A summary of the South African sardine resource and fishery

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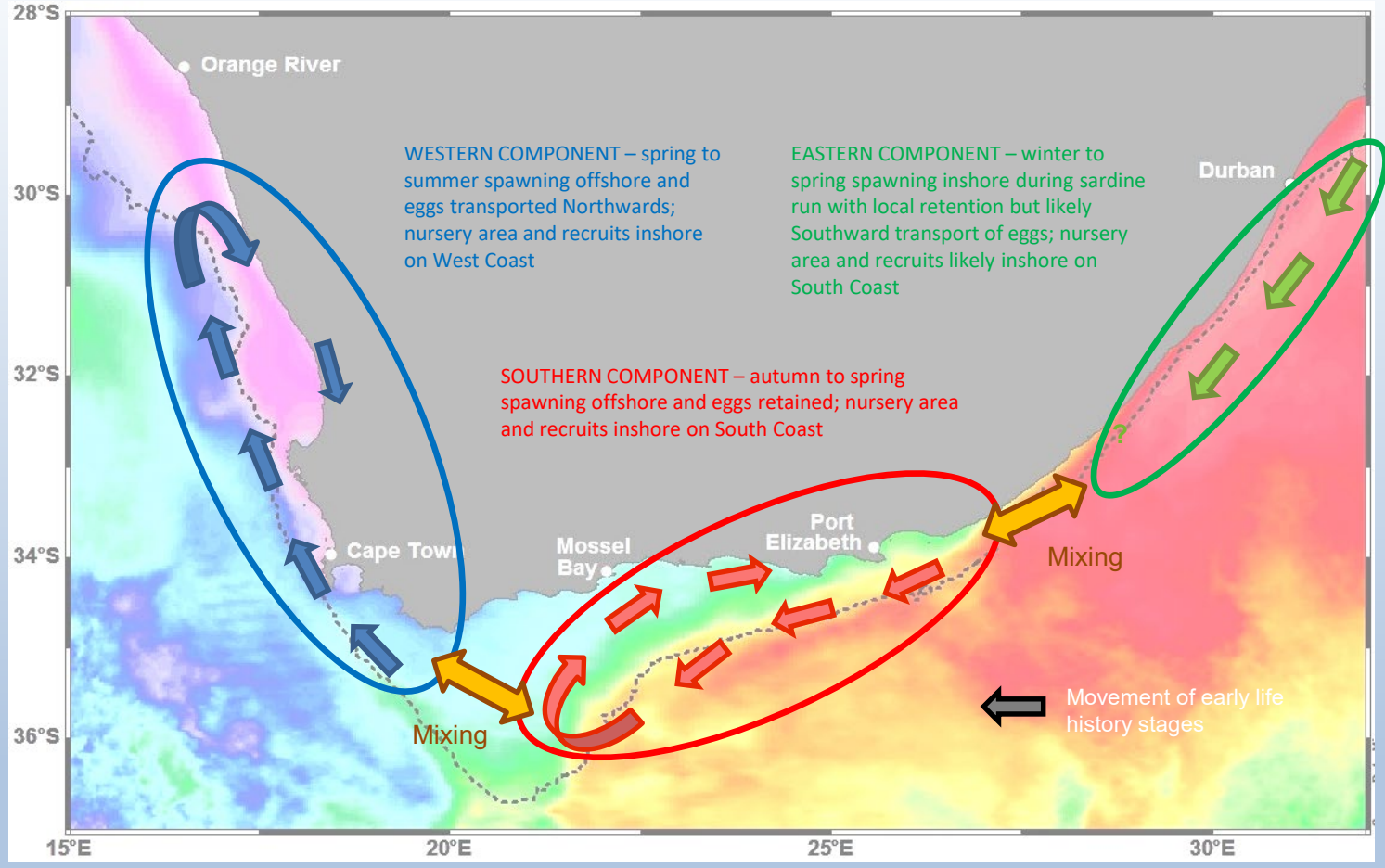
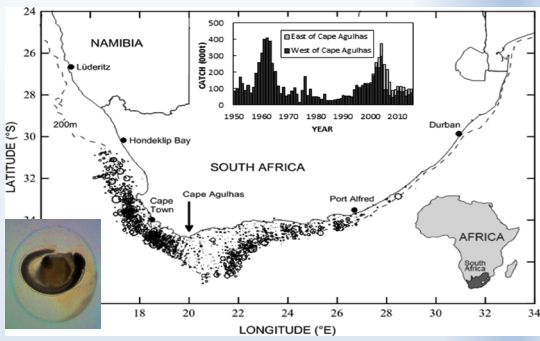
environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

South African Sardine Distribution and Stock Structure

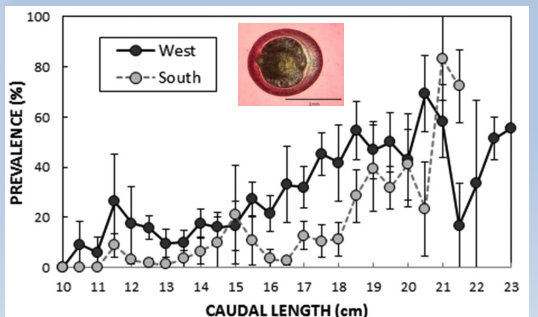


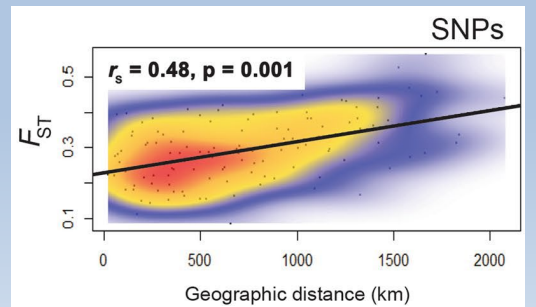
The South African sardine population is hypothesized to comprise multiple components, with semi-discrete stocks off the west, south and east coast that are not isolated but show some degree of mixing

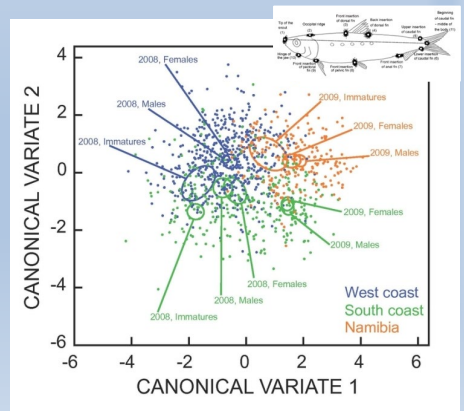
South African Sardine Distribution and Stock Structure



- The sardine multi-stock hypothesis was developed based on observations of significant spatial differences in a variety of sardine characteristics, including:
  - Life history characteristics (distribution patterns, spatially-separated spawning areas, different spawning seasons (Coetzee *et al* 2008; de Moor *et al* 2017)
  - Phenotypic meristic (*e.g.* gill raker and vertebral number; van der Lingen *et al* 2010; Idris *et al* 2016) and morphological (*e.g.* body shape, otolith shape) characteristics (Groenewald *et al* 2019)
  - Genetics - single nucleotide polymorphisms or SNPs (Teske *et al* 2018)
  - Parasite biotag loads (van der Lingen *et al* 2015; Weston *et al* 2015)







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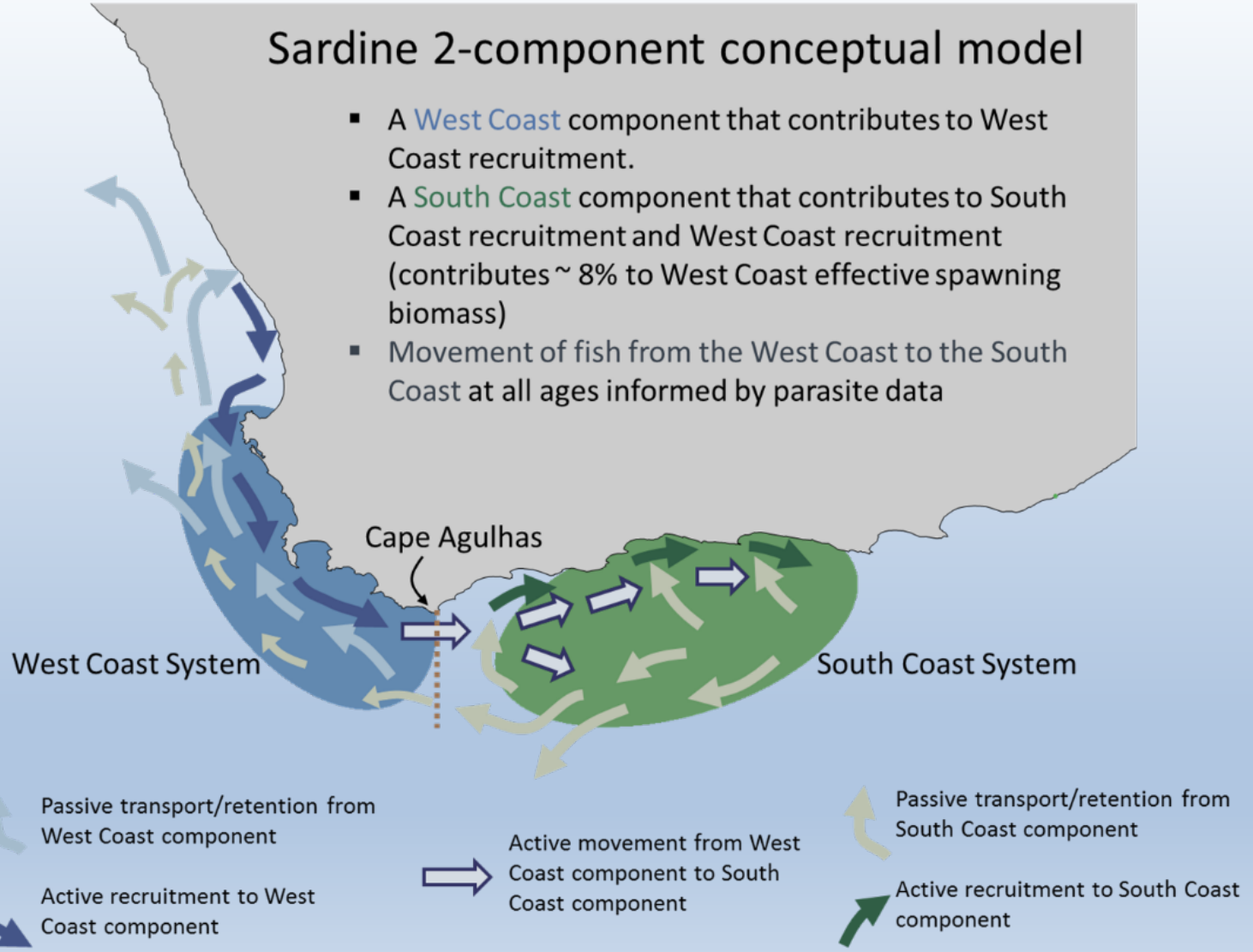
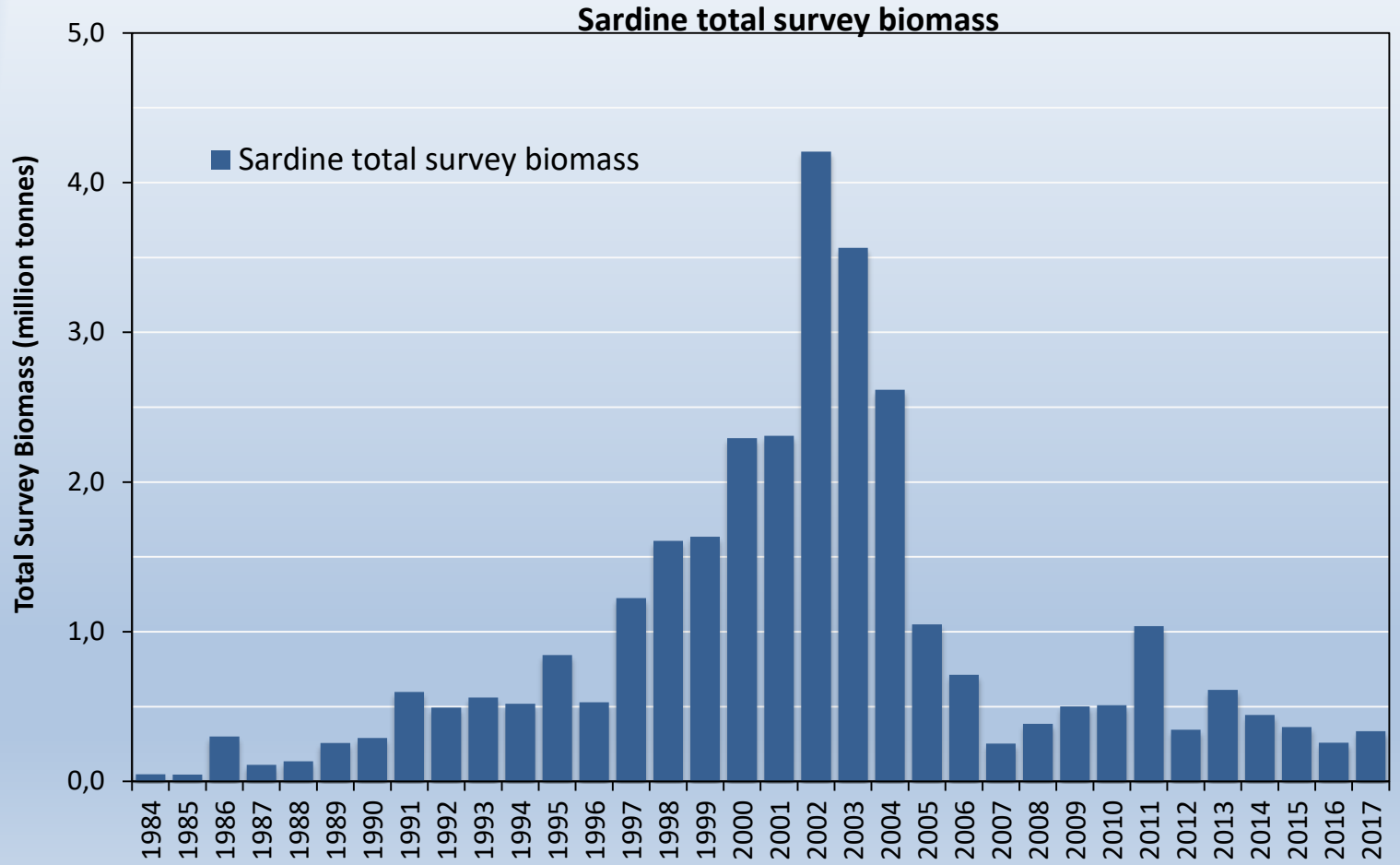
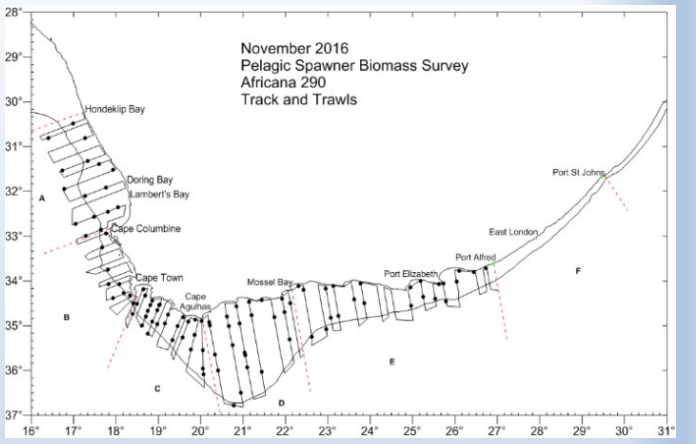


Hydroacoustic Survey Estimates of Biomass





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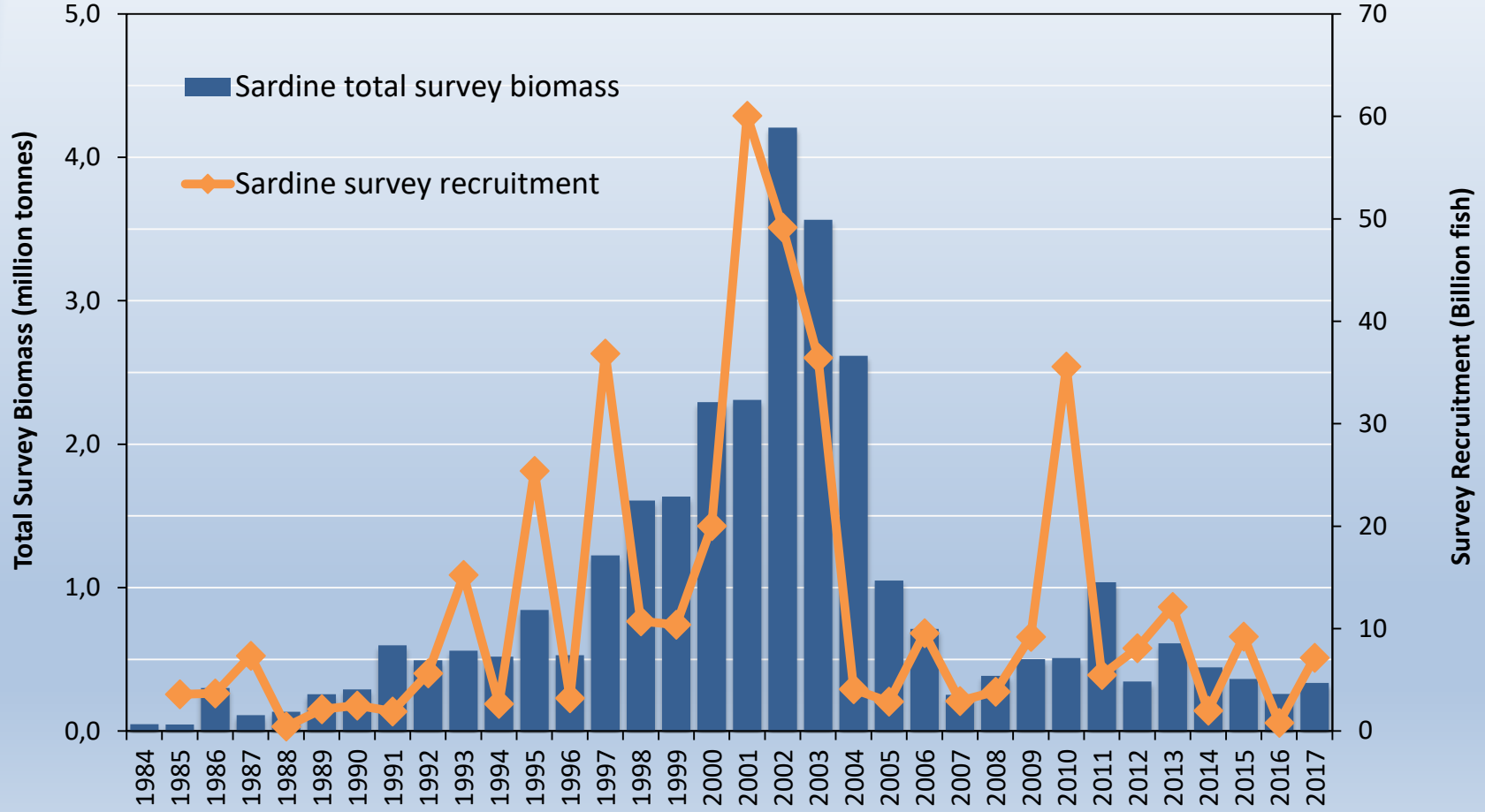

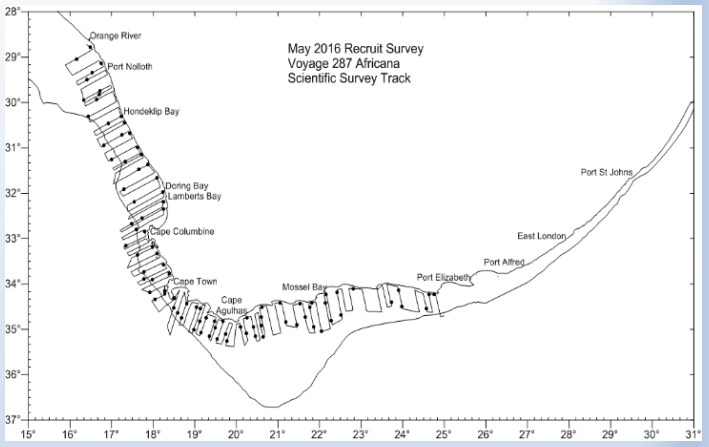

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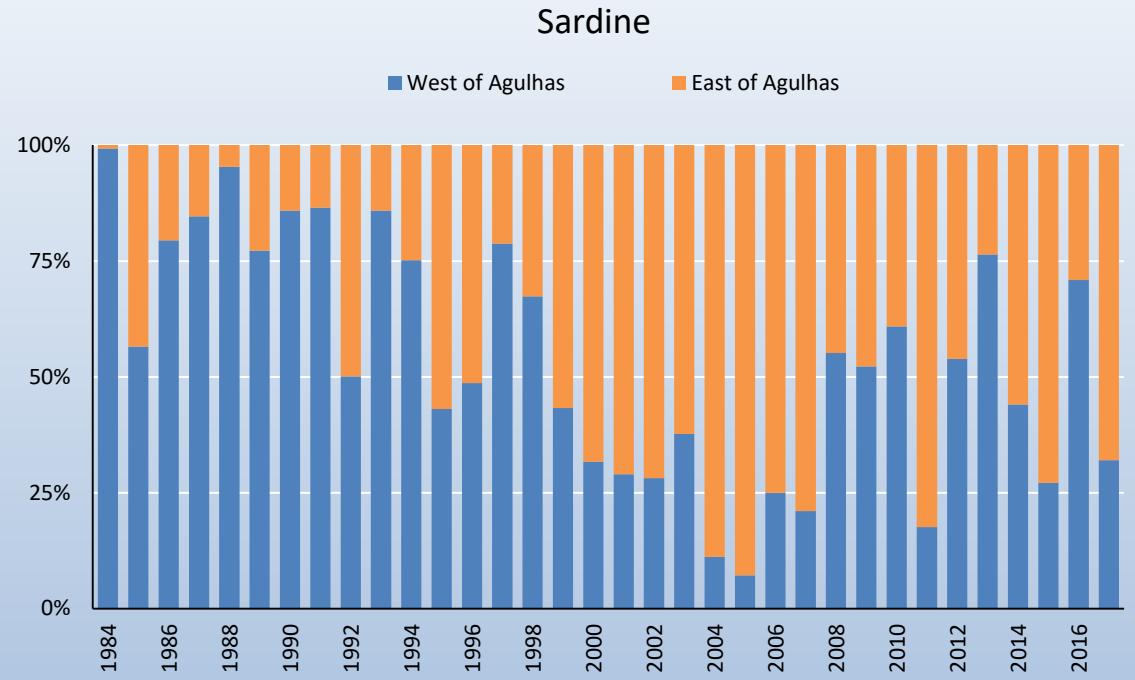
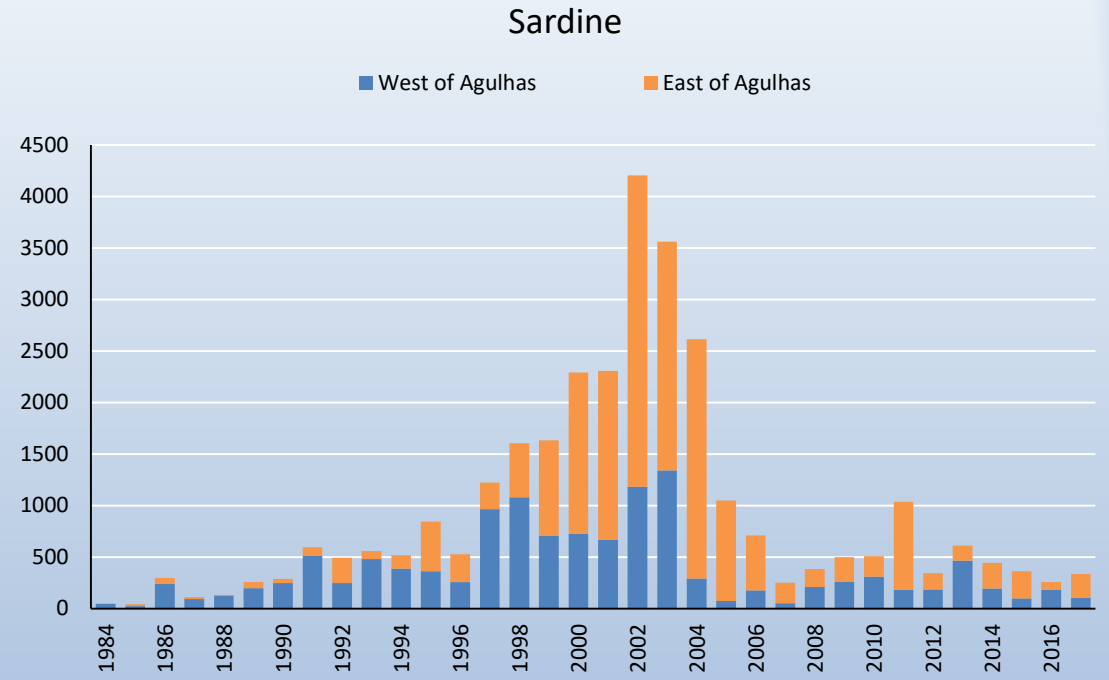
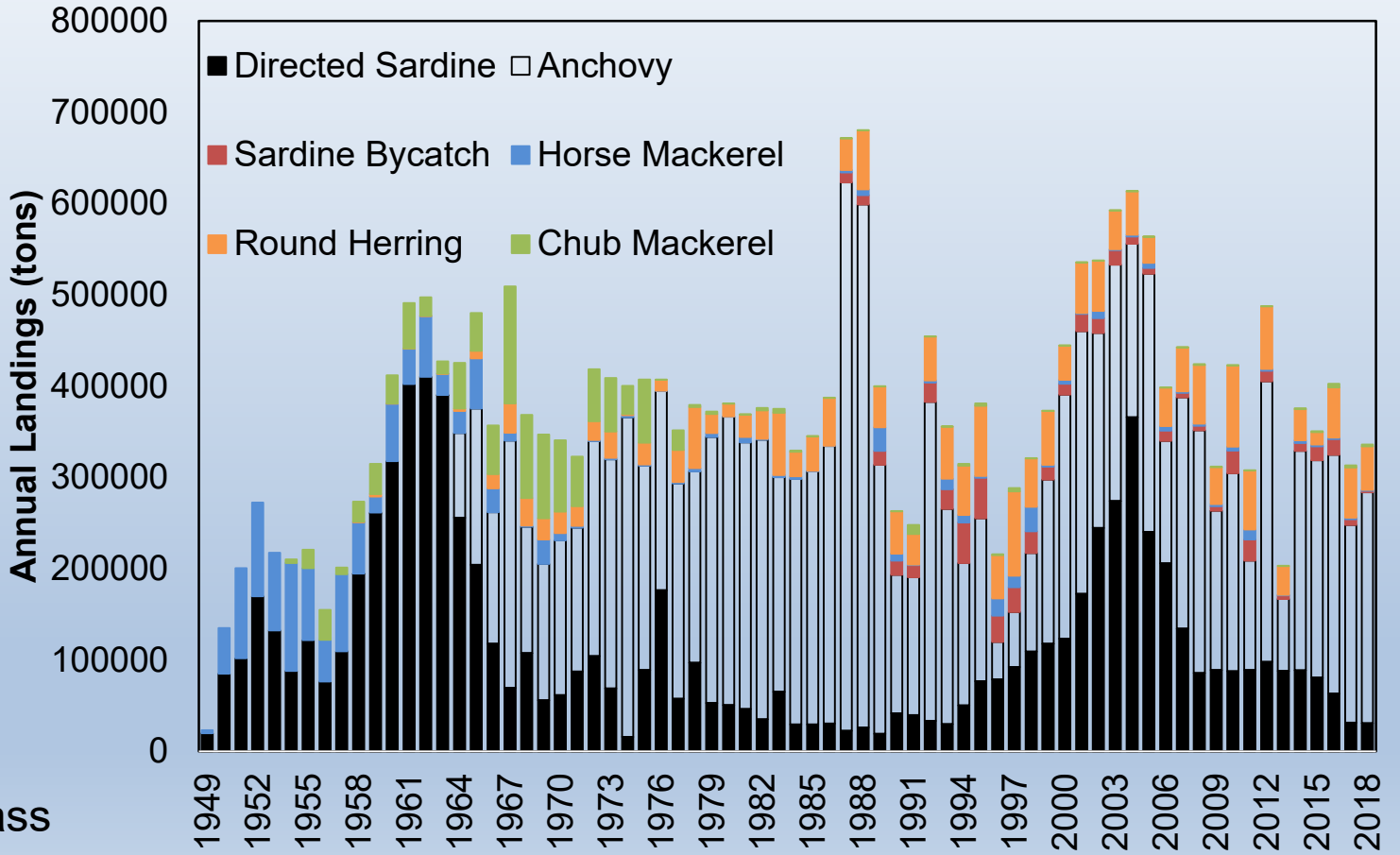




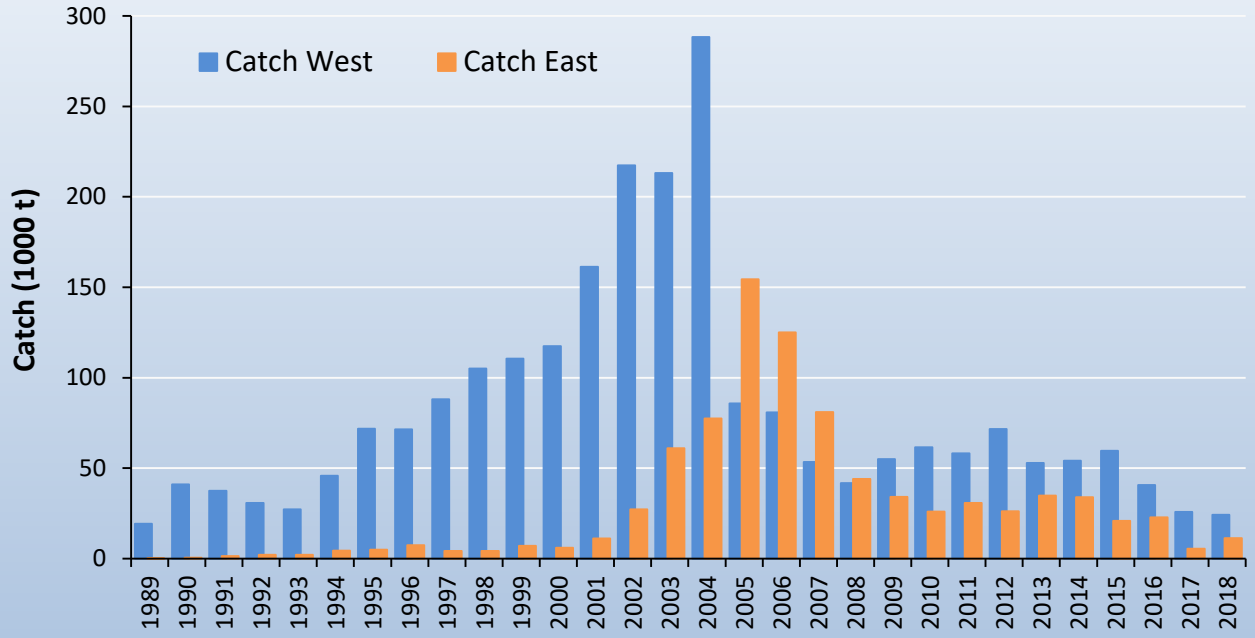
History of Fishery



Small pelagics purse-seine fishery:

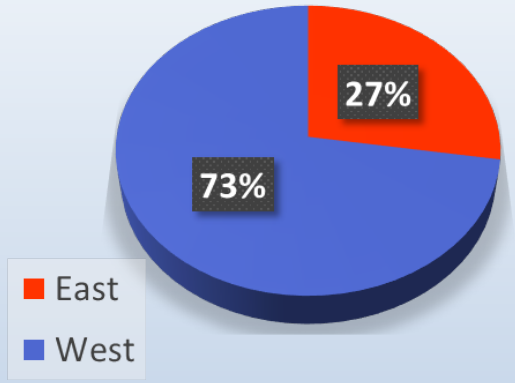
- Largest by landed mass
- 2nd largest by value

History of Fishery



Sardine have also been commercially harvested off the south coast since the 1990s

Sardine Fishery Background

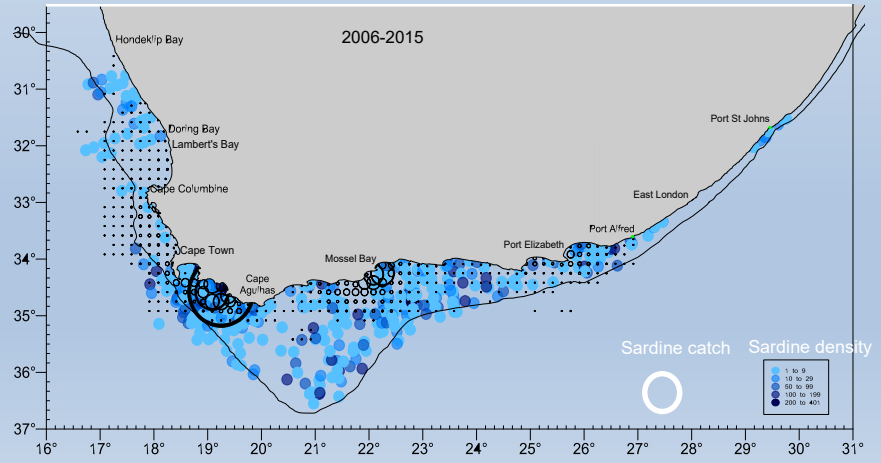


109 long-term rights issued 2006-2020

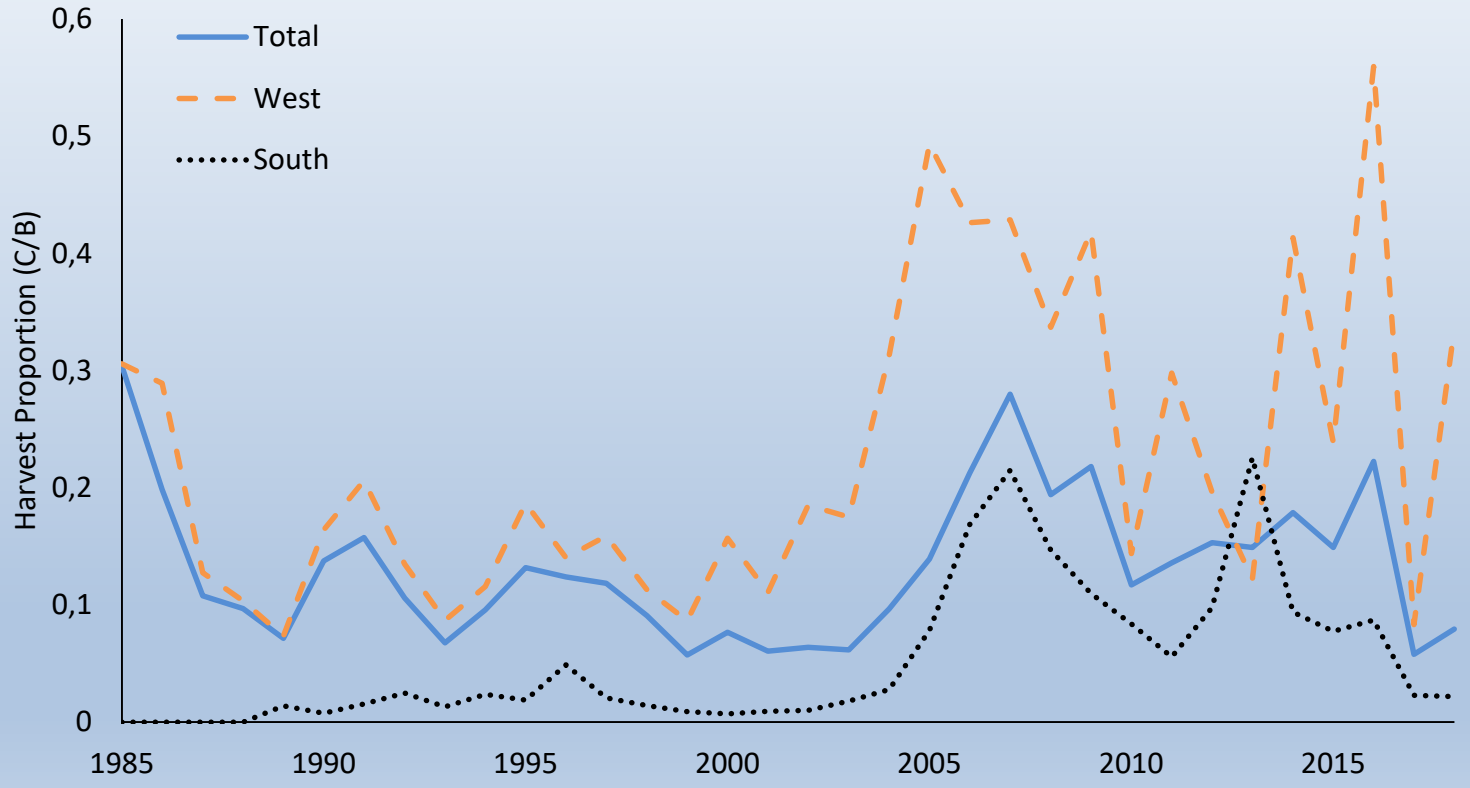
- 86 active rights holders in 2016
- Rights range from 0.05% – 15% of the TAC
- **Rights to 73% of the TAC is held by RHs from the West Coast**

80% of the catch is canned

- 6 canning factories (5 on west coast)
- small pack and freeze processors (bait and human consumption)



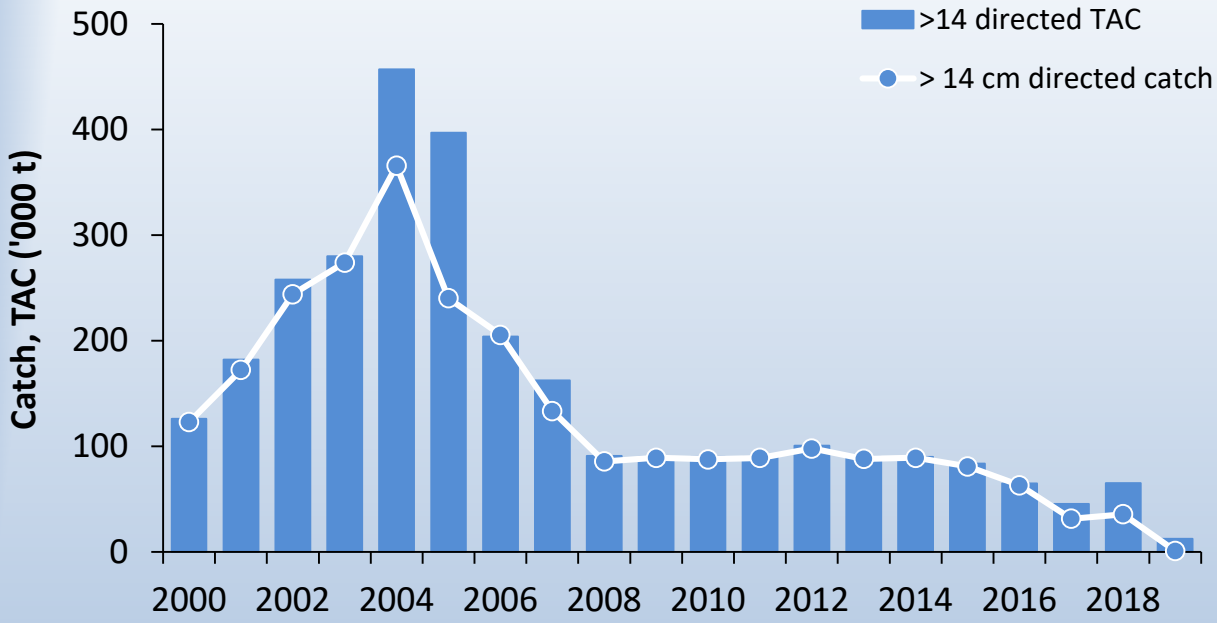
Spatial Distribution of Directed Sardine Catches

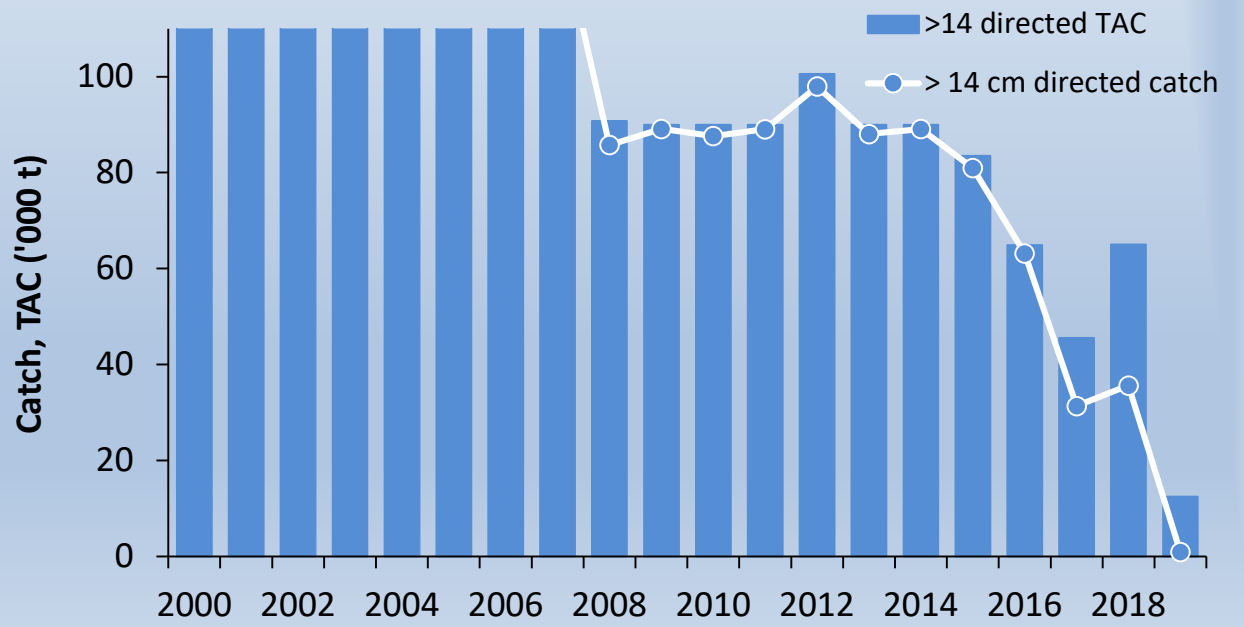


Harvest proportion on west component much higher

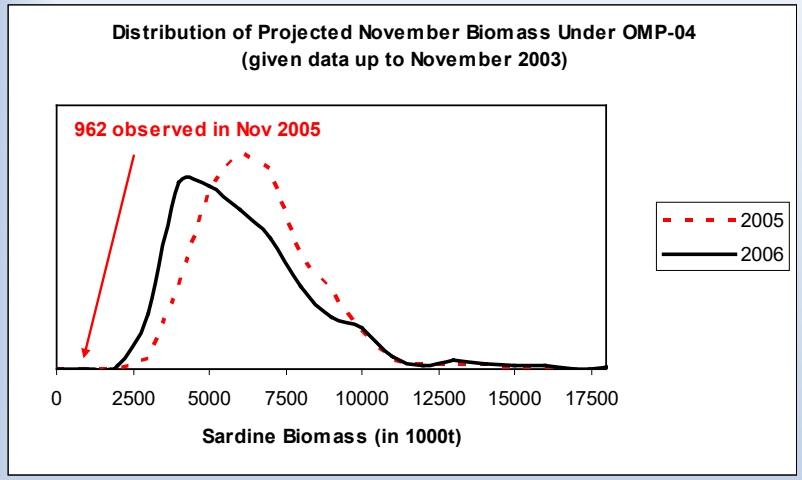
Of concern given poor recruitment to west component in recent decade if this is a “feeder” to both coasts

Directed Sardine Catch v TAC





OMPs and Exceptional Circumstances
Directed sardine TAC and sardine TABs



Survey estimated biomass											
Total				West of Cape Agulahs				East of Cape Agulhas			
5%ile	10%ile	90%ile	95%ile	5%ile	10%ile	90%ile	95%ile	5%ile	10%ile	90%ile	95%ile
175.7	231.8	1328.1	1776.7	50.3	75.9	870.9	1258.6	45.5	59.6	611.9	821.3

<91 thousand tons

<35 thousand tons

<56 thousand tons

Exceptional Circumstances Dec 2006

Exceptional Circumstances Dec 2018

Exceptional Circumstances Dec 2019?

OMP-02

OMP-04

Modified HCR

OMP-08

OMP-14

OMP-18

Short-term fixed catch projection

Short-term fixed catch projection

OMPs and Exceptional Circumstances Directed sardine TAC and sardine TABs

Uncertainties and Associated Concerns…

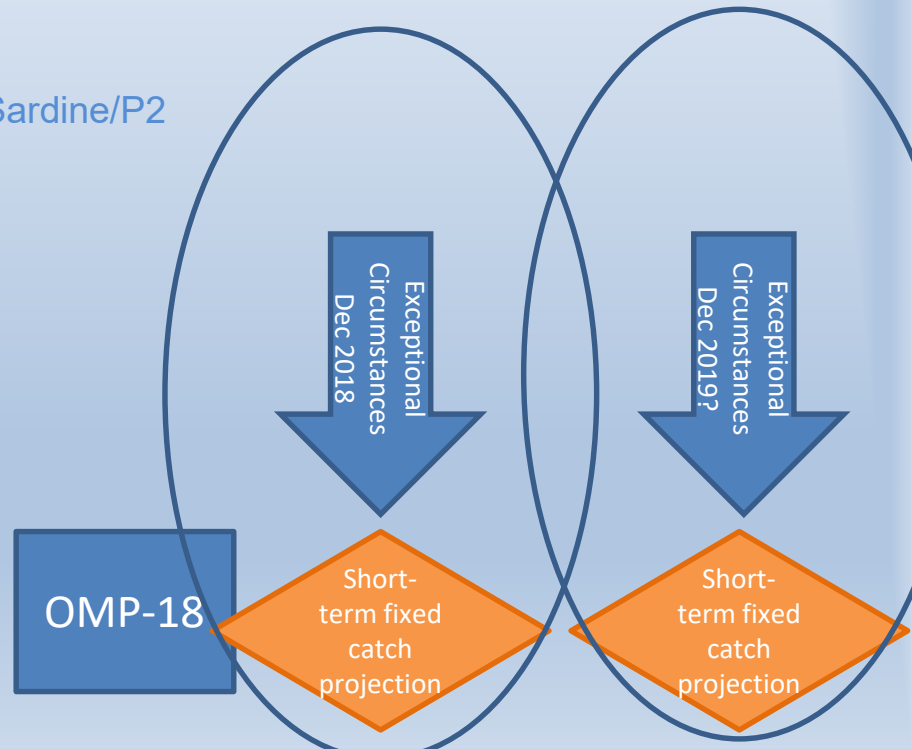
MARAM/IWS/2019/Sardine/P3

MARAM/IWS/2019/Sardine/P2

1) Updated assessment to 2018
2) Short-term projections

3) Modifications to assessment

4) Update assessment to 2019
5) Short-term projections



Assessment Details

- Age-structured production method framework, incorporating key elements of Statistical catch-at-age and Integrated Analysis methods
- Fit to survey estimates of recruitment and total abundance, catch data and length frequencies and parasite prevalence-at-length
- Estimate time-invariant growth curve with variability about length-at-age

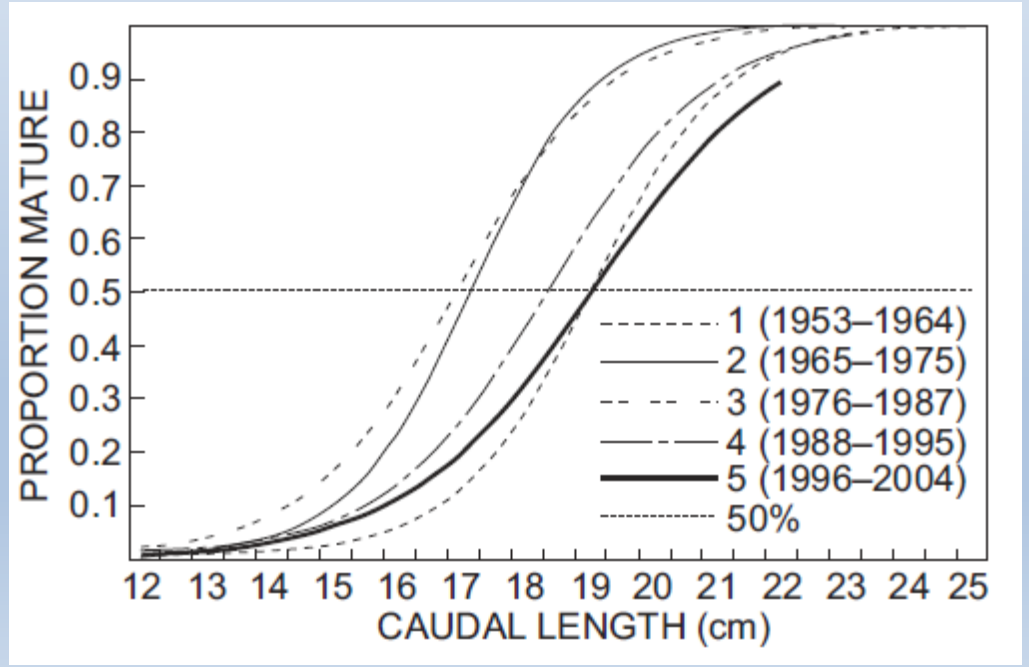
Biomass “currencies”

- Total biomass:

  model estimated biomass (all N x w = B)

- Spawner biomass:

  model estimated biomass contributing to spawning (N x w x f = B^{sp})



van der Lingen *et al.* (2006)

Biomass “currencies”

- Total biomass:

  model estimated biomass (all N x w = B)

- Spawner biomass:

  model estimated biomass contributing to spawning (N x w x f = B^{sp})

- Effective spawner biomass:

  model estimated biomass on which recruitment to the west/south component is assumed to be dependent

- Survey estimated (“observed”) biomass:

  biomass estimated by the survey; typically an underestimate for sardine ($B^{obs} = k*B$)

Biomass “currencies”