UIT

THE ARCTIC UNIVERSITY OF NORWAY

Arctic Marine Ecosystem Services and Values

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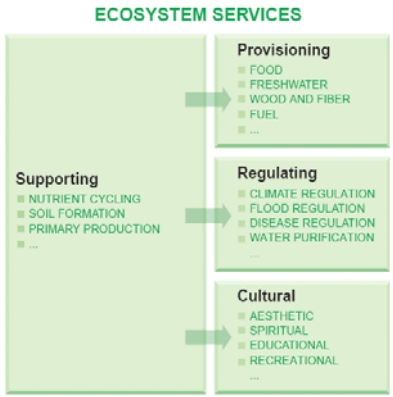
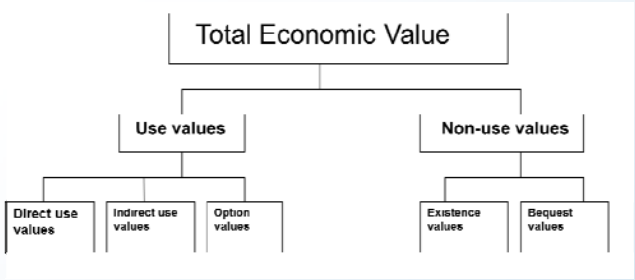
ACES
Washington December 2014

Outline of talk



Marine ecosystem services and the Arctic

Services from cold water coral



Valuing protection of cold water coral

Why should we care….?

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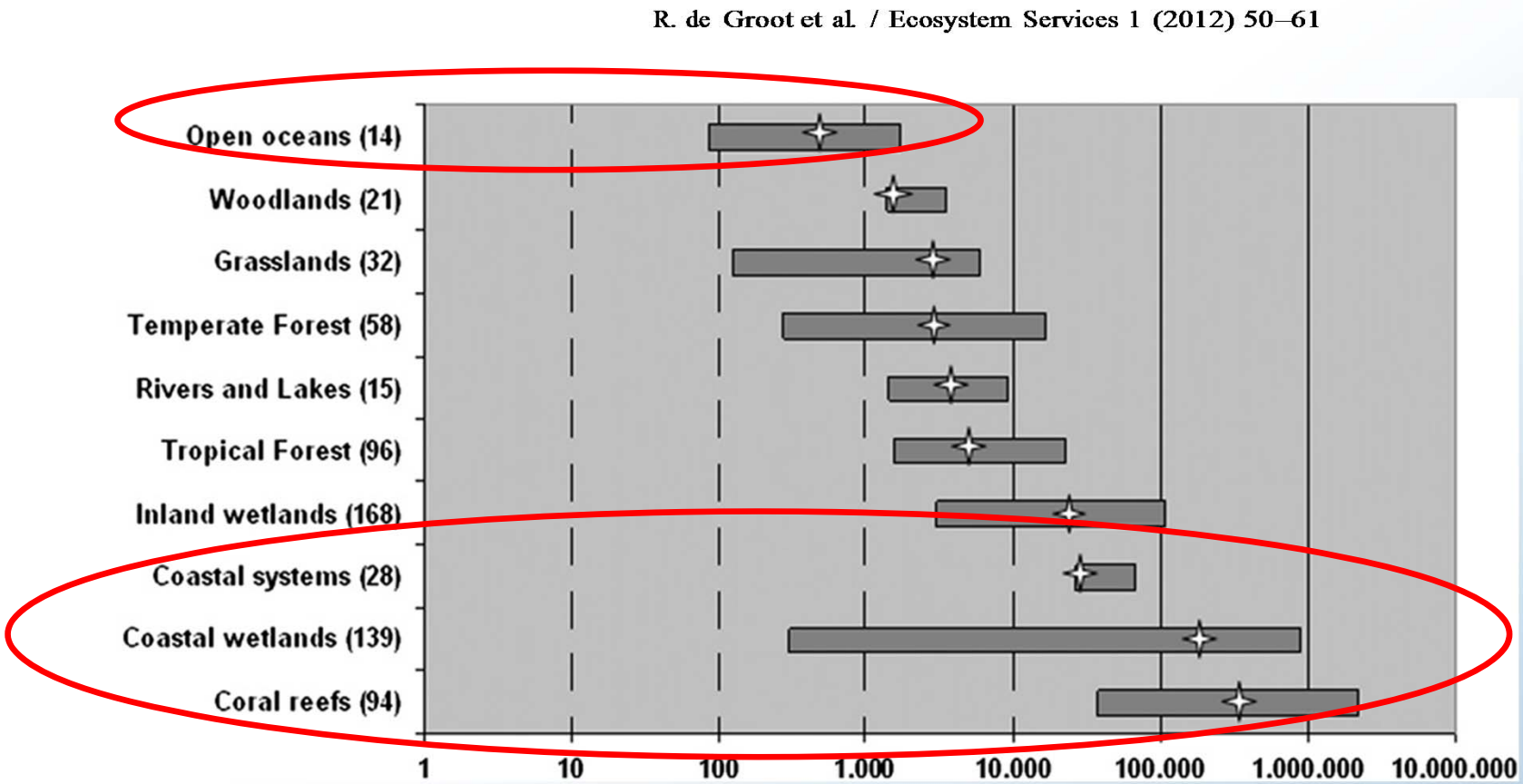

Range and average (shown as star) of total monetary value of ecosystem services per biome (in USD/ha/yr 2007/PPP-corrected).

Ecosystem services from Arctic marine biodiversity
Expected impacts of climate change.

Red *indicates declines in services,* ***green*** *increases in services, while* ***white*** *indicates lack of knowledge.*

	Supporting services	Provisioning services	Regulating services	Cultural services
Primary producers	Prey		Nutrient cycling	
Zooplankton communities	Prey/predators			
Benthic communities	Habitats Prey/predators		Carbon sequestration Nutrient cycling	Charismatic species
Fish and shellfish	Prey/predators	Indigenous and commercial *Arctic* species harvests		Fisheries communities
		Indigenous and commercial *Boreal* species harvests		Indigenous societies
Marine Mammals	Prey/predators	Indigenous and commercial harvesting		Fisheries communities Indigenous societies Charismatic species
Marine Birds	Prey/predators	Indigenous harvesting		Charismatic species

Arctic Ecosystem Services feed into services other places

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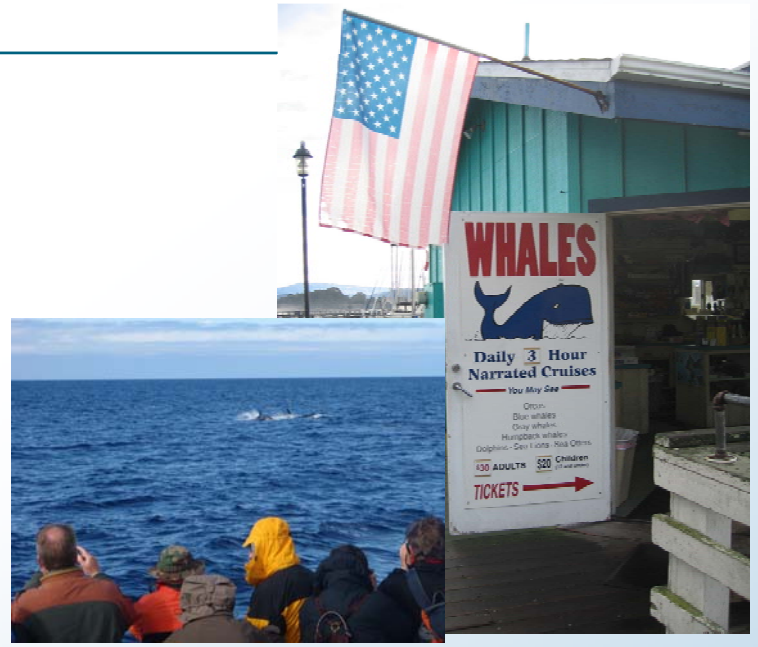
Arctic Ecosystems



Sub-Arctic ecosystem services

Ecosystem services from Arctic marine biodiversity
Expected impacts of climate change.

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	Supporting services	**Provisioning services**	**Regulating services**	**Cultural services**
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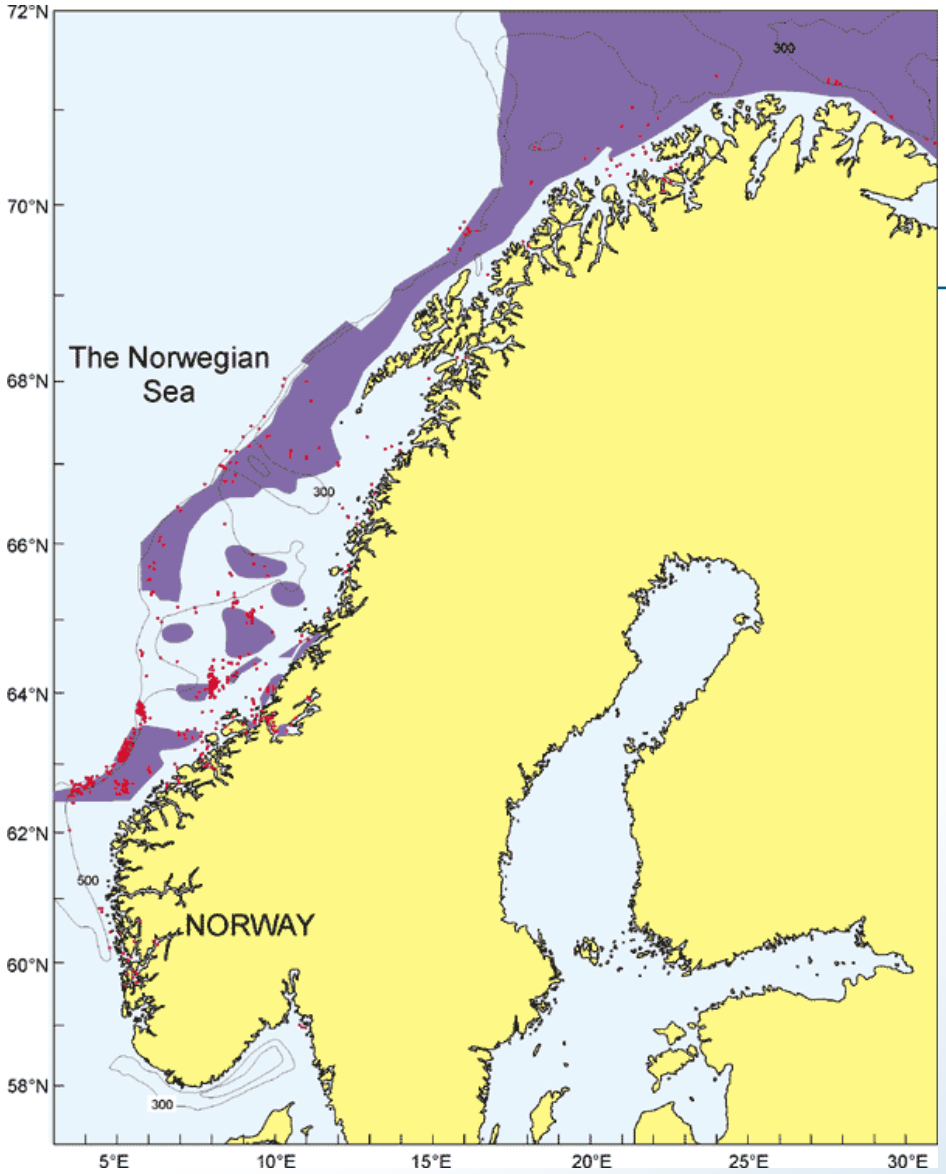
Cold water corals (CWC)



Cold water coral (red) and most used Trawl areas (blue) on the norwegian continental shelf
(Institute of Marine Research, Bergen).

Video picture from Sørmannsneset, Norway, 220 m depth (16. mai 1998), showing the crushed remains of Lophelia cold water coral spread over the area, due to trawling.

Cold water coral services

Supporting

- Biodiversity
- Resilience
- Habitat
- …

Provisioning

- Genetic resources
- Chemical compounds for industrial and pharmaceutical uses
- Jewellery
- …

Regulating

- Gas and climate regulation
- Carbon sequestration and storage
- …

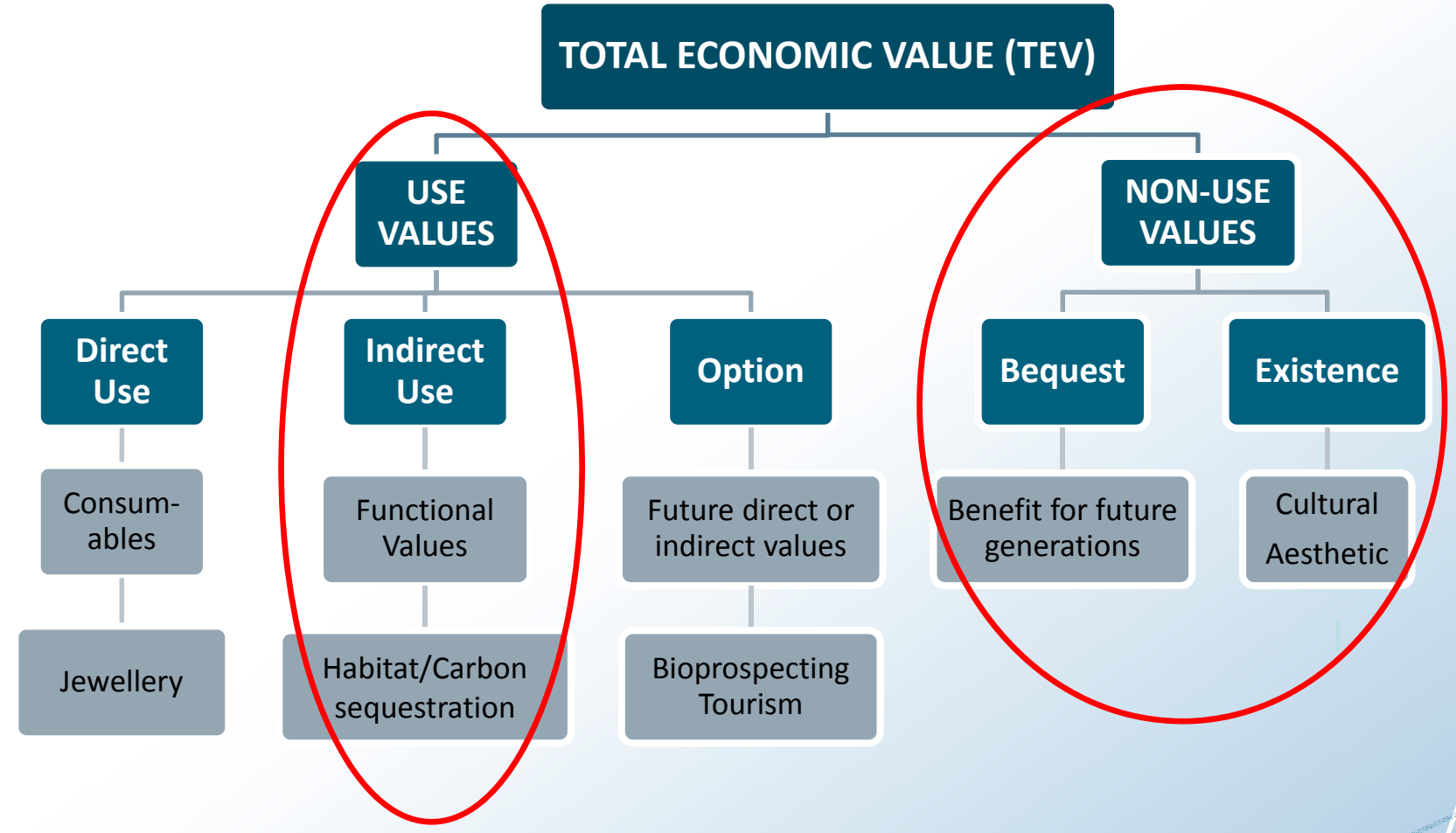
Cultural

- Educational
- Scientific
- Aesthetic
- Spiritual
- Temperature Indicators
- …

Why value ecosystem services

- In order to assess costs and benefits of development in natural environments
- In order to assess trade-offs between different services – a common metric
- In order to give input into management decisions
- In order to understand human preferences

Components of TEV associated with CWC



Existence values

Existence values

Classification of Environmental Valuation Techniques (based on individual preferences)

	Indirect	Direct
Revealed preference (RP)	Travel Cost method Hedonic Price analysis Averting Behaviour	Production Function (Market prices) Replacement Costs Mitigation Costs
Stated Preferences (SP)	Discrete Choice Experiments (DCE)	Contingent Valuation (CV)

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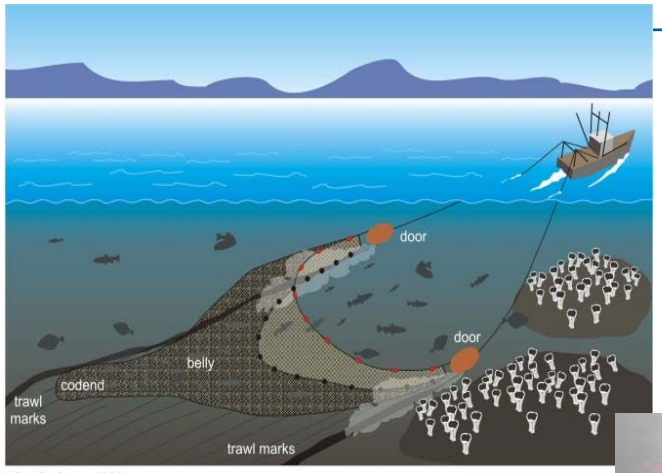
Are people willing to pay for more protection of cold water corals?

- 100 – 3000 m depths
- Little known ecosystem function
- Little known resource amongst the general public

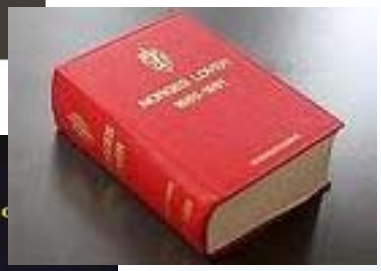
Attitudes and willingness to pay for protection of cold water coral (CWC)

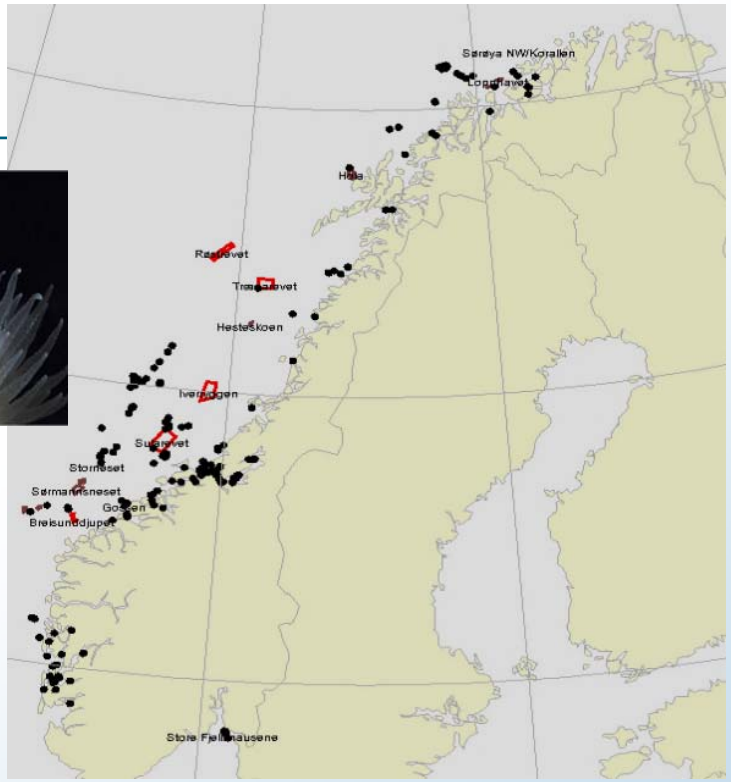
How do we capture this?

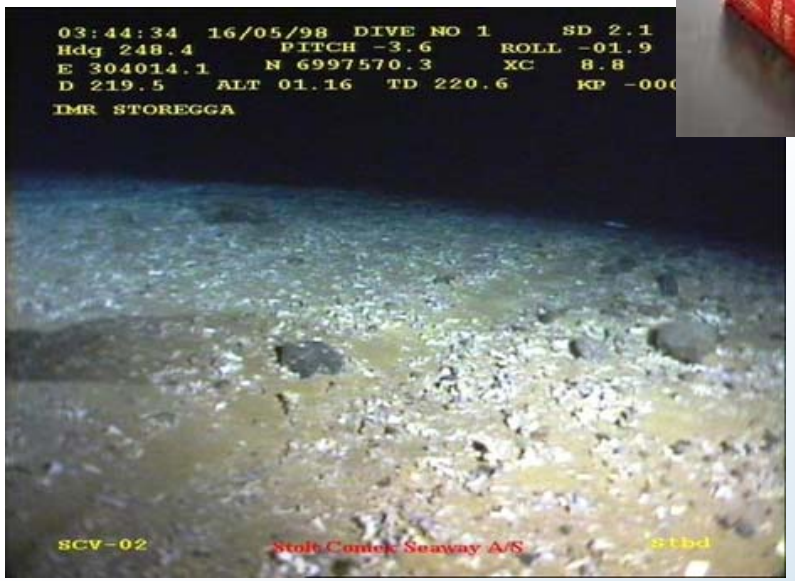
Bottom trawling may have damaged 30-50 % of CWC in Norway



(after Christen, 1999)

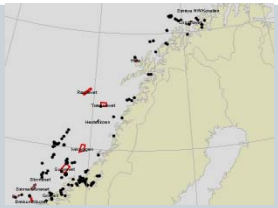






- Slow growing; 4-25mm/year
- 2445 km^2 already protected
- Illegal to intentionally damage

DISCRETE CHOICE EXPERIMENT

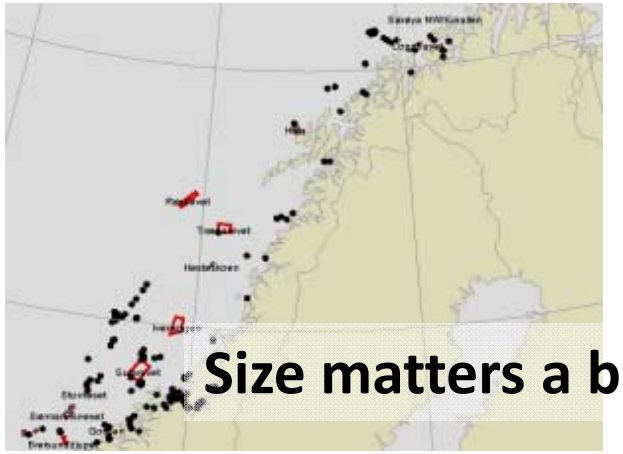
		Alternative 1	Alternative 2	Alternative 3 (no change)
Size of protected areas		5.000 km^2	10.000 km^2	2.445 km^2
Attractive for industry		Attractive for oil/gas	Attractive for fisheries	To some degree for both
Importance as habitat for fish		Not important	Important	To some degree
Cost per household per year to protect more cold water coral areas		100 kr/year	1000 kr/year	0
I prefer				

22 municipalities * 20 participants * 12 choice cards = 4800 choices

- average willingness to pay to protect more cold water coral
- preferences for what factors should be emphasised

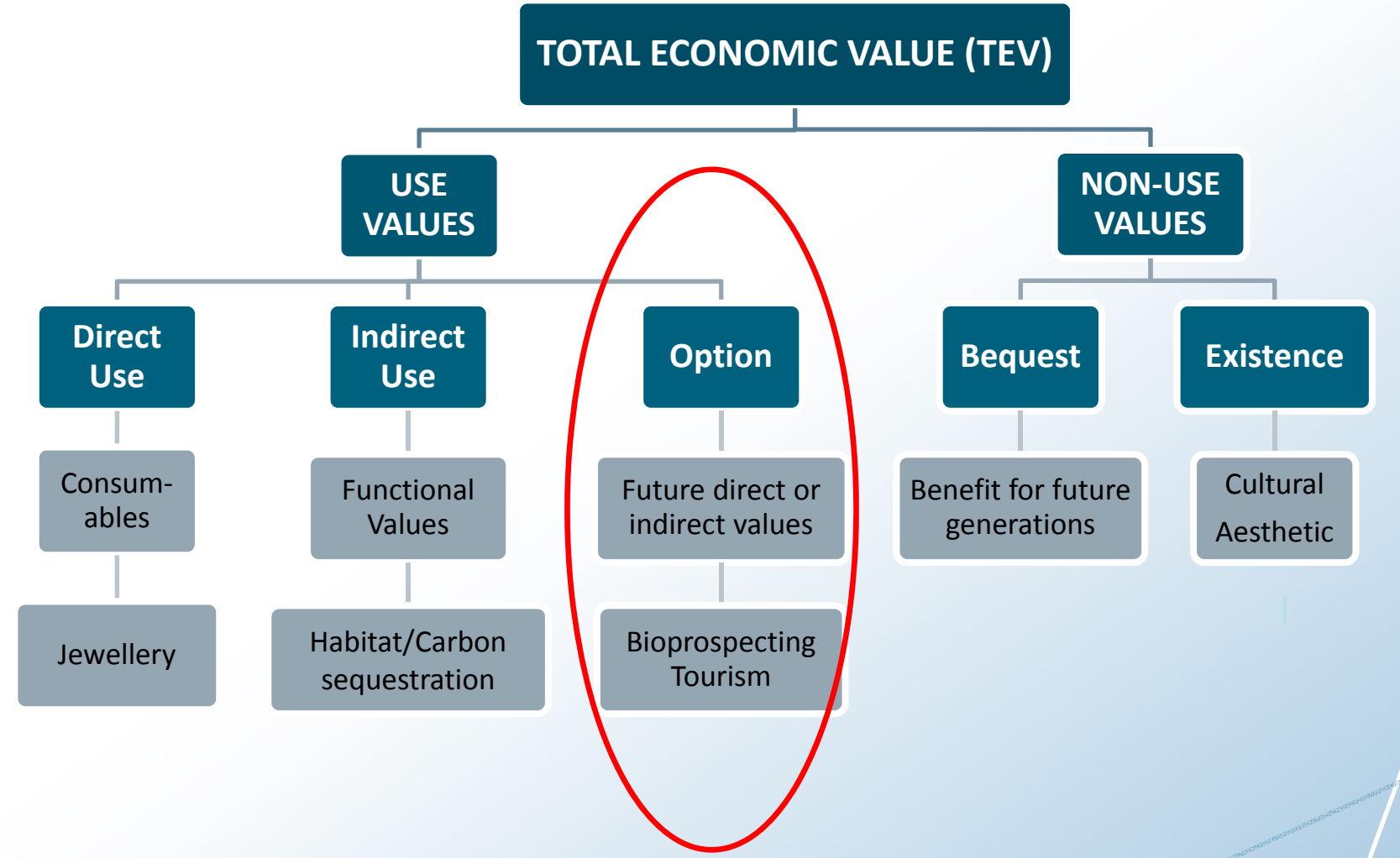
Can we trust valuation studies?

People willing to pay, but…




«The Nemo effect»
Really care

Components of TEV associated with CWC

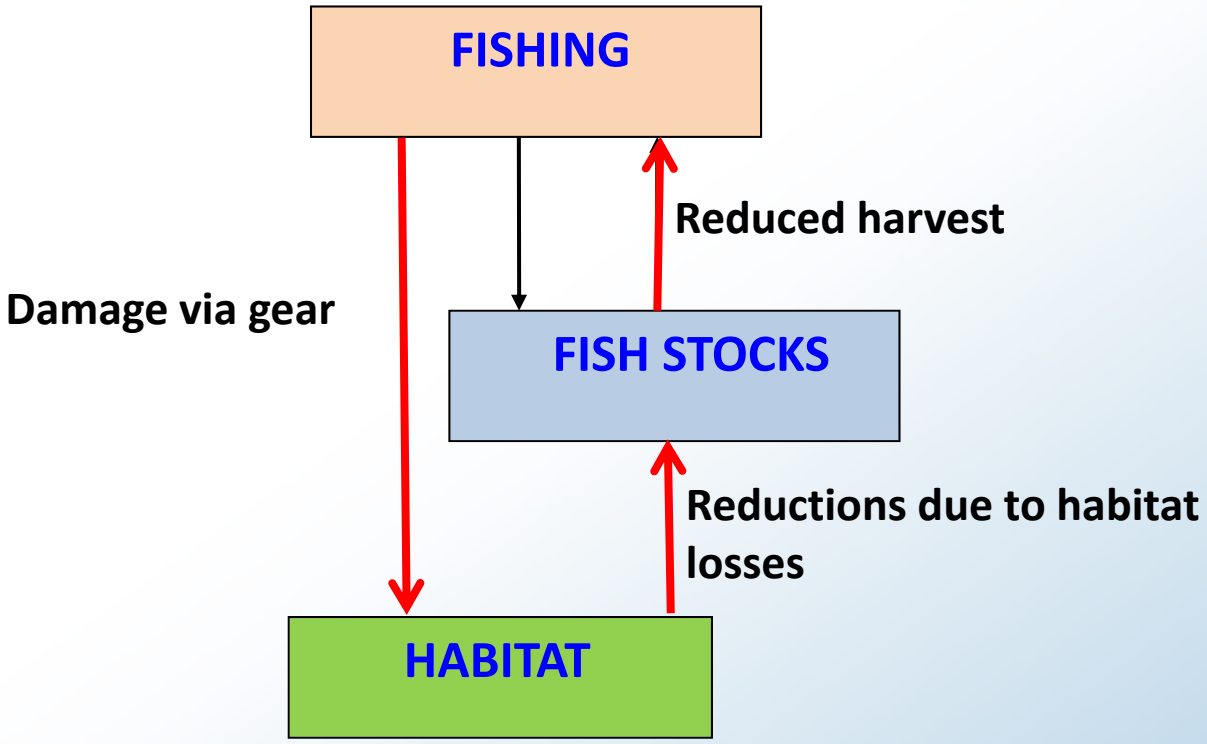


Option values

SCENARIO 1	Option A	Option B	Option C ("Business as usual")
New medicinal products (potential for the discovery of new medicinal products from deep-sea organisms) 	**Unknown** (potential for new medicinal products unknown)	**High potential for new medicines** (protect animals with potential for new medicinal products)	**Unknown** (potential for new medicinal products unknown)
Number of protected species (includes animals such as fish, starfish, corals, worms, lobsters, sponges & anemones) 	**1300 species** (300 more than "business as usual")	**1600 species** (600 more than "business as usual")	**1000 species** (base level)
Additional costs (per household per year) 	**£ 5**	**£ 60**	**£ 0**
Your choice for scenario 1 *(please tick A, B or C)*	☐	☐	☐

Jobstvogt et al 2013

Habitat-fisheries interactions



Conclusion

- People have preferenes for supporting services that feed into final non-consumptive services
- The Arctic is an important supporting service provider to sub-arctic areas
- If we are to take these values into account, this could affect how we manage Arctic resources in the future
- Especially this may involve more precautionary (and adaptive) measures regarding the harvesting of fish resources, but perhaps also of other resources that may impact benthic habitats.

Thanks to:

- Margrethe Aanesen
- Pål Buhl Mortensen
- Jannike Falk-Petersen
- Naomi Foley
- Jan Helge Fosså
- Anthony Grehan
- Nick Hanley
- Viktoria Kahui
- Ståle Navrud
- Erlend Dancke Sandorf
- Godwin Kofi Vondolia
- Lis Lindahl Jørgensen
- The Research Council of Norway