

Establish no-take zones to protect stocks and ecosystems

No-take zones can be an effective tool for protecting fish and crustacean stocks as well as marine ecosystems. However, it is important that these closed areas are properly designed and large enough. Seasonal spawning closures may be easier to enforce, but do not have as strong positive effects as no-take zones.

Our marine ecosystems are negatively affected by eutrophication, pollutants, climate change, physical exploitation, invasive alien species and – the biggest threat - overfishing. Many fish and crustacean stocks are severely depleted and some have collapsed.

As part of the EU's biodiversity strategy to increase biodiversity in Europe, Member States have agreed to protect 30 per cent of Europe's marine areas by 2030. The same target was also adopted globally in 2022 as part of the UN's Kunming-Montreal Global Biodiversity Framework. A key target for European marine protection is that one third of protected areas should be strictly protected, meaning that fishing should be prohibited or severely restricted in 10 per cent of the seas.

Globally, around 8 per cent of the world's oceans are currently protected and just under 3 per cent are closed to fishing. Most of these

RECOMMENDATIONS

- Introduce more no-take zones. When properly designed, no-take zones are a good tool for protecting and rebuilding fish and crustacean stocks. They also have positive effects on ecosystems.
- Prioritise the introduction of year-round closures. They are more effective than seasonal spawning closures.
- Include the most heavily fished areas in fishing closures and preferably design closures to cover all life stages of targeted species exposed to fishing. If the stock is severely depleted or the closed area is too small, the closure must be combined with measures outside the area to be effective.
- In no-take zones where seals and cormorants have a high impact on fish stocks, the closure may need to be complemented by measures to protect fish from predation.



areas are remotely situated and far from land where fishing pressure was already low. In Sweden about 32 per cent of the Skagerrak and Kattegat is protected (8 per cent strictly protected) and about 12.5 per cent of the Baltic Sea is protected (0.8 per cent strictly protected). Thus, in order to protect and restore many depleted fish and crustacean stocks and to meet the EU and UN marine protection targets, both the area and the number of protected areas and no-take zones must increase, in Sweden as well as globally.

No-take zones are effective

Between 2009 and 2011, five no-take zones were established in Sweden outside already established marine protected areas, as part of a government commission. The aim was to investigate whether no-take zones is a good tool for strengthening weak fish stocks. Evaluations of these areas, which have been closed to fishing for more than 10 years, showed an increase in number and size of the fish and crustacean species that were targeted by fishing prior to the closure. The protection was particularly effective for species that are relatively stationary as adults, i.e. do not move over large areas. The positive effects were seen for stocks targeted both by commercial and recreational fisheries.

For no-take zones to have the desired effects on vulnerable fish and crustacean stocks, they must be located and designed to significantly reduce fishing pressure on the stocks as a whole. They should be located where fishing pressure is the highest and designed to protect all life stages of the species exposed to fishing. If the protection leads to a relocation of the fisheries that still affect the stock or increases negative impacts on other parts of the ecosystem, fisheries regulations are also needed in adjacent areas.

The assessments also showed that the effects of fishing closures were small for collapsed stocks that have been overfished for a long time, such as cod in the Kattegat and Havstensfjorden. It is hence necessary that a critical mass of mature fish is present in the area and that the area covers a sufficiently large part of the stock for fishing restrictions to be effective without other supporting measures. It is also likely that it will take a long time to see the effects of closures on collapsed stocks.

FACTS: MARINE PROTECTION

Marine protected areas are marine areas that have some form of long-term formal protection. They can be marine nature reserves, Natura 2000 sites or marine national parks. They are often established to protect rare and sensitive species and habitats, for example by restricting boat traffic and exploitation. When protection measures have been established, the starting point has usually been to not restrict fishing any more than what is necessary to protect these species and habitats. In fully or strictly marine protected areas, fishing and other activities are completely banned or strongly restricted.

No-take zones are areas completely free from fishing and have often been established, sometimes for a limited time, to protect fish, crustaceans and ecosystems from fishing - both commercial and recreational. They are not necessarily formal marine protected areas.

Seasonal spawning closures are areas where fishing is prohibited only during the spawning period.

Seasonal spawning closures have less effect

In Sweden, there are about 100 seasonal spawning closures which are closed to fishing during the spawning period to ensure good recruitment. These areas have usually been established to protect spawning pike and perch in shallow, wave-protected coastal areas, or migrating salmon and trout in the estuaries of rivers and streams. It is generally much easier to get fisher and fishing right holders to accept seasonal spawning closures than no-take-zones.

A study in the Stockholm archipelago of 11 areas closed for fishing during the spawning season for more than 10 years showed that the number of pike caught per fishing effort (with a fishing rod) was significantly higher in the closed areas than in the reference areas. However, no effects were observed on the abundance of their prey in the areas - the common species perch, roach and three-spined stick-



Photo: Ulf Bergström

EVALUATED NO-TAKE ZONES

The map shows the areas that largely form the basis of the recommendations in the policy brief.

● No-take zones ● Seasonal spawning closures

- | | |
|-------------------------------|----------------------|
| 1. Storjungfrun – Kalvhararna | 5. Kattegat |
| 2. Lännåkersviken | 6. Vinga |
| 3. Licknevarpefjärden | 7. Havstensfjorden |
| 4. Gotska Sandön | 8. Kåvra |
| | 9. Coast of Svealand |

cod

turbot

plaice

lobster

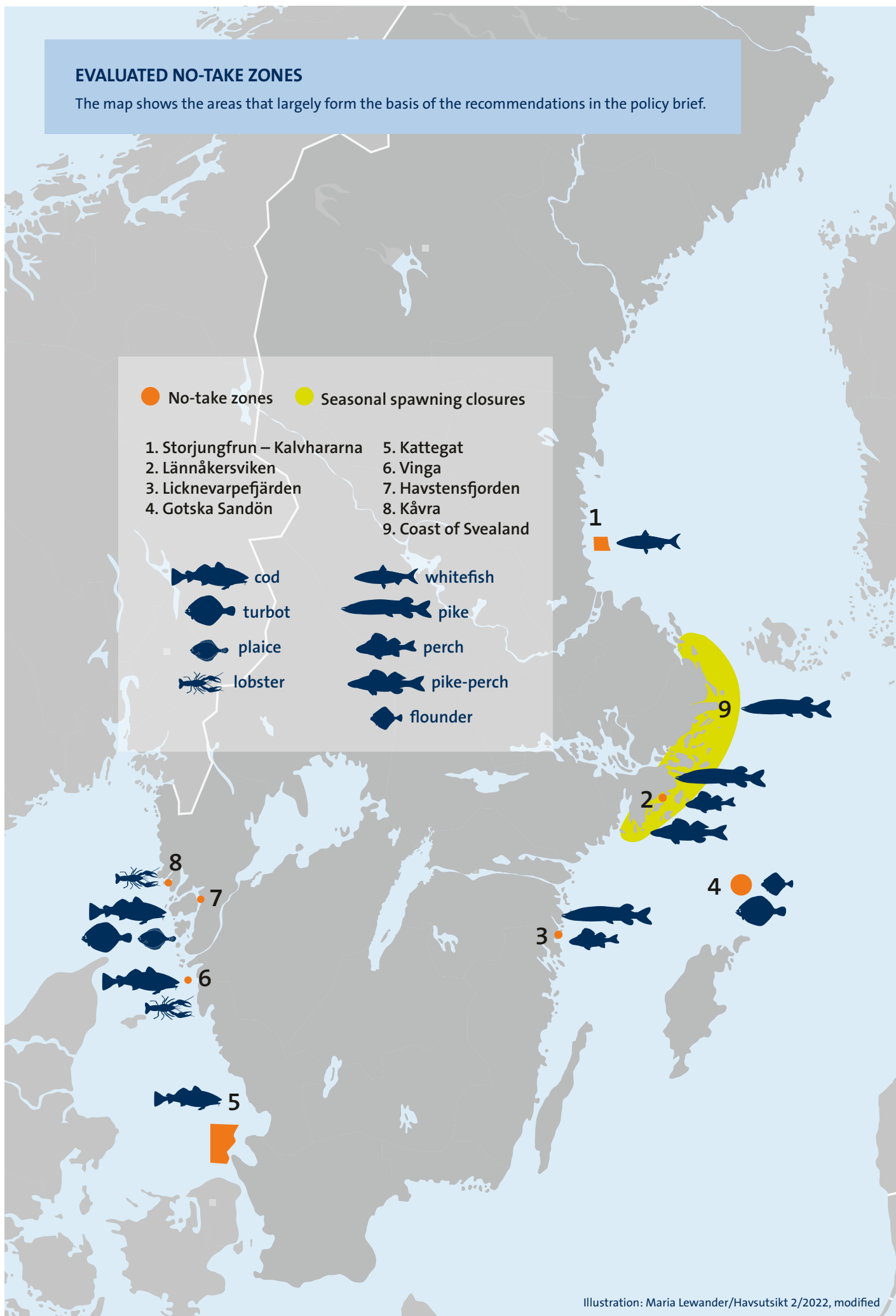
whitefish

pike

perch

pike-perch

flounder



leback, or on the size of the pike. The higher catches of pike may be partly due to higher production of pike in these bays, but another likely cause is that pike were more willing to bite and more fearless in the unfished areas. There are many studies showing that fish behaviour changes when fishing pressure is low - they become more fearless and therefore easier to catch.

The few studies that exist on the effects of seasonal spawning closures on salmon and trout show that the number of juvenile salmon and trout increase in streams with seasonal spawning closures, but it is not clear if the closures reduce the overall fishing mortality. Further studies are needed to shed light on this.

In accordance with other international studies, the Swedish results show that seasonal spawning closures are not efficient enough for the recovery of depleted fish and crustacean stocks. Seasonal closures of spawning grounds can have some effects by protecting the most valuable, productive and largest individuals, such as large females from fishing. But if these are fished at other times of the year, the initial positive effects may disappear and the spawning biomass is not rebuilt.

This is supported by two no-take zones that were opened to fishing after five years of full-year closures, where fish stocks quickly declined to levels similar to those before the closures, even though the areas remained protected during the spawning season.

Fishing closures protect the whole ecosystem

Evaluations of Swedish no-take zones that have been closed to fishing for at least 10 years also show positive effects on species other than the predatory fish that are usually the target species for protection. There are also several studies that show that the number of predatory fish in an area increases the abundance of small crustaceans and shellfish through cascading effects, which in turn limits the abundance of filamentous algae. There are no specific studies confirming that protecting predatory fish stocks would reduce the growth of filamentous algae and thereby counteract eutrophication. However, it can be expected that the absence of fishing will also improve habitats in the area, if it has led to a significant increase in predatory fish.

Other likely effects of fishing restrictions on the whole ecosystem are a reduction in physical disturbance from the fishing activity itself, both in terms of the impacts of fishing gear on sensitive sea beds and reduced boat traffic in the area.

Seals and cormorants can reduce the positive effects

Several studies have shown that seals and cormorants can have a significant local negative impact on coastal fish stocks in the Baltic Sea. The evaluation of Swedish no-take zones found that in some

areas the impact of seals and cormorants was probably so high that the protection had little or no effect on the fish populations. In areas with high concentrations of seals and cormorants, it may therefore be necessary to introduce additional measures to protect fish from bird and seal predation, such as physical barriers or scarers. These measures need to be scientifically designed and monitored.

Potential positive impacts on fisheries

No-take zones act as an insurance policy for fisheries, as they can help prevent stock collapse and counteract the genetic depletion that can result from selective fishing of large individuals. The net impact of no-take zones on fisheries in the short term is more difficult to assess. However, one possible positive effect is that more and larger fish in no-take zones will increase reproduction, which may lead to increased exports of eggs and larvae, and increased migration of older fish into adjacent fished areas.

Nature does not compromise

Research on protected areas shows that it is important to involve stakeholders early in the protection process to increase acceptance and compliance with restrictions. Poorly anchored implementation of strong restrictions in fisheries can lead to increased conflicts over resource use and feelings of alienation and injustice. But efforts to compromise and minimise conflict must not result in rules that are difficult to understand or that the desired protection of target species and ecosystems is not achieved.

ABOUT THIS POLICY BRIEF

This policy brief is a co-production between the Swedish University of Agricultural Sciences and Stockholm University.

A selection of references:

Bergström et al (2022): Long-term effects of no-take zones in Swedish waters. *Aqua reports* 2022:20.

Bergström et al (2016): Ekologiska effekter av fiskefria områden i Sveriges kust- och havsområden. *Aqua reports* 2016:20.

Eklöf et al (2023): Effects of seasonal spawning closures on pike (*Esox lucius* L.) and perch (*Perca fluviatilis* L.) catches and coastal food webs in the western Baltic Sea. *Fisheries Research*, Volume 263.



BRIDGING THE GAP BETWEEN SCIENCE AND POLICY

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We compile, analyse and synthesise scientific research on Baltic Sea related issues and communicate it at the right moment to the right actor.

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