Title: Lack of recognition of genetic biodiversity: international policy and its implementation in Baltic Sea marine protected areas

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Appendix S1: Baltic Sea Marine Protected Areas (MPAs) and our rational for focusing on HELCOM MPAs

There are several types of MPAs in the Baltic Sea including variation among countries, legal status, etc. We initially intended to focus on two different types – Natura 2000 and HELCOM MPAs. Natura 2000 is a network of nature protection areas established under the EU Habitats Directive and/or the EU Birds Directive. Natura 2000 areas occur both on land and in water including in the Baltic Sea. Their governance are outlined and monitored by the EU Commission.

HELCOM MPAs (until recently called BSPAs, Baltic Sea Protected Areas) are coastal and marine protected areas in the Baltic Sea established under the Helsinki Commission (www.helcom.fi). They represent regional implementation of the Helsinki Convention. HELCOM MPAs are established based on HELCOM Recommendation 15/5 which was renewed in 2014 and is now superseded by the HELCOM Recommendation 35/1 (See Table 1).

Our rational for choosing these two types of MPAs (Natura 2000 and HELCOM MPAs) were that i) they represent types of marine protected areas that occur in all four countries that we chose to study, and ii) they represent different degree of legal commitment. The Natura 2000 network of conservation areas is linked to the implementation of the Habitat Directive (92/43/EEC) and the Birds Directive (2009/147/EEC) that are binding for all EU member states (including our four focal countries; Moussis 2015), whereas the HELCOM MPA system represents a non-binding agreement.

We identified HELCOM MPAs of the four separate focal countries from www.helcom.fi, and Natura 2000 that included at least some marine habitat using the Natura 2000 Network viewer (http://natura2000.eea.europa.eu/#), the Swedish Environmental Protection Agency’s map function (http://skyddadnatur.naturvardsverket.se/). We also contacted responsible authorities in the four countries to obtain lists of Natura 2000 with marine habitat in the Baltic Sea. To obtain management plans for the MPAs we searched the above sites, performed regular searches on the Internet, and contacted a range of authorities and contact persons of the separate countries.

During this work we became aware that i) HELCOM MPAs and Natura 2000 are, in most cases overlapping, ii) such overlap occur in all four countries that we investigated, although the degree of overlap varies both among and within countries, iii) specific management plans for HELCOM MPAs that are separate from the Natura 2000 plans rarely exist in any of the investigated countries, and iv) in all four countries the HELCOM MPAs and the Natura 2000 often overlap with other national forms of area protection. Further, we found that there are several hundred Natura 2000 sites in the Baltic Sea and that the management plans for them are not easily accessible in all countries. Also, it is not always straightforward to find out which areas include marine habitat and which areas only concern values on land. Thus, we chose to focus on HELCOM MPAs of the four countries and collected all available management plans that we were able to locate for protected areas within these MPAs.

Management complexity

There are a total of 64 HELCOM MPAs in the Baltic Sea countries we investigated; 20 Swedish ones, 33 Finnish, 7 Estonian, and 4 German (Fig. 3, Tables 3; S3). Finding management plans was not straightforward in any of the countries. We had to use Internet
searches, e-mail correspondence, as well as many telephone contacts before we were able to locate a total of 161 management plans that apply to 45 of the 64 HELCOM MPAs; 19 HELCOM MPAs lack management plans (1 in Sweden, 2 in Germany, and 16 in Finland, 11 out of which were established during 2014-2015).

In all four countries the HELCOM MPAs overlap with other types of protection including Natura 2000, and national protection measures such as national parks or nature reserves. Overall, the HELCOM MPAs include other types of protected areas with 1-35 such areas (average=3) per HELCOM MPA. Management responsibility varies among countries and rests with regional, county administrative boards (Sweden), regional authorities (Finland), federal states (Germany), and the national environmental board (Estonia).

The management plans have typically not been developed for the HELCOM MPA but for other types of protection that apply to the whole or parts of the same area (Natura 2000, national parks, or nature reserves). For 8 of the 45 HELCOM MPAs that have management plans the plans only cover part of the HELCOM MPA area (4 Estonian, 4 Swedish; Tables 3, S3).

In Sweden, each of the 20 HELCOM MPAs includes one or several other types of protection (Natura 2000, nature reserves, and/or national parks), and available management plans typically refer to those areas. Only in four cases single, overall plans for the entire HELCOM MPA have been developed (Table S3). Often the protected areas overlap in the sense that a Natura 2000 MPA also is a nature reserve or a national park. In such cases plans typically exist for both types of protection, yet referring to the same area. This management structure implies that there are a multitude of different management plans; we located a total of 132 management plans for the 20 Swedish HELCOM MPAs with between 1 and 35 plans per HELCOM MPA.

The situation is similar in Estonia, although at the most 7 protected areas are included in one HELCOM MPA. In one case, three types of protection apply to the same area: HELCOM MPA, Natura 2000, and national park regulation. All Estonian HELCOM MPAs have one or more management plans (Tables 3, S3).

In Finland there is usually a complete overlap between the various forms of protection such that HELCOM MPAs typically overlaps completely with a Natura 2000. Further, there can be additional overlap with national parks or other types of area protection in Finland. In many cases there is a complete overlap between a HELCOM MPA, a Natura 2000, and a national park such that the one and same area is protected in all three ways. Only one plan applies to a particular HELCOM MPA, however, and all the forms of protection are included in the same plan. In two cases one plan even covers several HELCOM MPAs including all other protected areas within them and in one case the plan refers to an even larger protected area which is not in itself a HELCOM MPA (Tables 3, S3).

There are no separate management plans for the German HELCOM MPAs. For the two areas where plans are available they apply to the national park located – in these two cases there is a complete overlap between HELCOM MPA, national park and Natura 2000 (Table S1).

Reference
Moussis N. 2015. Access to the European Union: law, economics, policies. 19th updated edition, Rixenstart, 2011. ISBN 978-2-9601045-0-9. Available at: http://www.europedia.moussis.eu
Table S1. Baltic Sea HELCOM MPAs in Sweden (20), Finland (33), Estonia (7) and Germany (4) included in this study (cf. Figure 3). In all four countries the HELCOM MPAs overlap with Natura 2000 and/or with other forms of protection such as national parks or nature reserves. Thus, in many cases a separate HELCOM MPA includes one or more Natura 2000, and in some cases it also includes a national park. The system for management plans varies among countries; in Finland if a management plan is available it covers the whole HELCOM MPA and all the other protected areas within it. Typically, there is complete overlap between HELCOM MPAs and Natura 2000 in Finland, and sometimes these also overlap completely with national parks. In contrast, in Sweden, Estonia, and Germany, when plans are available they apply to separate Natura 2000 or other protected areas within the MPA. In very few cases there are management plans that apply directly to the whole HELCOM MPA in these countries. No HMPAs=number of HELCOM MPAs, N2K=Natura 2000. No hits=number of times search terms (cf. Figure 2) occur in management plan(s), and the last column summarize if and how the hits refer to genetic diversity. *=the same one management plan refers to these three HELCOM MPAs. **one plan for two HELCOM MPAs.
| Archipelago                  | Area | National Park | Management Plan | Management Authority |
|-----------------------------|------|---------------|-----------------|----------------------|
| Kirkkonummi Archipelago     | 46   | Complete overlap HMPA – N2K. | No management plan | Metsähallitus        |
| Kirkkosalmi                 | 26   | Complete overlap HMPA – N2K. | 1* FI1100202     | Metsähallitus        |
| Kokkola Archipelago         | 29   | Complete overlap HMPA – N2K. | 1 FI1000033      | Centre for Economic Development, Transport and the Environment (ELY Centre) |
| Kristiinan-kaukupunki Archipelago | 33 | Complete overlap HMPA – N2K. | No management plan | Metsähallitus        |
| Liminka Bay                 | 23   | Complete overlap HMPA – N2K. | No management plan | Metsähallitus        |
| Luoto Archipelago           | 28   | Complete overlap HMPA – N2K. | 1 FI0800132      | ELY Centre           |
| Outer Bothnian              | 31   | Complete overlap HMPA – N2K. | 1 (draft)        | Metsähallitus        |
| Area Name                    | Reference Code | Threshold Archipelago - The Quark | Threshold Archipelago, the Quark FI0800130 | overlap HMPA – N2K. | FI0800130 | No management plan | - | Metsähallitus | - | - |
|------------------------------|----------------|----------------------------------|---------------------------------------------|---------------------|-----------|--------------------|-----------|-------------------|---|---|
| Närpiö Archipelago           | 32             | Närpiö Archipelago FI0800135     | -                                           | Complete overlap HMPA – N2K. | No management plan | - | Metsähallitus | - | - |
| Oura Archipelago             | 34             | Oura Archipelago, FI0200077      | Oura Archipelago national park. Complete overlap between HELCOM MPA, N2K, and the national park. Further, all these three areas are part of the larger Bothnian Sea National Park. | Complete overlap HMPA – N2K – National Park. All three are part of another national park – Bothnian Sea National Park which is not in itself a HMPA. | 1 (draft)** The plan for Oura Archipelago is included in the drafted management plan for the Bothnian Sea National Park. | Yes | Metsähallitus | 1/1 | Concerns mouflon sheep stating that their population size on an island should be large enough to maintain genetic diversity. |
| Pernajabay and Pernaja Archipelago MPAs | 50 | Pernajabay and Pernaja Archipelago MPAs FI0100078 | -                                           | Complete overlap HMPA – N2K. | 1 FI0100078 The new plan for Pernajabay and Pernaja Archipelago is included in the management plan for the Eastern Gulf of Finland Archipelago and waters. | Yes | Metsähallitus | 0/0 | - |
| Area Name                        | Category Name                  | Category Code | Management Plan | Genetic Diversity | Status | Management Authority | Code | Additional Information |
|---------------------------------|--------------------------------|---------------|-----------------|-------------------|--------|----------------------|------|------------------------|
| Bothnian Bay National Park      | Bothnian Bay National Park     | FI1300301     | Complete overlap HMPA – N2K. | Yes               | Metsähallitus | 0/0                  |      |                        |
| Porvoonjoki Estuary-Stensböle   | Porvoonjoki Estuary-Stensböle  | FI0100074     | Complete overlap HMPA – N2K. | 1                  | ELY Centre | 0/0                  |      |                        |
| Rahja Archipelago               | Rahja Archipelago              | FI1000005     | Complete overlap HMPA – N2K. | 1                  | Metsähallitus | 0/0                  |      |                        |
| Saaristomeri - Archipelago Sea  | Saaristomeri - Archipelago Sea | FI0200164     | Complete overlap HMPA, N2K, and national park. | 1                  | Metsähallitus | 3/1                  |      | With respect to hunting important that genetic diversity is maintained. Gene banks potential aid for rare plants and animals. |
| Söderskär and Långören Archipelago | Söderskär and Långören Archipelago | FI0100077     | Complete overlap HMPA – N2K. | 1                  | Metsähallitus | 0/0                  |      |                        |
| Tammisaari and Hanko            | Tammisaari                    | FI10000077    | Complete overlap HMPA – N2K. | 1                  | Metsähallitus | 0/0                  |      |                        |
| Area Name                                      | Number | Description                                                                                          | Park Characteristics                                                                 | Management Plan Status | Agency                      | Notes                                      |
|-----------------------------------------------|--------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------|-----------------------------|--------------------------------------------|
| Hanko Archipelago and Pojo Bay MPA            | 43     | Tulliniemi bird protection area Tulliniemi bird protection area FI0100006                           | Complete overlap HMPA – N2K.                                                        | 1 (draft)              | Yes                         | Metsähallitus 0/0                |
| Uusikaarlepyy Archipelago                     | 30     | Uusikaarlepyy Archipelago FI0800133                                                                | Complete overlap HMPA – N2K.                                                        | No management plan     | Yes                         | Metsähallitus -                  |
| Uusikaupunki Archipelago                      | 35     | Uusikaupunki Archipelago FI0200072 Uusikaupunki Archipelago is part of the larger Bothnian Sea National Park | Complete overlap HMPA – N2K. Both part of larger national park which is not in itself a HMPA. | 1(draft)** FI0200072   | Yes                         | Metsähallitus ** See results for Oura Archipelago. |
| Länsiletto                                    | 52     | Länsiletto FI0400001                                                                                | Complete overlap HMPA – N2K.                                                        | No management plan     | -                           | -                           |
| Luodematalat                                  | 51     | Luodematalat FI0400002                                                                             | Complete overlap HMPA – N2K.                                                        | No management plan     | -                           | -                           |
| Merikalla                                     | 24     | Merikalla FI1100207                                                                               | Complete overlap HMPA – N2K.                                                        | No management plan     | -                           | -                           |
| Area Description                  | Code   | Code Details                        | Area Status               | Management Plan | Notes                                      |
|----------------------------------|--------|-------------------------------------|---------------------------|-----------------|--------------------------------------------|
| Björkör Islands                  | 39     | Björkör Islands FI1400006           | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Boxö Islands                     | 36     | Boxö Islands FI1400021              | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Långör-Ostra Sundskär Islands    | 38     | Långör-Ostra Sundskär Islands FI1400042 | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Signilskär-Märket Islands        | 37     | Signilskär-Märket Islands FI1400047 | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Sea area south from Sandkallan    | 48     | Sea area south from Sandkallan FI0100106 | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Open sea area southeast from Hanko| 44     | Open sea area southeast from Hanko FI0100107 | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Lågskär Islands                  | 40     | Lågskär Islands FI1400058           | Complete overlap HMPA – N2K. | No management plan | -                                          |
| Bogskär Islands                  | 41     |                                     | Only HMPA.                 | No management plan | -                                          |
| Germany (4/2)                     | 64     | Kadetrinne DE1339301               | Complete overlap HMPA – N2K. | No management plan | Bundesamt für Naturschutz, Insel Vilm - |
| Area                                      | Code  | Description                                                                 | N2K Inclusion | Management Plan | Authority                                      | Plan Parts | Additional Information                                                                                                                                               |
|-------------------------------------------|-------|-----------------------------------------------------------------------------|---------------|-----------------|------------------------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pommersche Bucht-Rönnebank                | 61    | Westliche Rönnebank DE1249301, Adlergrund DE1251301, SPA Pommersche Bucht   | -             | No management   | Bundesamt für Naturschutz, Insel Vilm         | -          | Aim of area includes preserving genetic resources of species.                                                                                                         |
|                                          |       | DE1552401, Pommersche Bucht mit Oderbank DE1652301                        |               |                  |                                                |            |                                                                                                                                                                      |
| Jasmund National Park                     | 62    | Jasmund DE1447302                                                          | 1             | Yes             | Landesamt für umwelt, naturschutz und geologie | 2/1        | Aim of area includes preserving genetic resources of species. Aim of area includes preserving genetic resources of species (2 hits). Baltic marine fish differ from North Sea populations. Two types of herring within the Baltic - spring and autumn spawning. |
| Vorpommersche Boddenlandschaft National Park | 63    | Recknitz-Ästuar und Halbinsel Zingst DE1542302, Darßer Schwelle DE1540302, |               | Yes             | Landesamt für umwelt, naturschutz und geologie | 3/1        | Aim of area includes preserving genetic resources of species (2 hits). Baltic marine fish differ from North Sea populations. Two types of herring within the Baltic - spring and autumn spawning. |
| Code     | Description                                | Type                  | Protection  | Board                        | Status  | Notes |
|----------|--------------------------------------------|-----------------------|-------------|------------------------------|---------|-------|
| DE1542401| Plantagenetgrund DE1343301                |                       |             | Estonian Environmental Board |         |       |
| Hiiu Madala 56 | Paope EE0040112, Hiiu Madala EE0040129, Körgessaare-Mudaste EE0040130 | 1 EE0040112          | No          | Estonian Environmental Board | 0/0     |       |
| Kura Kurk 60 | Kaugatoma-Lõu EE0040441, Abruka EE0040401, Allirahu EE0040402, Kura Kurgu EE0040434, Vesitükimaa EE0040490, Kerju EE0040421 | Rahuste Nature Reserve | 4 EE0040441, EE0040401, EE0040402, & Rahuste Nature Reserve | No | Estonian Environmental Board | 0/0 |       |
| Lahemaa 54 | Lahemaa EE0010173                         | Lahemaa National Park | Complete overlap between three types of protection. | 1 EE0010173 | Yes | Estonian Environmental Board | 0/0 |       |
| Pakri 55 | Pakri EE0010129                           |                       |             | Yes                          | Estonian Environmental Board | 0/0 |       |
| Pärnu lahe 58 | Manilaiu-Hanilaiu                         |                       |             | No                           | Estonian Environmental Board | 0/0 |       |
| Area Name          | Code   | Description                                                                 | Action Type | Authored By                          |
|--------------------|--------|----------------------------------------------------------------------------|-------------|--------------------------------------|
| Väinameri          | 57     | Vääkese väina, Hiiumaa Nature Reserve, Üügu Nature Reserve                | No          | Estonian Environmental Board         |
| Vilsandi           | 59     | Tagamöisa, Vilsandi, Hiiumaa Nature Reserve                              | Yes         | Estonian Environmental Board         |
| Sweden (20/129)    |        | Hoburgs bank, Complete overlap HMPA and N2K.                              | Yes         | Gotland County Administrative Board  |
| Kopparstenarna/   | 7      | Gotska sandön National Park                                               | Yes         | Gotland County Administrative Board  |
| Gotska Sandön/Salv |        |                                                                           |             |                                      |
| v Area             |        |                                                                           |             |                                      |
| Axmar              | 13     | Axmar-Nature Reserve                                                      | No          | Gävleborg County Administrative Board |

Assisted gene flow via pasturing cattle needed for disconnected marsh angelica (*Angelica palustris*) populations along seashores to avoid genetic impoverishment of the plant.

Inbreeding a factor potentially affecting *Epidalea calamita* viability.

Areas with no fishing allowed protect genetically valuable individuals of fish.
| Location                        | Code      | Description                                      | Complete overlap | Management Plan | Administration Board | County | Notes                                                                 |
|--------------------------------|-----------|--------------------------------------------------|------------------|-----------------|----------------------|--------|----------------------------------------------------------------------|
| Finngrundet-östra banken       | SE0630260 |                                                 |                  | Yes             | Gävleborg County Administrative Board | Yes    |                                                                      |
| Northern Midsjöbanken          | SE0330273 |                                                 |                  | No management plan | Kalmar County Administrative Board | No     |                                                                      |
| Värnanäs Archipelago            | SE0330123 | Värnanäs Archipelago                             |                  | Yes             | Kalmar County Administrative Board | Yes    |                                                                      |
| Haparanda Archipelago           | SE0820741 | Haparanda Archipelago National Park,             |                  | No              | Norrbotten County Administrative Board | No     | Risk of negative genetic effects due to isolated populations of Siberian primerose (Primula nutans; 13 plans) and bluntleaf sandwort (Moehringia lateriflora; 1 plan). The exact same text is repeated in 13 plans. |
|                                |           | Malören Nature Reserve                          |                  |                 |                      |        |                                                                      |
| Marakallen | 19 | Marakallen SE0820751 | Complete overlap HMPA and N2K. | Nature Reserve | Yes | Norrbotten County Administrative Board | 0/0 | - |
| Location Description | Number | Description | HMPA | Purpose | County Board | Number of Nature Reserves | HMPA Specific Plan |
|----------------------|--------|-------------|------|---------|--------------|----------------------------|-------------------|
| Falsterbo Peninsula with Mäkläppen | 1 | Falsterbo skjutfält SE0430111, Falsterbo-Foteviken SE0430002, Falsterbohalvön SE0430095, Tygelsjö-Gessie SE043149, Vellinge ängar SE0430150 | Flommen, Norra Ljunghusen, Skanör-Höll, Foteviksområdet, Skanörs Ljung, Kämpinge strandbad, and Ljungskogens och Ljunghusens strandbad Nature Reserves | 12 | One for each of the 5 N2K and one for each of the 7 nature reserves | No | Skåne County Administrative Board | 4/1 |
| Torhamns Archipelago (Blekinge archipelag) | 2 | Hästholmen-Öppenskär SE0410099, Sandhamn SE0410225, Torhamn- Hästholmen SE0410041, Torshamns udde SE0410104, Utlångan SE0410224 | Torshamns Archipelago Helcom MPA, Hästholmen-Ytterön, Torhamns udde, Utklippan Nature Reserves | This HMPA has a particular plan for the whole area. There is overlap with nature reserves and N2K. | 9 | One for each N2K (5), one for each nature reserve (3), and one for the HMPA. | Yes | Blekinge County Administrative Board | 0/0 |
| Bullerö-Bytta | 10 | Bullerö-Bytta SE0110088 | Biskopsö, Bullerö, Långskär, and Långviksskär Nature | The five protected areas together | 5 | One for the N2K, one for | Yes | Stockholm County Administrative | 0/0 |
| Reserves                                      | cover the whole HMPA. each nature reserve. | Yes | Stockholm County Administrative Board | 8/3 |
|----------------------------------------------|--------------------------------------------|-----|----------------------------------------|-----|
| Stora Nassa-Svenska Högarne                  | Stora Nassa and Svenska Högarne Nature Reserves | 5 One for each N2K, 2 for the nature reserves and one for the whole HMPA. |     | Genetic exchange among populations needed for long term favourable status. Unclear if this goal is reached in this area. Risk of negative genetic effects due to small, isolated/poorly connected subpopulations of little grapefern (*Botrychium simplex*) and northern crested newt (*Triturus cristatus*; Stora Nassa SE0110092 and Svenska Högarne SE0110096). Restoring pike (*Esox lucius*) populations through releases should be documented and monitored to avoid negative genetic effects and inbreeding (Stora
| 11                                           |                                            |     |                                        |     |
| Nature Reserve | Counties | Description | Overlap Status | Overlap | Board |
|----------------|----------|-------------|----------------|--------|-------|
| Fifång (Askö-Hartsö) | 9 | Fifång, Stora Bergö, Bokö-Askö, Bokö-Oxnö, Kråmö, Lacka, Långö, Hartsö SE0220129, Bokö-Oxnö SE0220215, Stendörren SE0220218, Persö SE0220234, Askö SE0220439, Kråmö SE0220509 | Several of the Nature Reserves overlaps completely with N2K. There are 5 plans for each nature reserve (23). | Yes | Stockholm and Södermanland County Administrative Board |
| Gräsö-Singö Archipelago | 12 | Grillskäret SE0210248, Hället, Blåbådan SE0210041, Högbådan SE0210249, Örskär SE0210228, Västerbådan, Låggrundet SE0210040 | Overlap between one nature reserve and a N2K (Örskär). | No | Uppland County Administrative Board |

Fragmentation results in lack of gene flow between populations. An endemic subspecies of *Cakile maritima* ssp. *baltica* in Askö (SE0220439, SE0220129, Askö Nature Reserve).

Pool frog (*Rana lessonae*) which represents the genetically distinct Swedish population (Örskär) important to conserve (Örskär nature reserve and N2K). Genetically distinct populations often occur at distribution edges. A special section on genetic diversity and resilience with several examples in...
| Area               | Code   | Nature Reserve                      | Complete overlap between HMPA, N2K, and nature reserve. | Units | Authority                                      | Count | Notes                                                                 |
|--------------------|--------|-------------------------------------|----------------------------------------------------------|-------|-----------------------------------------------|-------|-----------------------------------------------------------------------|
| Kronören           | 17     | Kronören Nature Reserve             | One each for N2K and nature reserve.                     | Yes   | Västerbotten County Administrative Board    | 1/1   | Risk of negative genetic effects due to isolation in the endangered Hippuris tetrphylla. |
| The Holmö Islands  | 18     | Holmöarna Nature Reserve            | One each for N2K and nature reserve.                     | Yes   | Västerbotten County Administrative Board    | 0/0   |                                                                         |
| High Coast         | 16     | Balesudden, Bråten, Gnäggen, Herrestaberget, Hummelvik, Högbonden, Höklänten, Mjältön, Norrfläkstviken, Omneberget, Rotsidan, Skuleberget, Trysunda, Halsviksravinen, Stormyran på Ulvön, Storsand, Storön, Södra Ulvön, Villmyran, Ögeltpjärn Nature Reserves Skuleskogens National Park High coast Helcom MPA | 35 One for each N2K (13), one for each nature reserve (20), one for the national park and one for the whole HMPA. | Yes   | Västernorrland County Administrative Board | 14/2  | Release of alien species, populations, or genes can cause genetic contamination and result in loss of genetic variation, genetic homogenization. Subspecies of conservation concern listed (Helcom MPA, Skuleskogen SE0710054). |
|antal| Areanamn| Beskrivning| HMPA| Helcom MPA| N2K| Oskarshamn County Administrative Board| Östergötland County Administrative Board| Östergötland County Administrative Board|
|---|---|---|---|---|---|---|---|---|
|15| Vänta litets grund| Vänta litets grund SE0710225| Complete overlap between HMPA and N2K.| 1 for N2K.| Yes| Västernorrland County Administrative Board| 0/0| 0/0|
|6| Kvädöfjärden med Torrö| Alsvikelandet-Kvädö SE0230138| Kvädöfjärden and Torrö Nature Reserves| 3 For N2K (1), and for the nature reserve (2).| Yes| Östergötland County Administrative Board| 1/1| 1/1|
|8| S:t Anna-Missjö Archipelago| Sankt Anna och Gryts skärgårdsöar SE0230055, Missjö SE0230328| Missjö Nature Reserve S:t Anna-Missjö Helcom MPA| This HMPA has a plan for the whole area. One for the Helcom MPA, one each for the N2K and the nature reserve.| Yes| Östergötland County Administrative Board| 4/2| 4/2|

Protected areas important as gene banks to protect genetically distinct fish populations. For fishes protected areas conserve individuals that carries genes for rapid growth.

Fragmentation of habitats results in lack of gene flow between populations (SE0230055). Eco-system approach to be applied aimed at securing all components of ecosystems including genetic...
variation. Probably genetic adaptation developed by Baltic Sea species. The population concept defined as a genetically separate group of individuals (HELCOM MPA plan).