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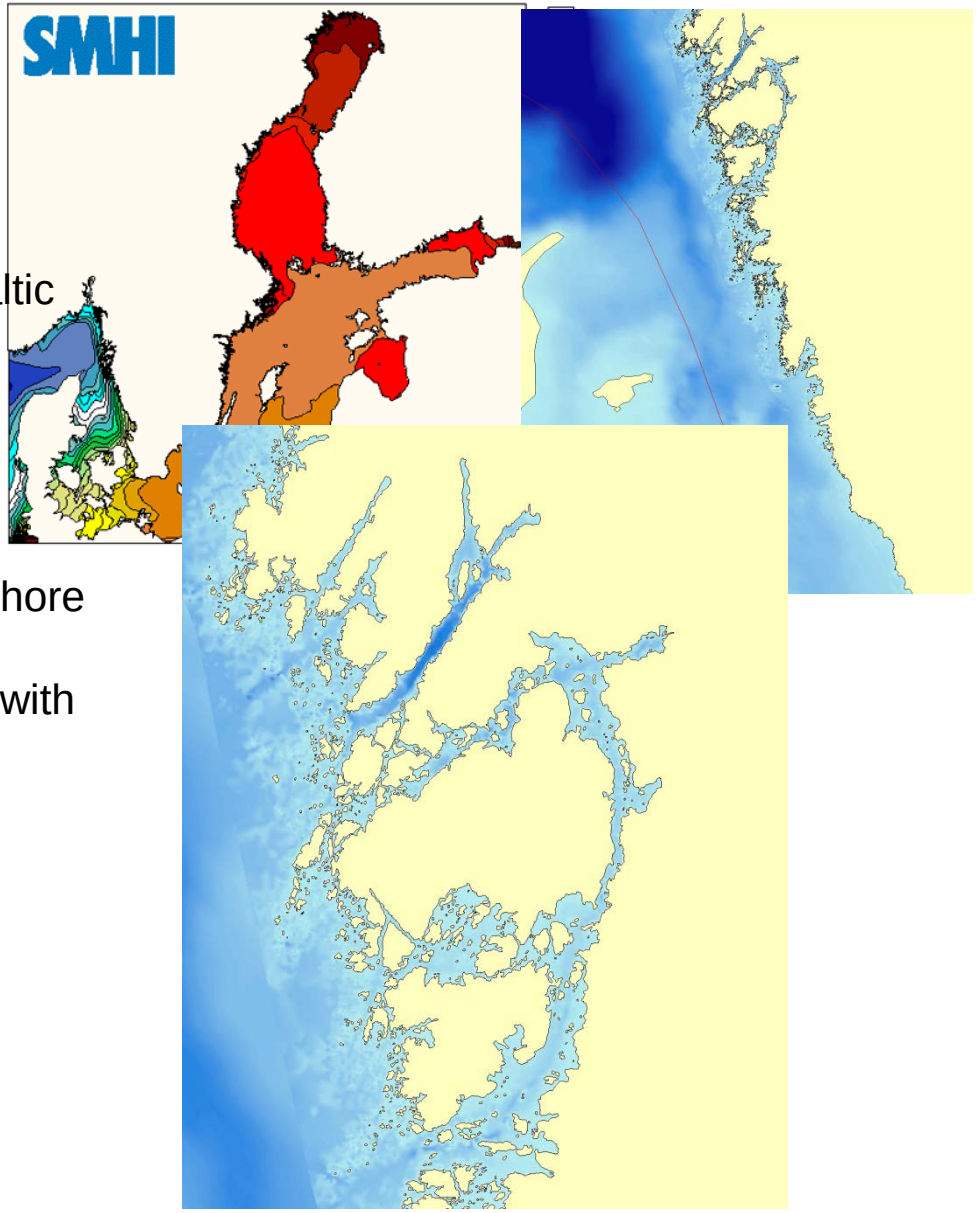
Setting saline water nutrient boundaries in Swedish waters

Introduction

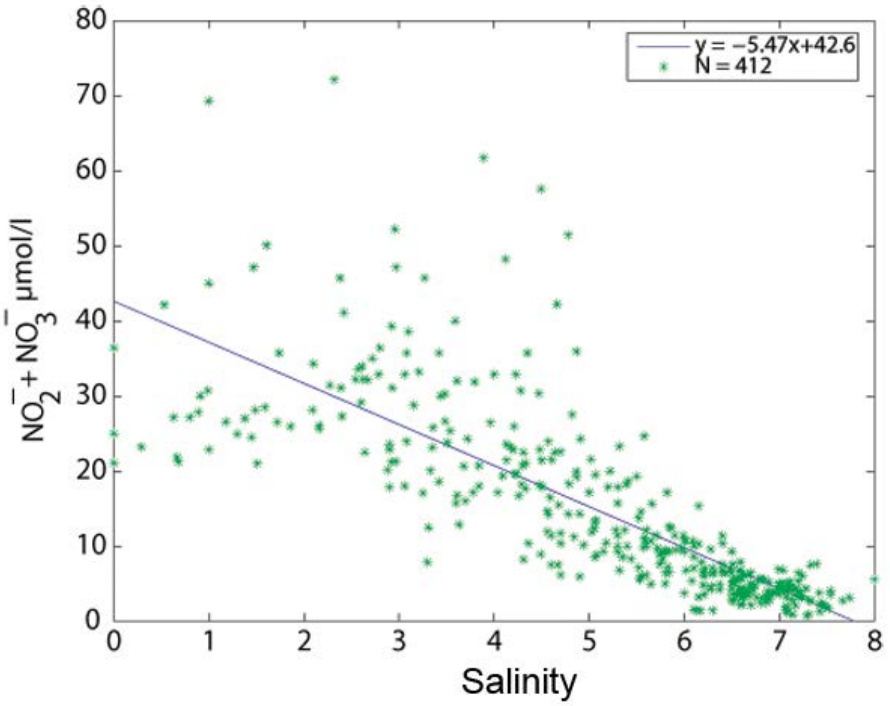
- Swedish coastal waters characteristics:
- - Ecoregions: North Sea and Baltic Sea
- Ocean conditions in Skagerrak/Kattegat, Baltic Sea brackish waters
- - Open coasts influenced of offshore conditions, semi-enclosed archipelagos and fjord systems with limited water exchange and freshwater influence
- - Minor tidal effect

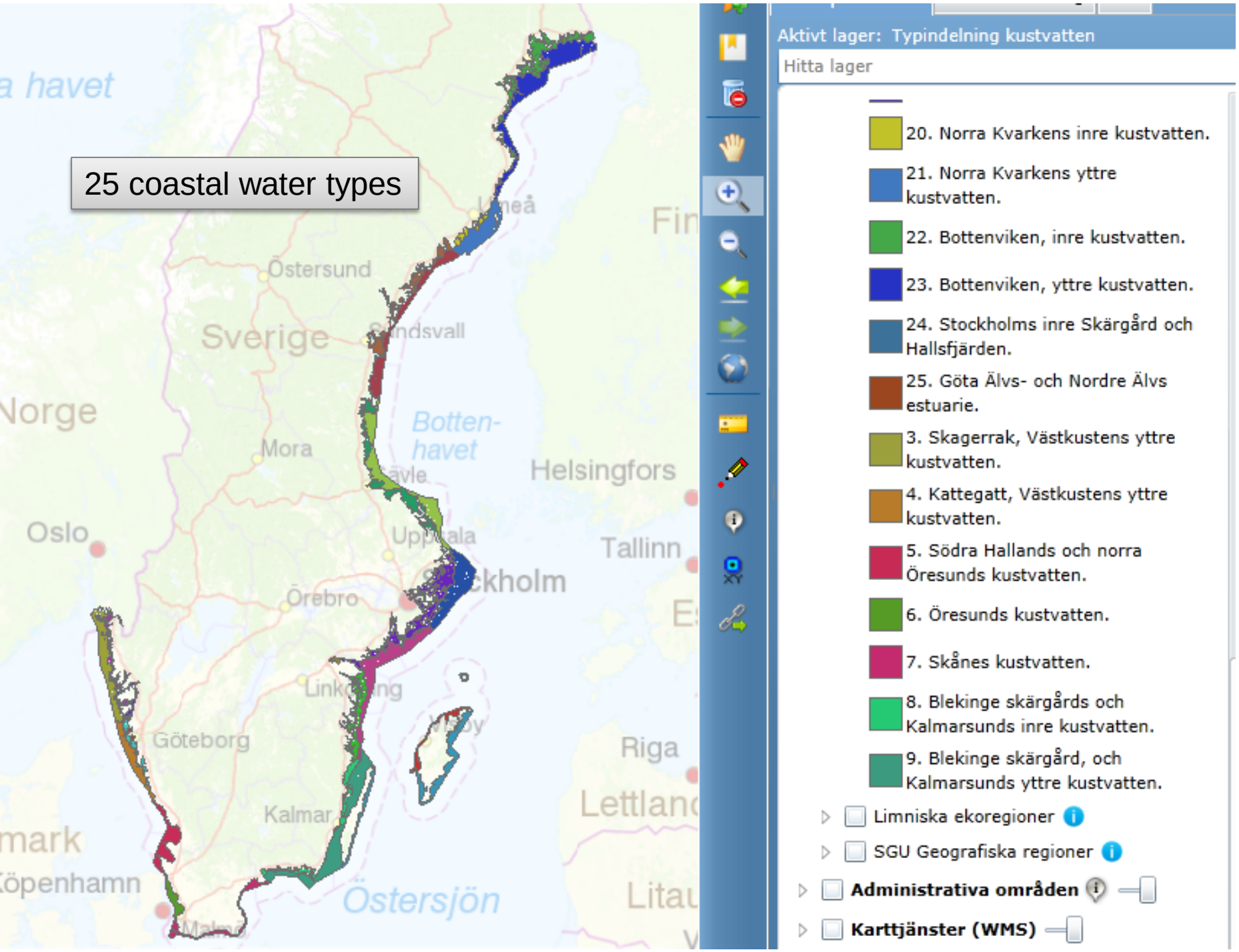


Gradients

In most coastal areas strong gradients are found along the coast and from shore to offshore

- Salinity
- Nutrients




25 coastal water types
Aktivt lager: Typindelning kustvatten
Hitta lager
20. Norra Kvarkens inre kustvatten.
21. Norra Kvarkens yttre kustvatten.
22. Bottenviken, inre kustvatten.
23. Bottenviken, yttre kustvatten.
24. Stockholms inre Skärgård och Hallsfjärden.
25. Göta Älvs- och Nordre Älvs estuarie.
3. Skagerrak, Västkustens yttre kustvatten.
4. Kattegatt, Västkustens yttre kustvatten.
5. Södra Hallands och norra Öresunds kustvatten.
6. Öresunds kustvatten.
7. Skånes kustvatten.
8. Blekinge skärgårds och Kalmarsunds inre kustvatten.
9. Blekinge skärgård, och Kalmarsunds yttre kustvatten.
Limniska ekoregioner
SGU Geografiska regioner
Administrativa områden
Karttjänster (WMS)
Östersund
Sverige
Sundsvall
Botten-
havet
Mora
Helsingfors
Oslo
Tallinn
Örebro
Göteborg
Kalmar
Riga
Östersjön

Indicators for nutrients

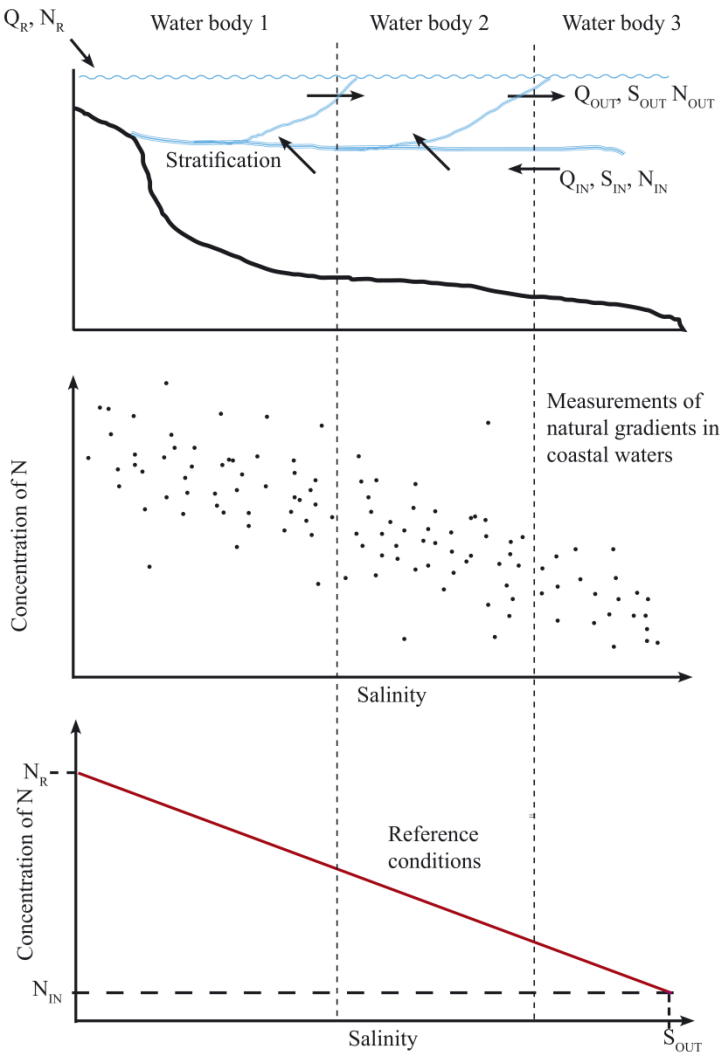
	winter	summer	WFD	MSFD
DIN	yes	no	yes	yes
DIP	yes	no	yes	yes
TN	yes	yes	yes	no
TP	yes	yes	yes	no

The Reference condition - Aims

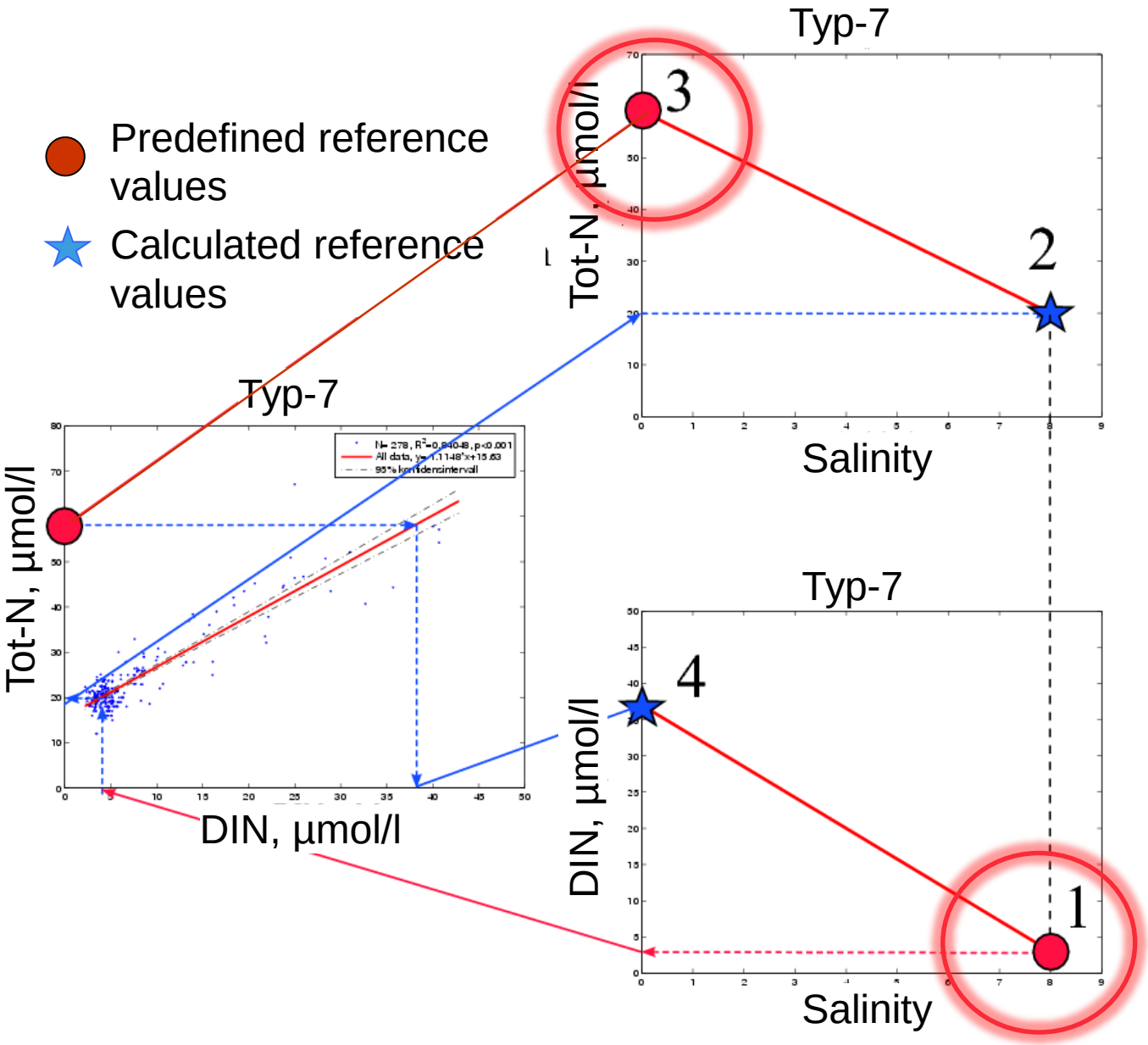
- Reference conditions should be usable along a salinity gradient, from freshwater to offshore
- Use already proposed reference conditions (OSPAR, HELCOM) and modelled background load.
- Create reference conditions and classification that are easy to use

The way forward

- Use predefined reference condition for DIN, DIP (offshore) and Tot-N and Tot-P (freshwater runoff)
- Calculate reference conditions for DIN, DIP (inshore) and Tot-N and Tot-P (offshore) by using relations between DIN vs. Tot-N and DIP vs. Tot-P.
- Use a simple water exchange model for calculating the reference concentrations between freshwater and offshore



Example of method for reference condition of Tot-N during winter.



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The coastal GES boundary DIN &DIP

For DIN and DIP the boundary of 50 % from the reference condition is used, according to OSPAR and HELCOM recomendations:

$DIN_{G/M} = 1.5 * DIN_{REF}$
$DIP_{G/M} = 1.5 * DIP_{REF}$

The off shore GES boundary DIN &DIP

Adapted to international off shore and national inshore GES values.

The coastal GES boundary TN & TP

The GES- boundary is set from the mean of a 50% increase in $Tot\text{-}N_{REF}$ ($Tot\text{-}P_{REF}$) and a 50% increase in DIN_{REF} (DIP_{REF}.)

Wintertime:

$Tot\text{-}N_{G/M} = (Tot\text{-}N(1{,}5*DIN_{REF}) + 1{,}5 * Tot\text{-}N_{REF}) / 2$

$Tot\text{-}P_{G/M} = (Tot\text{-}P(1{,}5*DIP_{REF}) + 1{,}5 * Tot\text{-}P_{REF}) / 2$

Summertime:

$Tot\text{-}N_{G/M} = (Tot\text{-}N(1{,}5*Chla_{REF}) + 1.5 * Tot\text{-}N_{REF}) / 2$

$Tot\text{-}P_{G/M} = (Tot\text{-}P(1{,}5*Chla_{REF}) + 1.5 * Tot\text{-}P_{REF}) / 2$

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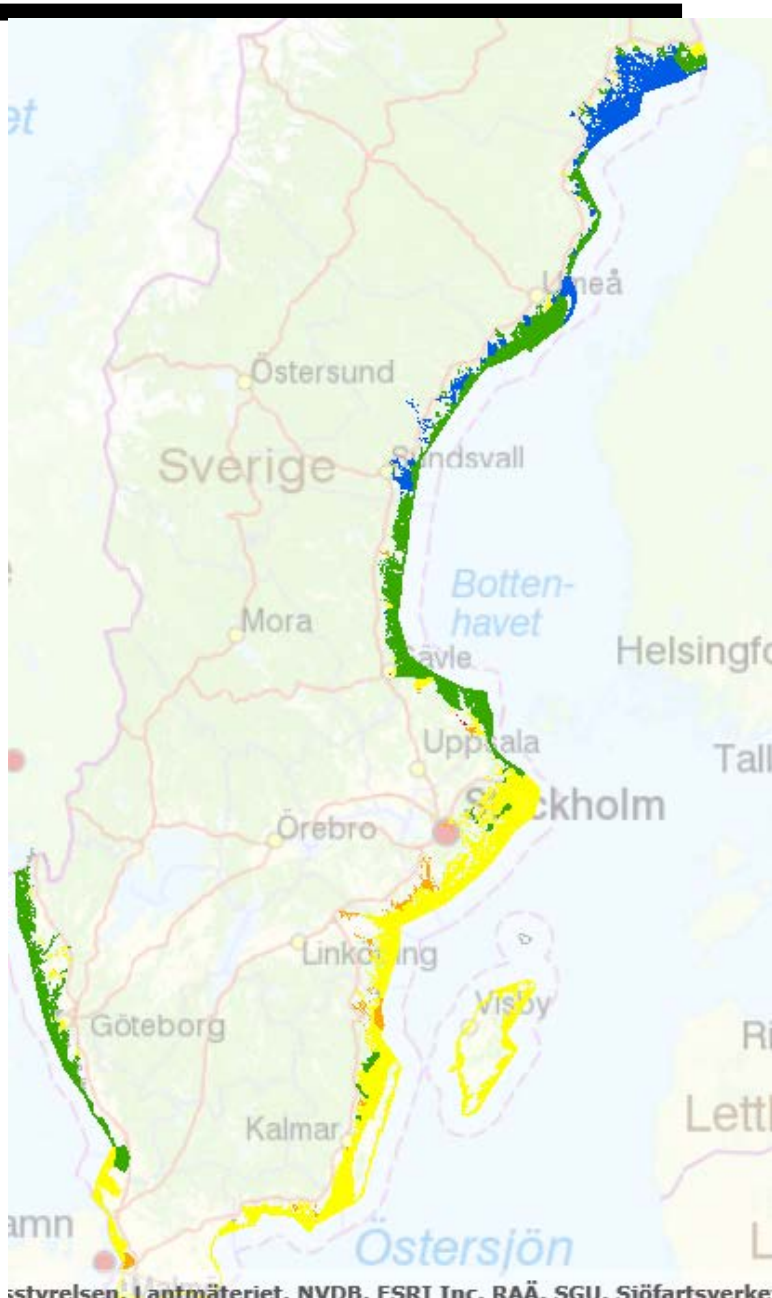
Thank you!



Preliminair status classification for nutrients
http://www.viss.lansstyrelsen.se

Modell för bestämning av referensvärden för Tot-P & Tot-N i Kustvatten under sommar