



**Havs
och Vatten
myndigheten**

Symphony i havsplaneringens miljöbedömning

Jan Schmidbauer Crona









jan.schmidbauer.crona@havochovatten.se

MKB-dagen 2019, Ultuna

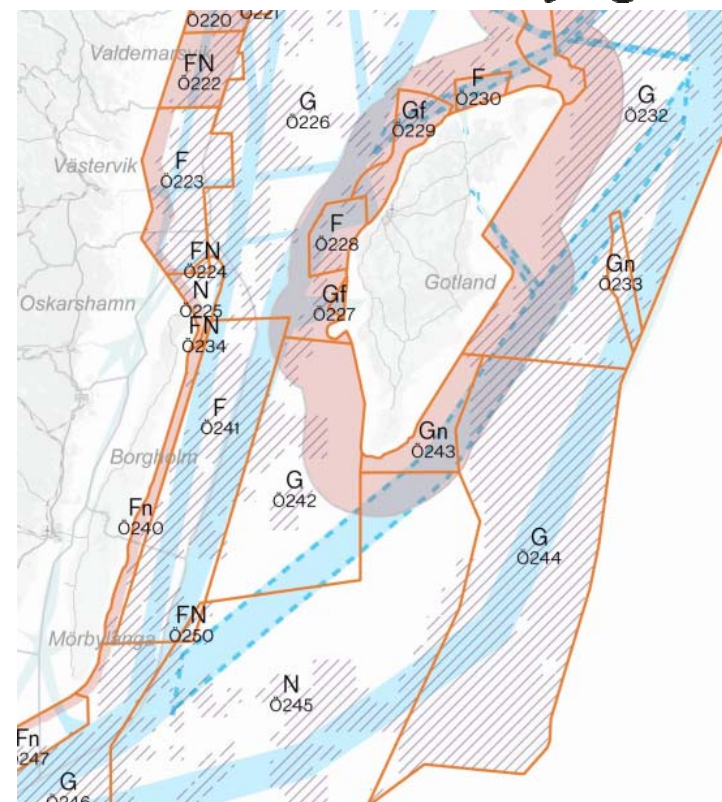
VI PLANERAR

HAVET

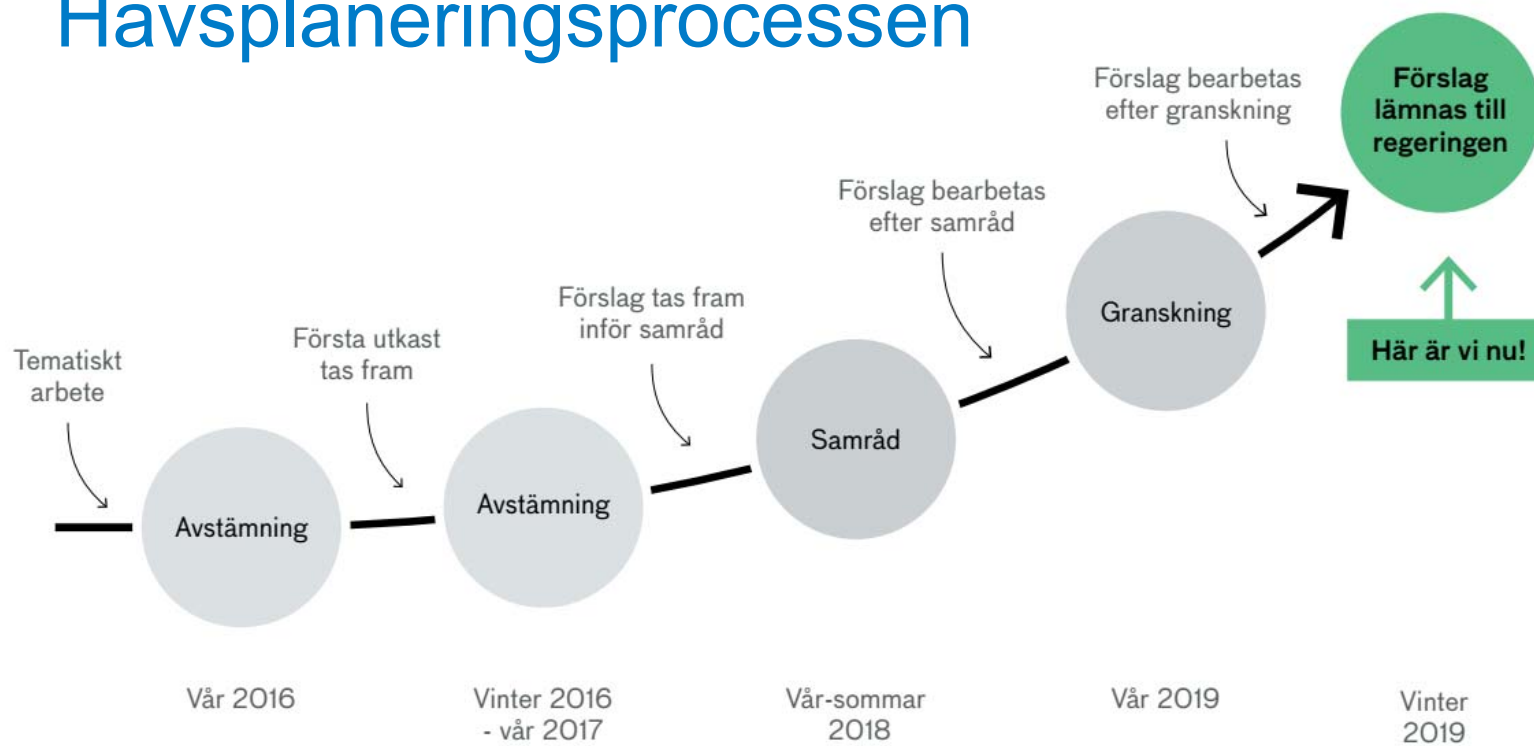
Och pekar ut den mest lämpliga användningen

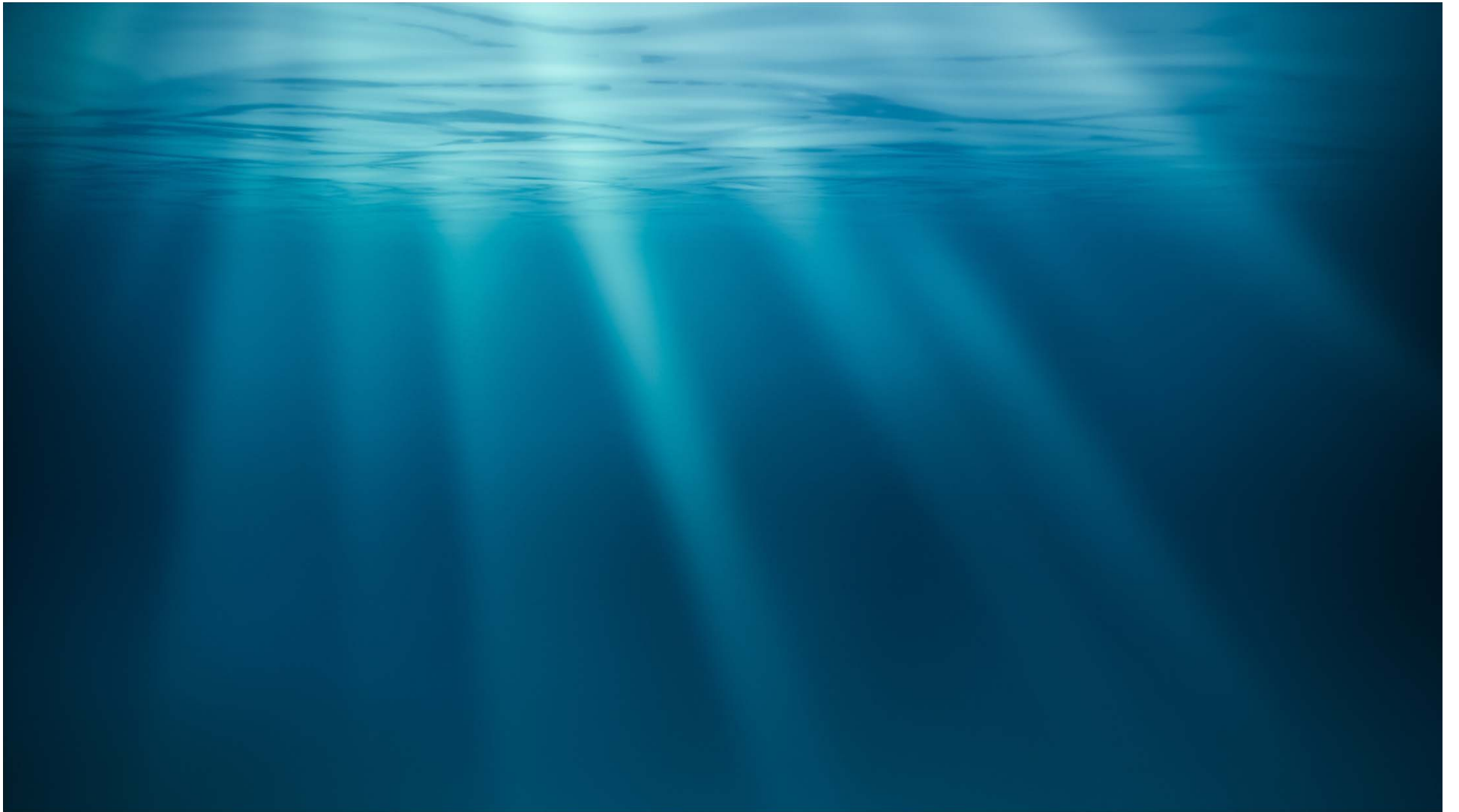
-  Hänsyn kulturmiljövärden
 -  Energiutvinning
 -  Försvar
 -  Generell användning
 -  Natur
 -  Sandutvinning
 -  Sjöfart
 -  Yrkesfiske
- Utredningsområden för energiutvinning och sjöfart
- n** Särskild hänsyn höga naturvärden

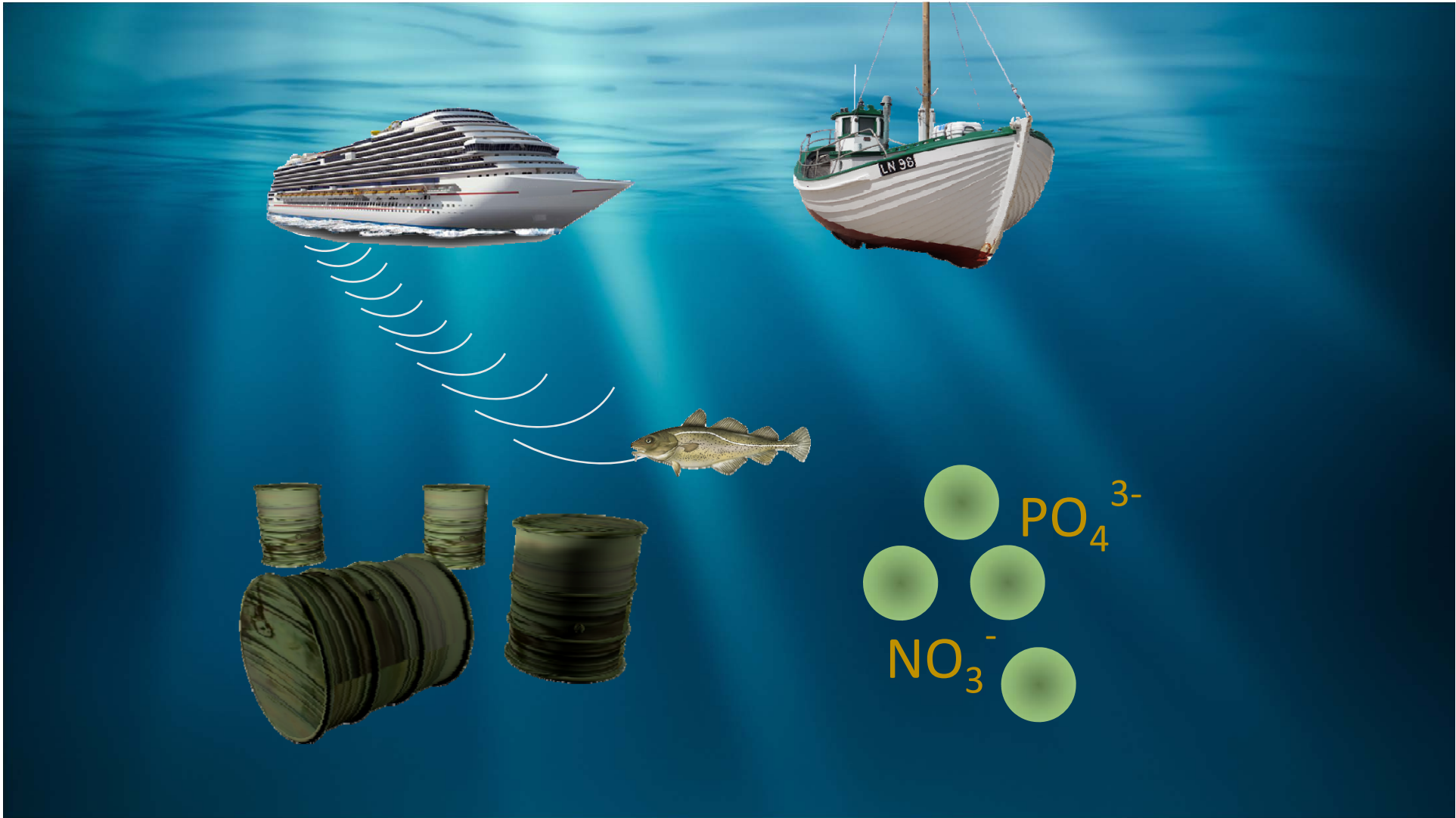
**Havs
och Vatten
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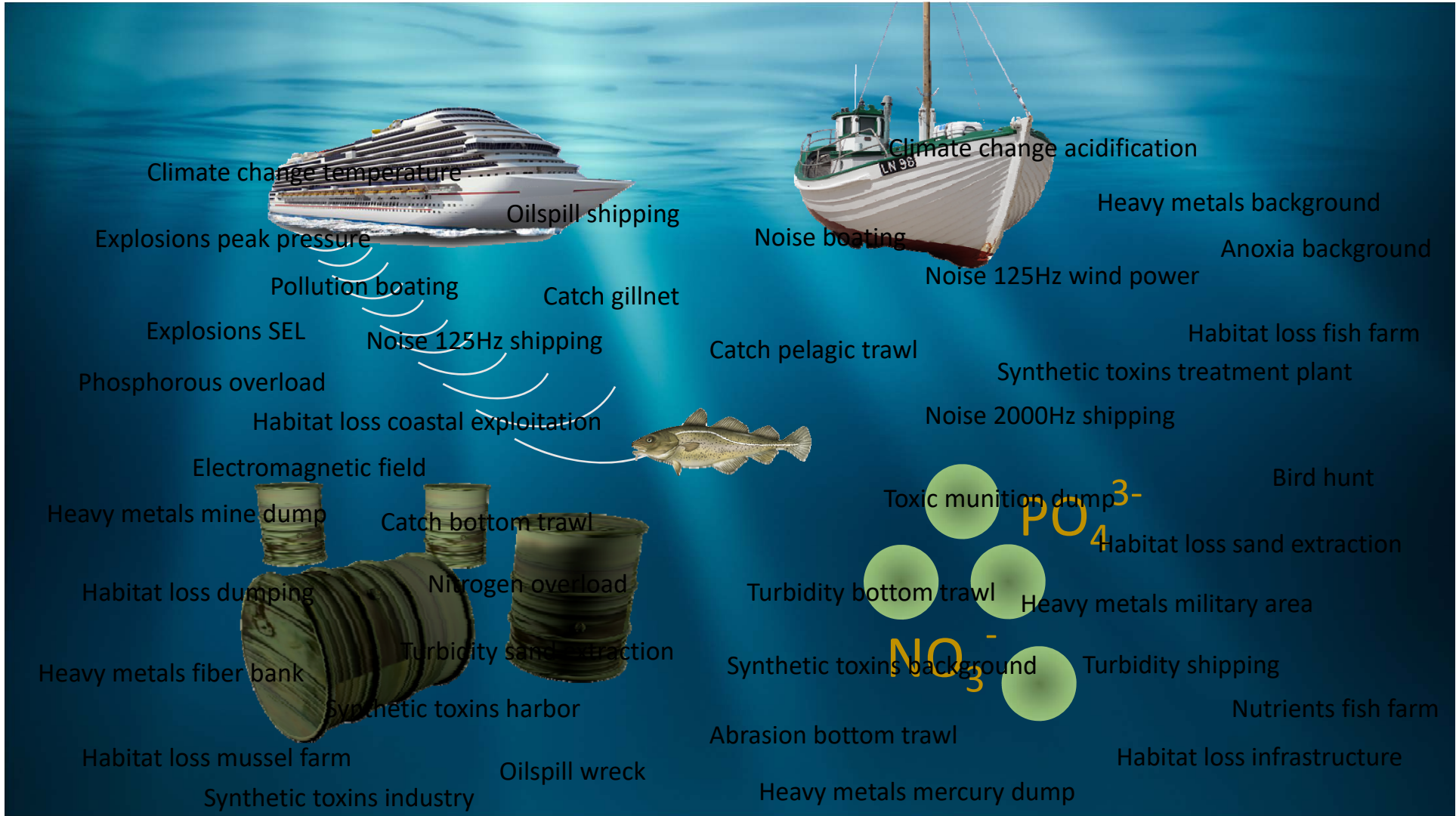


Havsplaneringsprocessen









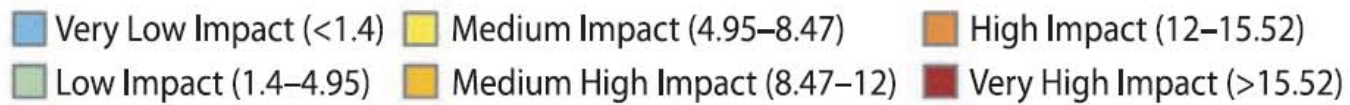
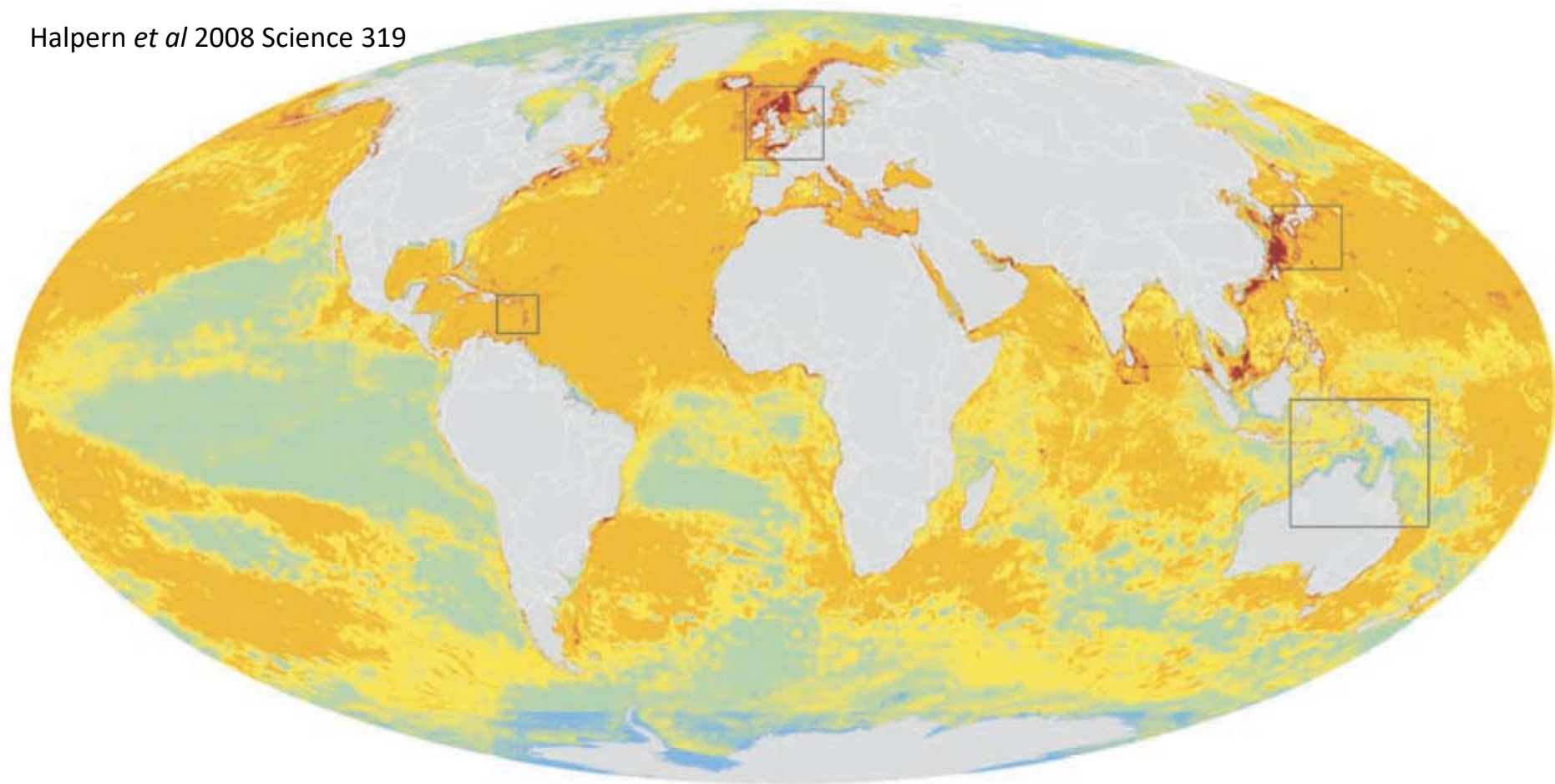


Climate change temperature
Climate change acidification
Angiosperms
Haploops reef
Oilspill shipping
Heavy metals background
Explosions peak pressure
Seabird coastal wintering
Grey seal
Rough bottom aphotic
Noise boating
Rough bottom photic
Anoxia background
Pollution boating
Catch gillnet
Porpoise north sea
Noise 125Hz wind power
Shoreline
Hard bottom aphotic
Explosions SEL
Noise 125Hz shipping
Catch pelagic trawl
Coastal birds
Habitat loss fish farm
Phosphorous overload
Plankton pelagic
Seabird offshore wintering
Synthetic toxins treatment plant
Soft bottom photic
Habitat loss coastal exploitation
Cod
Noise 2000Hz shipping
Hard bottom photic
Electromagnetic field
Fish spawning
Sprat
Harbour seal
Bird hunt
Heavy metals mine dump
Catch bottom trawl
Herring
Eel migration
Toxic munition dump
Transport bottom photic
Vendace
Porpoise baltic sea
Habitat loss sand extraction
Deep reef
Habitat loss dumping
Nitrogen overload
Turbidity bottom trawl
Heavy metals military area
Soft bottom aphotic
Porpoise belt sea
Mussel reef
Rivermouth fish
Heavy metals fiber bank
Turbidity sand extraction
Synthetic toxins background
Turbidity shipping
Rough bottom deep
Synthetic toxins harbor
Transport bottom aphotic
Artificial reef
Nutrients fish farm
Habitat loss mussel farm
Hard bottom deep
Abrasion bottom trawl
Habitat loss infrastructure
Oilspill wreck
Heavy metals mercury dump
Soft bottom deep
Synthetic toxins industry
Transport bottom deep

Måste bedöma kumulativa effekter

Symphony

Halpern *et al* 2008 Science 319



Så här funkar metoden

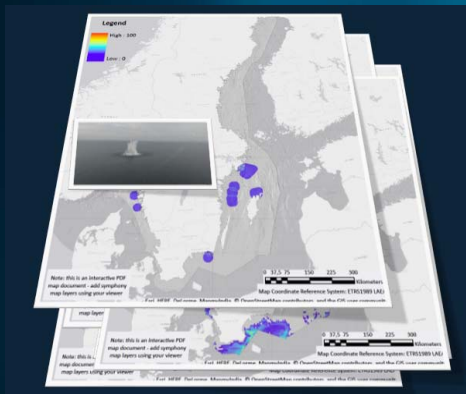
Equation

$$P_{sum} = \sum_{i=1}^n \sum_{j=1}^m B_i \times E_j \times K_{i,j}$$

Cumulative impact (P) is calculated as the sum of the product of all pressures' (B) effects on all ecosystem components (E), given the particular sensitivity (K) of every ecosystem component to every pressure.

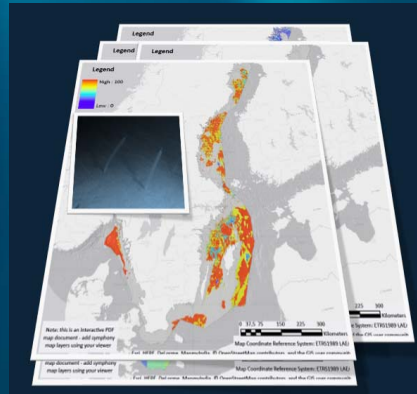
Belastningar

från mänskliga aktiviteter
TOTALT 40 st



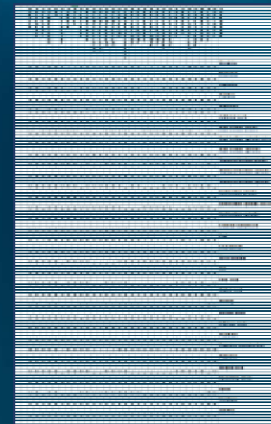
Ekokomponenter

naturvärden
TOTALT 34 st



Känslighetsmatris

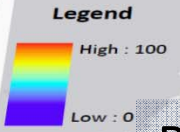
Effekten av varje belastning på varje
ekokomponent



Resultat

kartor & tabeller





Belastningar
från mänskliga aktiviteter
TOTALT 40 st



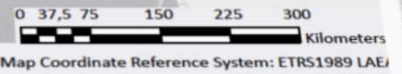
Note: this is an interactive PDF map document - add symphony map layers using your viewer



Ekokomponenter
naturvärden
TOTALT 34 st



Note: this is an interactive PDF map document - add symphony map layers using your viewer



map layer

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map document - add symphony map layers using your viewer

Map Coordinate Reference System: ETRS1989 LAE/ and the GIS user community



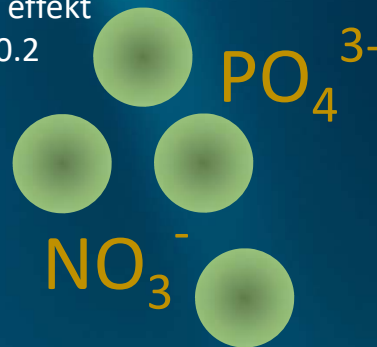
Liten effekt
0.1



Stor effekt
0.9



Viss effekt
0.2



Känslighetsmatrix

Effekten av varje belastning på varje ekokomponent

Så här funkar metoden

Equation

$$P_{sum} = \sum_{i=1}^n \sum_{j=1}^m B_i \times E_j \times K_{i,j}$$

Cumulative impact (P) is calculated as the sum of the product of all pressures' (B) effects on all ecosystem components (E), given the particular sensitivity (K) of every ecosystem component to every pressure.

Belastningar

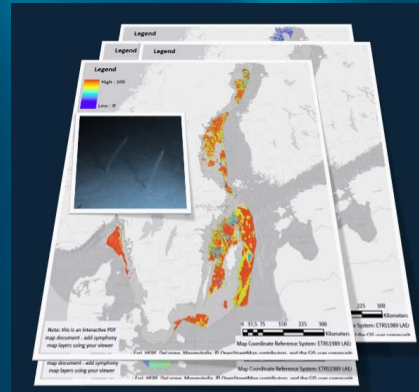
från mänskliga aktiviteter
TOTALT 40 st



×

Ekokomponenter

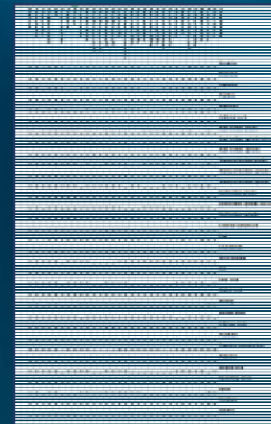
naturvärden
TOTALT 34 st



×

Känslighetsmatris

Effekten av varje belastning på varje
ekokomponent



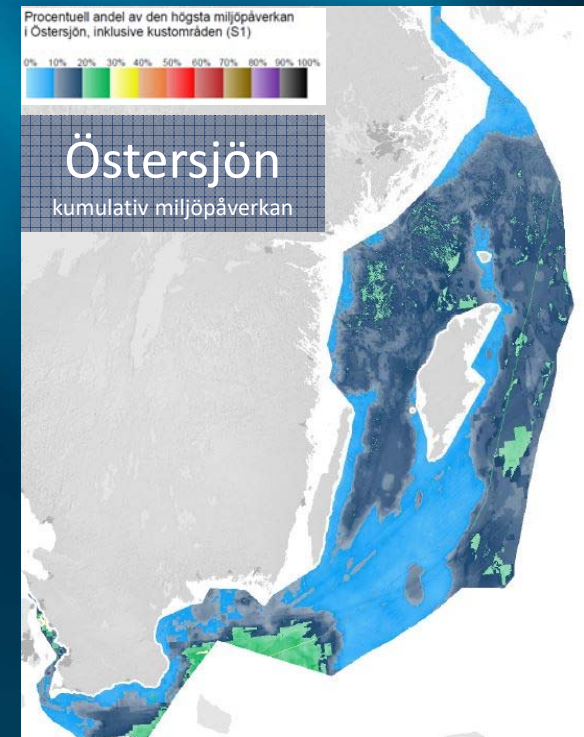
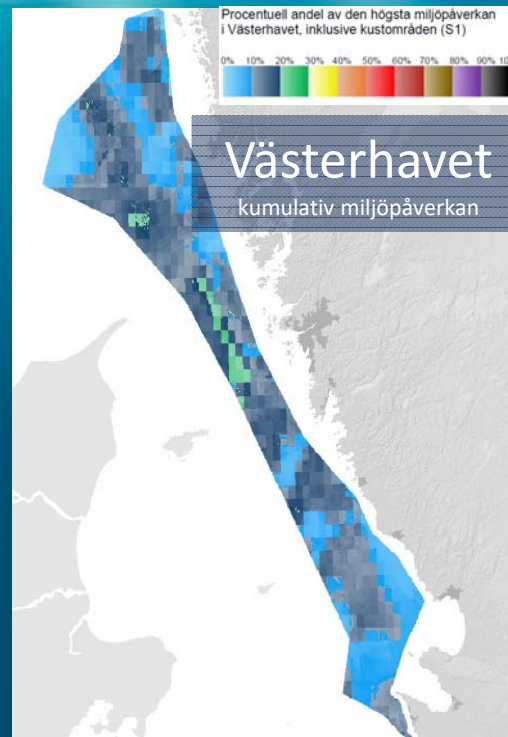
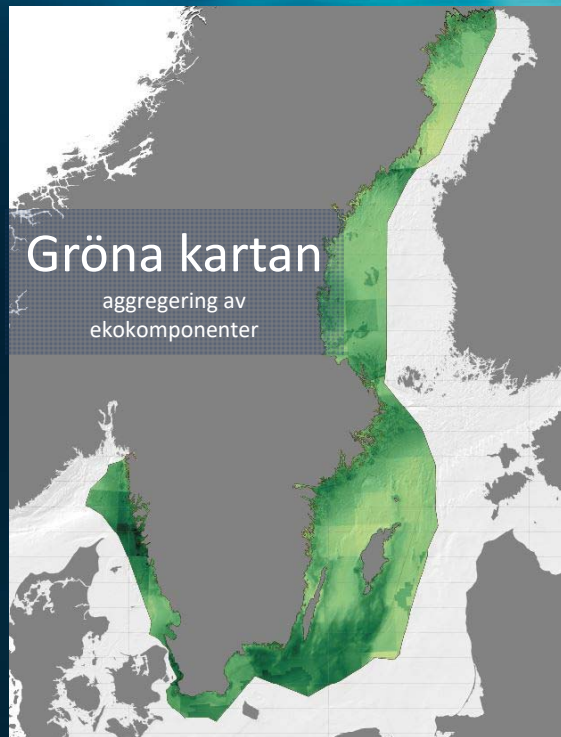
=

Resultat

kartor & tabeller

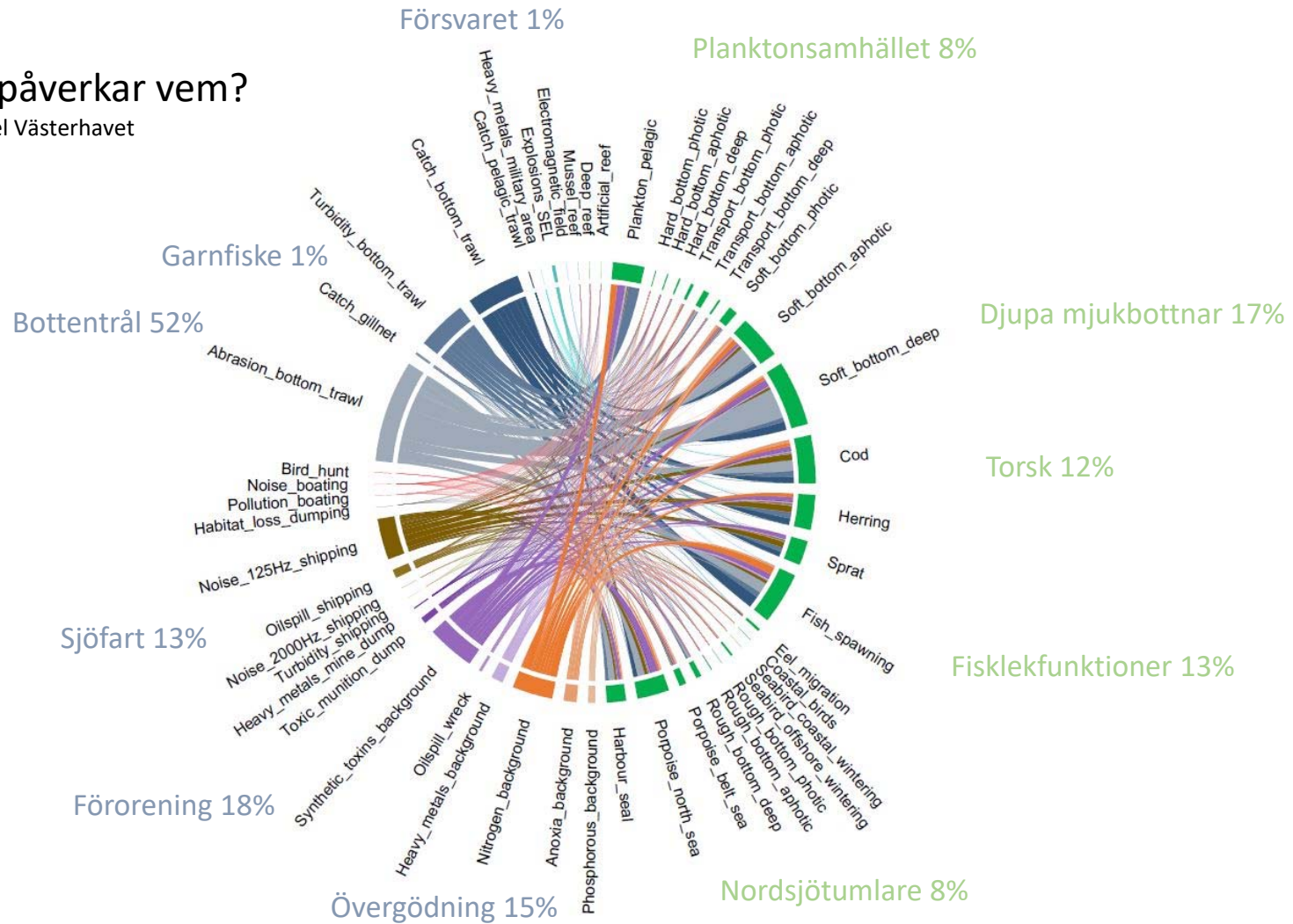


Resultat - nuläge

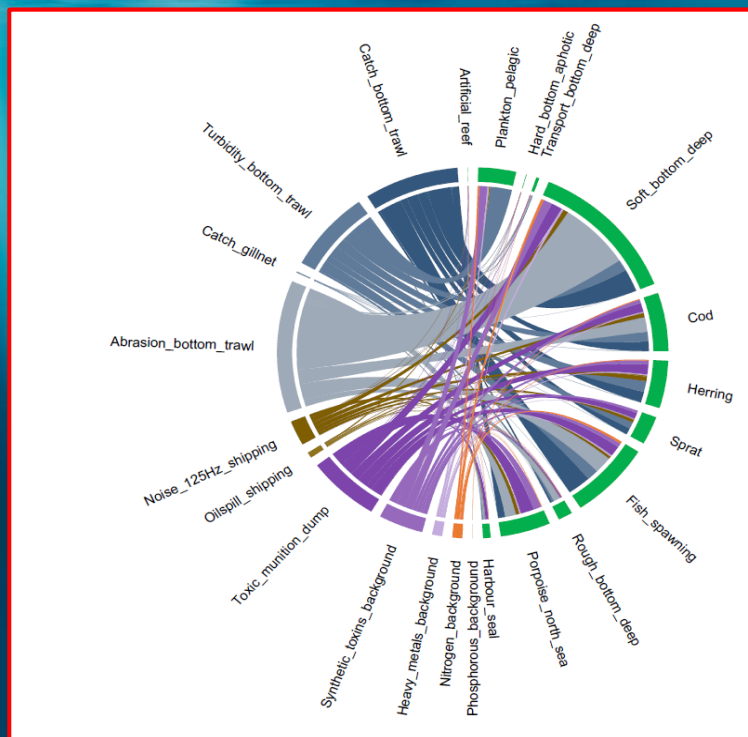
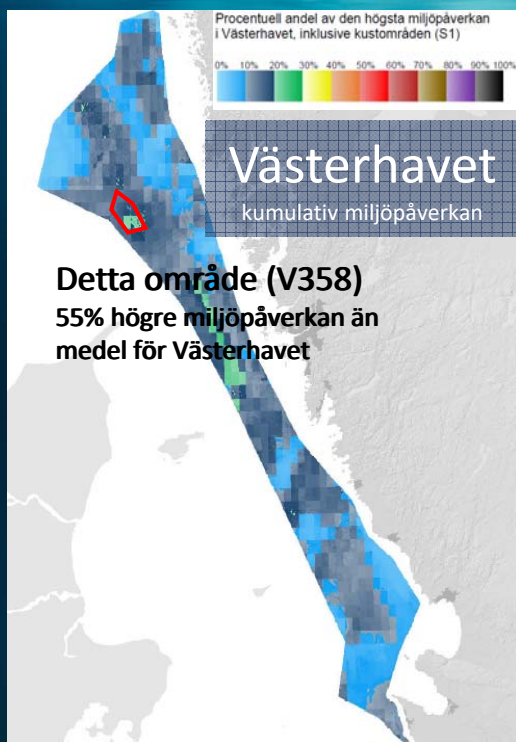


Vad påverkar vem?

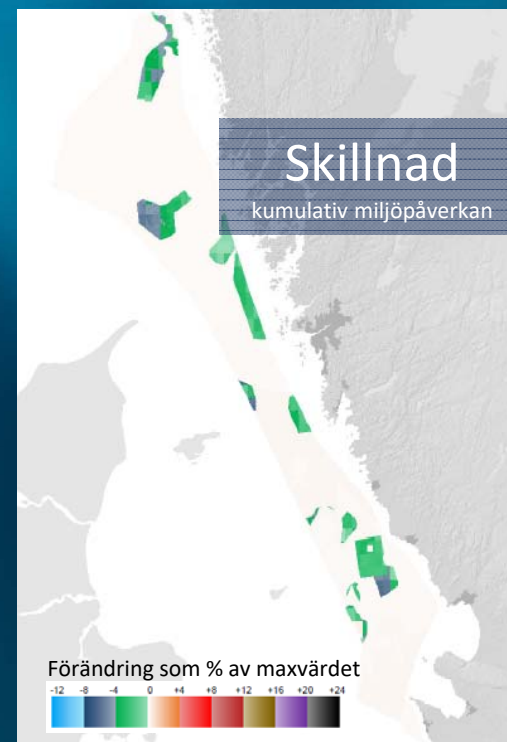
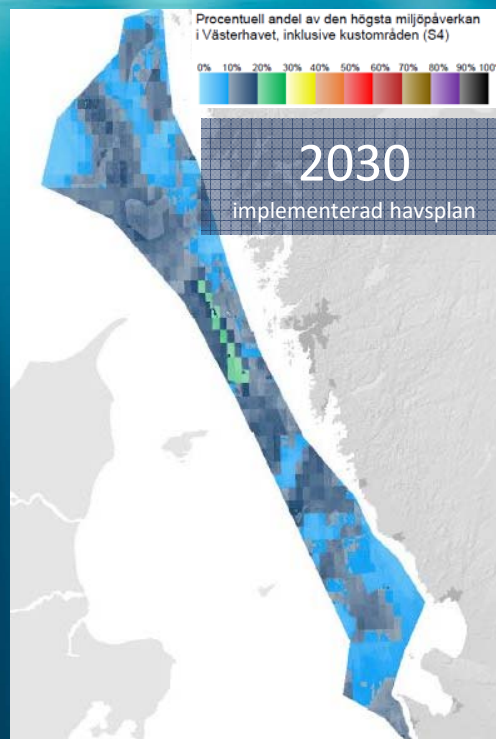
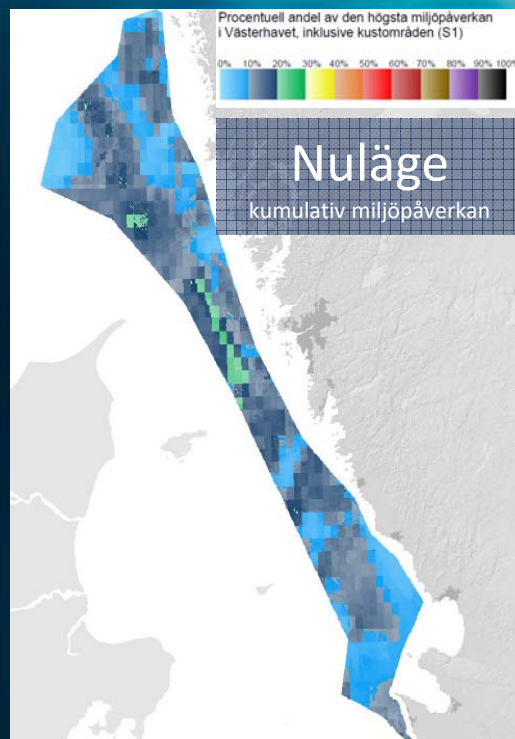
exempel Västerhavet



Scenario/alternativanalys

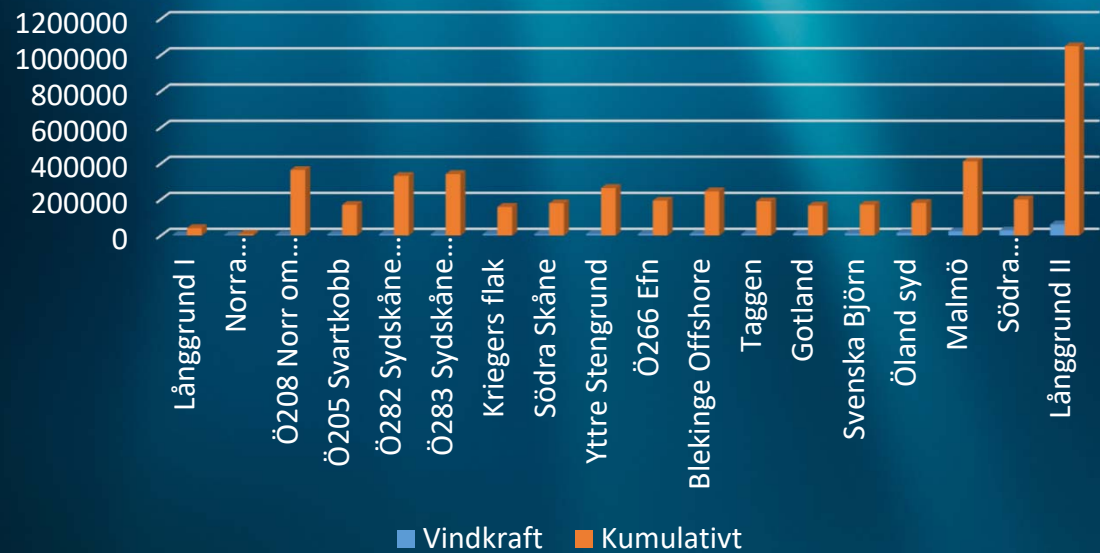


Resultat – “vad händer om..?”

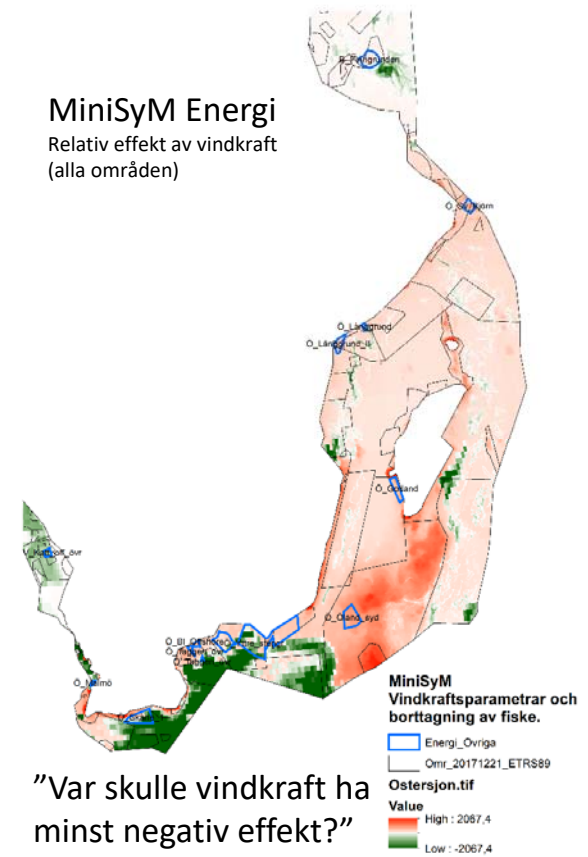


Inte bara kumulativ effektbedömning...

Jämförelse över miljöpåverkan från möjlig
vindkraftsetablering i olika områden

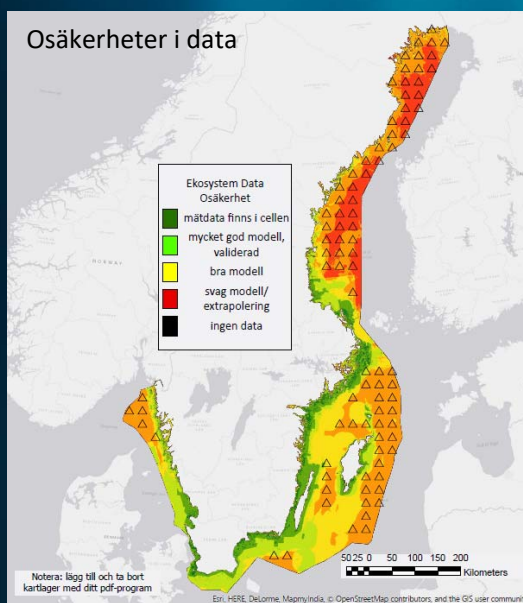


MiniSyM Energi
Relativ effekt av vindkraft
(alla områden)



”Var skulle vindkraft ha
minst negativ effekt?”

Är Symphony hela sanningen? Nej



Explicit födovävs-dynamik saknas, liksom
konnekktivitet och arters bevarandestatus



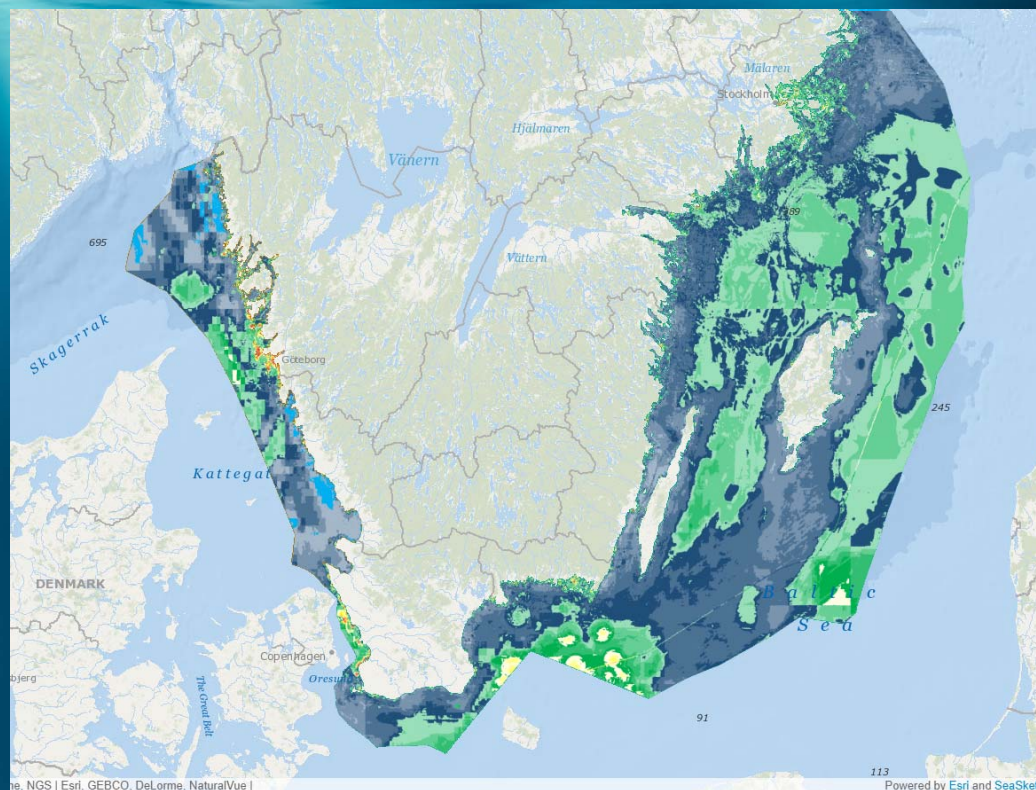
Tar inte hänsyn till geografiska
kumulativa effekter



PS klimatet då?

Kumulativ miljöpåverkan ökade med 50-100%

Analysen förbättras nu genom ClimeMarine (SMHI, SGU, GU, HaV)



Utvecklingsbehov

- Bättre data och kunskap om havet
- Bättre effektanalysmodell – mer dynamisk
- Bättre koppling mot miljömål
- Koppla mot ekosystemtjänster
- Koppla mot ekonomisk modellering
- Automatiserad optimering



TACK!

Mer info på www.havochvatten.se