

Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

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Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

March 2012

October 2010

3. Country:

Norway

4. Name of the Ramsar site:

Nordre Tyrifjord Wetlands System (includes sub-sites: Juveren, Synneren, Karlsrudtangen, Averøya, Lamyra)
(International No. 802, National No. 15)

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or
b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
- ii) the boundary has been extended ; or
- iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
- ii) the area has been extended ; or
- iii) the area has been reduced**

** Important note: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

None

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a hard copy (required for inclusion of site in the Ramsar List):
- ii) an electronic format (e.g. a JPEG or ArcView image)
- iii) a GIS file providing geo-referenced site boundary vectors and attribute tables

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary is the same as for the five sub-sites; Karlsrudtangen, Averøya, Juveren, Lamyra and Synneren Nature Reserves.

8. Geographical coordinates (latitude/longitude):

60° 07'N 10° 12'E

9. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

The protected wetland sites in Nordre Tyrifjorden are situated 5-10 km south of Hønefoss and about 40 km north-west of Oslo, in the municipalities of Hole and Ringerike in the county of Buskerud in south-east Norway.

10. Elevation: (average and/or max. & min.)

62-80 m.a.s.l.

11. Area: (in hectares)

In total 322 ha including:
 Averøya nature reserve: 107 ha
 Karlsrudtangen nature reserve: 87 ha
 Juveren nature reserve: 44 ha
 Synneren nature reserve: 50 ha

Lamyra nature reserve: 34 ha

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The Ramsar site comprises the lower reaches of the Storelva river and the nearby oxbow lakes at Juveren, Synneren and Lamyra, and also the river mouth by Averøya, as well as the mouth of the Sokna river where it flows into Tyrifjorden by Karlsrudtangen. The rivers Storelva and Sokna have formed the delta landscape out into the Nordfjord, which is the north-western part of Tyrifjord, with several islands and spits, oxbow lakes and channels in various stages of succession, boggy areas, meadows at the edge of freshwater, freshwater drift walls and clay mudbanks which are exposed during periods of low water in spring and autumn, caused by the regulation of water levels in Tyrifjord. Grey Alder *Alnus incana* woodland or wet willow woodland grow along the river banks.

After the Ramsar site at Nordre Øyeren, this is the most important inland site for migrating and wintering wetland birds in southern Norway. The areas main function is as a staging site during spring and autumn migration. Together the five subsites make a network where the birds moves between. Also a number of nationally and regionally rare species breed or have bred in the area, the area is also important as a wintering site. Several thousand wildfowl gather in the spring, and the area is important in particular as a staging site for the Svalbard population of Pink-footed Goose *Anser brachyrhynchus* and for Whooper Swan. There is a large overland migration of great Cormorant *Phalacrocorax carbo* moving between the Oslofjord and western Norway, and flocks may land in Nordfjorden to rest. Numbers of wildfowl in autumn are also considerable.. During the spawning period for Smelt *Osmerus eperlanus* in October/November over 600 Goosander have been observed in Nordfjorden and the lower reaches of the Storelva river, making this the most important site for the species in autumn in southern Norway. Waders are not so numerous, although in a regional perspective the area is an important staging site. In total, around 235 bird species are recorded in the wetland system, the majority of these within the protected parts.

Populations of 15 species of fish are present in Tyrifjorden, including trout *Salmo trutta*. Karlsrudtangen and the lower reaches of the Sokna river are important as spawning grounds for smelt and pike *Esox lucius*.

A number of rare and red-listed species of plants, fungi (associated with woodland), mosses, charaphytes and amphibia have been recorded within the five nature reserves. There are especially many nationally and regionally threatened plant species in the calcereous mires in Lamyra nature reserve. In addition several threatened vegetation types exist within the protected areas, such as rich areas of freshwater shore vegetation and aquatic vegetation.

13. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

14. Justification for the application of each Criterion listed in 13. above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Note: more detailed information is provided in RIS for individual sub-sites.

Criterion 1. One of southern Norway's largest inland deltas, with an interesting geomorphology. The delta consists of slow flowing, meandering rivers, several oxbow lakes in varying stages of succession, channels and freshwater drift walls along the Tyrifjorden. In the deltas by Averøya and Karlsrudtangen are large islands with sandy beaches and meadows at the edge

of freshwater with an interesting flora. Off these areas are fine-grained mudbanks with well-developed annual vegetation on exposed banks (*Nanocyperetalia*).

- Criterion 2. The area is most important as a staging site during migration for national red listed species such as Smew *Mergellus albellus* (VU) and Hen Harrier *Circus cyaneus* (VU). In addition the reserves are important for a number of red-listed plant species associated with meadows at the edge of freshwater and shallow waters, as well as red-listed charaphytes, mosses, amphibia and fungi (woodland species) and several threatened vegetation types are recorded along the shores. The Norwegian Red List 2010 is used. See also pt. 21 and 22.
- Criterion 3. Undeveloped inland deltas have become less common due to in-filling in connection with industry and such like. Therefore it is important to look after the remaining examples of this type, and thus protect the regional biodiversity. The Nordre Tyrifjorden wetland system has a well developed annual vegetation on exposed banks (*Nanocyperetalia*) and submerged meadows which are typical for river deltas below the marine limit in southern Norway, as well as bog and rich fen vegetation associated with oxbow lakes under succession. These vegetation communities host a number of rare and threatened species which need protecting together with their biotope. The wetland fauna of Nordre Tyrifjorden includes both rare and threatened species which are typical and representative for the biogeographic region.
- Criterion 4. After the Ramsar site at Nordre Øyeren, this is the most important inland site for migrating and wintering wetland birds in southern Norway. The areas main function is as a staging site during spring and autumn migration, and a number of nationally and regionally rare species breed or have bred in the area, and the area is also important as a wintering site for, amongst others, Whooper Swan *Cygnus cygnus*. Several thousand wildfowl gather in the spring, and the area is important in particular as a staging site for the Svalbard population of Pink-footed Goose *Anser brachyrhynchus* and for Whooper Swan. There is a large overland migration of Great Cormorant *Phalacrocorax carbo* moving between the Oslofjord and western Norway, and flocks may land in Nordfjorden to rest. Numbers of wildfowl in autumn are also considerable, not least of whooper swan, Eurasian Wigeon *Anas penelope* and Goosander *Mergus merganser* which are the most numerous. During the spawning period for Smelt *Osmerus eperlanus* in October/November over 600 Goosander have been observed in Nordfjorden and the lower reaches of the Storelva river, making this the most important site for the species in autumn in southern Norway. Waders are not so numerous, although in a regional perspective the area is an important staging site. See also point 22.
- Criterion 6: Up to 4500 Pink-footed Geese *Anser brachyrhynchus* regularly rest and feed in Nordfjorden, mostly within Karlsrudtangen nature reserve, in spring (1% of the Svalbard population is 420 birds according to Waterbird Population Estimates 4th Ed. 2002).
- Criterion 8: Several species have important spawning and rearing grounds in the lower reaches of the Storelva river and in Karlsrudtangen nature reserve, including Trout *Salmo trutta*, Smelt *Osmerus eperlanus* and Pike *Esox lucius*. In the river Randselva we find a population of Trout *Salmo trutta* that passes the delta (and sub-site) Averøya on its way to the spawning grounds further up in the river.

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

1. Boreonemoral vegetation zone, transitional section (BN-OC).
2. Boreal

b) biogeographic regionalisation scheme (include reference citation):

1. Zonal division showing the variation in vegetation from south to north and from the lowlands to the mountains, and sectional graduation showing the variation between the coast and inland (In: Moen, A. 1998. Nasjonalatlas for Norge; vegetasjon. Statens kartverk, Hønefoss).
2. Biogeographical regions of Europe, European Environment Agency, 2005

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Geology	The bedrock is composed of nutrient-rich Cambrosilurian rock with layers of fossils east of the Storelva river, and Precambrian basement rocks west of Storelva. Quartergeologically there are impressive deposits in the form of clay plains, alluvial deposits and glacial river deposits. There are large ice-edge deltas made up of sand and gravel in the area, and Storelva has dug into these and exposed marine deposits of clay.
Geomorphology	The delta by the mouth of the Storelva river is rich in various components. There are active river meanders, oxbow lakes, river terraces, terrace edges, old river courses, flood channels and freshwater drift walls along the stretch between Karlsrudtangen to Averøy in Nordfjorden. The sandbanks at the mouth of Storelva are constantly changing due to active processes within the delta. The rising land surface after the last ice age has led to river meanders becoming cut off from Storelva.
Substrate / soil type	The outer parts of the delta beyond Averøya and Karlsrudtangen are mainly made up of fine-grained material (sand, silt and clay), whereas there is more variation in substrate type along the rivers and oxbow lakes – but even here it is mainly clay soils. Glacial river deposits are mainly made up of coarser material. The soil at all of the sub-sites is organic. Mineral soils are present chiefly in small areas of pinewood at the rivermouths.
Water quality	Tyrifjorden is a typical clear water lake with little humus and has a good ionic composition. Water pH is between 6.8 – 7.2. Storelva has good quality water for such a large river, although periodically there are high levels of intestinal bacteria.
Water depth / fluctuations	Water depth within the protected areas is between 0 – 2 m. Large areas of mud are exposed when water levels in Tyrifjorden are low. The watercourse has a regulation regime of 1 m, and water levels are lowest in spring. During periods with little precipitation in summer a number of mudbanks may be exposed in late summer/autumn.
Climate	The area has a slightly continental climate, with relatively warm summers and cold winters and moderate annual precipitation (500 – 700 mm).

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

Tyrifjorden is Norway's 5th largest lake and Storelva, which is among the largest rivers in southern Norway, has a watershed of around 8000 km² whereas Sokna has a catchment area of 640 km². The watersheds encompass everything from the farming communities in Sokna, Ådalen and Valdres to the wooded hillsides and mountains with several glaciers in Jotunheimen, within the counties of Buskerud, Oppland and Sogn og Fjordane. Most of the watershed consists of areas of basement rock, although there are large areas with a richer bedrock, e.g. the Cambrosilurian areas along Storelva, Randselva, the

west side of Randsfjorden and large parts of the Valdres valley and upper reaches of the Dokka-/Etna watercourse, as well as areas of basic plutonic rocks in Jotunheimen. Moraine material which may be considerably thick covers most of the watershed, whereas in the valleys there are considerable glacial and alluvial deposits, especially in the lower parts of Begnadalen, in Ådalen and below Hønefoss.

The watershed stretches from the boreonemoral zone to the high alpine zone. Most of the area is coniferous forest, although there are large areas of mountain birch woodland, marshes and bare mountains in the north. There are large agricultural areas along Storelva, Randselva, the lower reaches of Etna and Dokka and along Begna in Valdres. There are also small towns (Hønefoss) and other dwellings. The climate within the watershed varies from slightly continental by Tyrifjorden to slightly oceanic in the west – with considerably higher annual precipitation and colder summers than lower down in the watercourse.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Transportation of sediments from Storelva and Sokna are responsible for the making of the deltas at Averøya and Karlsrudtangen. The area functions as a barrier or trap for sediments and has an important function as regards sedimentation and fixing of nutrients (especially nitrogen and phosphor). Due to a large watershed the river plays an important role in reducing flooding, although extensive ditching along the low lying areas allows water to flow faster into the main rivers and this results in frequent flooding, especially during snow melt in spring. The remaining, unexploited marsh and wetland areas are therefore important to reduce flooding elsewhere along the watercourse. Vegetation within Averøya nature reserve is important for stabilising the shoreline at the mouth of Storelva and Nordfjorden. See also RIS for individual sub-sites.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar “Classification System for Wetland Type” present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Ip • Is • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

L, O, Xf, M, U, Tp, Xp, Ts

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Juveren and Synneren are shallow permanent oxbow lakes, which still have large areas of open water. The shore is characterised by large populations of *Equisetum fluviatile* along belts of Sedge *Carex* and *Salix cinerea* scrub, and these areas flood regularly. The muddy areas have annual vegetation on exposed banks (*Nanocyperetalia*) with several threatened species, whereas the areas of open water are dominated by aquatic vegetation such as Canadian Pondweed *Elodea canadensis* and Pondweeds *Potamogeton*. *Lamyra* is

also an oxbow lake, but in a later stage of vegetational succession. The reserve at Lamyra is mainly bog areas with sedge meadows and reedbeds *Phragmites communis* and minerotrophic rich mires with wet willow woodland along the edges. Two small pools have some open water. Averøya is a delta area with many small channels, flood pools and meadows beside freshwater with sedges in the inner parts and mudbanks with a rich annual vegetation on exposed banks (*Nanocyperetalia*) and underwater meadows further out.

The invertebrate fauna is insufficiently known. Tyrifjorden has a wide diversity of fish, and several species have important spawning and rearing grounds in the lower reaches of the Storelva river and in Karlrudtangen nature reserve, including Trout *Salmo trutta*, Smelt *Osmerus eperlanus* and Pike *Esox lucius*. Juveren and Synneren have fewer fish species, mainly Pike, Bream *Abramis brama* and Crucian Carp *Carassius carassius*.

See also RIS for individual sub-sites.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The mudbanks and shallow waters in both Tyrifjorden and in the oxbow lakes have well-developed annual vegetation on exposed banks (*Nanocyperetalia*) with several rare and threatened species. Of these the following are still found: *Crassula aquatica* (VU) (Karlrudtangen, Synneren, Averøya), *Elatine triandra* (NT) (Synneren) and *Elatine hydropiper* (Synneren). Species believed to have been wiped out due to overgrowing of mudbanks and oxbow lakes include *Lytbrum portula* (Juveren) and *Callitriche autumnalis* (Juveren). Several nationally and regionally threatened species associated with rich mires occur in Lamyra nature reserve, including *Bidens cernua* (VU), *Carex elata* (VU), *Carex Heleonantes* (VU), *Dryopteris cristata* (EN), *Thelypteris palustris* (EN), *Myriophyllum verticillatum* (NT), *Potamogeton lucens* (NT) and *Stellaria palustris* (EN), ,

Other occurrences of red-listed species include *Nitella confervacea* (EN) at Juveren, *Bidens cernua* (VU) at Juveren and Karlrudtangen and *Viola persicifolia* (VU) at Juveren and Averøya. *Hierobloë hirta* spp. *hirta* has been found at Onsakervika, probably at Sandtangen in Averøya nature reserve. The endangered *Chara braunii* (EN) has previously been found at Juveren, but is now believed to be extinct.

Four threatened moss species including *Hydroamblystegium humile* (EN) have been found at Juveren, and there is an old record of *Hamatocaulis vernicosus* (VU) from Motjern in Lamyra. A couple of red-listed fungi are recorded from four of the reserves including *Camarophyllopsis schulzeri* (NT) at Juveren, a species more common in meadows.

See also RIS for individual sub-sites.

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Birds:

Nordre Tyrifjorden, in particular the area around Nordfjorden/Karlrudtangen, is an important staging and resting site for the Svalbard population of Pink-footed Goose *Anser brachyrhynchus*. At most 4500 geese have been counted staging in April. Fewer Pink-footed geese stop during the autumn migration. The reserves are also staging and wintering sites for several nationally rare species including red-listed species, for example up to 400 Whooper Swans *Cygnus cygnus* before the area freezes in autumn and almost as many during spring, Great Crested Grebe *Podiceps cristatus* (NT) (up to 40 during spring migration), bean goose *Anser fabalis* (VU) (up to 22 individuals), Common Scoter *Melanitta nigra* (NT) (up to 60 in spring and 30 in autumn), Smew *Mergellus albellus* (VU) (up to 6 individuals, which makes this perhaps the most important site in south-eastern Norway during the spring and autumn migration), 5-20

common Crane *Grus grus* (April - September), and smaller numbers of Northern Pintail *Anas acuta* (NT), Northern Shoveler *Anas clypeata* (NT) and Hen Harrier *Circus cyaneus* (VU). Mute Swan *Cygnus olor* is a characteristic species in the area throughout the year, and several pairs breed in the oxbow lakes. Nationally and regionally scarce species and/or threatened species which breed include Great Crested Grebe (0-10 pairs, irregular due to variations in water levels), Garganey *Anas querquedula* (EN), (0-1 pair), Northern Shoveler (0-1 pair), Common Coot *Fulica atra* (ca 15 pairs), Little Ringed Plover *Charadrius dubius* (NT) (1-2 pairs), Common Tern *Sterna hirundo* (VU) (0-2 pairs) and Lesser Spotted Woodpecker *Dendrocopos minor* (3-4 pairs). The Norwegian Red List is used.

Amphibia:

Both the threatened smooth newt *Triturus vulgaris* and moor frog *Rana arvalis* (NT) are recorded in a pool/channel at Averøya, moor frog is also recorded in Lamyra nature reserve.

Fish:

The Randselva population of Trout *Salmo trutta* found in Tyrifjorden passes the delta at Averøya on the way to the spawning grounds. This trout population in Norway is considered both valuable and threatened. Also of interest are the spawning grounds for Smelt *Osmerus eperlanus* at Karlsrudtangen and the lower reaches of the Sokna river.

Crustaceans:

There is a scattered population of *Astacus astacus* (EN) in Nordre Tyrifjorden, including the outer part of Karlsrudtangen nature reserve along the west side of Nordfjorden.

The Norwegian Red List is used. See also RIS for individual sub-sites.

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The area is regionally important for recreational purposes for both swimming, fishing and birdwatching. The southern part of Averøya nature reserve is close to a camp site, and is subject to illegal boating and camping. Such a management problem results in disturbance to both breeding and resting birds in the area.

University of Oslo formerly used Averøya as a study site, and operated a bird observatory during the 1970's and 1980's wherein information was gathered on migration (through ringing) and on breeding birds.

See also RIS for individual sub-sites.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

- (a) within the Ramsar site: Private
(b) in the surrounding area: Private
-

25. Current land (including water) use:

- (a) within the Ramsar site:

The reserves are much used for bathing and fishing, whilst hunting is not permitted. Some water is extracted for irrigation of farmland from Juveren and Synneren. The meadows beside freshwater at Karlsrudtangen were formerly grazed by cattle, and grazing has recommenced as part of the local management plan. Averøya nature reserve is also grazed, although this is not recommended in the management plan. Livestock have been allowed to graze at Lamyra to reduce overgrowing of mire and bog areas. See also RIS for individual sub-sites.

- (b) in the surroundings/catchment:

Both Tyrifjorden and Storelva are regulated to provide hydroelectricity. The reserve is surrounded by intensive farming, and about 25% of the delta by the mouth of Storelva is agricultural land. Hønefoss, with about 13500 residents, is a little north of Averøya. The rivers Randselva and Begna meet and Hønefoss, and then form Storelva. Further up this watercourse and the Sokna river are several smaller settlements. Helgelandsmoen military camp is situated around 1 km north-west of the reserve, on the eastern bank of Storelva. The camp is currently being dissembled. See also RIS for individual sub-sites.

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

- (a) within the Ramsar site:

Regulation of the Begna watercourse/Storelva affects water levels and the geomorphological processes in all of the reserves, especially Averøya and Karlsrudtangen. As the regulation results in less flooding then the natural processes within the delta are subdued. Overgrowing of meadows beside freshwater due to a reduction in grazing intensity has had a negative effect on the natural value of the area, although the recent resumption in grazing has had a positive effect on the biodiversity of the area. Canadian pondweed was introduced to Europe around 1836 and first found in Tyrifjorden in 1976. This has formed dense populations in both Juveren and Synneren and has outcompeted other aquatic plants. Together with over-fertilisation and cessation of grazing along the shoreline, Canadian pondweed has led to overgrowing of mudbanks that previously supported several threatened species of annual vegetation on exposed banks (*Nanocyperetalia*).

Information of factors specific for particular sub-sites is also provided in RIS for individual sub-sites.

- (b) in the surrounding area:

In recent years changes in farming practices, treatment of run-off from farming, and treatment of domestic waste water has led to a reduction in plant nutrients. This has consequences for the productivity of the area, and has probably resulted in a reduction in biomass of benthic organisms and therefore a reduction in available food to migrating birds.

Information of factors specific for particular sub-sites is also provided in RIS for individual sub-sites.

27. Conservation measures taken:

- a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

Lamyra was designated as a nature reserve on 21st march 1975, whereas Averøya, Karlsrudtangen, Juveren and Synneren were designated as nature reserves on 28th June 1985.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

The authorities have approved management plans (1999 and 2000) for all five reserves, and management measures are carried out on a continual basis. The management plans will be revised in connection with the ongoing process to expand the Ramsar sites in Tyrifjorden.

d) Describe any other current management practices:

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

The Norwegian Ornithological Society (NOF) has proposed that other sites within the Nordre Tyrifjorden wetland system receive protection, such as the lower reaches of Storelva and Nordfjorden in order to create a larger continuous protected area. In addition NOF also propose that protection be offered several other shallow wetlands and areas further east in Tyrifjorden, in Steinsfjorden and along Randselva and Begna.

Weekly counts throughout the year in 1997-1998 revealed that many of these areas are just as important, or even more important than the existing reserves for breeding, staging and wintering waterbirds. In a report from the Ramsar Secretariat in 1997 to the Norwegian authorities it was recommended that these additional areas also be afforded protected status.

The County Governor has proposed a protection plan for expansion of existing and new protected wetlands in Tyrifjorden.

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The Hole and Ringerike branch of the Norwegian Ornithological Society (NOF) carry out annual monitoring of breeding and wintering waterbirds in Nordre Tyrifjorden, as well as recording of passage movements of pink-footed geese and great cormorants. Averøya Field Station is no longer in active use. See also RIS for individual sub-sites.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The local game management association (Ringerike Viltneimnd) have produced a booklet about Nordre Tyrifjorden, which includes sections on all the five reserves with Ramsar status.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

The area is a popular for birdwatching, and each spring local ornithologists organise an annual trip for members of the general public. The southern part of Averøya nature reserve (Sandtangen) is used for bathing/sunbathing by guests from the nearby Onsakervika Camping and from day visitors who come by

boat. Some hobby fishing from boats takes place in Nordfjorden and in the oxbow lakes. See also RIS for individual sub-sites.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Norwegian Directorate for Nature Management (DN), Tungasletta 2, 7485 Trondheim

Ph +47 73580500

Fax +47 73580501

Email: postmottak@dirnat.no

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

The site is managed by the County Governor of Buskerud, which is under the instruction of DN.

Address: County Governor of Buskerud, Statens Hus, Postboks 1604, 3007 Drammen, Norway. Phone +47 32266600. E-mail: postmottak@fmbu.no

34. Bibliographical references:

scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

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Botanical and management plan:

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Freshwater ecology/fish/invertebrates:

Andersen, O. et al. 2001. Storørreten i Tyrifjorden. Oppsummering av undersøkelser i perioden 1982-2000. *Fylkesmannen i Buskerud, Miljøvernnavdelingen Rapport nr. 2-2001*. (In Norwegian – on research on trout *Salmo trutta* in Tyrifjorden).

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Elgmork, K. (red.) 1969. Verneverdige områder på Ringerike av interesse for naturvitenskapelig forskning og undervisning. Avgrensning og verneverdi. Universitetet i Oslo. 41 s. (In Norwegian – on areas of conservation value in Ringerike municipality of interest for research and education).

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