Australian Research Council – Industry Linkage Grant:

Utilising innovative fishing technology to address key questions on the biology of Antarctic krill

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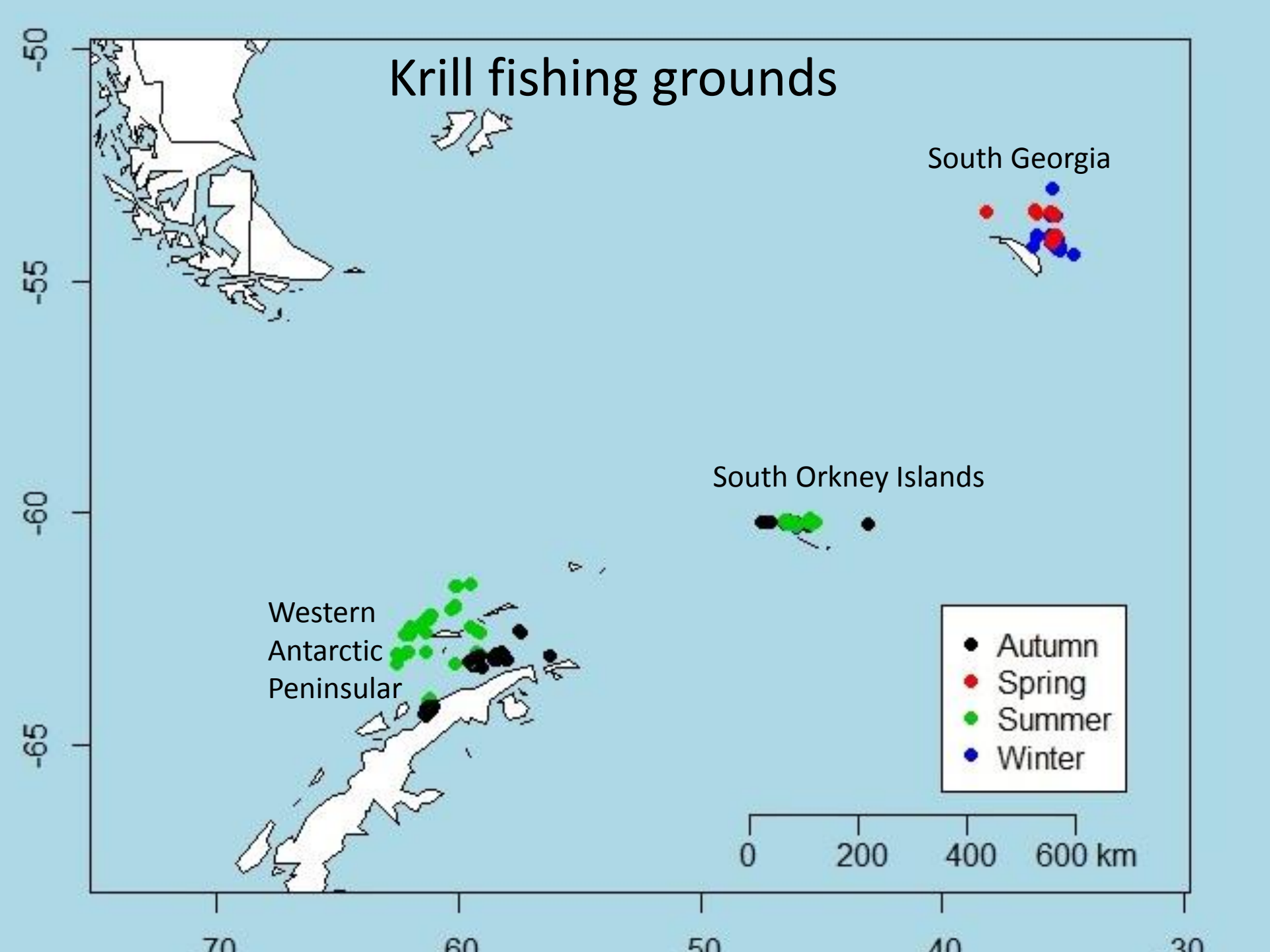
Project goals

- Predict the factors governing lipid levels and key biochemical composition in krill

- Determine the key items of diet for krill during all seasons

- Determine the seasonal onset of maturity in krill and the rate of reproduction

- Assess the effects of increasing temperature and ocean acidification on lipid content and composition of krill

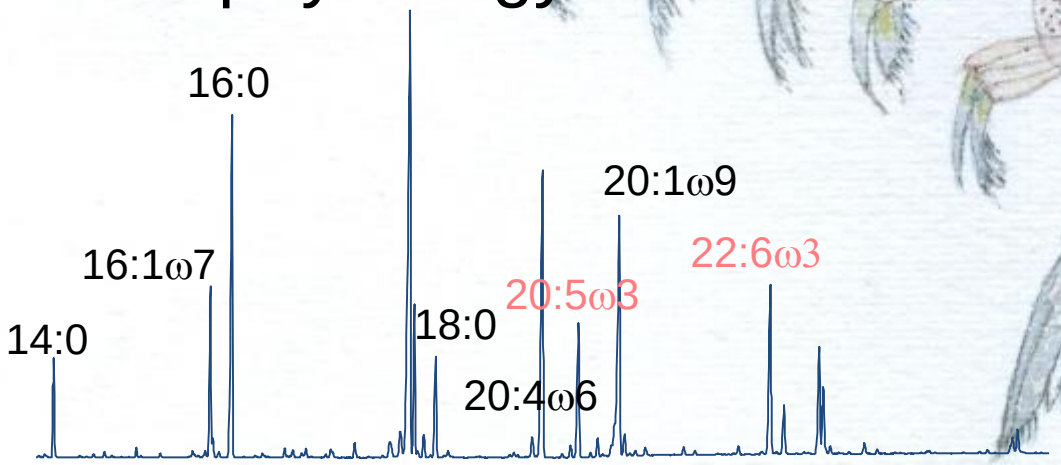

Krill fishing grounds
South Georgia
South Orkney Islands
Western
Antarctic
Peninsular
Autumn
Spring
Summer
Winter
0
200
400
600 km
-50
-55
-60
-65
70
60
50
40
30

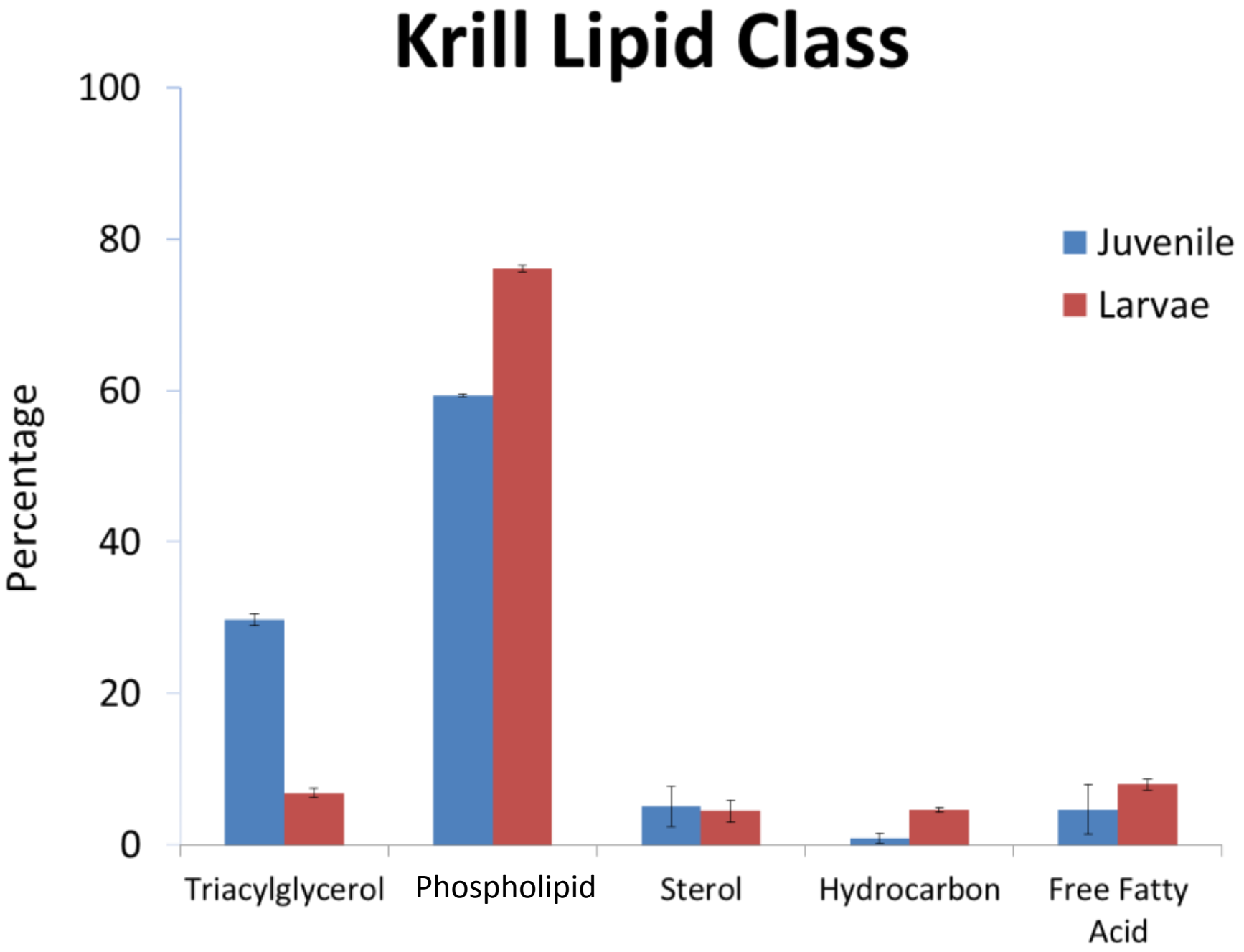
Lipid Analysis

-Total lipid- condition

-Lipid class- storage/structural

-Fatty acid profiles- diet/physiology




Krill Lipid Class
100
80
60
40
20
0
Percentage
Juvenile
Larvae
Triacylglycerol
Phospholipid
Sterol
Hydrocarbon
Free Fatty Acid

Docosahexaenoic acid DHA
Eicosapentaenoic acid EPA

Krill oil

- Phospholipid/Triacylglycerol
- Astaxanthin

Signature Lipids - 'You are what you eat'

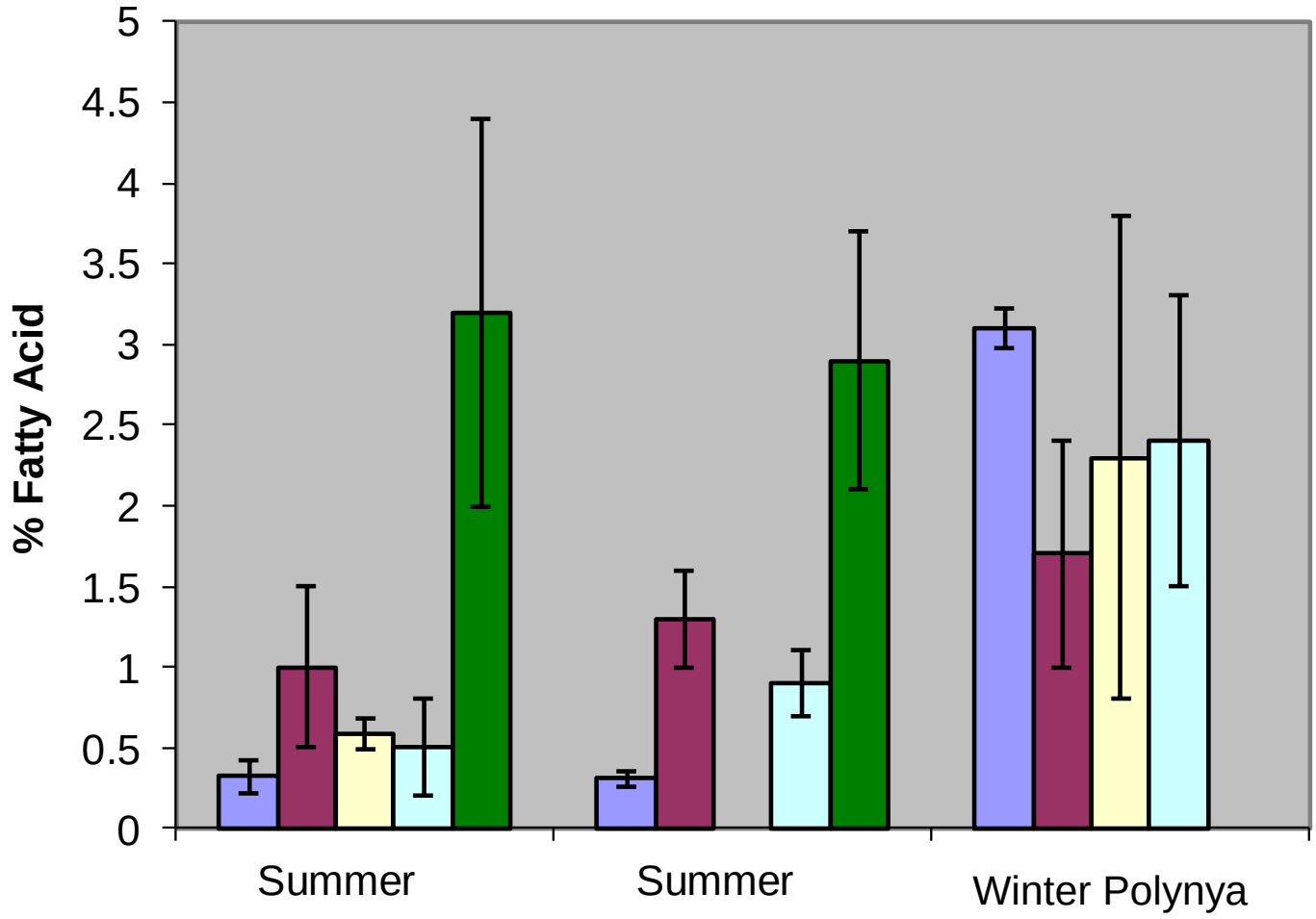
Many fatty acids readily transferred from prey to predator with minimal modification

Signature fatty acids: combinations of fatty acids preserved as they pass up the food chain

Constituent fatty acids therefore represent, to some extent, a temporal integration of diet

Complements other approaches

Diet of Ice Krill off East Antarctica



C16 PUFA diatoms

18:4ω3 non-diatom phytoplankton/protozoans

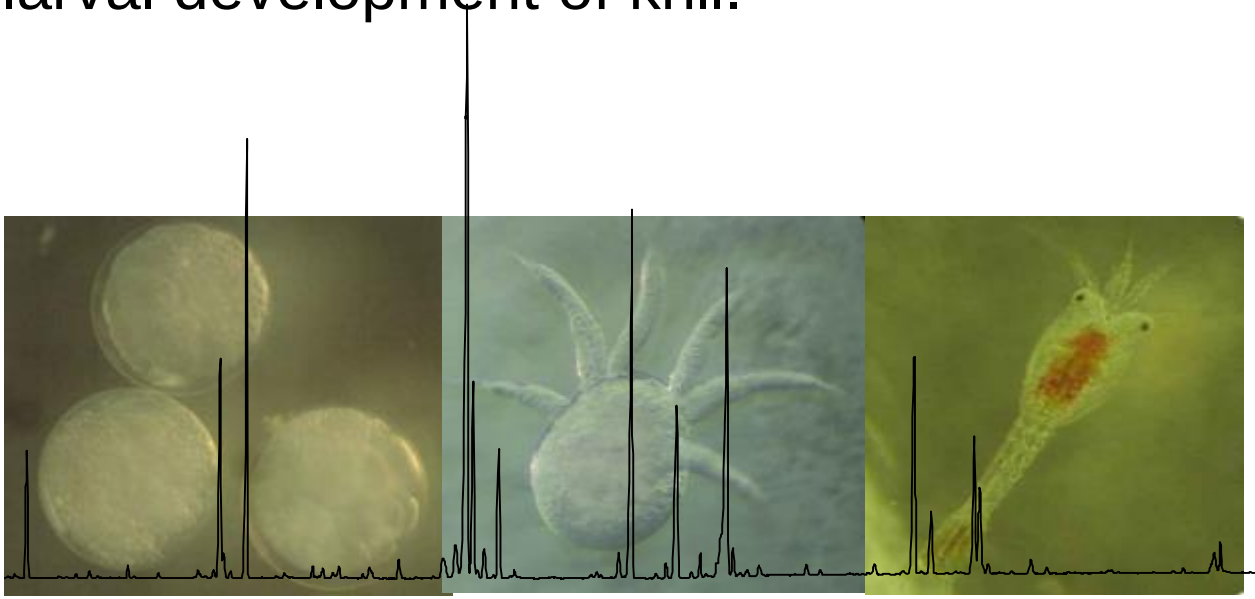
18:5ω3 dinoflagellates

20:1, 22:1 crustaceans

a + i 17:0 bacteria

Krill egg hatching success rate

- Dietary condition of maternal krill affects the quality of embryos, and in turn the hatching success and larval survival.
- Levels of the fatty acids LA and AA and the DHA/EPA ratio effect hatching success.
- The long chained PUFA are utilised at a greater rate compared to SFA and MUFA during the embryonic and larval development of krill.



Yoshida et al 2011
Marine Biology

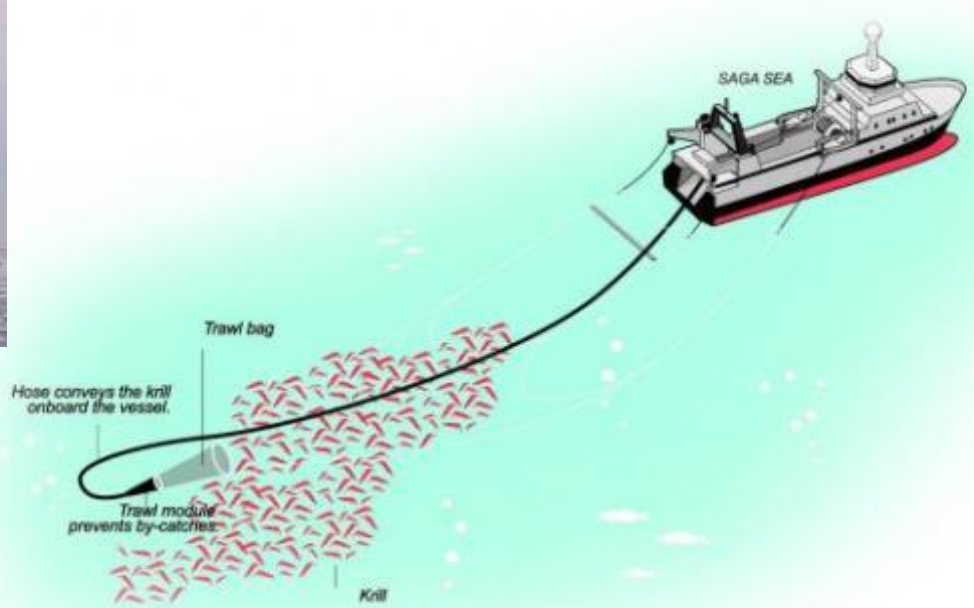
Scientific effort

Obtaining basic information on Antarctic krill is expensive and challenging because of their difficult habitat and complicated life history.

Australia has undertaken a half a dozen expeditions over the past 20 years with an allocated 20-30 days ($100,000/day) per voyage dedicated to krill research.

BROKE
BROKE WEST
KROCK
KAOS
KACTAS
SIPEX
SIPEX II

Approx- 150 days= $15,000,000



Aker Biomarine's patented "Eco-harvesting Technology"


Antarctic Ocean
Takk skal du ha