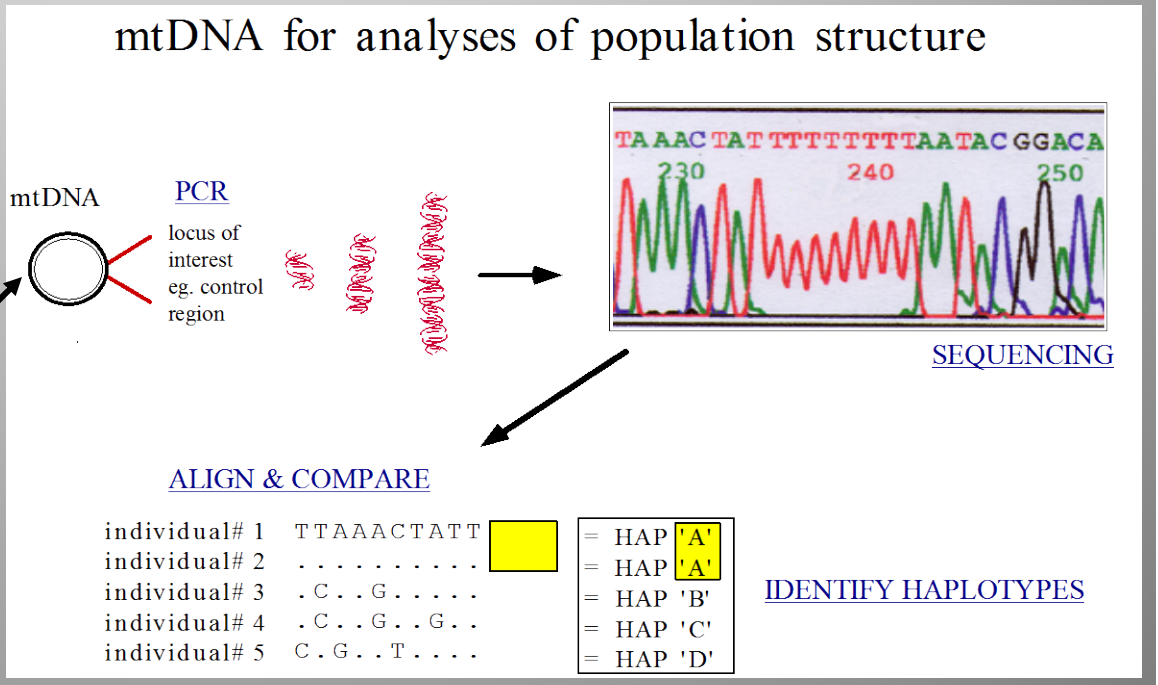
Source: IWC discussions

GATHERING INFORMATION - GENETICS

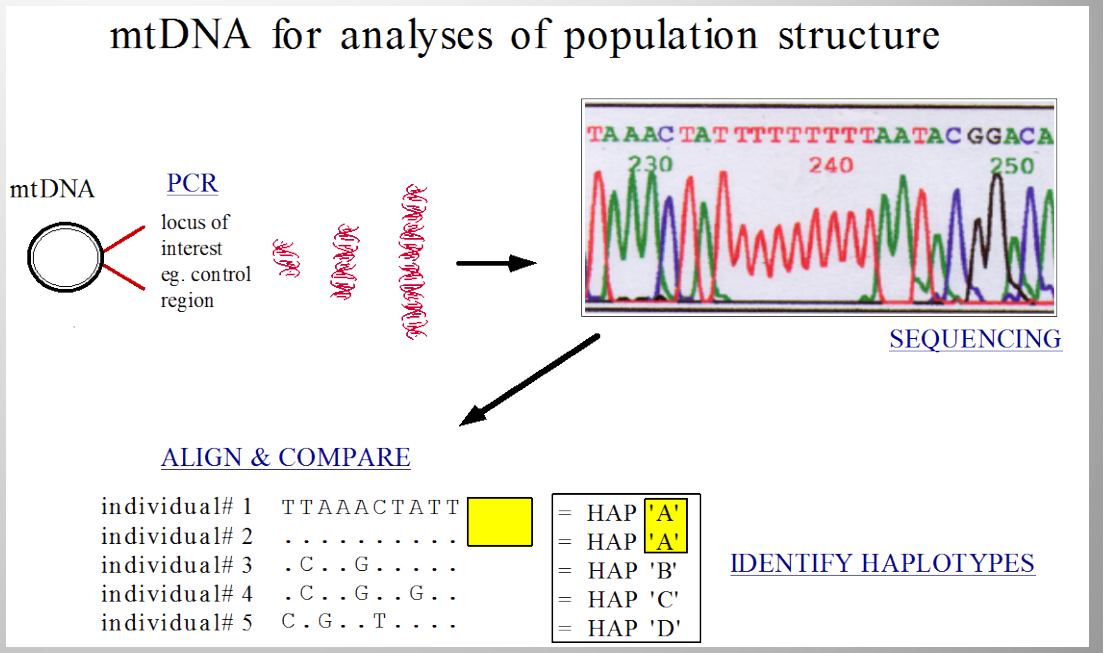


Genetic sampling

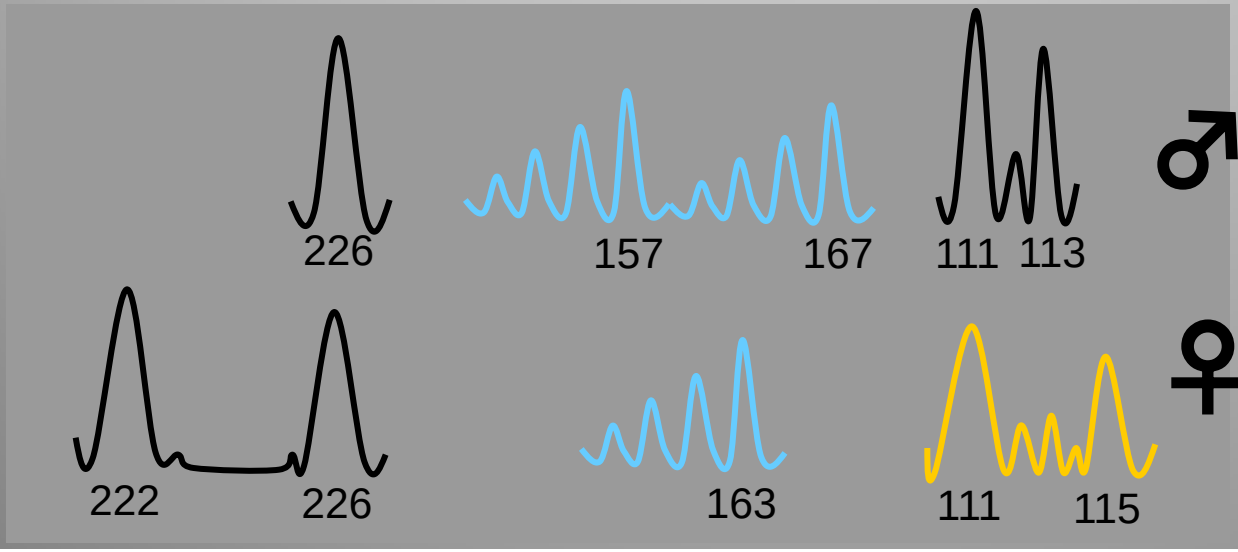
Paxarms biopsy system

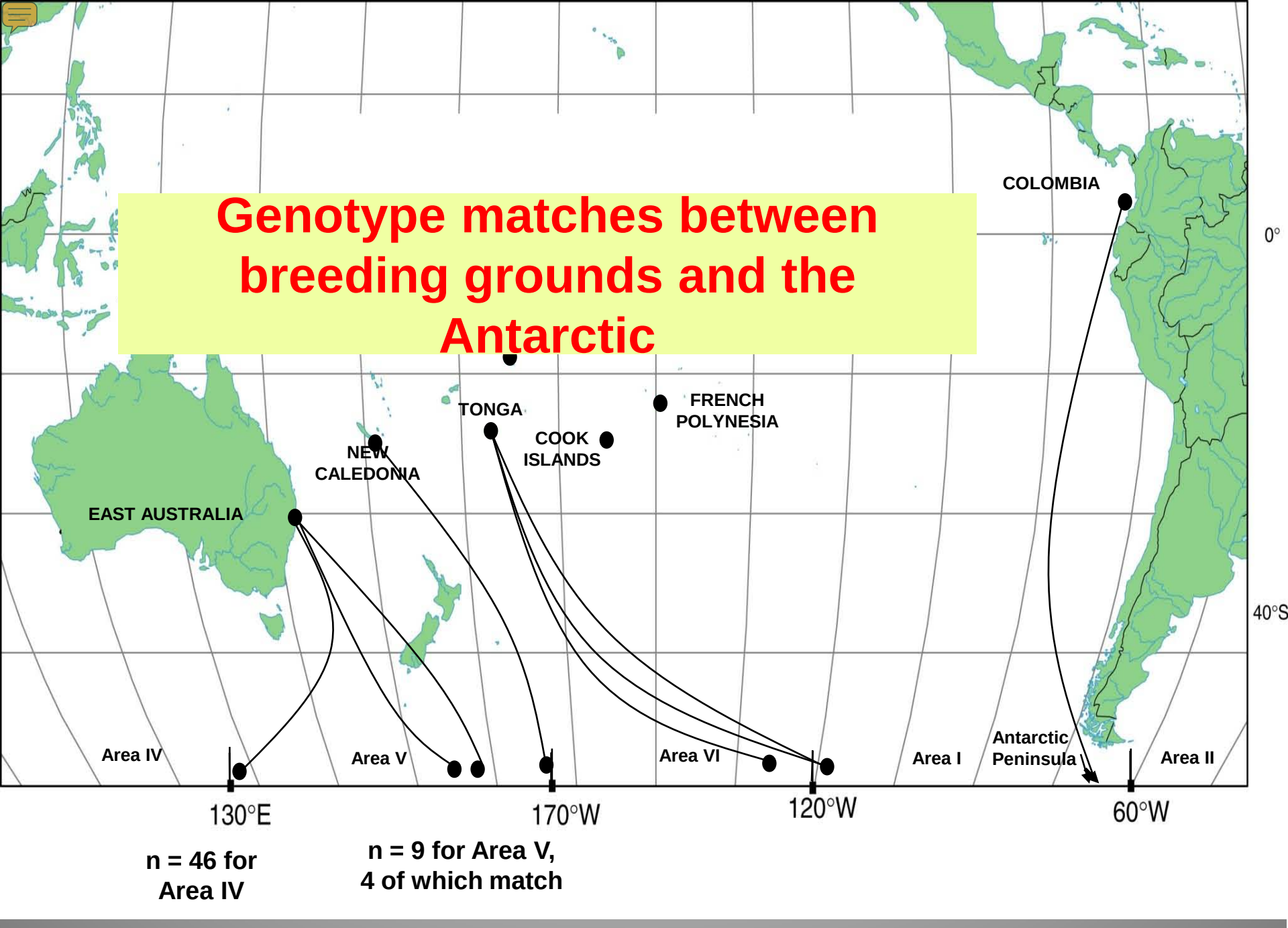


1) Sequencing mtDNA for maternal lineages

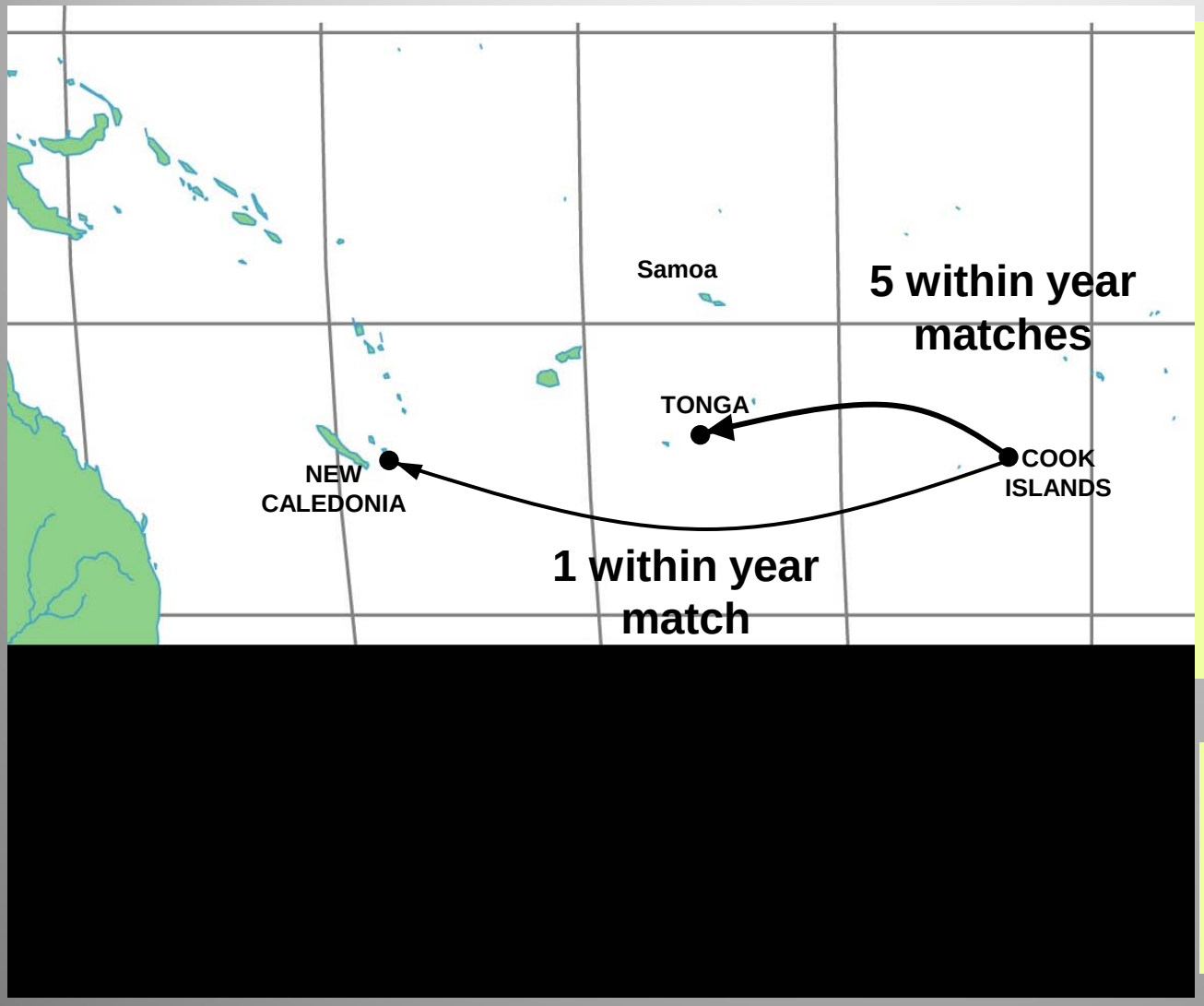


2) Genotyping for sex and individual identification




Genotype matches between breeding grounds and the Antarctic
COLOMBIA
0°
TONGA
FRENCH POLYNESIA
COOK ISLANDS
NEW CALEDONIA
EAST AUSTRALIA
40°S
Area IV
Area V
Area VI
Area I
Antarctic Peninsula
Area II
130°E
170°W
120°W
60°W
n = 46 for Area IV
n = 9 for Area V, 4 of which match

Which way in one season?



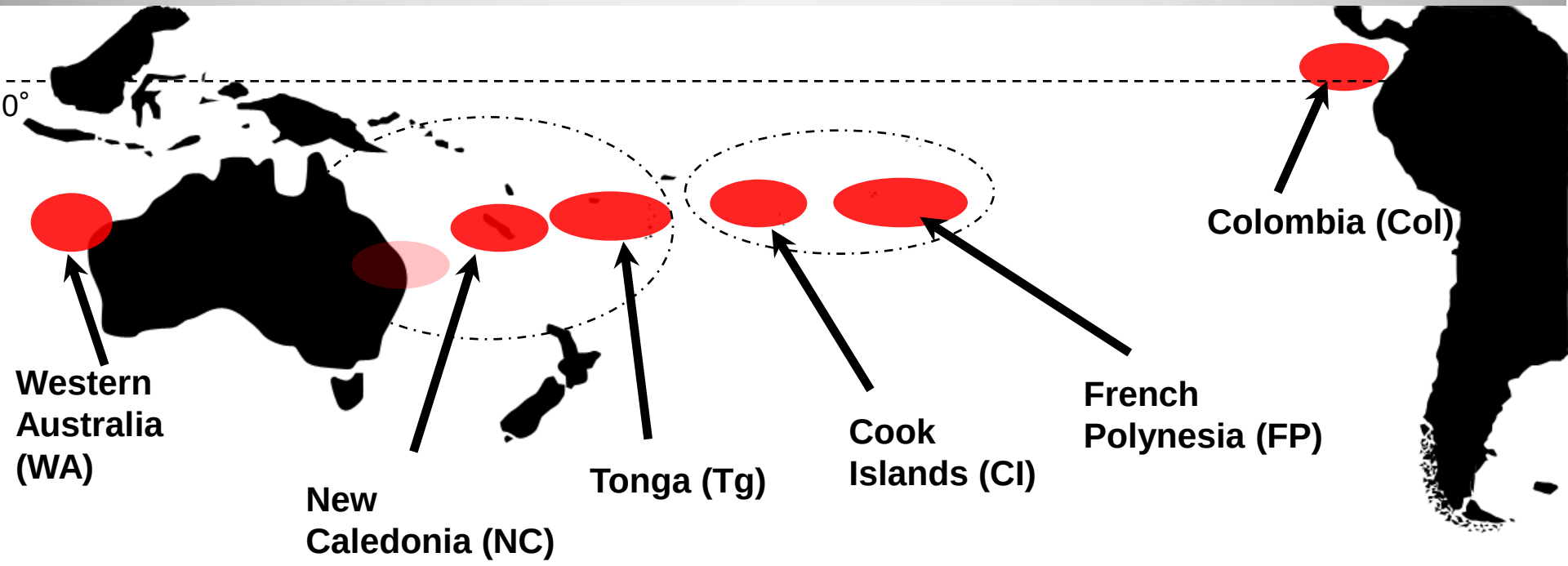
Cook Islands to Tonga

- Male, 31st Jul – 2nd Sept 2000
- Female, 23rd Aug – 8th Sept 2002
- Male, 31st Jul – 17th Sept 2003
- Male, 4th Sept – 19th Sept 2003
- Cow-calf, 19th Aug – 11th Sept 2003

Cook Islands to New Caledonia

- Female, 24th Jul – 31st Aug 2000

Genetic structure of populations



Analysis of more than 1,000 samples shows genetic differentiation among regional wintering grounds as a result of maternal fidelity to migratory destinations

Source: Olavarria et al. in press

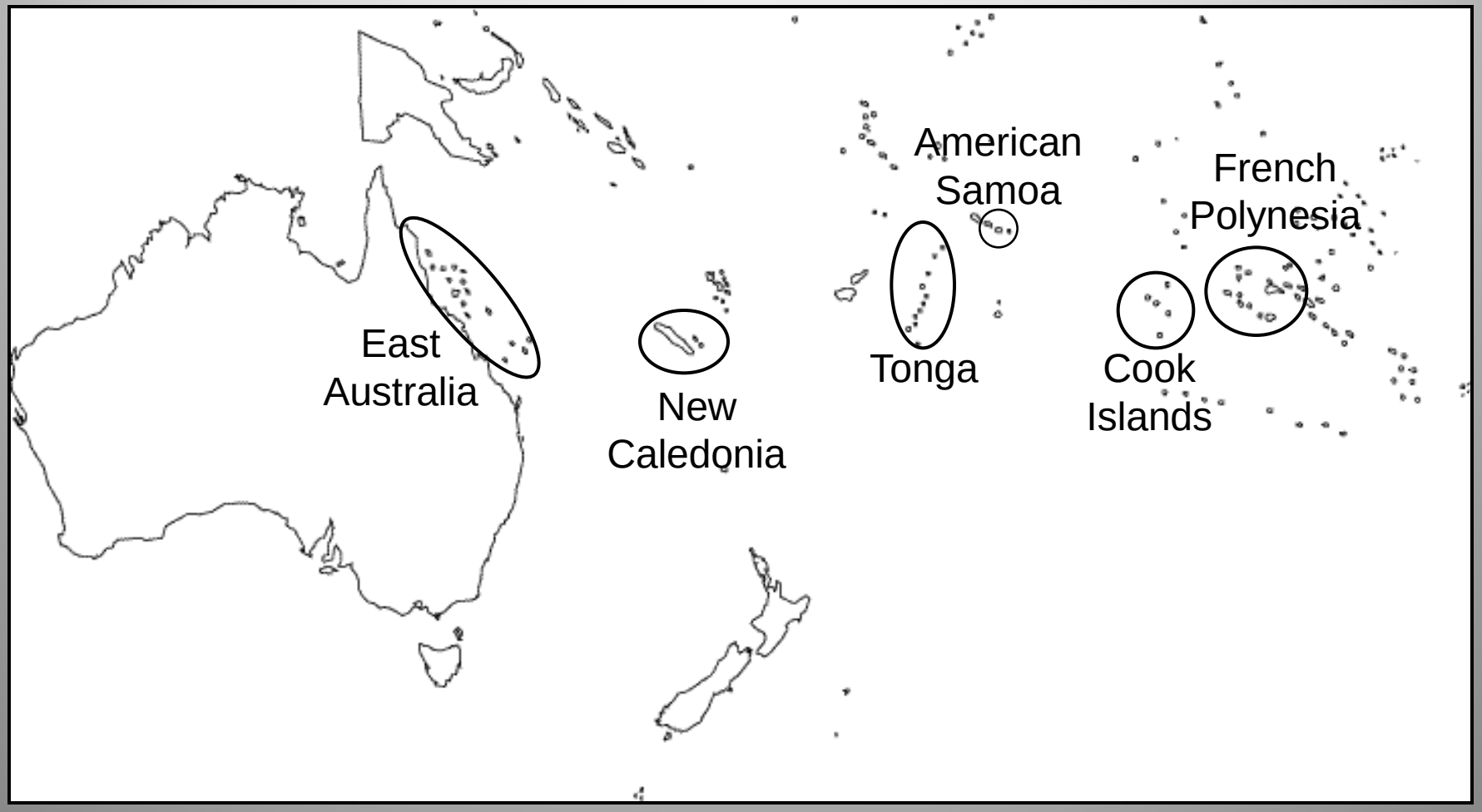
GATHERING INFORMATION - ACOUSTICS

HUMPBACK WHALE SONG

Only males sing
Sing to attract a female/repel a rival male
Song made up of sounds that are grouped together
All males sing similar songs
Song changes each year

Return to same breeding population
Song shared between populations in an ocean basin
Similarity depends on distance
Cultural transmission
Fashion

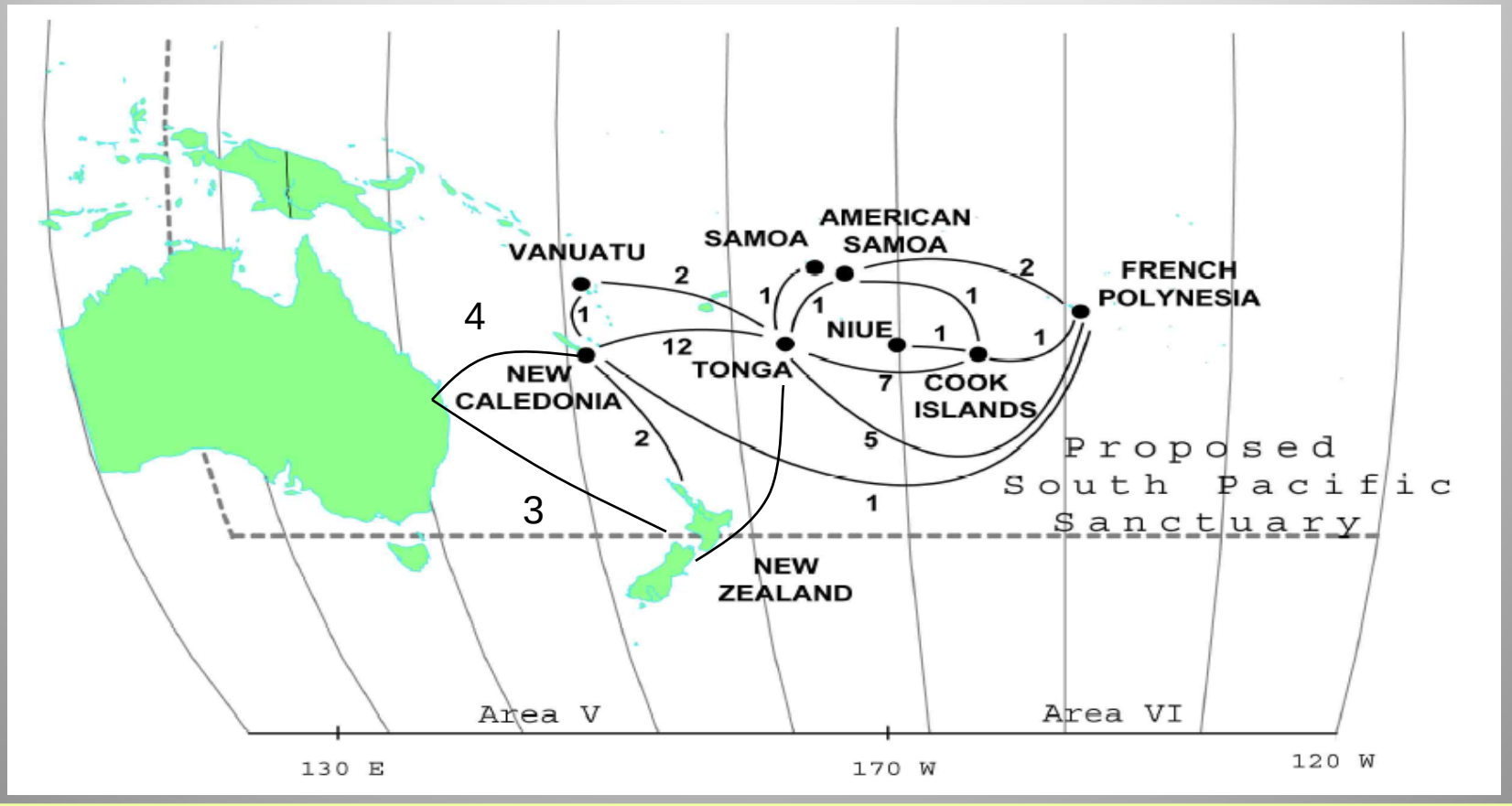
Tracking humpback song in Oceania



Song change and spread

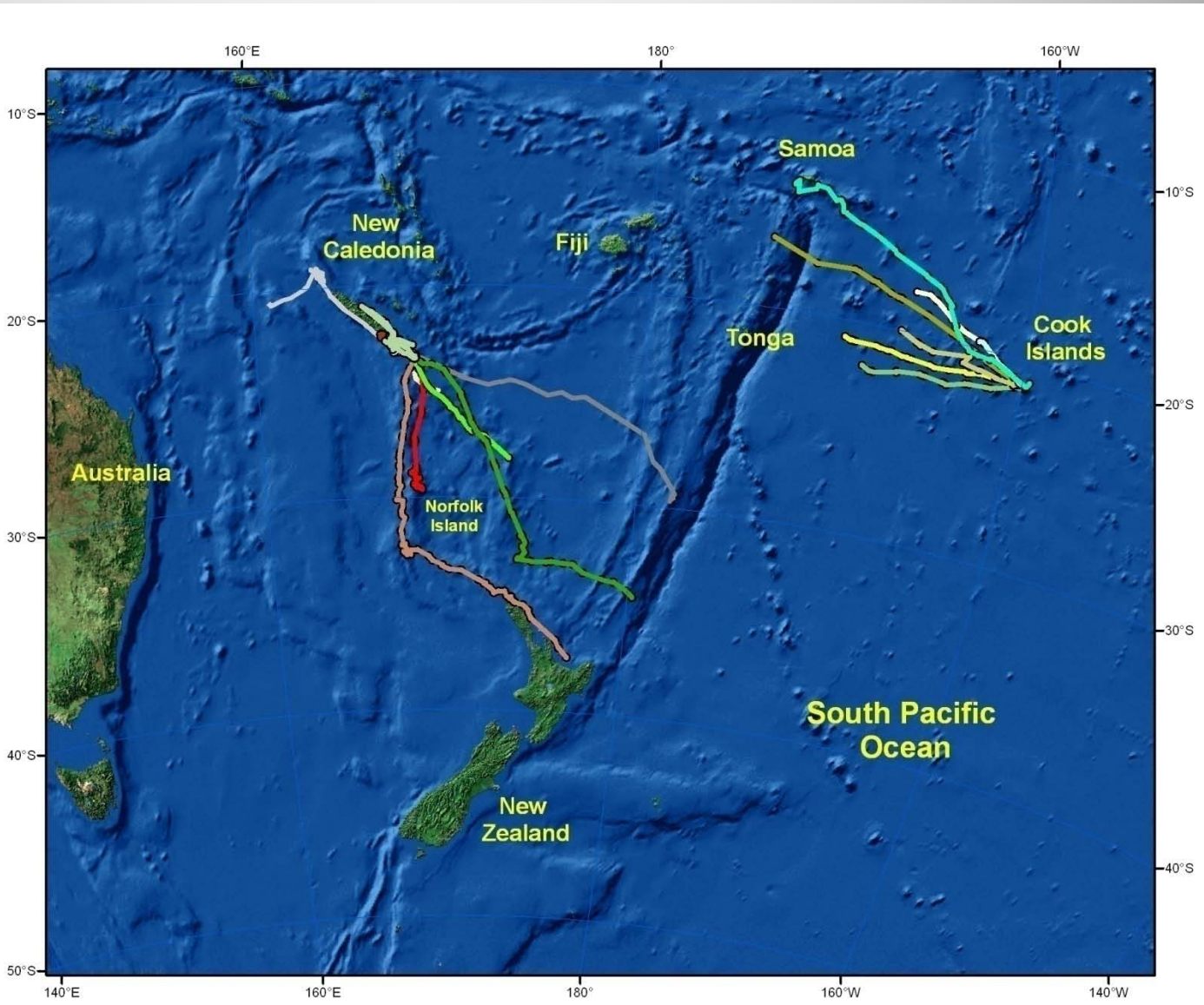
GATHERING INFORMATION – PHOTO-IDENTIFICATION

Migratory interchange across Oceania and connectivity to EA



Although whales generally show fidelity to regional wintering grounds, some individuals are capable of ‘voyaging’ between different regions. Tonga is the hub for Pacific island whales.

A new understanding



Estimating regional abundance:

Capture-recapture of Tongan humpback whales

Year	Fluke ID	92-93	1994	1995	1996	1997	1998	1999	2000
1991	13	0	1	1	2	0	0	2	0
1992	1	0	1	0	0	0	0	0	1
1993	2	-	1	0	0	0	0	0	0
1994	31		-	0	1	1	0	3	3
1995	31			-	2	0	5	2	1
1996	44				-	0	0	3	2
1997	9					-	0	0	1
1998	52						-	6	2
1999	92							-	4
2000	71								-
Total	376	-	3	1	5	1	5	16	14

Updating population estimates: capture-recapture by photo-ID

Example: Tonga 1999 to 2003

Total individuals = 441; Total captures = 516

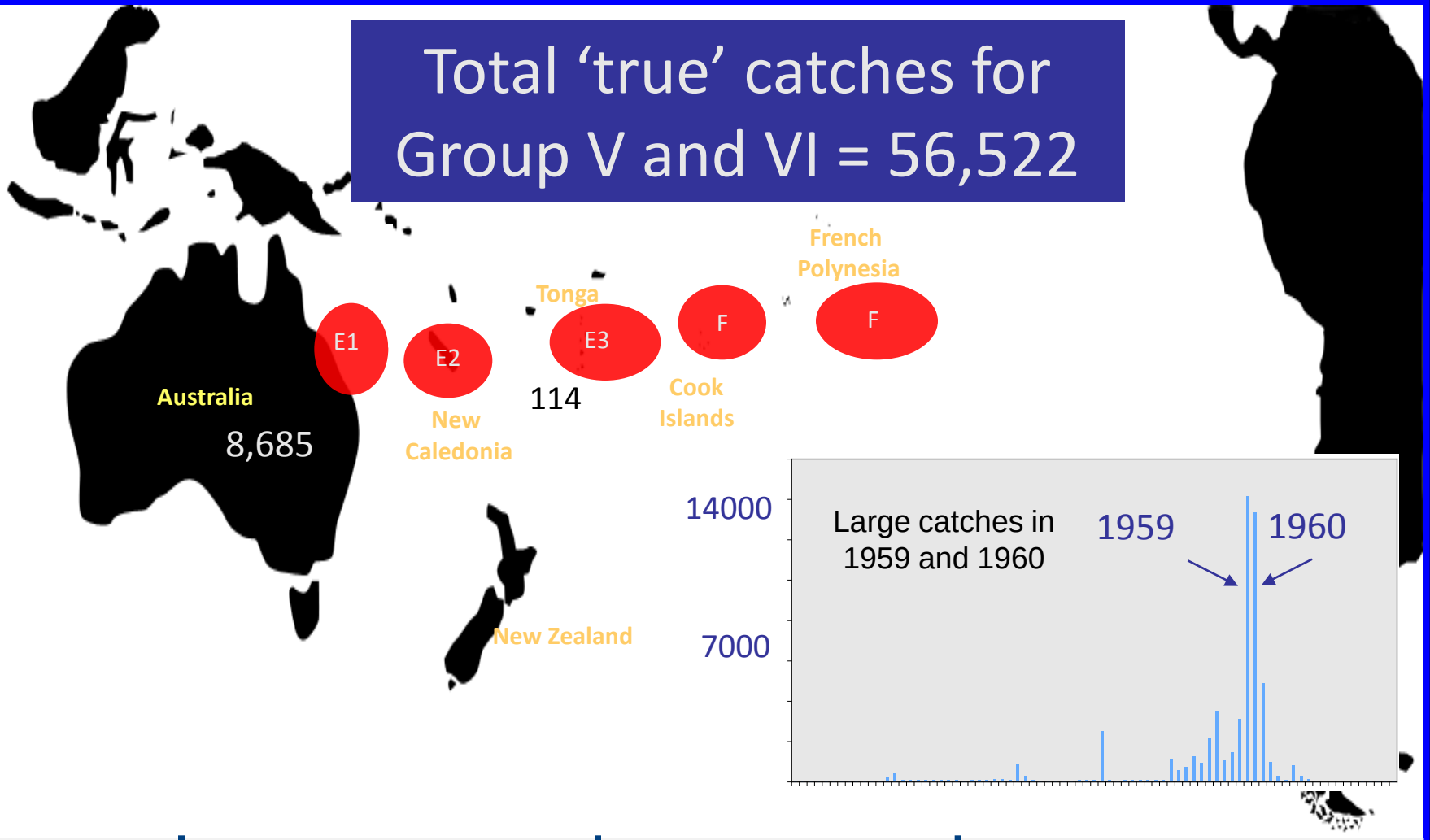
Best estimate of about 1,485 whales

Estimates for 1999-2003 Tonga

model	N-hat	SE	lowerCI	upperCI
Mt Chao	**1,247**	241	877	1,842
Mt Darroch	**1,215**	214	881	1,734
Mh jacknife	**735**	39	665	816
Mth	**1,485**	334	987	2,331

From Baker, Madon, Russell et al. 2006. IWC comprehensive assessment of southern hemisphere humpback whales, Hobart, Tasmania

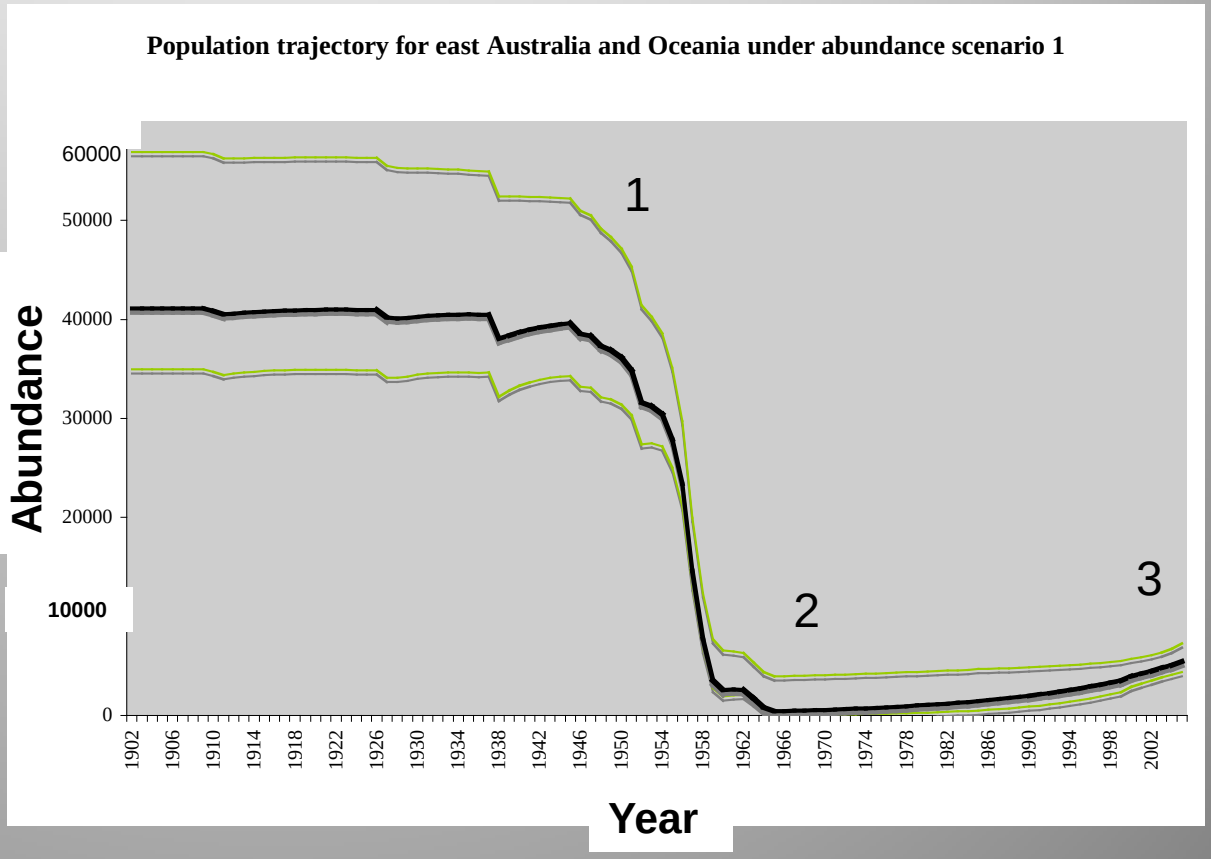
Total ‘true’ catches for Group V and VI = 56,522



Updating population dynamics models

Best guess:

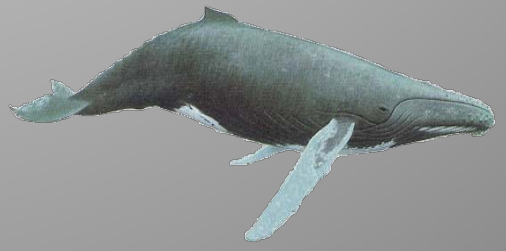
- **About 60,000 killed in the South Pacific**
- **Reduced to a few hundred by 1964-68**
- **Increase to about 10,000 by 2005 (about 7,000 along EA and the rest throughout Oceania)**



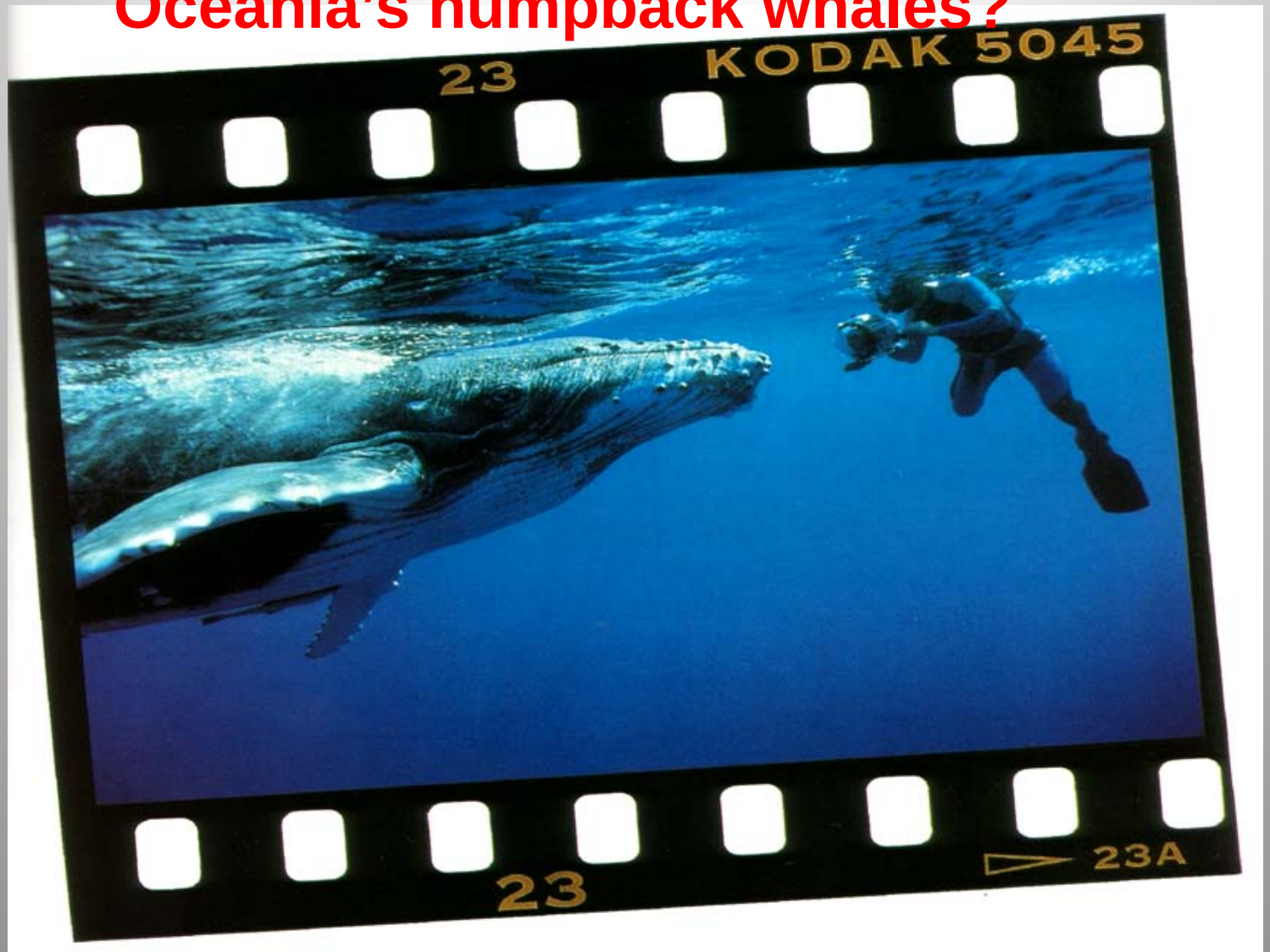
From Jackson et al. 2006. IWC comprehensive assessment of Southern Hemisphere humpback whales, Hobart, Tasmania

Population assessment of South Pacific humpbacks

- How many whales were there prior to whaling?
  - East Australia: 22,000-25,700
  - Oceania: 17,800-20,600
- How fast are these populations growing?
  - East Australia: 10.4-10.5% PA
  - Oceania: 5.1-6.4% PA
- What is the current level of recovery (2009)?
  - East Australia: 44-46%
  - Oceania: 23-30%



Trends – what is the future for Oceania's humpback whales?




THREAT – HUNTING FOR SCIENTIFIC RESEARCH


THREAT - MARINE DEBRIS

ENTANGLEMENT IN FISHING GEAR


Other threats include climate change, collisions with ships, and by-catch
Their future is in our hands