Kystvandrådet for Ringkøbing Fjord

Endelig afrapportering

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Foto Joao G. Ferreira & Flemming Gertz

1. Introduction.

Following the 'Agreement on the Green Transformation of Danish Agriculture' (October 2021), an evaluation of the scientific basis for the nitrogen effort is being carried out - a second opinion. A second opinion will also involve local involvement through the establishment of coastal water councils. Through locally based analyses, the coastal water councils should investigate whether there are other ways to achieve good ecological status in selected coastal waters. The results from the work of the coastal water council will need to be integrated into the overall review of the scientific basis for nitrogen regulation. The coastal water council can prepare analyses of the significant challenges of the coastal waters and proposals for an action program for the planning period 2021-2027.

2. General objektive of Ringkøbing Fjord

The general objective in Ringkøbing Fjord is to achieve good ecological potential according to the Water Frame Directive (WFD)

Ringkøbing Fjord is Denmark's largest sluice fjord, characterized as a type of fjord where the water level and exchange with the North Sea are actively regulated through a sluice. The fjord is approximately 30 kilometers long and 10-15 kilometers wide, covering an area of nearly 300 square kilometers with an average depth of just under 2 meters. Its deepest point reaches around 5 meters. Ringkøbing Fjord has a catchment about 9 percent of Denmark's area (347.950 hectares) of mainly sandy soils, including the catchment area of Skjern Å.

Legislative context and environmental classification.

Ringkøbing Fjord is in terms of the Water Frame Directive (WFD) classified as a heavily modified waterbody (HMW).

The objective is to achieve good ecological potential. The boundary between good and moderate status in terms of the quality elements implemented in the Danish legislation are as follows:

Algal biomass measured as summer (May-Sep) chlorophyll-a:	8.4 µg/l
Depth limit for the main distribution of angiosperms (rooted bottom plants):	3.1 m
Danish Quality Index (benthic invertebrates), DKI:	0.68

Oxygen conditions in heavily modified water bodies: During the months with the lowest oxygen levels, the following criteria should be met: > 4 mg O2/l for at least 50% of the time or > 2 mg O2/l for at least 10% of the time.

Reference

Bek nr. 792 af 13/06/2023. https://www.retsinformation.dk/eli/lta/2023/792

3. Source of financing.

In the catchment area of Ringkøbing Fjord, wetland establishment is suggested as the primary means to reduce nitrogen input into Ringkøbing Fjord. The funding for this initiative is currently obtained through subsidy schemes from the Agricultural Agency under the CAP plan, through "*Bekendtgørelse nr. 174 af 20.09.2023* om tilskud til Vand – og klimaprojekter" The subsidy scheme is co-financed by the EU. Additionally, it will be possible to finance projects through a subsidy scheme for the extraction of peat soil,

through the nationally financed Climate Lowland Scheme (Klima-lavbundsordning). Here, the focus is on reducing CO2, but there will also be varying levels of nitrogen retention depending on how the projects are organized. It is expected that these schemes will continue to support the efforts in the future.

Regarding phosphorus reduction, nitrogen wetlands can be constructed effectively targeting phosphorus and thereby cover the expenses for this effort. The remaining measures for phosphorus, such as ochre facilities, sand traps, and partly tree planting, could be financed through the River Basin Management Plan 2021-2027.

In the short term, it is expected that optimization of sluice practices can occur within the existing economic framework and therefore will not require additional financing.

It has not been possible within the short timeframe to calculate the expenses for the establishment and operation of pumps at the sluice in Hvide Sande for additional support in a future with climate changes. Therefore, the assessment of the financial costs for the mentioned scenarios in section 3 remains to be resolved. This will subsequently take place in a dialogue with the Coastal Authorities and the Sluice Committee, where the optimal placement of the pumps will also be further examined.

4. Overall conclusions for the Coastal Water Council work to bring Ringkøbing Fjord to good ecological potential

The sluice in Hvide Sande is the crucial local means for the condition of Ringkøbing Fjord. Without proper control of water inflow and outflow through the sluice, maintaining a stable high salinity in the fjord and a good mixing of salt and freshwater in the water column for the clam Mya arenaria population to thrive, the fjord cannot achieve the state of "good ecological potential."

Results from the sluice modelling have demonstrated, that the sluice has the capacity to maintain a sufficiently stable, high salinity in Ringkøbing Fjord for Mya arenaria to thrive. Scenario calculations for fjord salinity conducted for the year 2019 have shown, that the collapse of the Mya arenaria population, due to lower salinity in 2019, could have been avoided with changes in sluice operation. Despite the generally higher runoff from the catchment in 2019, sluice operations could have been optimized for a sufficiently high salinity.

The sluice modelling also indicates, that under climate scenarios with increased sea levels in the North Sea and greater runoff from the catchment, the sluice can still maintain a stable, high salinity in Ringkøbing Fjord, especially in combination with a pump solution at the sluice..

Sluice scenarios have also shown that raising salinity in early spring makes it easier to maintain a stable, higher salinity over the summer months.

Results from the ECO-Win model confirm that Mya arenaria in Ringkøbing Fjord filter algae (chlorophyll-a), providing better light conditions for seagrass and thus better conditions for expansion. The model also confirms that increased filtration shifts the eutrophication from plankton algae to epiphytes.

The model confirms that reducing nutrient input to the fjord will decrease the amount of epiphytes, benefiting seagrass growth. The presence of Mya arenaria in the fjord is a key factor in the top-down

regulation of eutrophication. If Mya arenaria disappear from the fjord, a significant increase in chlorophyll in the fjord is expected, explaining the spectacular algae bloom observed in Ringkøbing Fjord in 2019.

Scenarios with ECO-Win model demonstrates that a cut in land-based nitrogen loading by 35% - corresponding to the reduction in nitrogen targeted by the River Basin Management Plan - gives reductions of 0.2-4.2 $\mu g.L^{-1}$ in summer chlorophyll concentrations (Table 11 in bilag 5). This 35% reduction also results in a reduction in the risk for epiphytes and is a potentially important measure to control the fjord eutrophication although epiphytes are not considered a quality element in the WFD. The reduction in risk for epiphytes is greater for locations along the shoreline, where the current risk for epiphytes is highest.

Reducing the load by half of the 35% target indicates a reduction in summer chlorophyll concentrations of between 0.1 and 1.7 $\mu g.L^{-1}$ and a decrease in the risk for epiphytes divided by two compared with the 35% reduction.

Statistical correlations between nitrogen loads and chlorophyll confirm the chlorophyll variation observed in the response to reductions in loads. In general, no statistical correlation can be found between N-load and chlorophyll, but there is a period from 2002-2014 and especially 2007-2014, where increased chlorophyll values are seen, and here a correlation can be found between N-load and chlorophyll. It is assumed that filtration from the mussels was reduced during this period, since in the period 2008-2019 no correlation is seen between N-load and chlorophyll.

The SWAT+ catchment model shows that establishing wetlands can reduce even large nitrogen loads to Ringkøbing Fjord. The model also indicates that nitrogen reduction is greater with the establishment of maximum wetlands (54.000 ha) than by converting all agricultural land to grassland not using fertilizers. Scenario calculations indicate that restoring 23,000 hectares of wetlands (7% of the Ringkøbing Fjord catchment) could reduce nitrogen loading by approx. 38%, equivalent to 1.647 ton N/year.

Nitrogen from wastewater does not constitute a significant proportion of the total nitrogen input from the catchment, but Phosphorous from wastewater in the summer months, equals the diffuse discharge.

The fjord responds positively to phosphorus reductions, and several scenario calculations have been made to reduce diffuse phosphorus. The main source of diffuse phosphorus transport to the fjord is riverbank erosion, which can be reduced by planting trees along watercourses, but the greatest potential for retaining phosphorus in the landscape is by designing wetlands for temporary flooding in meadows, where phosphorus particles can settle.

The catchment is more drained than the drainage potential indicated on the maps from AU.

The fjord is in good ecological potential regarding chlorophyll-a for the period 2010-2023, if the years 2019+2020 with poor filtration are excluded from the average.

Samlet konklusion for det tekniske arbejde under kystvandrådsarbejdet (dansk).

Slusen i Hvide Sande er et afgørende lokalt virkemiddel for miljøtilstanden i Ringkøbing Fjord. Uden en korrekt styring af ind- og udslusning af vand gennem slusen, en stabil høj salinitet i fjorden og en god opblanding af salt og ferskvand i vandsøjlen så sandmuslingebestanden i fjorden trives, opnår fjorden ikke tilstanden ”godt økologisk potentiale”.

Resultaterne fra slusemodellen har vist, at slusen har kapacitet til at opretholde en tilstrækkelig stabil, høj salinitet i Ringkøbing Fjord til at sandmuslingerne kan trives i fjorden.

Scenarieberegninger for saltholdigheden i fjorden foretaget for året 2019 har vist, at kollapset af fjordens muslingebestand, grundet den lavere salinitet i 2019, kunne have været undgået ved ændringer i slusens drift. Trods den generelt større afstrømning fra oplandet i 2019 kunne sluseoperationerne have været optimeret til at sikre en tilstrækkelig høj salinitet.

Modellen har også vist, at ved beregning på klimascenarierne med forhøjet vandstand i Vesterhavet og større afstrømninger fra oplandet, vil slusen stadig kunne opretholde en stabil, høj salinitet i Ringkøbing Fjord - særligt i kombination med en pumpeløsning ved slusen. Pumperne er tænkt placeret ved slusen og de giver ved udpumpning af vand fra fjord til hav mulighed for indslusning af saltvand selv ved øgede afstrømninger fra oplandet og øget vandstand i Vesterhavet.

Slusescenarierne har også vist, at ved at køre saliniteten op i det tidlige forår, så er det nemmere at holde stabil, høj salinitet hen over sommermånederne.

Resultaterne fra ECO-Win modellen har bekræftet, at muslingerne i Ringkøbing Fjord filtrerer algerne (cholorofyl-a) så havgræsserne får bedre lysforhold og dermed bedre udbredelsesbetingelser. Modellen bekræfter også, at den øgede filtration flytter eutrofieringen fra planktonalger til epifytter.

Modellen bekræfter, at reduktionen af næringsstoftilledning til fjorden vil mindske mængden af epifytter, og dette vil gavne væksten og udbredelsen af havgræsserne.

ECO-Win modellen bekræfter, at tilstedeværelsen af muslingerne (Mya arenaria) i fjorden er en nøglefaktor i den top-down-control, der finder sted i forhold til eutrofiering (Tabel 12 i bilag 5). Forsvinder muslingerne fra fjorden, vil man opleve en betydelig stigning i klorofyl i fjorden. Dette er den primære hypotese, der forklarer den spektakulære algeopblomstring, der blev observeret i Ringkøbing Fjord i 2019.

Beregninger med ECO-Win modellen viser at en reduktion i kvælstofbelastning med 35% - svarende til den reduktion i kvælstof, der sigtes efter i Vandområdeplan 3 - resulterer i reduktioner på 0,2-4,2 µg/L i sommerkoncentrationerne af klorofyl (Tabel 11 i bilag 5). Denne reduktion på 35% resulterer også i en reduktion af risikoen for epifytter og er en potentielt vigtig foranstaltning til at kontrollere fjordens eutrofieringsgrad, selvom epifytter ikke et kvalitetselement jf. Vandrammedirektivet. Reduktion af risiko for epifytter er større i langs med land, hvor den nuværende risiko for epifytter er højest.

Ved at reducere belastningen med ca. 17% fås en reduktion i sommerkoncentrationerne af klorofyl på mellem 0,1 og 1,7 µg/L og risikoen for epifytter øges i forhold til 35% reduktionen.

Beregninger med statistiske sammenhænge mellem kvælstoftilførsel og klorofyl bekræfter den variation der kan være i respons på reduktioner. Der kan generelt ikke findes en statistisk sammenhæng mellem n-load og klorofyl, men der er en periode fra 2002-2014 og særligt 2007-2014, hvor der ses øgede klorofyl værdier, og her kan der findes en sammenhæng mellem N-load og klorofyl. Det formodes, at der i denne periode var forringet filtration fra muslingerne, da der i perioden 2008-2019 ingen sammenhæng ses mellem N-load og klorofyl.

SWAT+ oplandsmodellen blev brugt til at simulere virkningerne af ændringer i arealanvendelse og til scenarier for genopretning af vådområder til reduktion af kvælstofbelastningen. Resultaterne viser, at genopretning af vådområder (ådale) er mere effektiv end at udlægge hele det dyrkede areal i græs uden gødningstilførsel.

Modellen indikerer, at genopretning af 23.000 ha vådområder (7% af Ringkøbing fjord oplandet) vil kunne reducere kvælstofbelastningen med omkring 38% svarende til 1.647 tons N/år.

N fra spildevand udgør ikke en væsentlig andel af den samlede kvælstoftilledning fra oplandet, men fosfor fra spildevand udgør, særligt i sommerhalvåret, en vis andel i forhold til diffus udledning.

Fjorden reagerer positivt på fosforreduktioner og der er foretaget en række scenarieberegninger med henblik på at reducere diffus fosfor. Hovedkilden til de diffuse fosfortransporter til fjorden er brinkerosion. Brinkerosion vil kunne mindskes ved træplantning langs vandløbene, det største potentiale for at tilbageholde fosfor i landskabet er ved at designe vådområder, med henblik på temporære oversvømmelser på engene, hvor fosforpartikler kan sedimentere.

Oplandet er ifølge lokal viden mere drænet end drænpotentialekort fra Aarhus Universitet viser.

Fjorden er i god økologisk potentiale jf. Vandrammedirektivet, hvad angår klorofyl-a for perioden 2010-2023, hvis årene 2019+2020 med dårlig filtrering, holdes udenfor beregningen.

5. Recommendations from The Coastal Water Council

Main recommendations

- To achieve good ecological potential for chlorophyll-a by maintaining high enough salinity in the fjord for the clam Mya Arenaria to filtrate to a summer Chlorophyll of maximum 8,4 µ/l
- To reduce nutrients, mainly nitrogen, from the catchment area to minimize the growth of Ulva in the fjord and also minimize the epiphyte growth on seagrasses. This is intended to create optimal growth conditions for seagrasses, allowing them to spread in the fjord and reach a depth boundary of at least 3.1 meters.

Sluice

The results of the sluice scenarios have demonstrated that the sluice has enough capacity to obtain the needed salinity even in years with high runoff from land.

In the future, with more runoff from the catchment and higher water levels in the North Sea due to climate changes, the scenarios have demonstrated that a pump could be a possible solution for maintaining a high, stable salinity in the fjord.

The Coastal Water Council recommends the sluice scenario results be presented to relevant parties, including the Coastal Directorate, the Environmental Agency, DTU-Aqua, and the sluice committee. Calculations indicate that higher salinity is more easily maintained throughout the summer months when salinity is higher in the spring. Data also indicates that the clam Mya Arenaria is very sensitive to low salinity in spring. It is therefore recommended by the Coastal Water Council to raise salinity in winter and early spring from a minimum recommendation of 6 psu to 7 psu and even 8 in the middle of spring.

Monitoring program for epiphytes.

Epiphytes are not a quality element in the Water Frame Directive but too many epiphytes have a negative impact on the vegetation. The growth of epiphytes on seagrass leaves is a competing factor for seagrass

access to light. Too many epiphytes can therefore have significance for the depth limit of seagrasses. Better knowledge of epiphyte biomasses is crucial for managing vegetation.

Mogens Flindt, from SDU, has developed an easy-to-use method for monitoring epiphytes that involves placing plastic strips in the water around eelgrass.

The Coastal Water Council encourages the implementation of this method in Ringkøbing Fjord.

Call for increased monitoring of eelgrass, brush-leaved pondweed (*Stuckenia pectinate*), and long-stemmed seagrass (*Potamogeton*) in Ringkøbing Fjord.

Seagrasses play an essential role in the ecosystem in Ringkøbing Fjord and more seagrasses have positive feedback due to nutrient uptake and increased sedimentation. The seagrass cover in the fjord has increased over the last 20 years, but the monitoring program today does not have enough information to fully cover that and hence does not allow a model calibration on seagrasses.

The Coastal Council recommends implementing a better monitoring program for seagrasses both coverage and depth limit.

Call for actively planting seagrasses

The Coastal Water Council recommends planting seagrasses at selected locations in the fjord to achieve an establishment at locations, where it is difficult for the seagrasses to reintroduce by itself.

Call for increased monitoring of softshell clams (Mya arenaria) in Ringkøbing Fjord.

The softshell clam's filtration of fjord water is essential to maintain the fjord's ecological potential. Currently, there is a lack of knowledge regarding whether the softshell clam (Mya arenaria) reproduces within the fjord or if the population depends on the intake of seawater through the sluice.
There is also a lack of information about whether the distribution of softshell clams is uniform throughout the fjord. Longline has characterized the fjord using 50 boxes, and the same division could be applied in future monitoring of softshell clams.

The Coastal Water Council recommends better monitoring for softshell clams (Mya arenaria)

The final scenarios:

2 scenarios have been presented in the final report.

1. Nitrogen reduction as suggested in the River Basin Management Plan for the period 2021-2027 (1.647 tons nitrogen/year) by using wetlands to fulfill the reduction.
2. Half of the reduction above by using wetlands to fulfill the reduction.

The Coastal Water Council recommends reducing nutrients from the catchment by making wetlands to support the positive path Ringkøbing Fjord has taken in the last 10-15 years towards good ecological potential. With the current knowledge, it has not been possible for The Coastal Water Council to make recommendations for one or the other scenario.

The recommendation is also based on the multifunctional effect of wetlands regarding climate, nature, and biodiversity.

Priority hazardous substances

To achieve good ecological potential in Ringkøbing Fjord, compliance with the chemical status is a requirement of the Water Framework Directive. The chemical status of the fjord is characterized as "not good," and knowledge of hazardous substances is limited. The Coastal Water Council recommends that the Environmental Agency initiate measurements in watercourses and the fjord to gain sufficient knowledge of the issue. Simultaneously, necessary measures should be implemented to achieve good chemical potential as prescribed in the Water Framework Directive.

Urban wastewater

The Costal Water Council recommends that the ongoing process with refining the treatment of urban wastewater and prohibiting overflows continues.

Anbefalinger fra Kystvandrådet (dansk)

Overordnede anbefalinger

- For at opnå godt økologisk potentiale, målt på kvalitetsparameteret klorofyl-a, er det vigtigt at opretholde tilstrækkelig høj saltholdighed i fjorden særligt af hensyn til sandmuslingen Mya Arenaria. Den stabile, høje saltholdighed giver muslingerne optimale betingelser for at filtrere vandet til en maksimal sommer klorofyl på 8,4 µ/l.
- at reducere næringsstoffer, primært kvælstof, fra oplandet og derved minimere væksten af søsalat (Ulva) i fjorden samt mindske epifytvæksten på havgræsserne. Kvælstofreduktionen fra oplandet er medvirkende til at skabe optimale vækstbetingelser for havgræsserne, så de kan sprede sig i fjorden og nå den fastsatte dybdegrænse på mindst 3,1 meter.

Slusen i Hvide Sande

Resultaterne fra slusescenarierne har vist, at slusen har tilstrækkelig kapacitet til at opretholde den nødvendige saltholdighed, selv i år med høj afstrømning fra land.

I fremtiden, med øget afstrømning fra oplandet og højere vandstand i Vesterhavet som følge af klimaforandringer, har scenarierne vist, at en eller flere pumper kunne være en mulig løsning til at opretholde en høj, stabil saltholdighed i fjorden.

Kystvandrådet anbefaler, at resultaterne af slusescenarierne præsenteres for relevante parter, herunder Kystdirektoratet, Miljøstyrelsen, DTU-Aqua og sluseudvalget.

Beregninger indikerer, at det er lettere at opretholde en høj saltholdighed henover sommermånederne, når saltholdigheden øges om foråret.

Data indikerer også, at sandmuslingen Mya arenaria er meget følsom over for lav saltholdighed om foråret.

Det anbefales derfor af Kystvandrådet at hæve saltholdigheden om vinteren og tidligt om foråret fra en minimumsanbefaling på 6 PSU til 7 PSU og endda 8 PSU midt på foråret.

Overvågningsprogram for epifytter

Epifytter er ikke et kvalitetselement jf. Vandrammedirektivet, men for mange epifytter på planterne har en negativ indvirkning på vegetationen.

Væksten af epifytter på havgræsblade er en konkurrerende faktor for havgræsserne om at få adgang til lys (fotosyntese).

For mange epifytter kan derfor have betydning for dybdeudbredelsen for havgræsserne.

Bedre viden omkring epifytbiomasser er afgørende for at styre vegetationen.

Mogens Flindt fra SDU har udviklet en simpel metode til monitering af epifytter, der indebærer at placere plastikstrimler i vandet omkring havgræsserne.

Kystvandrådet opfordrer til implementering af denne metode i Ringkøbing Fjord.

Opfordring til øget overvågning af ålegræs, børstebladet vandaks (Stuckenia pectinate) og langstilket havgræs (Potamogeton) i Ringkøbing Fjord.

Ålegræs og de øvrige havgræsser spiller en væsentlig rolle i økosystemet i Ringkøbing Fjord, og flere havgræsser har positiv effekt på grund af næringsstofoptagelse og øget sedimentation.

Havgræssernes udbredelse i fjorden er steget i løbet af de sidste 20 år, men overvågningsprogrammet har i dag ikke tilstrækkelige data til fuldt ud at dække udbredelsen, og tillader derfor ikke en kalibrering af modellen på havgræsser.

Kystvandrådet anbefaler implementering af et bedre overvågningsprogram for havgræsser, både på dækningsgrad og dybdeudbredelse.

Opfordring til aktiv udplantning af ålegræs/børstebladet vandaks.

Kystvandrådet anbefaler udplantning af ålegræs og/eller børstebladet vandaks på udvalgte steder i fjorden for at opnå etablering på steder, hvor det er svært for havgræsserne at reintroducere sig selv.

Opfordring til øget overvågning af sandmuslingen (Mya arenaria) i Ringkøbing Fjord.

Muslingernes filtrering af fjordvandet er alt afgørende for at opretholde fjordens økologiske potentiale. I øjeblikket mangler der viden om, hvorvidt sandmuslingen (Mya arenaria) formerer sig inden for fjorden, eller om bestanden er afhængig af indtag af havvand gennem slusen.

Der mangler også viden om, hvorvidt fordelingen af muslinger er ensartet i hele fjorden.

Fjorden er i oplandsmodellen (bilag 5) karakteriseret ved hjælp af 50 bokse, og samme inddeling kunne anvendes i en fremtidig overvågning af muslingerne.

Kystvandrådet anbefaler en forbedret overvågning af muslingerne (Mya arenaria).

2 reduktionsscenarier præsenteres i den endelige rapport (bilag 5).

1. Kvælstofreduktionen som foreslået i Vandområdeplan 3 for perioden 2021-2027 (1.647 ton kvælstof/år) med vådområder som virkemiddel til at opfylde reduktionen.
2. Halvdelen af reduktionen under 1. med vådområder som virkemiddel til at opfylde reduktionen.

Kystvandrådet anbefaler at reducere næringsstoffer fra oplandet med vådområder som virkemiddel for på den måde at understøtte den positive udvikling mod godt økologisk potentiale Ringkøbing Fjord har gennemgået de seneste 10-15 år.

Med den nuværende viden har det ikke været muligt for Kystvandrådet at komme med anbefalinger til det ene scenarie frem for det andet. Virkemidlet vådområder hersker der ingen tvivl om.

Anbefalingen er ligeledes baseret på vådområdernes multifunktionelle effekt med hensyn til klima, natur og biodiversitet.

Miljøfremmede stoffer

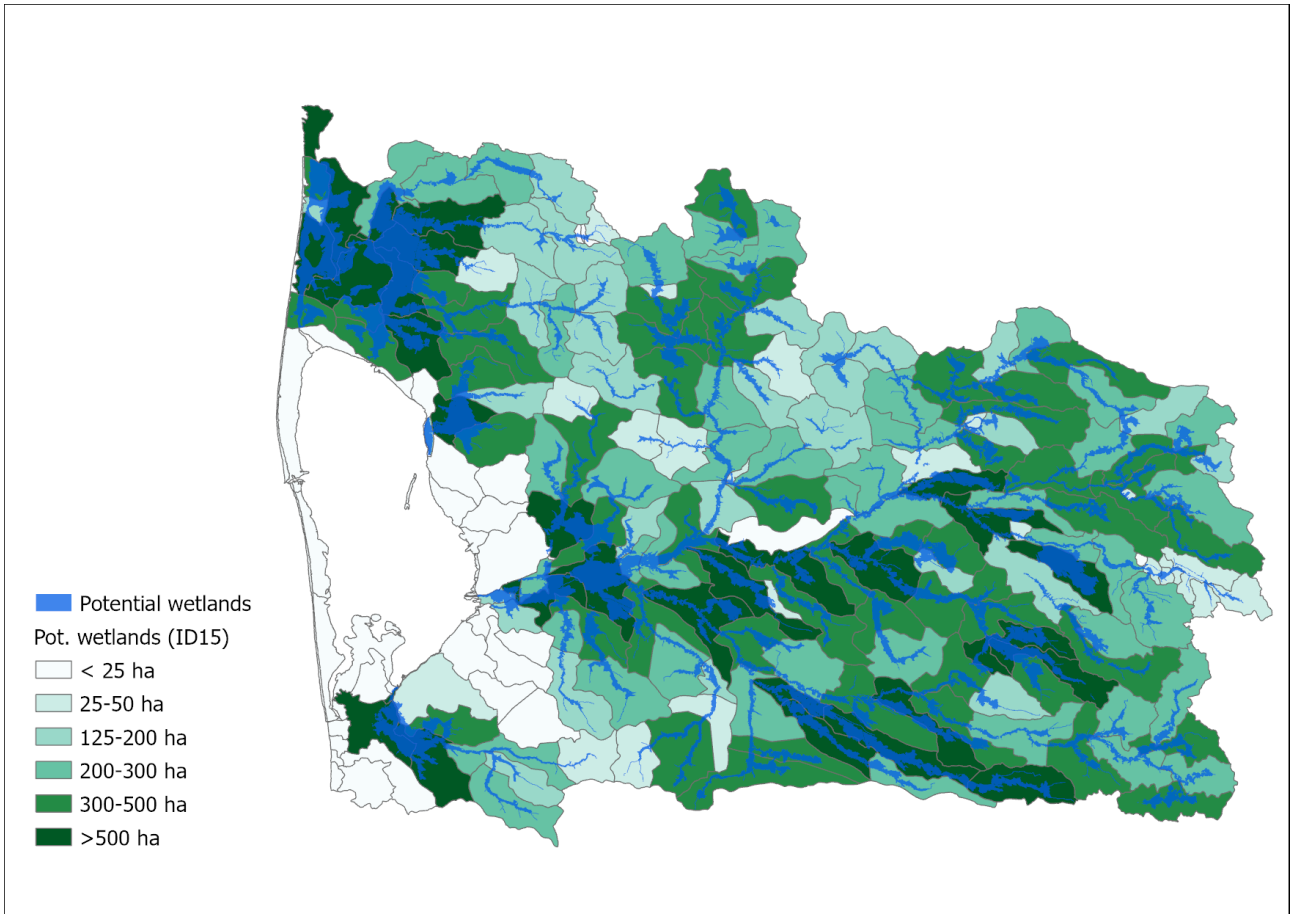
For at opnå godt økologisk potentiale i Ringkøbing Fjord er der ligeledes krav til den kemiske tilstand jf. Vandrammedirektivet.

Fjordens kemiske tilstand karakteriseres som "ikke god", og viden om kemiske stoffer er begrænset.

Kystvandrådet anbefaler, at Miljøstyrelsen igangsætter målinger i vandløb og fjorden for at opnå tilstrækkelig viden om problemet. Samtidig bør nødvendige foranstaltninger implementeres for at opnå god kemisk tilstand, som foreskrevet i Vandrammedirektivet.

Spildevand

Kystvandrådet anbefaler, at den igangværende proces med en forbedret rensning af byspildevandet og minimering af overløb fortsætter.



Figur 1. Det potentielt mulige areal med vådområder (ca. 54.000 ha). Kilde: Christian Prinds, RKSK.

Figure 1 shows where wetlands potentially could be placed in the catchment of Ringkøbing Fjord. The potential illustrated is much more than needed in the two scenarios suggested by the Coastal Water Council. This is merely to demonstrate, that there is potential for more than the full necessary reduction of nitrogen through wetlands.

Figur 1 viser, hvor vådområder potentielt kan placeres i oplandet til Ringkøbing Fjord. Det illustrerede potentiale er langt større end nødvendigt i de to scenarier foreslået af Kystvandrådet. Dette er blot for at vise, at der er potentiale for mere end den fulde, nødvendige reduktion af kvælstof fra oplandet med virkemidlet vådområder.

6. The final report

The final report consists of in total 9 individual technical documents and 7 appendixes. The documents are listed here under:

Bilag 1. Kystvandrådet for Ringkøbing Fjord intro konklusioner anbefalinger

Bilag 2. Ringkøbing Fjord - Ecosystem functionality

Bilag 3. Technical note SEGES - Characterization of the catchment to Ringkøbing Fjord

Bilag 4. The Ringkøbing Fjord sluice model - version 1.0

Appendix 1. Forcing 2017 baseline

Appendix 2. Sluice flow 2017 baseline

Appendix 3. Results 2017 baseline

Appendix 4. Forcing 2019 baseline

Appendix 5. Sluice flow 2019 baseline

Appendix 6. Results 2019 baseline

Appendix 7. Sluice flow 2019 sluice scenario

Bilag 5. LLE Modelling of Ringkobing Fjord and the catchment 21.12.2023

Bilag 6. Fosfor_Kystvandråd_Ringkøbing_Fjord_FINAL_english

Bilag 6-1. Fosfor_Kystvandråd_Ringkøbing_Fjord_FINAL

Bilag 7. Følgegruppen for Fisk i Ringkøbing Fjord

Bilag 8. Coastal Water Council Evaluation report