Seabirds in the North-East Atlantic

Climate Change Vulnerability and Potential Conservation Actions

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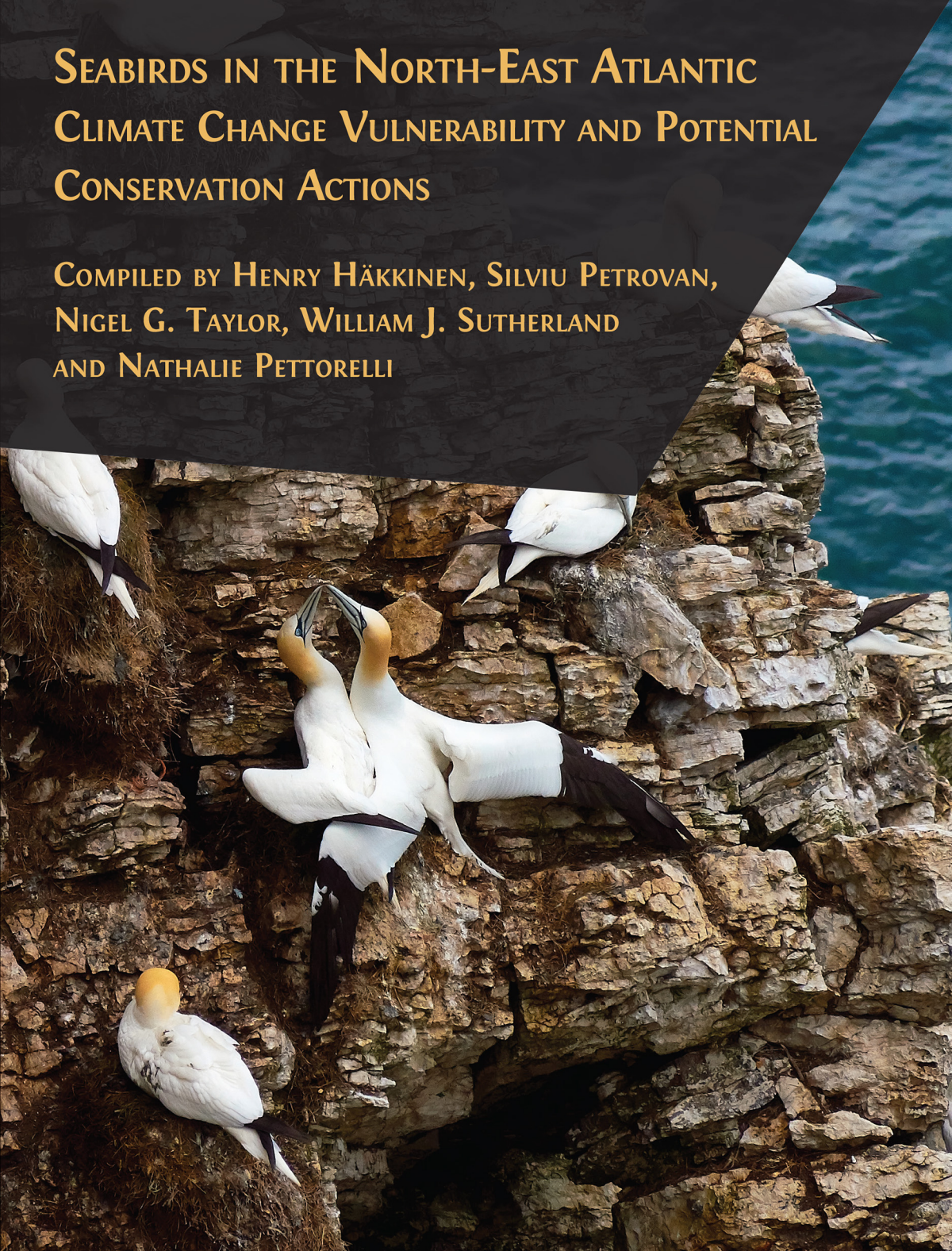

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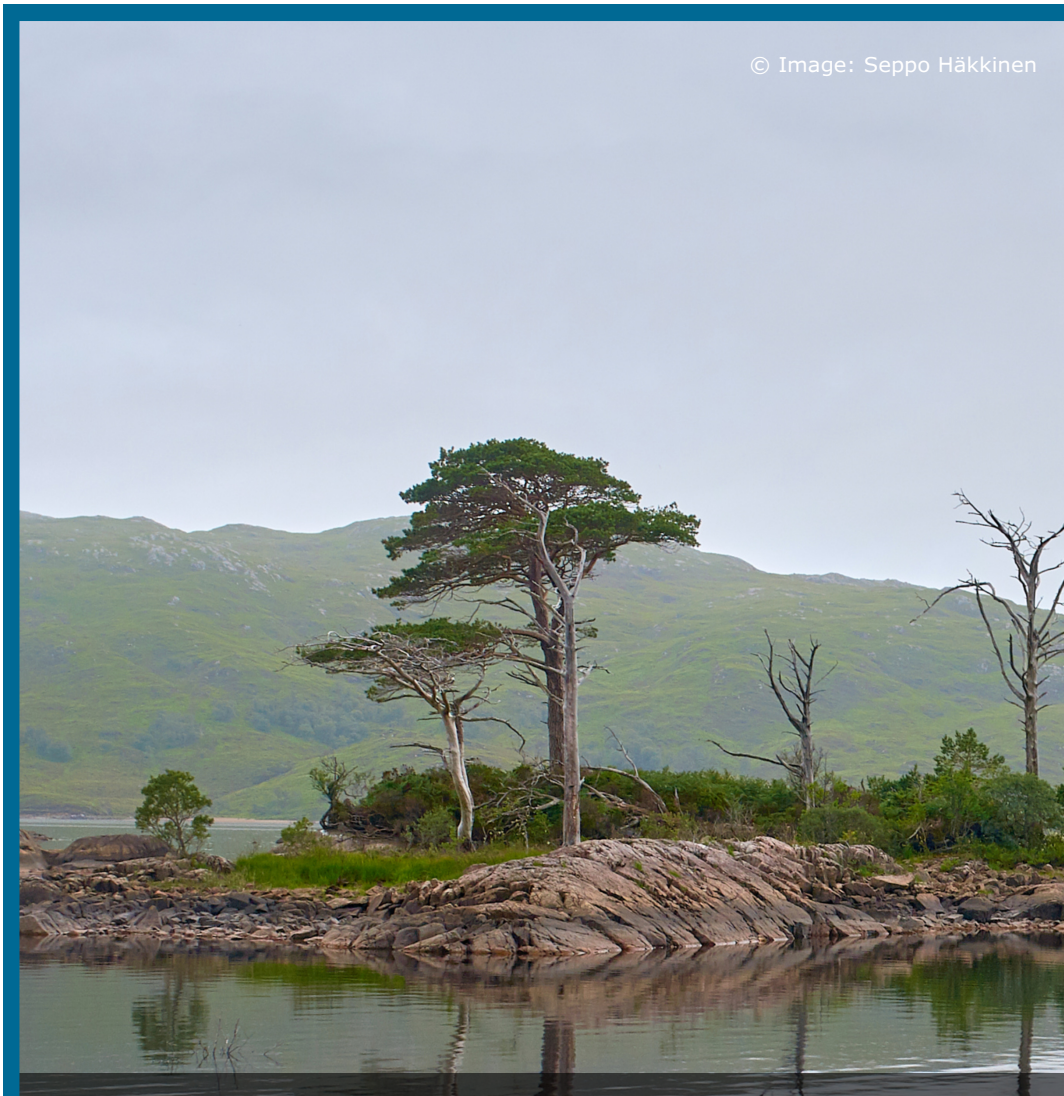

Loons/Divers and Grebes

(Gaviidae and Podicipedidae)

An assessment of climate change vulnerability and potential conservation actions for loons/divers and grebes in the North-East Atlantic

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1 Arctic Loon (*Gavia arctica*)

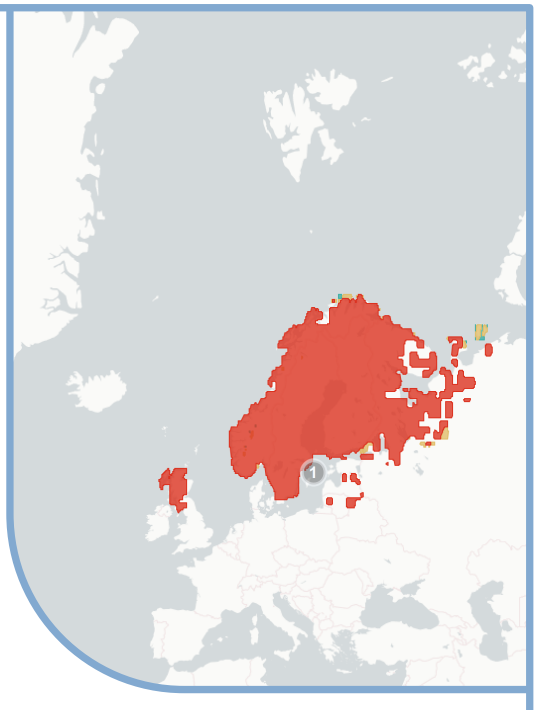
1.1 Evidence for exposure

1.1.1 Potential changes in breeding habitat suitability (by 2100):

Current breeding area that is likely to become less suitable (96% of current range).

Current breeding area that is likely to remain suitable (3%).

Current breeding area that is likely to become more suitable (1%).



1.1.2 Current impacts attributed to climate change:

We did not identify any current impacts of climate change for this species.

1.1.3 Predicted changes in key prey species:

1 Key prey species are likely to decline in abundance along the Swedish Baltic coast.

1.2 Sensitivity

- Loons have a strong preference for breeding near nutrient-poor, very clear fresh water. There is strong evidence that the productivity of lakes is increasing across Fenno-Scandinavia, which has resulted in decreased water transparency, and therefore decreased foraging success and condition of loon chicks. "Browning" of fresh water lakes has also led to reduced biomass of key fish species, but also a shift towards smaller fish, which could potentially result in

positive or negative effects for loons. Climate change is likely to accelerate this process and could have significant impacts on loons in the future.

- Species is sensitive to many threats, including disturbance by forestry work and tourism, ship traffic, bycatch and wind farms. Nest abandonment is common when disturbed. Conservation intervention may therefore be difficult.
- Sensitive to flooding due to storms and increased wave action as loons tend to nest close to water level in exposed areas. Any water level rise or increase in wave action is likely to have significant impact on breeding populations. Nests are also vulnerable to flooding due to heavy precipitation, and as significant rain events are expected to increase in many areas due to climate change, flooding events could become more frequent.

1.3 Adaptive capacity

- No relevant information could be identified.

Note: loons/divers and grebes rely heavily on freshwater prey and habitats. While these were considered for this assessment, we focused on marine habitats and prey. Estimates of breeding habitat and prey loss should therefore be treated as incomplete.

2 Common Loon (*Gavia immer*)

1.1 Evidence for exposure

1.1.1 Potential changes in breeding habitat suitability (by 2100):

Current breeding area that is likely to become less suitable (96% of current range).

Current breeding area that is likely to remain suitable (2%).

Current breeding area that is likely to become more suitable (2%).

1.1.2 Current impacts attributed to climate change:

We did not identify any current impacts of climate change for this species.

1.1.3 Predicted changes in key prey species:

No key prey assessment was carried out for this species.

1.1.4 Climate change impacts outside of Europe

Several impacts of climate change have been noted in North American populations, including decreased brood size, changes in migration patterns, increased energetic stress due to higher temperatures, and an increase in exposure to mercury.

1.2 Sensitivity

- Loon nests are vulnerable to flooding given their placement at the shoreline's edge. As significant rain events are expected to increase in many areas due to climate change, increased flooding could have significant impacts.
- This species has a long generation length (>10 years), which may slow recovery from severe impacts and increases population extinction risk.

1.3 Adaptive capacity

- Feeds on a wide variety of marine and freshwater fish, and appears to prey-switch readily. Loss of one or a few species due to climate change is unlikely to significantly impact most populations.
- Common loons frequently return to the same breeding sites, and show strong breeding site fidelity. In addition, dispersal is low so new areas are not commonly colonised. However, following repeated breeding failures several populations have abandoned previous sites and colonised new areas. This suggests some populations may shift in response to changing climate.
- Common loons have high fidelity to wintering sites, and they are unlikely to respond quickly to change in conditions in these wintering areas. Any major change to these areas may have significant impacts on wintering populations.

Note: loons/divers and grebes rely heavily on freshwater prey and habitats. While these were considered for this assessment, we focused on marine habitats and prey. Estimates of breeding habitat and prey loss should therefore be treated as incomplete.

Common loon © Silviu Petrovan

3 Red-throated Loon (*Gavia stellata*)

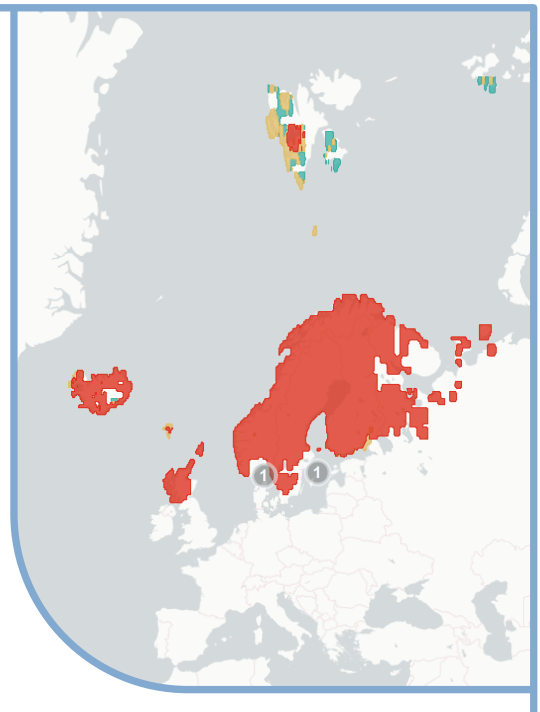
1.1 Evidence for exposure

1.1.1 Potential changes in breeding habitat suitability (by 2100):

Current breeding area that is likely to become less suitable (93% of current range).

Current breeding area that is likely to remain suitable (4%).

Current breeding area that is likely to become more suitable (2%).



1.1.2 Current impacts attributed to climate change:

We did not identify any current impacts of climate change for this species.

1.1.3 Predicted changes in key prey species:

1 Key prey species are likely to decline in abundance along the south-western Swedish coast and the Baltic Sea.

1.1.4 Climate change impacts outside of Europe

- Several impacts of climate change have been noted in North American populations, including decreased brood size, changes in migration patterns, increased energetic stress due to higher temperatures, and an increase in exposure to mercury.

1.2 Sensitivity

- Loons have a strong preference for breeding near nutrient-poor, very clear

fresh water. Productivity of lakes is increasing across Fenno-Scandinavia, which has resulted in decreased water transparency, and therefore decreased foraging success and condition of loon chicks. "Browning" of fresh water lakes has also led to reduced biomass and smaller body size of key fish species, which have both positive and negative consequences for loons.

- Some populations of red-throated loons (particularly in Iceland) rely on small, shallow ponds for feeding and for nesting sites. In hot, dry summers these pools can dry up and result in difficulty in take-off, foraging and thermoregulation. Further hotter, drier summers caused by climate change could have significant impacts on these populations.
- Climate change at high latitudes could greatly reduce the area of suitable breeding habitat for red-throated loons that breed in these areas. Warming can lead to changes in lake ice-coverage and drainage, which in turn can lead to the temporary or permanent loss of key tundra habitat for breeding loons.
- Red-throated loons are sensitive to disturbance, human activity can result in many nests being abandoned. Conservation intervention during the breeding season may therefore be difficult to carry out without disturbing nesting birds.
- Red-throated loons are also sensitive to predation, low overall breeding success rate is often due to heavy predation. Change in predator range or abundance due to climate change is likely to have significant impacts on loons.
- Nests are sensitive to flooding following high rainfall or heavy storms. Any increase in extreme events could significantly impact breeding populations.

1.3 Adaptive capacity

- Red-throated loons frequently return to the same breeding sites, and show some breeding site fidelity. However, when conditions change several populations have abandoned previous sites and colonised new areas. This suggests some populations may shift in response to changing climate.
- Red-throated loons have high fidelity to wintering sites, and they are unlikely to respond quickly to change in conditions in these wintering areas. Any major change to these areas may have significant impacts on wintering populations.
- Migration of red-throated loons often varies year to year in response to wind and weather conditions, though flexibility is likely to be limited due to complex interaction of carry-over effects and role of staged migration. Loons may be able to change migration strategy to some extent in response to climate change.

Note: loons/divers and grebes rely heavily on freshwater prey and habitats. While these were considered for this assessment, we focused on marine habitats and prey. Estimates of breeding habitat and prey loss should therefore be treated as incomplete.

4 Horned Grebe (*Podiceps auritus*)

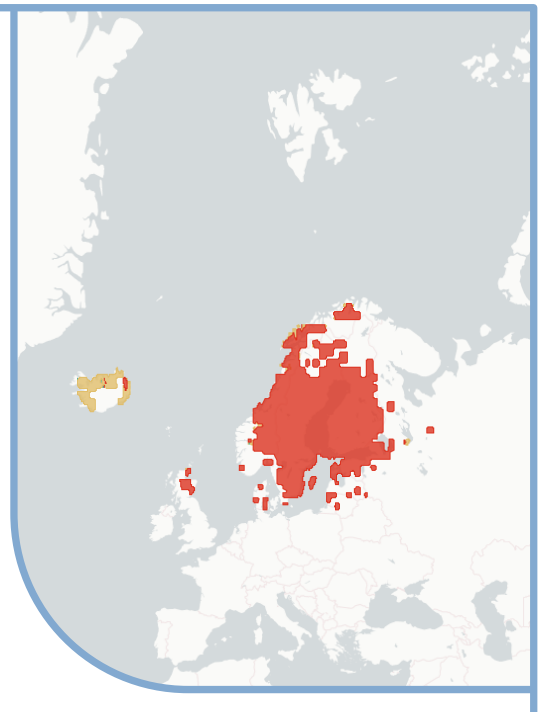
1.1 Evidence for exposure

1.1.1 Potential changes in breeding habitat suitability (by 2100):

Current breeding area that is likely to become less suitable (92% of current range).

Current breeding area that is likely to remain suitable (7%).

Current breeding area that is likely to become more suitable (1%).



1.1.2 Current impacts attributed to climate change:

We did not identify any current impacts of climate change for this species.

1.1.3 Predicted changes in key prey species:

No key prey assessment was carried out for this species.

1.2 Sensitivity

- The species has a large range, and a large population (though the population in Europe is relatively small), but is declining rapidly across much of its range. The cause is unknown, previous research has found little to no evidence climate change is contributing to decline. However, additional pressure from climate change is likely to exacerbate existing declines.
- Species is sensitive to disturbance, sites or whole areas can be abandoned if

there is heavy human activity. Conservation intervention or monitoring is therefore difficult.

- Horned grebes build either floating nests or nests on low-lying rocks and beaches. Nests are therefore vulnerable to flooding caused by high wind and wave action, it can be a significant source of mortality. Any changes in lake or coastal sea level are likely to have impacts on breeding populations.

1.3 Adaptive capacity

- Horned grebes frequently return to the same breeding sites, and show some breeding site fidelity. However, when conditions change several populations have abandoned previous sites. There appears to be significant interchange between populations, and some populations may shift in response to changing climate.
- Species has a varied diet of freshwater and marine species. Change in availability of one or a few species is unlikely to have significant impacts on most populations.

Note: loons/divers and grebes rely heavily on freshwater prey and habitats. While these were considered for this assessment, we focused on marine habitats and prey. Estimates of breeding habitat and prey loss should therefore be treated as incomplete.

5 Red-necked Grebe

(*Podiceps grisegena*)

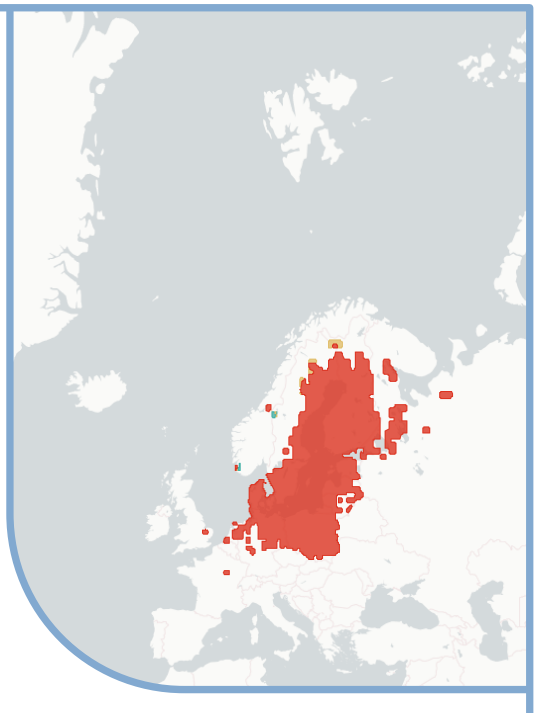
1.1 Evidence for exposure

1.1.1 Potential changes in breeding habitat suitability (by 2100):

Current breeding area that is likely to become less suitable (98% of current range).

Current breeding area that is likely to remain suitable (1%).

Current breeding area that is likely to become more suitable (0%).



1.1.2 Current impacts attributed to climate change:

We did not identify any current impacts of climate change for this species.

1.1.3 Predicted changes in key prey species:

No key prey assessment was carried out for this species.

1.2 Sensitivity

- Sensitive to disturbance; nests are frequently abandoned in presence of human activity. May make conservation action or monitoring more difficult.
- Sensitive to flooding and wave action as nest sites are often near the water-line and exposed. In some years this is a major cause of nest and egg loss, and any increase in sea level or frequency of storms may have significant impacts on nesting sites.

1.3 Adaptive capacity

- Red-necked grebes readily change breeding site, often changing their site each year. In some cases they will even change nest site during the breeding season. They could potentially rapidly change breeding areas in response to climate change.
- Has a varied diet of both fresh and saltwater species. The loss of one or a few species is unlikely to significantly impact most populations.

Note: loons/divers and grebes rely heavily on freshwater prey and habitats. While these were considered for this assessment, we focused on marine habitats and prey. Estimates of breeding habitat and prey loss should therefore be treated as incomplete.

Potential actions in response to climate change: Loons/ Divers and Grebes (Gaviidae and Podicipedidae)

In this section we list and assess possible local conservation actions that could be carried out in response to identified climate change impacts on auks . This section is not grouped by species, but by identified impacts. If an impact or action is specific to one or a few species, this information is included in the action summary or in the footnotes.

Additional note: loons/divers and grebes rely heavily on fresh water prey and habitats. While these were considered for this assessment, we focussed heavily on marine habitats and prey.

We did not identify any current impacts of climate change for this group.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