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Riddick, S.N.; Dragosits, U.; Blackall, T.D.; Daunt, F.; Wanless, S.; Sutton, M.A..
2012 The global distribution of ammonia emissions from seabird colonies.
Atmospheric Environment, 55. 319-327. 10.1016/j.atmosenv.2012.02.052

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The global distribution of ammonia emissions from seabird colonies

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Key Words: Coastal nitrogen; seabird colony; bioenergetic modelling; emission map; temperature; climate change

Abstract

Seabird colonies represent a significant source of atmospheric ammonia (NH_3) in remote maritime systems, producing a source of nitrogen that may encourage plant growth, alter terrestrial plant community composition and affect the surrounding marine ecosystem. To investigate seabird NH_3 emissions on a global scale, we developed a contemporary seabird database including a total seabird population of 261 million breeding pairs. We used this in conjunction with a bioenergetics model to estimate the mass of nitrogen excreted by all seabirds at each breeding colony. The results combined with the findings of mid-latitude field studies of volatilization rates estimate the global distribution of NH_3 emissions from seabird colonies on an annual basis. The largest uncertainty in our emission estimate concerns the potential temperature dependence of NH_3 emission. To investigate this we calculated and compared temperature independent emission estimates with a maximum feasible temperature dependent emission, based on the thermodynamic dissociation and solubility equilibria. Using the temperature independent approach, we estimate global NH_3 emissions from seabird colonies at 404 Gg NH_3 per year. By comparison, since most seabirds are located in relatively cold circumpolar locations, the thermodynamically dependent estimate is 136 Gg NH_3 per year. Actual global emissions are expected to be within these bounds, as other factors, such as non-linear interactions with water availability and surface infiltration, moderate the theoretical temperature response. Combining sources of error from temperature (± 49 %), seabird population estimates (± 36 %), variation in diet composition (± 23 %) and non-breeder attendance (± 13 %), gives a mid estimate with an overall uncertainty range of NH_3 emission from seabird colonies of 270 [97 to 442] Gg NH_3 per year. These emissions are environmentally relevant as they primarily occur as "hot-spots" in otherwise pristine environments with low anthropogenic emissions.

1 Introduction

Nitrogen is an abundant element on Earth, with di-nitrogen gas (N_2) making up 78 % of the atmosphere. In this form N is unreactive and cannot be used directly by plants for growth. To be useable, N_2 needs to be 'fixed' into reactive nitrogen (N_r), for which anthropogenic sources produce approximately 187 Tg N_r $year^{-1}$, (as of 2005) roughly doubling the natural rate of global nitrogen fixation (Sutton et al., 2008).

Seabird colonies are typically found in remote coastal areas. Due to their isolation from anthropogenic N_r sources, colonies are thought to play a major role in the nitrogen cycle within these ecosystems (Lindeboom, 1984). In particular, a significant fraction of the nitrogen is estimated to be lost as ammonia (NH_3) emission to the atmosphere, which will disperse and deposit on local ecosystems (Blackall et al., 2008). The local atmospheric deposition of NH_3 is estimated to have a large impact on plants and soil adjacent to a seabird colony (Anderson and Polis, 1999). Plants require nitrogen to grow, and because seabird colonies are often the main contributor of N_r, they are the most important pathway for plant nutrient supply within their ecosystem (Mizutani et al., 1985). However, excess NH_3 can negatively affect growth, productivity, tolerance to drought or frost and resistance to disease and insects, leading to long term changes in plant species composition (Stulen et al., 1998; Sutton et al., 2011).

Currently, estimates of NH_3 emissions from seabird colonies at a global scale are extremely uncertain (Blackall et al., 2007). Better quantification of their distribution is necessary to allow for a greater understanding of the biological, physical and biogeochemical effects that seabird colonies have on their immediate environment. Research carried out at UK colonies suggests that emissions are substantial (in some cases more than 100 Mg NH_3 per colony per year) (Blackall et al., 2007). Although these estimates suggest that seabirds contribute only 2 % of the national NH_3 emission in the UK, they dominate local NH_3 emission in the remote areas where they occur (Wilson et al., 2004).

Based on an energetic model, Wilson et al. (2004) provided a first estimate of NH_3 emissions for UK seabirds. This approach was extended by Blackall et al. (2007) to calculate the NH_3 emission from seabird colonies at a global scale. Blackall's provisional value suggested an overall emission of 242 Gg NH_3 $year^{-1}$. However, the bird population estimates that underpinned this estimate were predominantly from the 1970s and 1980s and were not spatially referenced. Updated, spatially-referenced population data are now available so there is the opportunity to map global NH_3 emissions using recent data for the first time. The global estimate by Blackall et al. (2007) also took no account of global climate differences, whereas, in principle, NH_3 emissions should be highly temperature sensitive, according to the thermodynamic Henry and dissociation equilibria for NH_3 (Nemitz et al., 2000, Zhu et al., 2011). The consideration of temperature is important because seabird breeding colonies are distributed across a large range of thermal conditions from the poles to the tropics.

This paper reports the establishment of an updated seabird population and distribution database coupled with an exploration of the possible consequences of temperature dependence on global NH_3 emissions from seabird colonies, allowing uncertainties to be estimated. By mapping seabird NH_3 emissions at a global scale for the first time, the paper also quantifies the extent to which these occur in hot spots far from anthropogenic sources. In this paper we aim to achieve a better fundamental understanding of the role of natural NH_3 sources, including the sensitivity to environmental conditions relevant for developing a global perspective. In this respect, seabirds represent a "model system" relevant for comparison with other excretal sources of NH_3 emission. Many sources of NH_3, especially agriculture are complicated by different management practices across the globe, whereas seabird emissions are a model system for studying climate dependence.

2 Methods and materials

2.1 Seabird population estimates

A detailed spatially explicit seabird database was collated from a wide range of sources, incorporating data from 180 countries, comprising 323 species in 33,255 colonies. An indication of the uncertainty of the data collection for each source was incorporated into the database. In the case of penguins, which represent a significant NH_3 source, population uncertainty estimates were taken from the study by Woehler (1993). An attempt was made to consider all seabird NH3 sources and some data included inland colonies, such as for the UK. However, data for inland seabird colonies outside the UK were not readily available and are not included in the dataset.

2.2 Bioenergetics model

The bioenergetics model developed by Wilson et al. (2004) calculated the NH_3 emissions from seabirds using population and bird specific data. Nitrogenous waste excreted by birds is in the form of uric acid ($C_5H_4O_3N_4$), which is relatively insoluble and must undergo bacterial transformation before it can release NH_3. Biochemical degradation of uric acid primarily forms NH_3 (Groot Koerkamp et al. 1998):

$$C_5H_4O_3N_4 + 1.5O_2 + 4H_2O \rightarrow 5CO_2 + 4NH_3. \qquad (1)$$

2.2.1 Calculating Annual NH_3 emission

Breeding Adults

Using the method of Wilson et al. (2004) the annual NH_3 emission for breeders ($Q_{NH_3}(br)$, g NH_3 bird^{-1} yr^{-1}) can be calculated from the adult mass (M, g bird^{-1}), nitrogen content of the food (F_{Nc}, g N g^{-1} wet mass), energy content of the food (F_{Ec}, kJ g^{-1} wet mass), assimilation efficiency of ingested food (A_{eff} , kJ [energy obtained] kJ^{-1} [energy in food]), proportion of excreted nitrogen volatilized as NH_3 (F_{Nv}), length of the breeding season ($t_{breeding}$, days), proportion of time spent at the colony during the breeding season (F_{tc}), a habitat correction factor (F_{hab}) and 17/14 the mass ratio of NH_3 to N. This study aims to estimate the NH_3 emission from seabird guano deposited at the colony and does not attempt to calculate NH_3 emission from seabirds outside the breeding season or out-with the nesting areas.

$$Q_{NH_3}(br) = \frac{9.2.M^{0.774}}{F_{Ec}A_{eff}}.F_{Nc}.F_{Nv}.t_{breeding}.F_{tc}.F_{hab}.\frac{17}{14}. . \qquad (2)$$

F_{Nc} and F_{Ec}, estimated at 0.036 g N g^{-1} and 6.5 kJ g^{-1} (both wet mass), (Energy: Nitrogen (E:N) ratio = 181 kJ g N^{-1}) respectively, have been calculated assuming a high protein, fish only diet (Furness, 1991). A_{eff} is estimated at 0.8 (Furness, 1991). Due to differences in feeding behaviour and food type of seabird species it is recognised that the values of F_{Nc}, F_{Ec} and A_{eff} have associated uncertainty. An uncertainty analysis was conducted on these values, using F_{Nc} and F_{Ec} for Antarctic krill *Euphausia superb*, a low nitrogen content food source (F_{Nc} of 0.023 g N g^{-1}, F_{Ec} = 4.35 kJ g^{-1} and E:N ratio of 189 kJ g N^{-1}) (Croxall and Davis 1990). A_{Eff} varies between 0.633 and 0.828 for seabird species (Green et al., 2007).

F_{Nv} was estimated following field campaigns measuring NH_3 emissions from seabird colonies on the Isle of May and the Bass Rock, Scotland (Blackall et al., 2004; 2007). F_{Nv} was estimated at 0.3 and combines the effect of temperature, humidity, wind speed and solar irradiance on volatilization rate for a mid-latitude environment (Wilson et al., 2004). Part of the total guano excretion at the colony will wash to the sea by either rain events or by wave action (Blackall et al., 2008). However, the total amount of N excreted is used as the reference point for the NH_3 emission calculation. The amount of nitrogen lost in run off events would need to be considered in a more detailed dynamic modelling approach, which takes account of local rainfall and run-off.

The term $t_{breeding}$ was calculated by summing species-specific pre-laying (courtship and nest building), incubation and chick-rearing periods. The value for F_{tc} takes into account the loss of excreta whilst the bird is not at the colony, i.e., feeding at sea or during flying. NH_3 emissions in Equation 2 are only estimated for guano deposited by seabirds during their attendance at the breeding colony. Previous measurements showed NH_3 emission to occur after the departure of the birds at the end of the breeding season (Blackall et al., 2008) and that NH_3 emission drops to background levels one month after birds have left the colony. It is feasible that NH_3 emissions may last longer in colder and drier locations as suggested by Zhu et al. (2011), however further measurements will be required to test that suggestion.

F_{hab} describes re-absorption of NH_3 by the substrate and overlying vegetation. Wilson et al. (2004) estimated F_{hab} at 1.0 (no re-absorption) for guano excreted on rock, 0.2 for guano excreted on a nest or vegetation and 0 (total re-absorption) for guano excreted in a burrow, which was consistent with the findings of Blackall et al. (2007).

Non-Breeding Adults

Non-breeders are estimated to make up c.33 % of the breeding population of UK seabirds and spend 50 % less time at the colony than breeders, a value that are typical of many seabirds globally (Wilson et al., 2004). The annual NH_3 emission for non-breeders ($Q_{NH_3}(nbr)$, g NH_3 bird^{-1} yr^{-1}) is therefore estimated as:

$$Q_{NH_3}(nbr) = 0.167 Q_{NH_3}(br) \,. \qquad (3)$$

Estimates of non-breeder attendance could have spatial and temporal variation. In general, seabirds spend appreciable amounts of time at a colony before recruiting into the breeding population. Variation in non-breeder attendance has been estimated at between 35 and 73 % (Williams and Rodwell, 1992) and an uncertainty estimation is based on these values.

Chicks

Chick attendance is estimated as the length of time between hatching and fledging. The annual NH_3 emission for chicks ($Q_{NH_3}(ch)$, g NH_3 bird^{-1} yr^{-1}) is estimated from the mass of the chick at fledging ($M_{fledging}$, g) and the breeding productivity (P_{chicks}, chicks fledged pair):

$$Q_{NH_3}(ch) = \frac{28.43 M_{fledging}^{1.06}}{F_{Ec} A_{eff}} . F_{Nc} . F_{Nv} . \frac{17}{14} . \frac{P_{chicks}}{2} . F_{hab} \ . \qquad (4)$$

2.3 Model parameterization

Species-specific values for input parameters (adult mass, number of days spent at the colony per year, proportion of time at the colony, breeding success, fledging mass of the chick and breeding habitat) were extracted from the literature and are summarised in Appendix 1. Where data were available from multiple colonies and/or years, the mean of colony/year means was used. Of the 318 species of seabird considered, data were available for 311 species (Birdlife International, 2011). Data for the missing species were estimated from similar species identified using information from Birdlife International (2011).

Few data were available on the percentage of time an adult spends at a nest. We therefore adopted the same approach as Wilson et al. (2004). Seabirds that lay their eggs in open habitat (rock or vegetation) are required to attend the brood continuously until they are large enough to be safe from predators; thus, it was estimated that each adult of these species spends 60 % of their time at the nest. Burrow nesters do not continuously attend their chicks and each adult was estimated to spend 30 % of their time in the burrow for diurnal species, active during the day, and 10% for nocturnal species that only return to the nest at night.

2.4 Temperature dependence of NH_3 emissions

We hypothesize that using a temperature corrected value for F_{Nv} instead of a constant derived under Scottish conditions (Wilson et al., 2004; Blackall et al., 2007), could allow for more realistic estimates of NH_3 emission across a temperature gradient. F_{Nv} was therefore investigated in relation to its possible temperature sensitivity. We undertook two estimations: Scenario 1: NH_3 emissions independent of temperature, following the method outlined above; Scenario 2: NH_3 emissions calculated on the basis of the combined Henry and dissociation equilibria for NH_3 and ammonium (NH_4^+), following the empirical fit of Nemitz et al. (2000):

$$c_T = \frac{161500}{T} exp\left(\frac{-10378}{T}\right) \qquad (5)$$

where c_T is the temperature dependent Henry's Law constant and T is the prevailing temperature (K) (Nemitz et al., 2000). By taking 10 °C as a reference, the proportion of excreted nitrogen that volatilizes, F_{Nv}, at 10 °C is 0.33. In colder climates, where the average temperature during the breeding season is 5 °C, F_{Nv} decreases to 0.09. For colonies where the average temperature is 15 °C F_{Nv} is 0.61. At colonies where the average temperature is greater than 19 °C all of the excreted nitrogen is estimated to volatilize (F_{Nv} = 1).

The local temperature correction factor for NH_3 emission was calculated based on the mid-latitude experimental results of Blackall et al. (2007) from measurements carried out under an average temperature of 283 K. The relationship of Equation 5 was used to calculate a temperature correction factor (c_{local}/c_{283}) at all colonies across the globe, using the average air temperature during the breeding season, obtained from the 1995 Climatic Research Unit dataset at the University of East Anglia (Harris, 2007). A geographical information system (GIS) was used to identify the closest measurement sites in the temperature dataset for each of the global seabird colonies. For colonies farther than 1000 km from a measurement site, the temperature was calculated as the average of the nearest three sites. The decision to use 1000 km as a cut off was taken because it was assumed that for our purposes temperature at sea level would be sufficiently similar to sites with less than this distance. This correction was only necessary for 50 colonies, mostly in the South Pacific.

Other processes can be expected to offset the temperature effect simulated in Scenario 2, such that this can be considered as representing a theoretical maximum temperature dependence. For example, in a cold dry atmosphere the NH_3 emission potential may be smaller, but result in emissions taking place over a longer period of time. Conversely, in warm, dry conditions the rate of urea hydrolysis may be limited, leading to guano accumulation or a higher chance that guano is washed into the sea during intermittent intensive rain events.

Given these uncertainties, the average of Scenarios 1 and 2 (‘limited temperature dependence’, Scenario 3) is used as the best estimate of NH_3 emission for the purpose of mapping using a GIS. The maps shown in Figures 1, 3 and 4, representing location, size and magnitude of seabird colonies and NH_3 emissions, were produced in a GIS (ArcGIS 9 ESRI inc., 2011). Latitude, longitude, and seabird populations by species for every colony were collected in a detailed spatial database, and NH_3 emissions calculated for each colony. To show the distribution of the NH_3 emissions clearly in Figures 1 and 3, the contents in each 5 degree grid square have been aggregated and plotted.

3 Results

3.1. Global distribution of seabird colony populations and N excretion

The global seabird database included a total seabird population of 261 million breeding pairs, with an average date of count being 1992 (and standard deviation of 11 years). Figure 1 shows the estimated regional distribution of seabirds globally. Antarctica and the sub-Antarctic islands (69 million pairs) have similar numbers of seabirds to Greenland and Svalbard combined (68 million pairs). Australasia and the Pacific Islands also have large seabird populations.

{Insert Figure 1 here}

However, a large population size does not necessarily correspond to large nitrogen excretion. The differences between species’ body masses and length of breeding season are reflected in difference between N excretion on Antarctica and sub-Antarctic islands (858 Gg N year^{-1}) and Greenland and Svalbard (59 Gg N year^{-1}). Total nitrogen from seabird excretion is dominated by Antarctica and Southern Ocean, accounting for 79 % of the total (Figure 2).

{Insert Figure 2 here}

3.2. Global distribution of NH_3 emissions and temperature sensitivity

Regional estimates of NH_3 emissions are shown in Table 1, comparing the Scenarios assuming temperature independent and temperature dependent emissions. The temperature independent global NH_3 emissions are estimated at 404 Gg year^{-1}. When the temperature coefficient based on thermodynamics is applied, this estimate is reduced to 136 Gg year^{-1}, because the major seabird breeding assemblages occur in cool circumpolar conditions, especially Antarctica and Southern Ocean. In these locations, average temperatures in the breeding season are approximately 5-10 °C lower than the UK measurements of Blackall et al. (2007), on which the temperature independent estimates are based. Overall, Antarctica and the Southern Ocean contribute 84% of the total NH_3 emissions in Scenario 1 (similar to the proportion of N excretion noted in Section 3.1), which is reduced to 79% in Scenario 3, and 61% in Scenario 2, as a result of the estimated temperature dependences.

{Insert Table 1 here}

The extent to which the estimated effect of thermodynamics alters NH_3 emissions with latitude is shown in Figure 3. The emissions at higher latitudes are significantly reduced (Scenario 2) compared with the temperature independent model (Scenario 1).

{Insert Figure 3 here}

The emissions between 40 °S and 60 °S contributed 68 % of the overall NH_3 emission from seabird colonies (Scenario 3) and correspond to the large penguin populations on the sub-Antarctic islands. The lowest NH_3 emissions are between 0 °N and 20 °N and contribute 1 % to the global NH_3 emission from seabirds (Scenario 3). Even though these colonies are in a hot climate, the absolute emission values are relatively low, therefore changes to tropical birds emissions have little impact on the global estimate. Many tropical seabird species have a small body mass and nitrogen excreted at these colonies is insignificant when compared to the penguin colonies. Even though the NH_3 emission increases when thermodynamic effects are considered, the NH_3 emission at tropical seabird colonies remains small when compared to the emissions in the Southern Ocean.

{Insert Figure 4 here}

Figure 4 shows the estimated global distribution of NH_3 emissions from seabirds using the limited temperature dependent model (Scenario 3), with a total NH_3 emission of 270 Gg NH_3 year^{-1}. The resulting emissions database itself is structured with emissions on a colony basis, as illustrated by the maps for the south Atlantic and north-west Europe (Figure 5). Our NH_3 emissions estimates for the three scenarios (Ammonia Global Emissions from Seabirds: AGES v1: S1, S2, S3) are available for downloading as supplementary material at 0.1 degree resolution (Appendix 2), which is consistent with the resolution of the EDGAR (v 4.1) global emissions database (EC-JRC/PBL, 2010).

{Insert Figure 5 here}

3.3. Main seabird species contributing to ammonia emissions

By far the largest contribution to NH_3 emission from seabird colonies, was provided by a few key species, with 15 of 323 species included in the database accounting for 93.5% of the estimated NH_3 emissions (Scenario 3). Irrespective of the model scenario used, the largest contributors to the global NH_3 emission are the penguins. These birds, which only occur in the Southern Hemisphere, represent the top seven species in terms of NH_3 emission, with the penguin family (comprising a total of 17 species) contributing 80 % of the global NH_3 emission (scenario 3, with range 63-83% for scenarios 1 and 2, respectively). The penguins are numerous, have large body mass, long breeding seasons and many penguin species breed on rocky ground, all of which are characteristics that tend to be associated with high NH_3 emission.

Of the penguins, by far the most important is the Macaroni Penguin (*Eudyptes chrysolophus*), which alone accounts for an estimated 26% of global NH_3 emissions from seabird colonies. The three of the five largest colonies of Macaroni penguins in our database are South Georgia Island, Willis Island and Iles Kerguelen, with estimated annual emissions of 17.4, 16.1 and 6.5 Gg NH_3 year^{-1} (Scenario 3), highlighting their importance as major point sources of NH_3 in the remote marine environment. At these colonies, using Scenario 3, emission densities within colonies range up to 2.7 kg NH_3 m^{-2} yr^{-1} and this refers to the 5.4 million pairs of Macaroni penguin in South Georgia.

4 Discussion

This paper presents the first global map of NH_3 emissions from seabird colonies. It demonstrates substantial spatial heterogeneity, with the largest emissions occurring on the sub-Antarctic Islands throughout the Southern Ocean. The global map allows the location of the largest NH_3 emissions to be identified in relation to seabird contribution to N processes within local ecosystems, as well as a contribution to atmospheric emissions relevant for aerosol balance in remote marine atmospheres.

In an earlier study, Blackall et al. (2007) estimated temperature-independent global emissions from seabird colonies at 242 Gg NH_3 yr^{-1}, which is considerably lower than the temperature independent estimate of 404 Gg NH_3 yr^{-1} (Scenario 1) presented in this paper. The contrast between the two studies reflects differences in the population estimates, primarily resulting from better data availability since Blackall et al. (2007). Although seabird population changes have also occurred over recent decades and contributed to the differences, such effects are considered secondary compared with the improved quality and coverage of count data.

This study therefore provides an update to previous seabird estimates and indicates a global seabird population of 261 million breeding pairs. Furthermore, the emission estimate noted above is based on breeding birds plus plausible estimates of the nonbreeding component and annual chick production. Using Brooke’s method, the present study estimates the total number of seabirds to be 1,180 million individuals, updating the previous estimates of 700 million (Brooke, 2004) and 900 million (Karpouzi et al., 2007).

A further difference in the estimate of global seabird colony emission reported here is the larger fraction attributable to penguins. Blackall et al. (2007) estimated that 57% of global ammonia emissions were due to penguin species, as compared with our new estimate of 80% (63-85%), depending on the model scenario used. This larger contribution of penguins can be explained by improved information on population numbers (Trathan et al., 2007).

4.1 Temperature Dependence of NH_3 Emissions

Many environmental factors affect the size of NH_3 emission from seabird guano. For example, in Antarctic regions pH of guano, freezing-thawing processes and water amount have all been shown to affect NH_3 emission (Zhu et al. 2011). This study focuses on the global response of NH_3 emission to temperature. The importance of temperature was also shown by Zhu et al. (2011) who observed an exponential relationship between NH_3 emission and temperature (Figure 6).

Our study used a relationship based on the combined Henry and dissociation equilibria for NH_3 to estimate an upper limit of the temperature dependence of global NH_3 emission by seabirds. According to the thermodynamic relationship, based on temperature alone, the global NH_3 emission from seabirds was estimated at 136 Gg year^{-1} (Scenario 2).

Evidence of climate relationships for NH_3 emissions from animal manure spreading to agricultural land show that responses are not always related to temperature due to confounding interactions, such as altered rates of infiltration and surface run off, as well as of emission duration (Misselbrook et al., 2005). Such relationships are further complicated for avian guano, which is also dependent on water availability for its hydrolysis to produce NH_3. This suggests that, even though temperature may be an important driver in the production of NH_3, it may not be the only climatic variable to affect NH_3 emissions (Zhu et al., 2011). Blackall et al. (2007) suggested that water availability may be an important factor and that limited water in tropical conditions may counteract the temperature effect. To handle these issues, Scenarios 1 and 2 can be considered as limits, with Scenario 3 (limited temperature dependence) providing a best estimate of global NH_3 emission for seabirds at 270 Gg NH_3 year^{-1}. The temperature function for is seen to Scenario 3 agree well with the measured NH_3 emissions from ornithogenic soils OS_{DG2} and OS_{DG4} of Zhu et al. (2011) (Figure 6). As the temperature changes from 10 °C to 15 °C, the temperature function increases by 115 % in Scenario 2, 46 % in Scenario 3, 42 % for the OS_{DG2} soil and 35 % for the OS_{DG4} soil. Further measurements at colonies in different environments would allow climate factors other than temperature to be incorporated into the model.

{Insert Figure 6 here}

4.2 Uncertainty in input data

The input parameters to the bioenergetics model are a source of uncertainty. The values described above will vary within and between years and across species' ranges. For example, breeding success in a given population shows considerable inter-annual variation, and the number of days spent at a colony often varies among populations depending on latitude and/or breeding conditions. Habitat will vary in relation to fine-scale heterogeneity across a colony and through the season, in particular, amongst precocial species, where chicks move away from the nest soon after hatching. Whilst we fully recognise the importance of this variation across multiple temporal and spatial scales, our approach was to use a representative estimate of each parameter for each species, suitable for input to the global NH_3 emission model.

Bird population data are subject to large uncertainties, and these have a large impact on the estimates of NH_3 emissions. It is difficult to derive a global seabird population uncertainty from colony data because there is no standard method for reporting uncertainty. An attempt has been made at estimating the uncertainty in counts of seabird populations, based on the penguin population uncertainty estimates, since these are responsible for 80 % of the total NH_3 emission from seabirds. The uncertainty in the penguin population is ± 36 % (Woehler, 1993). An uncertainty analysis was conducted on non-breeder attendance, the values of nitrogen content of the food, the energy content of the food, assimilation efficiency of ingested food and thermodynamic effects. Variation in non-breeder attendance corresponds to an uncertainty in NH_3 emission of ± 13 %. The uncertainty in NH_3 emission caused by E:N ratio of food is ± 5 % and A_{Eff} is ± 15 %. Table 1 shows the uncertainty in NH_3 emission associated with thermodynamic effects is ± 49 %. Combining these (using Scenario 3 as the best estimate) suggests that global seabird NH_3 emissions are 270 Gg NH_3 year^{-1} within the range of 97 - 442 Gg NH_3 year^{-1}.

4.3. Magnitude of seabird ammonia emissions compared with other sources.

On a global scale, the estimated ammonia emissions from seabird colonies amounts to less than 2 % of the 13.8 Tg year^{-1} NH_3 emission from all sources (EC-JRC/PBL, 2010). Seabirds are, nevertheless, relevant sources of NH_3 because they occur as large point sources in remote areas with otherwise low emissions.

The scale of seabird point sources can be gauged by considering colonies of Macaroni penguins. Given the rate of excretion of 6.7 kg N bird^{-1} year^{-1} at the colony, and a colony density of 17,000 individuals ha^{-1} results in colony excretion rates from Macaroni penguins at 114,240 kg N ha^{-1} yr^{-1}. To our knowledge, this is by far the highest excretal / N input rate ever estimated. Prior to this study, the highest published nitrogen excretion rate was reported by Blackall et al. (2007) at 52,200 kg N ha^{-1} yr^{-1} from the Northern gannet *Morus bassanus* colony on the Bass Rock, Scotland. Combined with the large numbers of penguins, these excretion rates translate into extremely high emission rates. For example, on Willis Island, South Georgia, 1 million Macaroni penguins are estimated within an area of 5.9 km^2, providing an estimated emission of 15.6 [4.2 – 26.9] Gg NH_3 year^{-1} from this single source. This is two orders of magnitude larger than the colony source strength of 0.15 Gg NH_3 yr^{-1} estimated by Blackall et al. (2007) for a colony of 100,000 Gannets (Bass Rock) in Scotland.

Such penguin colonies appear to be by far the largest biogenic point sources of NH_3 globally, even including anthropogenic agricultural sources. For example, the largest poultry installation of ~2 million birds emitting NH_3 at 0.1 kg NH_3 bird^{-1} year^{-1} (egg-laying system with infrequent belt cleaning) would provide a total emission of around 0.2 Gg NH_3 year^{-1}, which is similar to the emission from a major feedlot of 10,000 cattle emitting ~0.2 kg NH_3 animal^{-1} year^{-1}. The only point source of NH_3 that has been estimated to exceed the value of 15.6 Gg year^{-1} given here for Willis Island is the volcano Mount Mijake-jima in Japan, which was calculated to have released 400 Gg NH_3 year^{-1} around the year 2000 (Uematsu et al., 2004, Sutton et al., 2008).

The seabird ammonia database can also be put into context by comparison with the spatial estimates of NH_3 emissions from other sources in the EDGAR database (EC-JRC/PBL, 2010). For the 0.1 x 0.1 degree locations where they occur, seabirds often account for > 99.9 % of NH_3 emissions from all sources and seabird NH_3 emissions are always more than 50 % of the local emissions in each 0.1 x 0.1 degree cell, showing the importance of seabird emission to local ecosystems.

5. Conclusions

This study has provided a first mapped estimate of the contribution that seabirds make to global NH_3 emissions. Overall, penguins dominate the global seabird NH_3 emission, accounting for around 80% of the emission, and with Macaroni penguins alone contributing an estimated 26%. The main locations of these emissions are the sub-Antarctic islands and around the Antarctic continent, where high ocean productivity supports a larger seabird biomass than in other areas.

The inclusion of a temperature factor substantially affects the size of the estimated NH_3 emission. However, results from this study suggest that temperature is not the sole driver of NH_3 emission (Figure 6). Further investigation needs to examine the role of other climatic drivers such as wind speed and precipitation. The main sources of uncertainty were thermodynamic dependence (± 49 %), variation in diet composition (± 23 %), non-breeder attendance (± 13 %) and seabird population (± 36 %). Combining these sources of error provides a global best estimate of NH_3 emission from seabird colonies of 270 [97 to 442] Gg NH_3 year^{-1}. Although amounting to less than 2 % of total global emissions, seabird NH_3 emissions are relevant because of their occurrence in remote regions where they are the main NH_3 source, in the form of discrete “hot-spots”, leading to intense local impacts on terrestrial ecosystems.

The anticipated temperature dependence of NH_3 emissions also highlights their likely sensitivity to global climatic change. Temperatures are increasing in many parts of the Southern Ocean and the Antarctic Continent (IPCC, 2007). Changes in temperature could result in changes to the nitrogen cycle of sensitive ecosystems, decreased food supplies for the seabirds and resultant population declines. A better understanding of how climate drives NH_3 emission may help to understand some of the challenges that these ecosystems face.

Acknowledgements

This research was supported by a grant from the NERC CEH Integrating Fund. We are grateful to all contributors that provided data for the seabird database: Birdlife

International, Eric Woehler (University of Tasmania, Australia), Halvard Strom (Nordic Seabird Group), Yat-tung Yu (Hong Kong Bird Society), Roddy Mavor (JNCC), David Irons (US FWS), Canada's Important Bird Areas, Australian Department for Environment, Graeme Taylor (Department of Conservation, NZ), Pablo Yorio (Centro Nacional Patagónico), Chin Aik Yeap (Malaysian Nature Society), Philip Round (Mahidol Unversity), Aevar Petersen (Icelandic Institute of Natural History), Carsten Egevang (Greenland Institute of Natural Resources), Takashi Yamamoto (Japan National Institute of Polar Research), Tycho Anker-Nilssen (Norwegian Institute for Nature Research), Jaanus Elts (Estonian Ornithological Society), Martti Hario (Finnish Game and Fisheries Research), Yuri Artukhin (Pacific Institute of Geography), Michelle Paleczny (UBC), Robin Allen (Florida Fish and Wildlife Conservation Commission), Christina Kisiel (NJ Fish and Wildlife, USA), Michelle Gibbons, Daniel Rosenblatt (both Stony Brook University), Sue Cameron (North Carolina Wildlife Resources Commission), Brent Ortego (US FWS Texas), Shawn Stephensen (US FWS Oregon) and Ruth Boettcher (VA Game and Inland Fisheries). The authors would also like to acknowledge helpful comments from referees on a previous version of the manuscript.

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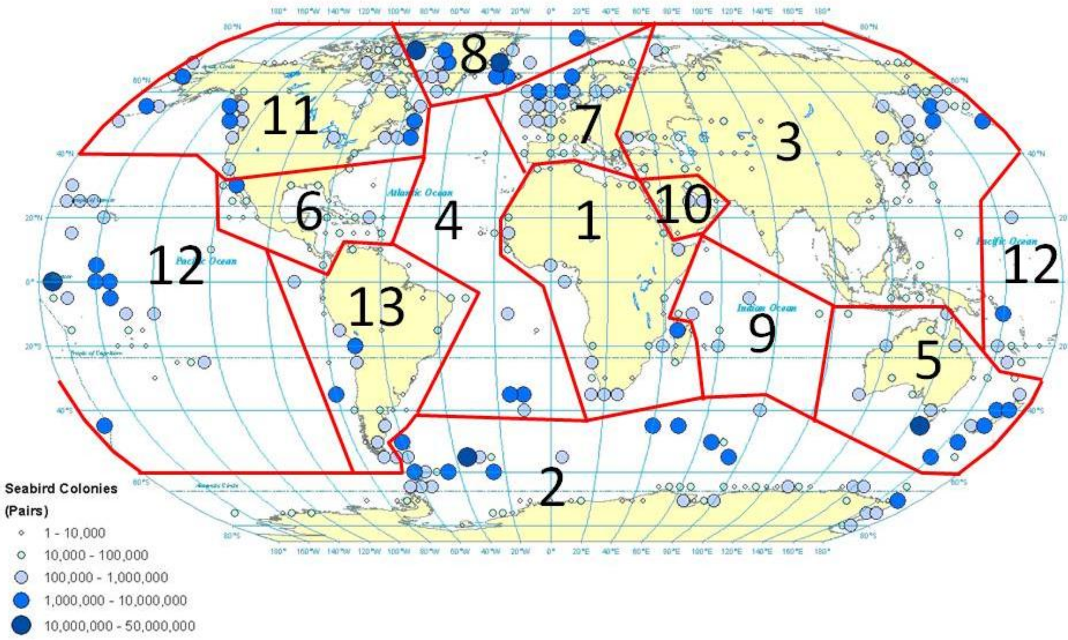

Figure 1 Global distribution of seabird colonies, based on number of breeding pairs. Lines delineate regional boundaries: 1. Africa, 2. Antarctica & Southern Ocean, 3. Asia, 4. Atlantic, 5. Australasia, 6. Caribbean & Central America, 7. Europe, 8. Greenland & Svalbard, 9. Indian Ocean, 10. Middle East, 11. North America, 12. Pacific and 13. South America. To show distribution of the colonies clearly, the number of pairs in each 5° grid square have been summed.

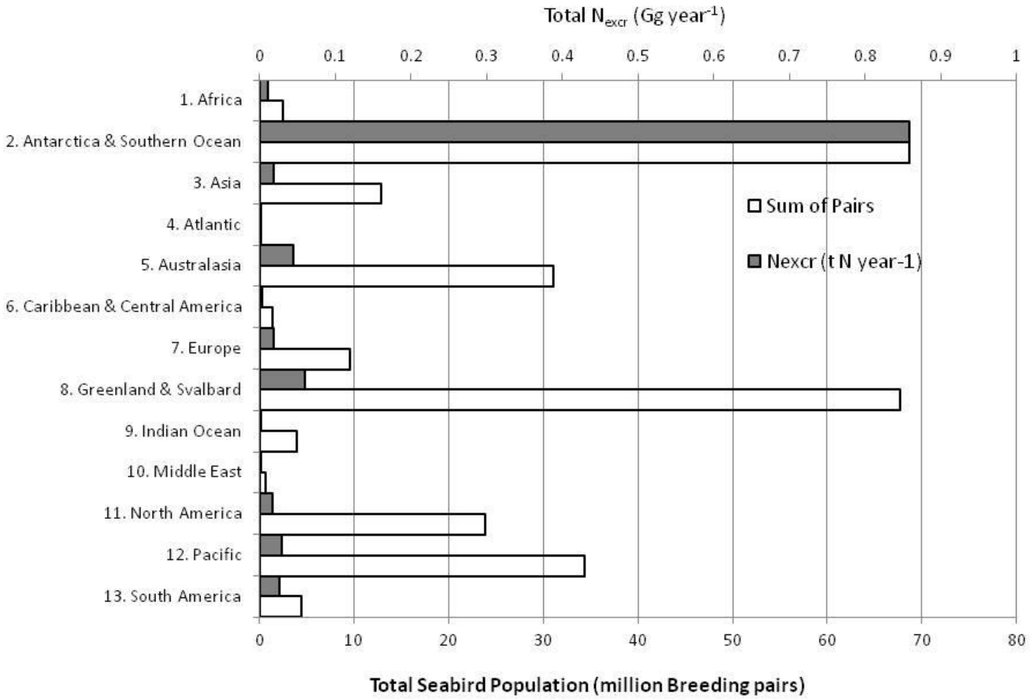

Figure 2 Regional estimates of breeding pairs of seabird and N excretion calculated in this study.

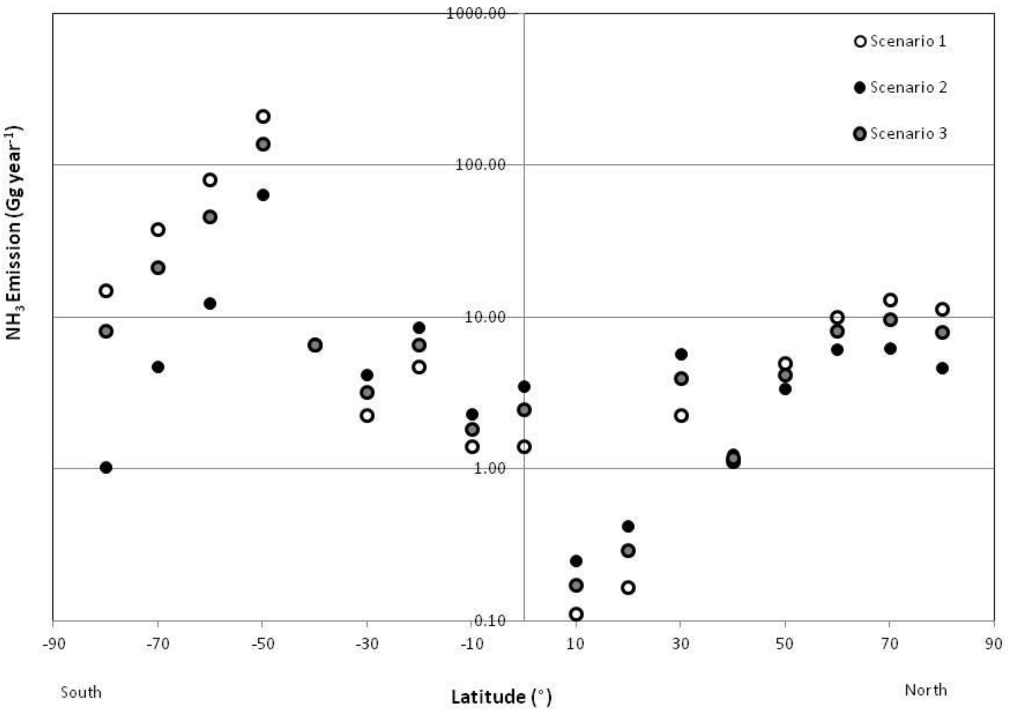

Figure 3 Latitudinal variation in global NH_3 emissions from seabird colonies based on the temperature independent bioenergetics model (Scenario 1) and thermodynamically adjusted bioenergetics model estimates (Scenario 2). The limited-temperature dependent NH_3 (Scenario 3) emission is the average of Scenario 1 and Scenario 2.

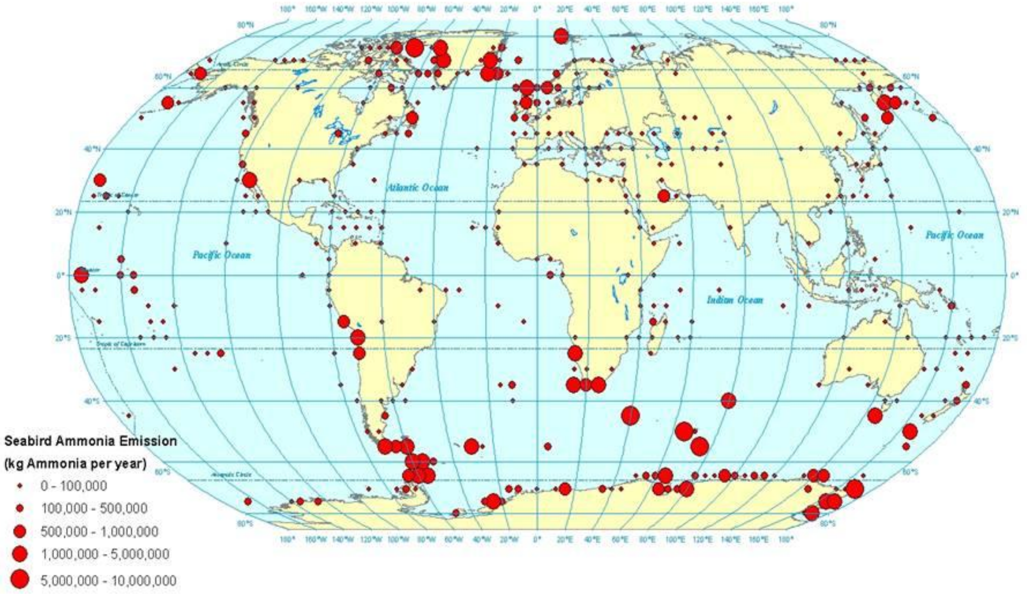

Figure 4 Estimated global distribution of NH_3 emissions from seabird colonies, using the mid-estimate between the temperature independent bioenergetics model and the thermodynamically adjusted bioenergetics model (Scenario 3). The results incorporate species and colony specific data on population size, birds' energy requirements, colony attendance, breeding success and estimated volatilization rates for guano deposited onto bare rock and vegetation. To show the distribution of the NH_3 emissions clearly, emissions in each 5° grid square have been summed.

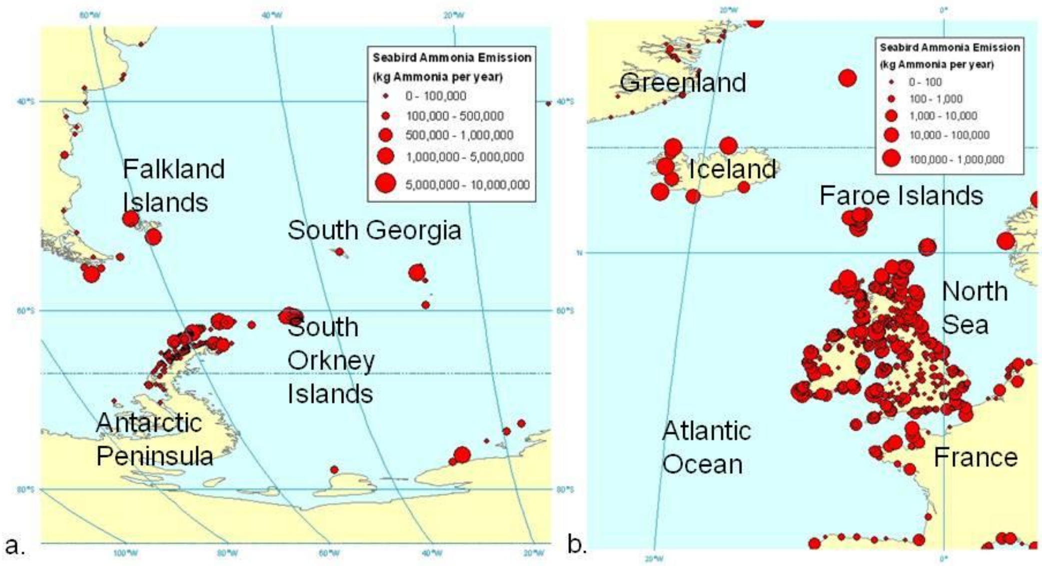

Figure 5 Illustrations of the global database, showing colony NH_3 emissions mapped on 0.1° resolution for a) the south Atlantic and b) NW Europe.

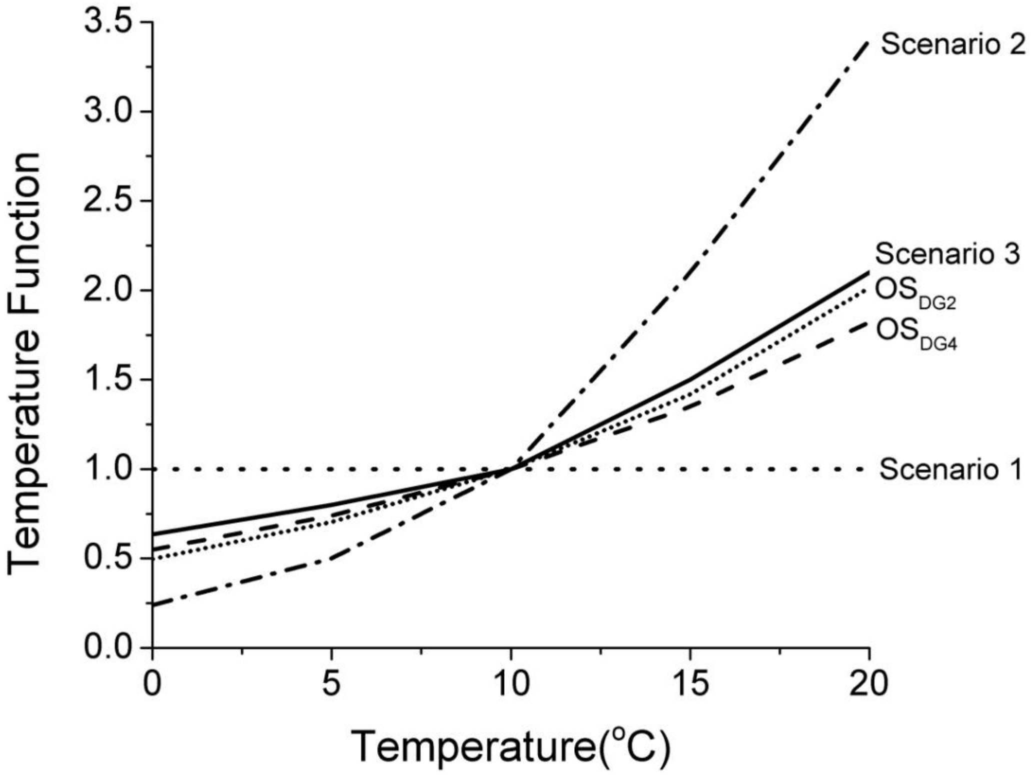

Figure 6 The graph shows the comparison of temperature functions from ornithogenic soils OS$_{DG2}$ and OS$_{DG4}$ of Zhu et al. (2011), the temperature independent bioenergetics model (Scenario 1), the thermodynamically adjusted bioenergetics model (Scenario 2) and the limited-temperature dependent model (Scenario 3). Temperature functions have been normalised to 10 ℃.

Table 1 Variation in total seabird NH_3 emission by region for: Scenario 1: temperature independent emission rates based on mid-latitude measurements; Scenario 2: combination of mid-latitude measurements with thermodynamic temperature dependence of emissions; Scenario 3, limited temperature dependence as mean of Scenarios 1 and 2.

Region	Scenario 1 ($Gg\ NH_3\ Year^{-1}$)	Scenario 2 ($Gg\ NH_3\ Year^{-1}$)	Scenario 3 ($Gg\ NH_3\ Year^{-1}$)
1. Africa	3.64	4.84	4.24
2. Antarctica & Southern Ocean	341	83.5	213
3. Asia	6.61	3.67	5.14
4. Atlantic	0.01	0.02	0.01
5. Australasia	5.09	4.7	4.9
6. Caribbean & Central America	0.97	2.47	1.72
7. Europe	5.94	4.68	5.31
8. Greenland & Svalbard	23	10.1	16.6
9. Indian Ocean	0.22	0.53	0.37
10. Middle East	0.57	1.52	1.05
11. North America	5.62	3.37	4.49
12. Pacific	2.51	6.29	4.4
13. South America	8.01	9.88	8.94
Total	404	136	270

Appendix 1

Substrate value: Rock (R), Sand (S), Soil (So), Vegetation (V), Burrow (B)

Family: Alicdae(A), Chionididae (Ch), Diomedeidae (D), Fregatidae (F), Hydrobatidae (H), Laridae (L), Phalacrocoracidae (P), Pelecanidae (Pe), Phaethontidae (Ph), Procellariidae (Pr), Sternidae (S), Spheniscidae (Sp), Stercorariidae (St), Sulidae (Su).

Entries in bold are where species specific data were unavailable, the data used were taken from similar species identified using Birdlife International (www.birdlife.org).

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Crested Auklet	Aethia cristatella	A	260	122	0.6	0.5	240	R	R	(Fraser et al., 1999)
Least Auklet	Aethia pusilla	A	80	122	0.6	0.5	80	R	R	(Jones, 1994)
Whiskered Auklet	Aethia pygmaea	A	110	122	0.6	0.5	100	R	R	(Hunter et al., 2002)
Razorbill	Alca torda	A	670	152	0.6	0.6	250	R	R	(Wilson et al., 2004)
Little Auk	Alle alle	A	150	122	0.6	0.5	100	R	R	(Evans, 1981; Kampp et al., 2000)
Kittlitz's Murrelet	Brachyramphus brevirostris	A	220	120	0.6	0.2	100	R	R	(Birdlife International, 2009; Kaler et al., 2009)
Marbled Murrelet	Brachyramphus marmoratus	A	200	183	0.6	0.5	160	V	V	(Hull et al., 2002)
Long-billed Murrelet	Brachyramphus perdix	A	290	122	0.6	0.5	220	V	V	(Oka and Hamasoto, 2001)
Spectacled Guillemot	Cepphus carbo	A	680	122	0.3	1.03	620	R	B	(Minami et al., 1995)
Pigeon Guillemot	Cepphus columba	A	460	122	0.3	0.82	400	R	B	(Konyukhov, 2000)
Black Guillemot	Cepphus grylle	A	380	152	0.3	1.1	370	R	B	(Wilson et al., 2004)
Rhinoceros Auklet	Cerorhinca monocerata	A	480	152	0.3	0.9	320	So	B	(Deguchi et al., 2004)
Parakeet Auklet	Cyclorrhynchus psittacula	A	260	122	0.3	0.5	200	R	B	(Hipfner and Byrd, 1993)
Atlantic Puffin	Fratercula arctica	A	410	152	0.3	0.71	290	V	B	(Wilson et al., 2004)
Tufted Puffin	Fratercula cirrhata	A	780	120	0.3	0.55	500	V	B	(Gjerdrum, 2004; Morrison et al., 2009; Williams et al., 2007)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Horned Puffin	Fratercula corniculata	A	570	152	0.3	0.68	370	So	B	(Harding et al., 2003; Konyukhov; Piatt and Kitaysky, 2002)
Cassin's Auklet	Ptychoramphus aleuticus	A	170	152	0.3	0.6	160	B	B	(Manuwal, 1979; Manuwal and Thoresen, 1993)
Ancient Murrelet	Synthliboramphus antiquus	A	190	91	0.3	1.54	20	So	B	(Birdlife International, 2009; Gaston, 1990, 2003)
Craveri's Murrelet	Synthliboramphus craveri	A	150	122	0.3	1	20	R	B	(Breese et al., 1993; Carter et al., 2005)
Xantus's Murrelet	Synthliboramphus hypoleucus	A	160	122	0.3	0.72	20	R	B	(Carter et al., 2005; Karnovsky et al., 2005; Wolf et al., 2005)
Japanese Murrelet	Synthliboramphus wumizusume	A	180	120	0.6	0.36	25	R	R	(Birdlife International, 2009; De Santo and Nelson, 1995)
Common Guillemot	Uria aalge	A	970	152	0.6	0.71	210	R	R	(Wilson et al., 2004)
Thick-billed Murre	Uria lomvia	A	960	122	0.6	0.8	220	R	R	(Birdlife International, 2009; Birkhead et al., 1985; Ford et al., 2004)
Snowy Sheathbill	Chionis albus	Ch	640	365	0.6	0.5	600	R	R	(Fang, 2010)
Black-faced Sheathbill	**Chionis minor**	**Ch**	**640**	**365**	**0.6**	**0.5**	**600**	**R**	**R**	**Separate data unavailable but similar to Chionis albus (Fang, 2010)**
Brown-headed Gull	Chroicocephalus brunnicephalus	L	310	152	0.6	0.9	250	V	V	(Birdlife International, 2009; Zubakin, 1982)
Black-billed Gull	Chroicocephalus bulleri	L	300	152	0.6	1.1	270	V	V	(Birdlife International, 2009; Brown and Morris, 1996; Teplitsky et al., 2008)
Brown-hooded Gull	Chroicocephalus maculipennis	L	300	150	0.6	1	250	R	R	(Birdlife International, 2009; Ghys and Favero, 2004; Lizurume et al., 1995)
Bonaparte's Gull	Chroicocephalus philadelphia	L	200	152	0.6	1	160	V	V	(Burger, 2002)
Red-billed Gull	Chroicocephalus scopulinus	L	300	152	0.6	1.1	270	V	V	(Brown and Morris, 1996; Teplitsky et al., 2008)
Andean Gull	Chroicocephalus serranus	L	400	152	0.6	0.9	350	V	V	(Birdlife International, 2009; Burger and Gochfeld, 1985)
Swallow-tailed Gull	Creagrus furcatus	L	700	150	0.6	0.35	650	R	R	(Birdlife International, 2009; Harris, 1970)
Franklin's Gull	Larus pipixcan	L	280	150	0.6	1	250	V	V	(Birdlife International, 2009; Burger, 1974; Burger and Gochfeld, 1994)
Herring Gull	Larus argentatus	L	980	152	0.6	0.89	750	R	R	(Wilson et al., 2004)
Olrog's Gull	Larus atlanticus	L	930	152	0.6	0.9	770	V	V	(Borboroglu and Yorio, 2007; Devillers, 1977)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Laughing Gull	Larus atricilla	L	290	152	0.6	1	250	V	V	(Birdlife International, 2009; Hedenstrom, 2008)
Audouin's Gull	Larus audouinii	L	770	152	0.6	0.9	640	V	V	(Birdlife International, 2009; Oro et al., 1996)
Belcher's Gull	Larus belcheri	L	600	150	0.6	1	600	S	S	(Birdlife International, 2009; Olrog, 1967)
Yellow-legged Gull	Larus cachinnans	L	1080	152	0.6	0.8	900	V	V	(Birdlife International, 2009; Bosch et al., 2000)
California Gull	Larus californicus	L	200	122	0.6	1	200	V	V	(Birdlife International, 2009; Rodriguez et al., 1996)
Common Gull	Larus canus	L	410	152	0.6	0.82	340	V	V	(Wilson et al., 2004)
Grey-headed Gull	Larus cirrocephalus	L	310	152	0.6	0.9	250	V	V	(Birdlife International, 2009; Brooke et al., 1999)
Black-tailed Gull	Larus crassirostris	L	530	152	0.6	0.8	450	V	V	(Cheng, 1990; Iseki and Watanuki, 2002; Lee et al., 2008)
Ring-billed Gull	Larus delawarensis	L	420	152	0.6	1	400	V	V	(Hedenstrom, 2008)
Kelp Gull	Larus dominicanus	L	1000	152	0.6	1.1	830	V	V	(Dantas and Morgante, 2010; Malacalza, 1987)
Lesser Black-backed Gull	Larus fuscus	L	810	152	0.6	0.61	720	V	V	(Wilson et al., 2004)
Slender-billed Gull	Larus genei	L	270	152	0.6	1	220	V	V	(Brasseur, 2006; Oro, 2002)
Glaucous-winged Gull	Larus glaucescens	L	1600	152	0.6	1.1	920	V	V	(Birdlife International, 2009; Scott, 1971; Vermeer et al., 1988)
Iceland Gull	Larus glaucoides	L	770	152	0.6	1.1	650	V	V	(Goethe, 1984; Snell, 2002)
King Gull	Larus hartlaubii	L	300	152	0.6	1	240	V	V	(Crawford and Underhill, 2003; Williams, 1990)
Heermann's Gull	Larus heermanni	L	500	152	0.6	0.7	420	R	R	(Islam, 2002; Velarde, 1999; Vieyra et al., 2009)
Sooty Gull	Larus hemprichii	L	350	152	0.6	1	280	R	R	(Birdlife International, 2009; Goodman and Storer, 1988)
Glaucous Gull	Larus hyperboreus	L	1590	122	0.6	1	1320	V	V	(Birdlife International, 2009; Samelius and Alisauskas, 1999)
Pallas's Gull	Larus ichthyaetus	L	1500	152	0.6	1.4	1300	V	V	(Birdlife International, 2009; Panov, 2009; Panov and Zykova, 1987)
White-eyed Gull	Larus leucophthalmus	L	350	152	0.6	1	280	R	R	(Birdlife International, 2009; Goodman and Storer, 1988)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Yellow-footed Gull	Larus livens	L	1000	150	0.6	0.5	1000	S	S	(Birdlife International, 2009; Lozano et al., 2004)
Great Black-backed Gull	Larus marinus	L	1620	152	0.6	1.29	1380	R	R	(Wilson et al., 2004)
Mediterranean Gull	Larus melanocephalus	L	300	122	0.6	0.9	250	V	V	(Birdlife International, 2009; Goutner, 1994; Van Impe, 1997)
Little Gull	Larus minutus	L	100	152	0.6	1.6	70	V	V	(Birdlife International, 2009; Ewins and Weseloh, 1999)
Gray Gull	Larus modestus	L	350	150	0.6	1.8	300	S	S	(Birdlife International, 2009; Guerra et al., 1988; Howell, 1972)
Silver Gull	Larus novaehollandiae	L	350	152	0.6	0.8	250	V	V	(Auman et al., 2008; Birdlife International, 2009; Kentish, 1999; Smith and Carlile, 1992)
Western Gull	Larus occidentalis	L	1200	152	0.6	0.6	1000	V	V	(Good, 2002; Pierotti and Annett, 1995; Spear and Nur, 1994)
Pacific Gull	Larus pacificus	L	1000	152	0.6	1	850	V	V	(Birdlife International, 2009; Coulson and Coulson, 1998)
Relict Gull	Larus relictus	L	260	152	0.6	1	220	V	V	(Birdlife International, 2009; Zhang et al., 1993)
Black-headed Gull	Larus ridibundus	L	260	152	0.6	0.9	220	V	V	(Wilson et al., 2004)
Slaty-backed Gull	Larus schistisagus	L	1400	152	0.6	1	1100	R	R	(Birdlife International, 2009; Firsova et al., 1982; Takahashi et al., 1999)
Thayer's Gull	Larus thayeri	L	1100	152	0.6	1	1000	V	V	(Birdlife International, 2009; del Hoyo, 1996)
Lava Gull	Leucophaeus fuliginosus	L	300	150	0.6	1.5	100	S	S	(Birdlife International, 2009; Snow and Snow, 1969)
Dolphin Gull	Leucophaeus scoresbii	L	500	150	0.6	0.86	450	V	V	(Birdlife International, 2009; Suarez and Yorio, 2005; Yorio et al., 1996)
Ivory Gull	Pagophila eburnea	L	530	122	0.6	1	430	R	R	(Bevan et al., 1998; Haney and MacDonald, 1995)
Ross's Gull	Rhodostethia rosea	L	200	150	0.6	1	175	V	V	(Alerstam and Jonsson, 1999; Birdlife International, 2009; Blomqvist and Elander, 1981; Lindstrom et al., 1998)
Red-legged Kittiwake	Rissa brevirostris	L	390	183	0.6	0.25	370	R	Nest	(Ford et al., 2004; Lance and Roby, 1998)
Black-legged Kittiwake	Rissa tridactyla	L	390	152	0.6	0.78	320	R	Nest	(Wilson et al., 2004)
Saunders's Gull	Saundersilarus saundersi	L	260	152	0.6	0.9	220	V	V	(Birdlife International, 2009; Jiang et al.; Wilson et al., 2004)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Sabines Gull	Xema sabini	L	190	152	0.6	0.41	140	V	V	(Ford et al., 2004; Stenhouse et al., 2001, 2005)
Southern Skua	Catharacta antarctica	St	2100	150	0.6	1.2	1900	V	V	(Peter et al., 1990; Reinhardt, 1997b)
Brown Skua	Catharacta lonnbergi	St	2100	150	0.6	1.2	1900	V	V	(Peter et al., 1990; Reinhardt, 1997b)
South Polar Skua	Catharacta maccormicki	St	1750	150	0.6	0.5	1200	V	V	(Montalti et al., 1996; Reinhardt, 1997a; Ritz et al., 2005)
Great Skua	Catharacta skua	St	1430	150	0.6	0.78	1150	V	V	(Wilson et al., 2004)
Chilean Skua	Stercorarius chilensis	St	1300	150	0.6	1	1000	V	V	(Birdlife International, 2009; Reinhardt et al., 1997)
Long-tailed Skua	Stercorarius longicaudus	St	350	150	0.6	0.25	250	V	V	(Andersson, 1976; Birdlife International, 2009; De Korte, 1986)
Parasitic Skua	Stercorarius parasiticus	St	460	150	0.6	0.49	460	V	V	(Wilson et al., 2004)
Pomarine Skua	Stercorarius pomarinus	St	1430	150	0.6	0.78	1150	V	V	(Birdlife International, 2009)
Black Noddy	Anous minutus	S	120	122	0.6	0.5	100	V	V	(Birdlife International, 2009; Hill et al., 1997; Pettit et al., 1984; Surman and Wooller, 2003)
Brown Noddy	Anous stolidus	S	200	122	0.6	0.5	150	V	V	(Morris and Chardine, 1992; Ramos et al., 2006; Shea and Ricklefs, 1996)
Lesser Noddy	Anous tenuirostris	S	100	122	0.6	0.56	90	V	V	(Ramos et al., 2004)
Whiskered Tern	Chlidonias hybrida	S	90	122	0.6	0.92	80	V	V	(Bakaria et al., 2002; Paillisson et al., 2008)
White-winged Tern	**Chlidonias leucopterus**	**S**	**90**	**122**	**0.6**	**0.92**	**80**	**V**	**V**	**Separate data unavailable but similar to Chlidonias hybrida**
Black Tern	Chlidonias niger	S	60	122	0.6	0.9	60	V	V	(Heath and Servello, 2008; Zenatello et al., 2002)
Common White Tern	Gygis alba	S	120	122	0.6	0.56	100	V	V	(Birdlife International, 2009; Malan et al., 2009)
Little White Tern	Gygis microrhyncha	S	100	122	0.6	0.56	100	S	S	(Birdlife International, 2009; Olson, 2005)
Inca Tern	Larosterna inca	S	180	120	0.6	0.4	150	R	R	(Birdlife International, 2009; Velarde, 1999)
Large-billed Tern	Phaetusa simplex	S	250	120	0.6	0.6	200	S	S	(Birdlife International, 2009; Krannitz, 1989; Schulenberg et al., 2007)
Blue Noddy	Procelsterna cerulea	S	40	122	0.6	0.5	40	R	R	(Birdlife International, 2009; Rauzon et al., 1984)

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Black-bellied Tern	Sterna acuticauda	S	90	122	0.6	0.92	80	V	V	(Birdlife International, 2009)
Little Tern	Sterna albifrons	S	40	122	0.6	1.9	30	S	S	(Wilson et al., 2004)
Aleutian Tern	Sterna aleutica	S	120	122	0.6	0.85	100	S	S	*Birdlife International*, 2009; *Malan et al.*, 2009]
Bridled Tern	Sterna anaethetus	S	140	122	0.6	0.81	130	S	S	(Birdlife International, 2009; Villard and Bretagnolle, 2010)
Least Tern	Sterna antillarum	S	40	122	0.6	0.65	40	S	S	(Chandler and Wilds, 1994; Cherubini et al., 1996; Conway et al., 2003)
River Tern	Sterna aurantia	S	250	120	0.6	0.35	200	S	S	(Birdlife International, 2009; Claassen, 2004; Neelakantan, 1990)
Damara Tern	Sterna balaenarum	S	40	122	0.6	0.56	40	S	S	(Birdlife International, 2009)
Lesser Crested Tern	Sterna bengalensis	S	220	122	0.6	0.8	190	S	S	(Birdlife International, 2009; Hulsman, 1977)
Greater Crested Tern	Sterna bergii	S	350	122	0.6	0.35	310	S	S	(Crawford, 2009; King et al., 1992; Olsen and Larsson, 1995)
Caspian Tern	Sterna caspia	S	660	122	0.6	0.8	520	S	S	(Barlow and Dowding, 2002; Nunn and Stanley, 2000)
Roseate Tern	Sterna dougallii	S	110	91	0.6	1.49	100	S	S	(Wilson et al., 2004)
Elegant tern	Sterna elegans	S	250	122	0.6	0.56	230	S	S	(Birdlife International, 2009; Collins et al., 1991; Nunn and Stanley, 2000; Olsen and Larsson, 1995)
Forster's Tern	Sterna forsteri	S	150	122	0.6	0.7	140	S	S	(Nunn and Stanley, 2000)
Sooty Tern	Sterna fuscata	S	190	122	0.6	0.5	170	S	S	(Feare, 2002; Hughes et al., 2010; King et al., 1992; Ramos et al., 2004)
South American Tern	Sterna hirundinacea	S	190	122	0.6	0.35	180	S	S	(Favero et al., 2000; Scolaro et al., 1996)
Common Tern	Sterna hirundo	S	120	122	0.6	1.25	120	S	S	(Chokri et al.; Nunn and Stanley, 2000; Scolaro et al., 1996)
Grey-backed Tern	Sterna lunata	S	140	91	0.6	0.5	120	S	S	(Kessler, 2003; Mostello et al., 2000; Shea and Ricklefs, 1996)
Royal Tern	Sterna maxima	S	470	122	0.6	0.56	340	S	S	(Buckley and Buckley, 2002; Nunn and Stanley, 2000)
Fairy Tern	Sterna nereis	S	70	122	0.6	0.2	50	S	S	(Birdlife International, 2009; Surman and Wooller, 2003)
Gull-billed tern	Sterna nilotica	S	170	122	0.6	1.48	150	S	S	(Chokri et al.; Erwin et al., 1999)

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Arctic Tern	Sterna paradisaea	S	100	122	0.6	0.8	90	V	V	(Wilson et al., 2004)
White-cheeked Tern	Sterna repressa	S	120	122	0.6	0.92	110	S	S	(Birdlife International, 2009; Harvey, 1974)
Sandwich Tern	Sterna sandvicensis	S	240	122	0.6	1.01	210	S	S	(Wilson et al., 2004)
Saunders's Tern	Sterna saundersi	S	40	122	0.6	0.85	40	S	S	(Birdlife International, 2009; Chandler and Wilds, 1994)
White-fronted Tern	Sterna striata	S	190	122	0.6	0.8	170	S	S	(Birdlife International, 2009; Mills and Shaw, 1980)
Black-naped Tern	Sterna sumatrana	S	100	122	0.6	0.2	90	S	S	(Birdlife International, 2009; Hulsman, 1977; Hulsman and Smith, 1988; Kolby et al., 2009)
Yellow-billed Tern	Sterna superciliaris	S	50	120	0.6	0.66	45	S	S	(Birdlife International, 2009; Krannitz, 1989; Schulenberg et al., 2007)
Snowy-crowned Tern	Sterna trudeaui	S	150	120	0.6	0.6	130	V	V	(Birdlife International, 2009; Guicking et al., 2001)
Kerguelen Tern	Sterna virgata	S	130	122	0.6	0.24	110	R	R	(Sagar, 1991; Weimerskirch and Stahl, 1988)
Antarctic Tern	Sterna vittata	S	140	122	0.6	0.56	130	S	S	(Schulz and Gales, 2004; Tree and Klages, 2004)
Black-fronted Tern	Sterna albostriata	S	100	120	0.6	0.28	100	S	S	(Birdlife International, 2009; Keedwell, 2005)
Peruvian Tern	Sternula lorata	S	50	120	0.6	0.4	45	S	S	(Birdlife International, 2009; Schulenberg et al., 2007; Zavalaga et al., 2008)
Chinese Crested Tern	Thalasseus bernsteini	S	350	122	0.6	0.35	310	S	S	(Birdlife International, 2009)
Christmas Island Frigatebird	**Fregata andrewsi**	**F**	**1310**	**243**	**0.6**	**0.2**	**1310**	**V**	**Nest**	**(Nelson, 1975) Similar species to Fregata minor (Birdlife International, 2009)**
Ascension Frigatebird	**Fregata aquila**	**F**	**1470**	**243**	**0.6**	**0.17**	**1470**	**V**	**Nest**	**(Nelson, 1975; Stonehouse and Stonehouse, 2008) Similar species to Fregata magnificens (Birdlife International, 2009)**
Lesser Frigatebird	Fregata ariel	F	840	213	0.6	0.2	840	V	Nest	(Nelson, 1975; Reville, 1983, 1991)
Magnificent Frigatebird	Fregata magnificens	F	1470	243	0.6	0.2	1470	V	Nest	(Diamond and Schreiber, 2002; Gonzalez and De La Cueva, 2007; Nelson, 1975)

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Great Frigatebird	Fregata minor	F	1310	213	0.6	0.35	1310	V	Nest	(Dearborn and Anders, 2006; Gauger Metz and Schreiber, 2002; Nelson, 1975; Reville, 1988)
Brown Pelican	Pelecanus occidentalis	Pe	3750	270	0.6	1.2	3500	V	Nest	(Birdlife International, 2009; Sachs and Jodice, 2009; Shields, 2002)
Reed Cormorant	Phalacrocorax africanus	P	500	200	0.6	0.3	450	V	Nest	(Birdlife International, 2009; Kopij, 1996; Olver, 1984)
European shag	Phalacrocorax aristotelis	P	1760	243	0.6	1.34	1520	R	R	(Wilson et al., 2004)
Imperial Shag	Phalacrocorax atriceps	P	1930	243	0.6	1.4	1520	R	Nest	(Arrighi and Navarro, 1998; Birdlife International, 2009; Punta et al., 2003)
Double-crested Cormorant	Phalacrocorax auritus	P	2350	213	0.6	1.46	2060	V	Nest	(Glahn and Brugger, 1995; Stenzel et al., 1995; Wires and Cuthbert)
Guanay Cormorant	Phalacrocorax bougainvillii	P	2100	213	0.6	2.4	1800	R	Nest	(Birdlife International, 2009; Jahncke et al., 2004; Yorio et al., 1999)
Neotropic Cormorant	Phalacrocorax brasilianus	P	1300	122	0.6	1.65	1000	V	Nest	(Birdlife International, 2009; del Hoyo, 1996; Kalmbach et al., 2001)
Campbell Island Shag	Phalacrocorax campbelli	P	1500	200	0.6	0.4	1500	R	Nest	(Bernstein and Maxson, 1981; Birdlife International, 2009)
Cape Cormorant	Phalacrocorax capensis	P	1200	213	0.6	1.35	1100	R	Nest	(Berry, 1976; Birdlife International, 2009; Crawford and Jahncke, 1999; Ryan et al., 2010)
Japanese Cormorant	Phalacrocorax capillatus	P	2800	213	0.6	2.4	2720	R	Nest	(Birdlife International, 2009; Ishikawa and Watanuki, 2002; Kato et al., 1999; Watanuki et al., 1996)
Great Cormorant	Phalacrocorax carbo	P	2300	152	0.6	2.16	2220	R	R	(Wilson et al., 2004)
King Shag	Phalacrocorax carunculatus	P	2500	200	0.6	0.5	2500	R	Nest	(Birdlife International, 2009)
Stewart Island Shag	Phalacrocorax chalconotus	P	3000	200	0.6	0.4	3000	R	Nest	(Birdlife International, 2009; Watt, 1975)
Auckland Shag	Phalacrocorax colensoi	P	1500	200	0.6	0.4	1500	R	Nest	(Birdlife International, 2009)
Crowned Cormorant	Phalacrocorax coronatus	P	700	213	0.6	1.35	610	V	Nest	(Crawford and Dyer, 1996; Crawford et al., 1999; Williams and Cooper, 1983)
Pitt Cormorant	Phalacrocorax featherstoni	P	2000	200	0.6	0.4	1500	R	Nest	(Bell and Bell, 2000; Birdlife International, 2009)
Black-faced Shag	Phalacrocorax fuscescens	P	1510	183	0.6	1.35	1330	R	Nest	(Birdlife International, 2009; del Hoyo, 1996; Marchant and Higgins, 1990)

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Indian Cormorant	Phalacrocorax fuscicollis	P	400	200	0.6	2.5	400	V	Nest	(Birdlife International, 2009; Naher et al., 2009; Zeenath and Zacharias, 2010)
Red-legged Cormorant	Phalacrocorax gaimardi	P	1300	213	0.6	2.4	1140	R	Nest	(Frere and Gandini, 2001; Millones et al.)
Flightless Cormorant	Phalacrocorax harrisi	P	4000	365	0.6	2.5	4000	R	Nest	(Birdlife International, 2009)
Rock Shag	Phalacrocorax magellanicus	P	1500	300	0.6	2	1250	R	V	(Birdlife International, 2009; Libenson, 1997; Punta and Saravia, 1993; Quintana, 1999)
Little Pied Cormorant	Phalacrocorax melanoleucos	P	720	243	0.6	1.8	630	V	Nest	(Miller, 1979, 1980; Powlesland and Luke, 2000)
Bank Cormorant	Phalacrocorax neglectus	P	1800	213	0.6	1.5	1580	R	Nest	(Birdlife International, 2009; Cooper, 1981)
Little Cormorant	Phalacrocorax niger	P	400	200	0.6	2.5	400	V	Nest	(Birdlife International, 2009; Naher et al., 2009; Zeenath and Zacharias, 2010)
Socotra Cormorant	Phalacrocorax nigrogularis	P	2270	213	0.6	1.35	2000	R	Nest	(Birdlife International, 2009; Symens et al., 1993)
Chatham Island Shag	Phalacrocorax onslowi	P	2500	200	0.6	1	2000	R	Nest	(Bell and Bell, 2000; Birdlife International, 2009)
Pelagic Cormorant	Phalacrocorax pelagicus	P	1910	213	0.6	2.2	1800	R	Nest	(Birdlife International, 2009; del Hoyo, 1996; Ford et al., 2004; Zelenskaja, 2001)
Brandt's Cormorant	Phalacrocorax penicillatus	P	2110	213	0.6	1.9	1900	R	Nest	(Birdlife International, 2009; Ford et al., 2004; Heinl and Piston, 2007; Jones et al., 2008)
Spotted Shag	Phalacrocorax punctatus	P	1200	274	0.6	2.05	1070	R	Nest	(Birdlife International, 2009; Miskelly, 2000; Smith, 2011)
Pygmy Cormorant	Phalacrocorax pygmeus	P	450	152	0.6	3.2	400	V	Nest	(Barati et al., 2008; Nazirides and Papageorgiou, 1996; Shmueli et al., 2003)
Bounty Islands Shag	Phalacrocorax ranfurlyi	P	2500	200	0.6	1.5	2000	R	Nest	(Birdlife International, 2009; Robertson and Van Tets, 1982)
Little Black Shag	Phalacrocorax sulcirostris	P	450	152	0.6	1.84	400	R	Nest	(Cherry, 2005; Miller, 1979, 1980)
Red-faced Cormorant	Phalacrocorax urile	P	1940	213	0.6	1.25	1700	R	Nest	(Birdlife International, 2009; Causey, 2002)
Greater Pied Cormorant	Phalacrocorax varius	P	2050	213	0.6	1.34	1800	R	Nest	(Birdlife International, 2009; Powlesland et al., 2008; Reese et al., 1996)
Kerguelen Shag	Phalacrocorax verrucosus	P	1930	243	0.6	1.4	1520	R	Nest	(Arrighi and Navarro, 1998; Birdlife International, 2009; Punta et al., 2003)

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Northern Gannet	Morus bassanus	Su	3010	243	0.6	0.73	3900	R	R	(Wilson et al., 2004)
Cape Gannet	Morus capensis	Su	2800	243	0.6	0.76	3000	R	R	(Mullers et al., 2006; Pichegru et al., 2007; Ryan et al., 2010)
Australasian Gannet	Morus serrator	Su	2350	183	0.6	0.63	2900	R	R	(Bunce, 2001a, b; Bunce et al., 2005; Gibbs et al., 2000)
Abbott's Booby	Papasula abbotti	Su	1550	274	0.6	0.2	1550	V	V	(Birdlife International, 2009; Nelson, 1971; Nelson and Powell, 1986)
Masked Booby	Sula dactylatra	Su	2000	274	0.6	0.51	2230	S	S	(Priddel et al., 2005)
Nazca Booby	Sula granti	Su	1000	200	0.6	0.5	1100	S	S	(Birdlife International, 2009; Clifford and Anderson, 2001; Pitman and Jehl, 1998)
Brown Booby	Sula leucogaster	Su	1150	243	0.6	0.8	1250	S	S	(Beadell et al., 2003; Ospina-Alvarez, 2008)
Blue-footed Booby	Sula nebouxii	Su	1500	274	0.6	0.45	1750	R	R	(Kim et al., 2007; Torres and Drummond, 1999; Zavalaga et al., 2007)
Red-footed Booby	Sula sula	Su	1000	243	0.6	0.4	920	V	V	(Ballance, 1995; Cao et al., 2005; Nelson, 1969)
Peruvian booby	Sula variegata	Su	1410	213	0.6	0.45	1500	R	R	(Duffy, 1987; Zavalaga et al., 2007; Zavalaga et al., 2010)
Red-billed Tropicbird	Phaethon aethereus	Ph	420	213	0.6	0.46	430	R	Nest	(Birdlife International, 2009; Bourne et al., 2003; del Hoyo, 1996; Javed et al., 2008)
White-tailed Tropicbird	Phaethon lepturus	Ph	320	243	0.6	0.43	320	R	Nest	(Burger and Gochfeld, 1991; Malan et al., 2009; Phillips, 1987)
Red-tailed Tropicbird	Phaethon rubricauda	Ph	670	183	0.6	0.48	680	R	Nest	(del Hoyo, 1996; Prysjones and Peet, 1980; Schreiber and Schreiber, 1993)
Short-tailed Albatross	Diomedea albatrus	D	3910	243	0.6	0.51	3710	V	Nest	(Hasegawa and Degange, 1982; Momose et al., 2003)
Amsterdam Albatross	Diomedea amsterdamensis	D	6000	240	0.6	0.7	5500	V	V	(Jouventin and Dobson, 2002; Weimerskirch et al., 1997; Weimerskirch et al., 1986)
Antipodean Albatross	Diomedea antipodensis	D	10000	240	0.6	0.2	9000	V	V	(Birdlife International, 2009; Marchant and Higgins, 1990; Robertson, 1992)
Tristan Albatross	Diomedea dabbenena	D	8390	152	0.6	0.33	8390	V	Nest	(Ryan et al., 2001)
Wandering Albatross	Diomedea exulans	D	10200	152	0.6	0.33	9500	V	Nest	(Arnould et al., 1996; Shaffer, 2004)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Northern Royal Albatross	Diomedea sanfordi	D	6500	300	0.6	0.31	6000	V	Nest	(Birdlife International, 2009; Jouventin and Dobson, 2002; Marchant and Higgins, 1990)
Southern Royal Albatross	Diomedea epomophora	D	6500	240	0.6	0.62	6000	V	Nest	(Birdlife International, 2009; Jouventin and Dobson, 2002; Waugh et al., 1997)
Shy Albatross	Domedea cauta	D	3910	243	0.6	0.51	3710	V	Nest	(Abbott et al., 2006; Alderman et al., 2010; Hedd et al., 2002)
Laysan Albatross	Phoebastria immutabilis	D	3040	274	0.6	0.48	2310	S	Nest	(Birdlife International, 2009; Fisher, 1976; Ford et al., 2004; Lefebvre, 1977; Young et al., 2009)
Waved Albatross	Phoebastria irrorata	D	3390	274	0.6	0.25	3700	V	Nest	(Anderson et al., 2002; Birdlife International, 2009; Jouventin and Dobson, 2002)
Black-footed Albatross	Phoebastria nigripes	D	3010	274	0.6	0.5	2310	S	S	(Birdlife International, 2009; Ford et al., 2004; Jouventin and Dobson, 2002; Kappes et al.; Shaffer, 2004)
Sooty Albatross	Phoebetria fusca	D	2470	122	0.6	0.22	2250	R	R	(Birdlife International, 2009; Delord et al., 2008; Ridoux, 1994)
Light-mantled Albatross	Phoebetria palpebrata	D	3150	274	0.6	0.63	2310	So	Nest	(Birdlife International, 2009; Delord et al., 2008; Ridoux, 1994)
Indian Yellow-nosed Albatross	Thalassarche carteri	D	2500	243	0.6	0.24	2200	V	Nest	(Birdlife International, 2009; Jouventin et al., 1983; Weimerskirch et al., 1986)
Atlantic Yellow-nosed Albatross	Thalassarche chlororhynchos	D	2320	243	0.6	0.7	2200	V	Nest	(Birdlife International, 2009; Jouventin et al., 1983; Weimerskirch et al., 1986)
Grey-headed Albatross	Thalassarche chrysostoma	D	3750	122	0.6	0.5	3500	V	Nest	(Adams and Brown, 1984; Birdlife International, 2009)
Chatham Albatross	Thalassarche eremita	D	4500	240	0.6	0.8	4000	R	Nest	(Birdlife International, 2009; Robertson et al., 2003)
Campbell Albatross	Thalassarche impavida	D	3000	240	0.6	0.5	2500	V	Nest	(Birdlife International, 2009; Woehler et al., 2002)
Black-browed Albatross	Thalassarche melanophrys	D	3530	274	0.6	0.51	3250	V	Nest	(Birdlife International, 2009; Woehler et al., 2002)
Salvin's Albatross	Thalassarche salvini	D	3910	243	0.6	0.51	3710	R	Nest	(Birdlife International, 2009; Spear et al., 2003)
Buller's Albatross	Thalassarche bulleri	D	2700	240	0.6	0.58	2500	V	Nest	(Birdlife International, 2009; Jouventin and Dobson, 2002)
White-capped Albatross	Thalassarche steadi	D	4000	243	0.6	0.5	3500	R	Nest	(Abbott et al., 2006; Alderman et al., 2010; Birdlife International, 2009; Thompson and Sagar, 2008)
White-bellied Storm-petrel	Fregetta grallaria	H	50	117	0.1	0.5	50	R	B	(Birdlife International, 2009; Hutton, 1991; Marchant and Higgins, 1990)

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Black-bellied Storm-petrel	Fregetta tropica	H	50	117	0.1	0.5	50	R	B	(Birdlife International, 2009; Hahn, 2000)
Grey-backed Storm-petrel	Garrodia nereis	H	30	90	0.1	0.5	30	B	B	(Cooper and Brooke, 1984; Plant, 1989)
Least Storm Petrel	Halocyptena microsoma	H	20	122	0.1	0.5	20	V	B	(Birdlife International, 2009; King, 1974)
European Storm-petrel	Hydrobates pelagicus	H	20	150	0.1	0.5	30	R	B	(Wilson et al., 2004)
White-throated Storm-petrel	Nesofregetta fuliginosa	H	60	160	0.1	0.5	60	S	B	(Birdlife International, 2009; Brooke, 2004)
White-vented Storm-petrel	Oceanites gracilis	H	50	120	0.1	0.45	50	R	B	(Birdlife International, 2009; Hertel and Torres-Mura, 2003; Schlatter and Martin, 1983; Warham, 1990)
New Zealand Storm-petrel	Oceanites maorianus	H	50	120	0.1	0.45	50	V	B	(Birdlife International, 2009)
Wilson's Storm-petrel	Oceanites oceanicus	H	40	160	0.1	0.4	40	R	B	(Birdlife International, 2009; Busser et al., 2004; Quillfeldt et al., 2006)
Madeiran Storm-petrel	Oceanodroma castro	H	40	180	0.1	0.4	50	S	B	(Birdlife International, 2009; Teixeira and Moore, 1983)
Fork Tailed Storm-Petrel	Oceanodroma furcata	H	40	122	0.1	0.7	40	V	B	(Birdlife International, 2009; Boersma and Silva, 2001; Brooke, 2004; Drummond and Leonard, 2009)
Ashy Storm-Petrel	Oceanodroma homochroa	H	40	200	0.1	0.6	40	R	B	(Adams and Takekawa, 2008; McChesney et al., 2000)
Hornby's Storm-petrel	Oceanodroma hornbyi	H	50	100	0.1	0.45	50	R	B	(Birdlife International, 2009; Warham, 1990)
Leach's Storm-petrel	Oceanodroma leucorhoa	H	40	150	0.1	0.5	60	R	B	(Wilson et al., 2004)
Markham's Storm-petrel	Oceanodroma markhami	H	50	200	0.1	0.45	50	R	B	(Birdlife International, 2009; Garcia-Godos et al., 2002; Warham, 1990)
Matsudaira's Storm-petrel	Oceanodroma matsudairae	H	40	122	0.1	0.45	50	V	B	(Birdlife International, 2009; King, 1976; Warham, 1990)
Black Storm-Petrel	Oceanodroma melania	H	40	150	0.1	0.6	50	So	B	(Ainley and Everett, 2001; Birdlife International, 2009; Brooke, 2004)
Swinhoe's Storm-petrel	Oceanodroma monorhis	H	40	160	0.1	0.6	40	So	B	(Birdlife International, 2009; Brooke, 2004)
Monteiro's Storm-petrel	Oceanodroma monteiroi	H	40	180	0.1	0.4	50	S	B	(Birdlife International, 2009; Teixeira and Moore, 1983)
Wedge-rumped Storm-petrel	Oceanodroma tethys	H	30	100	0.1	0.4	30	V	B	(Ayala and Sanchez-Scaglioni, 2007; Bernal et al., 2006; Birdlife International, 2009)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Tristram's Storm-Petrel	Oceanodroma tristrami	H	40	122	0.1	0.45	50	S	B	(Brooke, 2004; McClelland et al., 2008)
White-faced Storm-petrel	Pelagodroma marina	H	50	122	0.1	0.6	40	R	B	(Underwood and Bunce, 2006)
South Georgia Diving-petrel	Pelecanoides georgicus	H	120	122	0.3	0.7	120	S	B	(Birdlife International, 2009; Payne and Prince, 1979; Roby and Ricklefs, 1983)
Common Diving-petrel	Pelecanoides urinatrix	H	140	110	0.3	0.8	120	So	B	(Birdlife International, 2009; Bocher et al., 2000; Chastel et al., 1995a; Payne and Prince, 1979; Roby and Ricklefs, 1983)
Bulwer's Petrel	Bulweria bulwerii	Pr	90	150	0.6	0.44	90	S	Nest	(Nunes and Vicente, 1998)
Jouanin's Petrel	Bulweria fallax	Pr	400	120	0.3	0.45	400	R	B	(Birdlife International, 2009; Warham, 1990)
Cory's Shearwater	Calonectris diomedea	Pr	730	240	0.3	0.5	700	B	B	(Catry et al., 2009; Navarro et al., 2009)
Cape Verde Shearwater	**Calonectris edwardsii**	**Pr**	**730**	**240**	**0.3**	**0.5**	**700**	**B**	**B**	**Separate data unavailable but similar to Calonectris diomedea (Gomez-Diaz et al., 2006)**
Streaked Shearwater	Calonectris leucomelas	Pr	500	180	0.3	0.4	500	V	B	(Birdlife International, 2009; Lee and Yoo, 2002; Oka et al., 2002)
Cape Petrel	Daption capense	Pr	470	94	0.6	0.5	400	R	R	(Hodum, 2002)
Snares Cape Pigeon	Daption capense australe	Pr	470	94	0.6	0.5	400	R	R	(Hodum, 2002)
Northern Fulmar	Fulmarus glacialis	Pr	750	183	0.6	0.57	800	R	R	(Wilson et al., 2004)
Southern Fulmar	Fulmarus glacialoides	Pr	850	99	0.6	0.57	930	R	R	(Hodum, 2002)
Blue Petrel	Halobaena caerulea	Pr	190	105	0.3	0.5	170	V	B	(Birdlife International, 2009; Chastel et al., 1995b)
Kerguelen Petrel	Lugensa brevirostris	Pr	80	122	0.3	1	60	So	B	(Birdlife International, 2009; Imber, 1985)
Southern Giant-petrel	Macronectes giganteus	Pr	3890	200	0.6	0.88	3400	So	V	(Cooper et al., 2001; Copello and Quintana, 2009; Obst and Nagy, 1992)
Northern Giant-petrel	Macronectes halli	Pr	4500	122	0.6	0.90	4000	V	V	(Cooper et al., 2001; Gonzalez-Solis et al., 2000)
Slender-billed Prion	Pachyptila belcheri	Pr	150	122	0.3	0.38	150	V	B	(Birdlife International, 2009; Cherel et al., 2002; Quillfeldt et al., 2003)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Antarctic Prion	Pachyptila desolata	Pr	130	122	0.3	0.5	130	V	B	(Birdlife International, 2009; Bretagnolle et al., 1990; Liddle, 1994)
Medium-billed Prion	Pachyptila salvini	Pr	150	122	0.3	0.5	150	So	B	(Birdlife International, 2009; Bretagnolle et al., 1990; Van Rensburg and Bester, 1988)
Fairy Prion	Pachyptila turtur	Pr	130	122	0.3	0.5	150	V	B	(Birdlife International, 2009; Bretagnolle et al., 1990; Van Rensburg and Bester, 1988)
Broad-billed Prion	Pachyptila vittata	Pr	190	122	0.3	0.5	180	R	B	(Birdlife International, 2009; Medway, 2002)
Fulmar Prion	Pachyptila crassirostris	Pr	130	122	0.3	0.5	150	R	B	(Birdlife International, 2009; Bretagnolle et al., 1990; Tennyson and Bartle, 2005)
Snow Petrel	Pagodroma nivea	Pr	260	90	0.6	0.5	250	R	R	(Hodum, 2002)
White-chinned Petrel	Procellaria aequinoctialis	Pr	1280	122	0.3	0.49	1100	So	B	(Adams and Takekawa, 2008; Berrow and Croxall, 1999; Birdlife International, 2009; Bried and Jouventin, 1999)
Grey Petrel	Procellaria cinerea	Pr	1000	122	0.3	0.7	900	V	B	(Birdlife International, 2009; Schulz et al., 2005)
Spectacled Petrel	Procellaria conspicillata	Pr	200	180	0.3	0.45	200	V	B	(Birdlife International, 2009; Warham, 1990)
Parkinson's Petrel	Procellaria parkinsoni	Pr	700	120	0.3	0.45	700	V	B	(Birdlife International, 2009; Imber, 1987; Warham, 1990)
Westland Petrel	Procellaria westlandica	Pr	800	180	0.3	0.45	750	V	B	(Baker and Coleman, 1977; Birdlife International, 2009; Warham, 1990)
Tahiti Petrel	Pseudobulweria rostrata	Pr	150	122	0.3	0.5	140	B	B	(Birdlife International, 2009; Villard et al., 2006)
Mascarene Petrel	Pseudobulweria aterrima	Pr	100	120	0.3	0.45	100	R	B	(Birdlife International, 2009; Warham, 1990)
Beck's Petrel	Pseudobulweria becki	Pr	120	120	0.3	0.45	120	V	B	(Birdlife International, 2009; Warham, 1990)
Fiji Petrel	Pseudobulweria macgillivrayi	Pr	120	120	0.3	0.45	100	V	B	(Birdlife International, 2009; Warham, 1990)
Phoenix Petrel	**Pterodroma alba**	**Pr**	**150**	**122**	**0.3**	**0.5**	**140**	**B**	**B**	**Similar species to the Pseudobulweria rostrata(Birdlife International, 2009)**
Trindade Petrel	Pterodroma arminjoniana	Pr	450	122	0.6	0.45	420	R	R	(Birdlife International, 2009; King and Reimer, 1991)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Henderson Petrel	**Pterodroma atrata**	**Pr**	**450**	**122**	**0.6**	**0.2**	**420**	**V**	**Nest**	**(Birdlife International, 2009). Similar species to the Pterodroma arminjoniana**
Barau's Petrel	Pterodroma baraui	Pr	430	180	0.3	0.2	360	So	B	(Birdlife International, 2009; Pinet et al., 2009)
Collared Petrel	Pterodroma brevipes	Pr	210	122	0.3	0.2	200	V	B	(Birdlife International, 2009; Watling, 1986)
Bermuda Petrel	Pterodroma cahow	Pr	240	180	0.6	0.25	220	R	Nest	(Birdlife International, 2009; Nunn and Stanley, 2000)
Fea's Petrel	Pterodroma feae	Pr	310	122	0.3	0.2	300	So	B	(Birdlife International, 2009; Nunn and Stanley, 2000)
Herald Petrel	Pterodroma heraldica	Pr	450	90	0.3	0.3	420	R	B	(Birdlife International, 2009; King and Reimer, 1991)
Bonin Petrel	Pterodroma hypoleuca	Pr	160	122	0.3	0.25	180	V	B	(Adams and Brown, 1984; Grant et al., 1983)
Atlantic Petrel	Pterodroma incerta	Pr	520	122	0.3	0.2	500	So	B	(Cuthbert, 2004; Nunn and Stanley, 2000)
Mottled Petrel	Pterodroma inexpectata	Pr	310	170	0.3	0.65	220	So	B	(Nunn and Stanley, 2000; Warham et al., 1977)
White-headed Petrel	Pterodroma lessonii	Pr	690	220	0.3	0.15	200	So	B	(Chastel, 1995; Nunn and Stanley, 2000; Zotier, 1990)
Great-winged Petrel	Pterodroma macroptera	Pr	500	122	0.3	0.2	610	So	B	(Adams et al., 2008; Imber, 1976; Nunn and Stanley, 2000)
Soft-plumaged Petrel	Pterodroma mollis	Pr	310	122	0.3	0.4	350	V	B	(Birdlife International, 2009; Nunn and Stanley, 2000; Schramm, 1983)
Kermadec Petrel	Pterodroma neglecta	Pr	500	122	0.6	0.1	500	R	Nest	(Birdlife International, 2009; Brooke, 1995; Nunn and Stanley, 2000; Veitch and Harper, 1998)
Hawaiian Petrel	Pterodroma sandwichensis	Pr	430	320	0.3	0.5	600	R	B	(Birdlife International, 2009; Simons, 1985)
Murphy's Petrel	Pterodroma ultima	Pr	420	122	0.6	0.15	450	R	Nest	(Brooke, 1995; Ford et al., 2004)
Chatham Petrel	Pterodroma axillaris	Pr	185	240	0.3	0.45	175	V	B	(Birdlife International, 2009; Hutton and Priddel, 2002; Tennyson, 1991; Warham, 1990)
Cook's Petrel	Pterodroma cookii	Pr	200	120	0.3	0.4	200	V	B	(Birdlife International, 2009; Imber et al., 2003; Rayner et al., 2007)
De Filippi's Petrel	Pterodroma defilippiana	Pr	200	120	0.3	0.45	200	R	B	(Birdlife International, 2009; Howell et al., 1996; Warham, 1990)
Juan Fernandez Petrel	Pterodroma externa	Pr	450	180	0.3	0.25	450	V	B	(Birdlife International, 2009; Brooke, 1987; Hodum and Wainstein, 2002)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Black-capped Petrel	Pterodroma hasitata	Pr	300	120	0.3	0.45	300	V	B	(Birdlife International, 2009; Haney, 1987; Lambert, 1977; Warham, 1990)
Gould's Petrel	Pterodrom leucoptera	Pr	200	120	0.3	0.45	200	V	B	(Birdlife International, 2009; Priddel and Carlile, 2007; Warham, 1990)
Stejneger's Petrel	Pterodroma longirostris	Pr	150	180	0.3	0.5	150	V	B	(Birdlife International, 2009; Hodum and Wainstein, 2002)
Magenta Petrel	Pterodroma magentae	Pr	150	122	0.3	0.45	140	V	B	(Birdlife International, 2009; Warham, 1990)
Kermadec Petrel	Pterodroma neglecta	Pr	500	180	0.6	0.4	500	V	V	(Birdlife International, 2009; Hodum and Wainstein, 2002)
Black-winged Petrel	Pterodroma nigripennis	Pr	185	240	0.3	0.75	175	V	B	(Birdlife International, 2009; Hutton and Priddel, 2002; Tennyson, 1991)
Galapagos Petrel	Pterodroma phaeopygia	Pr	400	120	0.3	0.24	400	R	B	(Birdlife International, 2009; Cruz-Delgado et al.; Warham, 1990)
Pycroft's Petrel	Pterodroma pycrofti	Pr	200	120	0.3	0.5	200	V	B	(Birdlife International, 2009; Dunnet, 1985)
Providence Petrel	Pterodroma solandri	Pr	420	122	0.3	0.35	450	R	B	(Bester et al., 2002; Bester et al., 2007; Birdlife International, 2009; Brooke, 1995; Ford et al., 2004)
Little Shearwater	Puffinus assimilis	Pr	220	180	0.1	0.45	150	V	B	(Birdlife International, 2009; Nunn and Stanley, 2000; Priddel et al., 2003; Warham, 1990)
Newell’s Shearwater	Puffinus auricularis	Pr	270	180	0.1	0.45	240	V	B	(Birdlife International, 2009; Nunn and Stanley, 2000; Warham, 1990)
Flesh-footed Shearwater	Puffinus carneipes	Pr	560	280	0.1	0.47	500	V	B	(Nunn and Stanley, 2000; Powell et al., 2007)
Fluttering Shearwater	Puffinus gavia	Pr	320	200	0.1	0.45	300	V	B	(Birdlife International, 2009; Nunn and Stanley, 2000; Warham, 1990)
Great Shearwater	Puffinus gravis	Pr	840	300	0.1	0.66	800	V	B	(Cuthbert, 2005; Nunn and Stanley, 2000)
Sooty Shearwater	Puffinus griseus	Pr	780	122	0.1	0.55	600	V	B	(Geary, 2010; Nunn and Stanley, 2000; Sagar and Horning, 1998)
Audubon’s Shearwater	Puffinus lherminieri	Pr	160	150	0.1	0.59	160	So	B	(Birdlife International, 2009; Nunn and Stanley, 2000; Snow, 1965)
Christmas Shearwater	Puffinus nativitatis	Pr	350	122	0.6	0.45	340	R	R	(Birdlife International, 2009; Nunn and Stanley, 2000; Warham, 1990)
Black-vented Shearwater	Puffinus opisthomelas	Pr	270	180	0.1	0.45	250	S	B	(Birdlife International, 2009; Keitt et al., 2003; Nunn and Stanley, 2000; Warham, 1990)
Wedge-tailed Shearwater	Puffinus pacificus	Pr	380	122	0.1	0.45	450	V	B	(Adams and Brown, 1984; Warham, 1990)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Manx Shearwater	Puffinus Puffinus	Pr	410	122	0.1	0.7	450	V	B	(Wilson et al., 2004)
Yelkouan Shearwater	Puffinus yelkouan	Pr	400	122	0.1	0.67	390	V	B	(Birdlife International, 2009; Bourgeois and Vidal, 2007; Warham, 1990)
Townsend's Shearwater	Puffinus auricularis	Pr	270	180	0.1	0.45	250	V	B	(Birdlife International, 2009; Keitt et al., 2003; Nunn and Stanley, 2000; Warham, 1990)
Buller's Shearwater	Puffinus bulleri	Pr	400	122	0.1	0.4	400	V	B	(Birdlife International, 2009; Harper, 1983; Medway, 2001)
Pink-footed shearwater	Puffinus creatopus	Pr	700	180	0.1	0.5	750	V	B	(Birdlife International, 2009; Hodum and Wainstein, 2002)
Heinroth's Shearwater	Puffinus heinrothi	Pr	160	150	0.1	0.59	160	So	B	(Bailey, 1992; Birdlife International, 2009; Nunn and Stanley, 2000; Snow, 1965)
Hutton's Shearwater	Puffinus huttoni	Pr	350	180	0.1	0.4	350	V	B	(Birdlife International, 2009; Cuthbert and Davis, 2002a, b)
Balearic Shearwater	Puffinus mauretanicus	Pr	780	122	0.1	0.55	600	V	B	(Birdlife International, 2009; Geary, 2010; Nunn and Stanley, 2000; Sagar and Horning, 1998)
Short-tailed Shearwater	Puffinus tenuirostris	Pr	500	200	0.6	0.6	450	V	V	(Birdlife International, 2009; Wooller et al., 1990)
Antarctic Petrel	Thalassoica antarctica	Pr	690	96	0.6	0.5	600	R	R	(Birdlife International, 2009; Hodum, 2002)
Emperor Penguin	Aptenodytes forsteri	Sp	39000	330	0.6	0.61	10560	Ice	Ice	(Kooyman et al., 2004; Robertson, 1992; Stonehouse, 1952; Williams, 1995)
King Penguin	Aptenodytes patagonicus	Sp	12000	243	0.6	0.39	10000	R	R	(Corbel et al.; Dobson et al., 2008)
Rockhopper Penguin	Eudyptes chrysocome	Sp	3060	213	0.6	0.43	2300	R	R	(Crawford et al., 2003; Crawford et al., 2008; Hull et al., 2004)
Macaroni Penguin	Eudyptes chrysolophus	Sp	4680	213	0.6	0.44	3270	R	R	(Lindeboom, 1984; Williams, 1981)
Fiordland Penguin	Eudyptes pachyrynchus	Sp	3500	300	0.6	1	3000	R	R	(McLean, 2000; St. Clair et al., 1999)
Royal Penguin	Eudyptes schlegeli	Sp	6000	213	0.6	0.44	5400	R	R	(Hull and Wilson, 1996; Hull et al., 2001)
Erect-crested Penguin	Eudyptes sclateri	Sp	3900	274	0.6	0.64	3000	R	R	(Cooper et al., 1990; Warham, 1975)
Snares Penguin	Eudyptes robustus	Sp	3500	274	0.6	0.64	3000	R	R	(Birdlife International, 2009; Demongin et al., 2010; Warham, 1975)

Species	Latin Name	Family	Adult Mass (g)	Days at colony	Time at colony	Prod per pair	Fledge mass (g)	Adult Substrate	Chick Sub.	References
Little Penguin	Eudyptula minor	Sp	1080	340	0.3	0.35	940	So	B	(Gales and Green, 1990; Priddel et al., 2008)
Yellow-eyed Penguin	Megadyptes antipodes	Sp	4800	250	0.6	0.8	4000	V	V	(Ratz et al., 2004; Ricklefs and Matthew, 1983)
Adelie Penguin	Pygoscelis adeliae	Sp	4200	243	0.6	1.02	3000	R	R	(Kent et al., 1998; Salihoglu et al., 2001)
Chinstrap Penguin	Pygoscelis antarctica	Sp	4150	274	0.6	1.2	2900	R	R	(Barbosa et al., 1997; Croll et al., 2006; Nunn and Stanley, 2000)
Gentoo Penguin	Pygoscelis papua	Sp	5500	213	0.6	1.0	5100	R	R	(Ghys et al., 2008; Nunn and Stanley, 2000)
African Penguin	Spheniscus demersus	Sp	3170	300	0.3	0.61	2950	V	B	(Barham et al., 2007; Durant et al., 2010; Nagy et al., 1984; Wolfaardt et al., 2009)
Humboldt penguin	Spheniscus humboldti	Sp	4100	340	0.3	0.7	3000	V	B	(Bingham, 2002; Ellenberg et al., 2006; Paredes et al., 2002; Taylor et al., 2002)
Magellanic Penguin	Spheniscus magellanicus	Sp	3500	243	0.3	0.56	2500	So	B	(Yorio et al., 2001; Zavalaga and Paredes, 2009)
Galapagos Penguin	Spheniscus mendiculus	Sp	2500	180	0.6	1.5	2000	R	R	(Birdlife International, 2009; Boersma, 1976)

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Appendix 2 Ammonia Global Emissions from Seabirds (AGES) version 1

NH_3 emissions estimates for the three scenarios (Ammonia Global Emissions from Seabirds: AGES v1: S1, S2, S3) supplementary material at 0.1 degree resolution (rounded to 2 significant figures).

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
78.2	15.3	2100	760	1400
77.4	-67.7	8500	3600	6100
77.3	-79.3	0.22	0.065	0.14
76.8	-101.2	0.09	0.13	0.11
76.7	-18.5	0.00035	0.000081	0.00022
76.6	-20.7	0.00017	0.000041	0.00011
76.5	-20.8	0.00024	0.000055	0.00015
76.5	-20.7	0.0033	0.00077	0.002
76.5	-89.7	2.1	0.8	1.5
76.4	-20.8	0.00032	0.000074	0.0002
76.4	-20.7	0.0019	0.00044	0.0012
76.4	-20.6	0.0029	0.00067	0.0018
76.3	-20.0	0.00029	0.000067	0.00018
76.3	-85.1	0.18	0.054	0.12
76.3	-89.3	28	11	19
75.8	-94.3	1.6	0.47	1.1
75.8	59.0	3.3	0.55	1.9
75.8	-79.4	160	78	120
75.7	-88.7	0.15	0.058	0.11
75.3	-17.9	0.00064	0.00015	0.00039
75.2	-18.1	0.0029	0.00067	0.0018
75.1	-80.8	0.027	0.0081	0.018
75.1	-17.5	540	130	330
74.7	-57.8	0.013	0.0049	0.0091
74.6	-57.8	0.02	0.0073	0.014
74.6	-91.2	11	3.2	7.3
74.5	-86.8	28	11	20
74.4	-57.2	0.0014	0.00053	0.00099
74.4	-56.7	0.005	0.0018	0.0034
74.2	-57.1	0.023	0.0085	0.016
74.2	-56.8	0.03	0.011	0.02
74.2	-20.1	0.094	0.022	0.058
74.1	-57.1	0.006	0.0022	0.0041
74.1	-57.3	0.008	0.0029	0.0055
74.1	-57.2	0.039	0.014	0.026
74.0	-57.4	0.0029	0.0011	0.002
74.0	-57.8	0.25	0.093	0.17
73.9	-20.3	0.0014	0.00034	0.00089

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
73.9	-20.1	0.0041	0.00094	0.0025
73.9	-57.4	0.0036	0.0013	0.0025
73.9	-56.6	0.0043	0.0016	0.003
73.9	-56.8	0.012	0.0044	0.0082
73.9	-56.9	0.034	0.012	0.023
73.8	-56.0	0.002	0.00084	0.0014
73.8	-20.1	0.0048	0.0011	0.0029
73.8	-55.9	0.0072	0.0031	0.0051
73.8	-56.5	0.0083	0.004	0.0062
73.8	-56.2	0.037	0.018	0.027
73.8	-56.3	0.044	0.021	0.032
73.8	-56.9	0.05	0.018	0.034
73.8	-80.4	260	130	190
73.7	-55.9	0.013	0.0056	0.0095
73.7	-56.8	0.014	0.0052	0.0098
73.7	-56.3	0.043	0.021	0.032
73.7	-56.6	57	27	42
73.6	-56.7	0.0043	0.0021	0.0032
73.6	-56.6	0.0066	0.0031	0.0048
73.6	-56.9	0.037	0.015	0.026
73.6	-87.8	0.17	0.064	0.12
73.6	-57.0	0.23	0.085	0.16
73.6	-56.4	0.43	0.21	0.32
73.5	-20.4	0.0014	0.0005	0.00098
73.5	-21.5	0.0033	0.0012	0.0022
73.5	-55.8	0.0075	0.0032	0.0053
73.5	-56.5	0.0093	0.0044	0.0069
73.5	-56.1	0.011	0.0047	0.0079
73.5	-56.4	0.025	0.012	0.019
73.5	-56.7	0.44	0.21	0.33
73.4	-55.6	0.0094	0.0039	0.0067
73.4	-56.3	0.019	0.0091	0.014
73.4	-55.8	0.037	0.015	0.026
73.4	-56.2	0.039	0.019	0.029
73.4	-56.6	9.7	4.6	7.2
73.4	-84.5	31	12	22
73.3	-25.2	0.0014	0.00051	0.00098
73.3	-56.2	0.0013	0.00063	0.00098
73.3	-56.0	0.0027	0.0011	0.0019
73.3	-55.4	0.0056	0.0024	0.004
73.3	-56.4	0.0068	0.0032	0.005
73.3	-56.3	0.027	0.013	0.02
73.3	-56.5	0.15	0.072	0.11

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
73.2	-23.1	0.0022	0.00079	0.0015
73.2	-55.8	0.0043	0.0018	0.003
73.2	-56.3	0.006	0.0029	0.0044
73.2	-55.3	0.042	0.018	0.03
73.1	-55.6	0.0014	0.00061	0.001
73.1	-56.0	0.02	0.0084	0.014
73.1	-56.7	0.024	0.011	0.018
73.1	-56.4	0.025	0.012	0.019
73.1	-56.2	0.058	0.028	0.043
73.0	-55.1	0.00016	0.000067	0.00011
73.0	-55.2	0.0029	0.0012	0.0021
73.0	-54.9	0.0068	0.0029	0.0048
73.0	-55.0	0.011	0.0046	0.0077
73.0	-55.3	0.012	0.0049	0.0082
73.0	-55.7	0.015	0.0062	0.01
73.0	-56.5	0.027	0.013	0.02
73.0	-56.9	0.039	0.019	0.029
73.0	-56.4	0.073	0.035	0.054
73.0	-24.7	0.53	0.19	0.36
73.0	-56.7	12	5.7	8.8
72.9	-54.8	0.0045	0.0019	0.0032
72.9	-55.3	0.0058	0.0024	0.0041
72.9	-54.9	0.012	0.005	0.0085
72.9	-55.0	0.015	0.0062	0.01
72.9	-56.3	0.1	0.05	0.078
72.9	-56.1	45	19	32
72.9	-56.4	91	43	67
72.9	53.1	110	38	72
72.9	-79.5	400	200	300
72.9	-56.2	1900	890	1400
72.8	-56.5	0.0014	0.00069	0.0011
72.8	-24.9	0.0058	0.0021	0.0039
72.8	-56.2	0.0067	0.0032	0.0049
72.8	-22.9	0.011	0.0038	0.0073
72.8	-56.3	0.013	0.006	0.0093
72.8	-55.6	0.027	0.012	0.02
72.8	-56.6	0.033	0.016	0.024
72.8	-54.7	0.039	0.016	0.027
72.8	-55.7	0.087	0.037	0.062
72.8	-55.3	0.096	0.041	0.068
72.8	-54.5	0.14	0.058	0.098
72.8	-54.9	0.18	0.078	0.13
72.8	-55.4	0.2	0.085	0.14

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
72.8	-55.0	0.26	0.11	0.18
72.8	-55.5	0.5	0.21	0.35
72.7	-56.2	0.014	0.0067	0.01
72.7	-55.3	0.029	0.012	0.021
72.7	-56.3	0.055	0.026	0.04
72.7	-55.9	0.089	0.037	0.063
72.7	-56.4	0.12	0.057	0.088
72.7	-54.8	0.25	0.1	0.17
72.7	-55.6	0.27	0.11	0.19
72.7	-54.9	0.3	0.12	0.21
72.7	-55.2	0.33	0.14	0.23
72.7	-55.1	0.37	0.15	0.26
72.7	-55.7	0.96	0.41	0.68
72.7	-55.8	120	51	86
72.6	-56.1	0.012	0.0052	0.0087
72.6	-55.5	0.013	0.0057	0.0095
72.6	-55.2	0.034	0.015	0.024
72.6	-55.8	0.048	0.02	0.034
72.6	-24.6	0.055	0.019	0.037
72.6	-55.4	0.07	0.029	0.05
72.6	-55.6	0.11	0.048	0.082
72.6	-55.3	0.12	0.049	0.083
72.6	-55.1	0.14	0.057	0.096
72.6	-55.0	0.24	0.1	0.17
72.6	-55.7	0.37	0.16	0.26
72.6	-55.9	0.61	0.26	0.43
72.5	-24.2	0.0036	0.0013	0.0024
72.5	-24.1	0.011	0.004	0.0077
72.5	-55.6	0.011	0.0048	0.008
72.5	-56.0	0.014	0.0061	0.01
72.5	-54.6	0.056	0.024	0.04
72.5	-55.8	0.087	0.037	0.062
72.5	-55.0	0.1	0.042	0.071
72.4	-55.4	0.00064	0.00027	0.00045
72.4	-54.9	0.0016	0.00067	0.0011
72.4	-55.2	0.002	0.00084	0.0014
72.4	-24.3	0.0042	0.0015	0.0028
72.4	-55.1	0.011	0.0046	0.0077
72.4	-55.7	0.026	0.011	0.018
72.4	-55.0	0.11	0.048	0.081
72.4	-56.3	0.2	0.094	0.15
72.3	-23.9	0.0016	0.00057	0.0011
72.3	-55.4	0.0047	0.002	0.0033

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
72.3	-54.9	0.023	0.0098	0.017
72.3	-55.1	0.041	0.017	0.029
72.3	-56.3	0.13	0.063	0.097
72.3	-55.9	0.3	0.12	0.21
72.2	-53.8	0.0043	0.0021	0.0032
72.2	-23.7	0.0054	0.0019	0.0037
72.2	-23.8	0.0096	0.0034	0.0065
72.2	-55.8	0.045	0.019	0.032
72.2	-55.7	0.072	0.03	0.051
72.1	-56.0	0.028	0.012	0.02
72.1	-56.1	1.3	0.53	0.9
72.0	-54.7	0.0072	0.0031	0.0051
72.0	-52.8	0.015	0.0076	0.012
72.0	-53.7	0.036	0.018	0.027
72.0	-55.4	0.055	0.023	0.039
72.0	-53.5	0.5	0.25	0.37
71.8	-55.8	0.093	0.039	0.066
71.8	-74.5	28	15	22
71.7	-55.8	0.014	0.0059	0.0099
71.7	-55.0	0.017	0.007	0.012
71.7	-53.4	0.27	0.13	0.2
71.5	-21.7	0.074	0.026	0.05
71.4	-21.7	0.0027	0.00093	0.0018
71.4	-175.6	53	14	33
71.3	-55.0	0.0052	0.0022	0.0037
71.3	-52.6	0.037	0.018	0.028
71.2	-21.7	0.0053	0.0019	0.0036
71.2	-53.4	0.073	0.036	0.054
71.2	-177.4	53	14	33
71.1	-54.9	0.0027	0.0011	0.0019
71.1	-53.7	0.0095	0.0046	0.0071
71.1	-71.1	20	11	16
71.1	178.7	37	16	26
71.0	-54.9	0.0032	0.0014	0.0023
71.0	-54.8	0.014	0.0069	0.01
71.0	-53.0	0.024	0.012	0.018
71.0	-52.1	0.43	0.21	0.32
71.0	-8.5	180	58	120
70.9	-55.3	0.051	0.021	0.036
70.9	-51.8	3.9	1.9	2.9
70.8	-51.6	0.0032	0.0016	0.0024
70.8	-53.9	0.015	0.0072	0.011
70.8	-51.4	0.027	0.013	0.02

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
70.8	-54.1	0.027	0.013	0.02
70.8	-51.9	0.035	0.017	0.026
70.8	-53.7	0.2	0.099	0.15
70.8	-54.2	0.2	0.098	0.15
70.8	-51.7	860	420	640
70.7	-51.0	0.0027	0.0011	0.0019
70.7	-52.1	0.0053	0.0026	0.004
70.7	-50.9	0.03	0.013	0.021
70.7	-51.8	0.029	0.014	0.022
70.7	-52.4	0.042	0.021	0.031
70.7	-51.3	0.068	0.033	0.051
70.7	-53.7	0.091	0.045	0.068
70.7	-54.6	0.13	0.062	0.095
70.7	-51.2	0.27	0.11	0.19
70.7	-51.5	45	22	34
70.7	-51.9	50	25	37
70.6	-50.7	0.004	0.0017	0.0028
70.6	-52.1	0.014	0.0069	0.011
70.6	-51.3	0.018	0.0075	0.013
70.6	-50.8	0.032	0.013	0.022
70.6	-52.8	0.03	0.015	0.022
70.6	-51.1	0.052	0.022	0.037
70.6	-51.2	0.057	0.024	0.041
70.6	-51.7	0.076	0.038	0.057
70.6	-51.0	0.13	0.054	0.092
70.6	-54.5	0.15	0.074	0.11
70.6	162.3	1.6	0.81	1.2
70.5	-50.8	0.00095	0.0004	0.00068
70.5	-51.2	0.0016	0.00067	0.0011
70.5	-54.2	0.0069	0.0034	0.0052
70.5	-51.7	0.013	0.0065	0.0099
70.5	-55.0	0.023	0.011	0.017
70.5	-51.0	0.07	0.029	0.05
70.5	-54.9	0.12	0.058	0.088
70.4	-53.9	0.022	0.011	0.017
70.4	-54.0	0.027	0.013	0.02
70.4	-52.7	0.03	0.015	0.022
70.4	-54.7	0.032	0.016	0.024
70.4	-51.2	0.064	0.027	0.045
70.4	-51.0	0.067	0.028	0.047
70.4	-53.5	0.092	0.045	0.069
70.4	-51.1	0.14	0.058	0.098
70.4	-54.1	0.13	0.064	0.098

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
70.4	-51.5	0.15	0.064	0.11
70.4	-54.8	0.16	0.079	0.12
70.4	-50.6	0.19	0.078	0.13
70.4	-55.0	0.18	0.09	0.14
70.4	-50.7	0.45	0.19	0.32
70.3	-54.2	0.0084	0.0041	0.0063
70.3	-50.8	0.01	0.0043	0.0073
70.3	-54.7	0.04	0.02	0.03
70.3	-51.9	0.1	0.051	0.077
70.3	-53.9	0.18	0.089	0.13
70.3	-54.4	0.24	0.12	0.18
70.3	-50.6	0.59	0.25	0.42
70.2	-55.1	0.0064	0.0031	0.0048
70.2	-50.9	0.0083	0.0035	0.0059
70.2	-53.5	0.13	0.064	0.097
70.2	-124.7	0.36	0.071	0.21
70.2	-22.8	2100	750	1400
70.1	-54.0	0.013	0.0064	0.0097
70.1	-51.2	0.014	0.0061	0.01
70.1	-52.4	0.033	0.016	0.025
70.1	-53.5	0.041	0.02	0.03
70.1	170.4	0.093	0.043	0.068
70.1	-51.8	0.18	0.074	0.12
70.1	-51.5	88	37	62
70.0	-50.6	0.0023	0.00097	0.0016
70.0	-50.9	0.039	0.016	0.028
70.0	-52.2	0.11	0.055	0.084
70.0	172.8	3.8	1.8	2.8
70.0	170.5	5	2.3	3.7
70.0	-50.7	7.6	3.2	5.4
70.0	-51.2	38	16	27
70.0	-90.0	160	92	130
69.9	-50.5	0.0035	0.0015	0.0025
69.9	-54.2	0.007	0.0034	0.0052
69.9	-50.7	0.049	0.021	0.035
69.9	-22.8	0.067	0.024	0.045
69.9	-22.7	0.27	0.095	0.18
69.9	-50.8	0.47	0.2	0.34
69.9	-54.8	0.6	0.16	0.38
69.9	-51.3	0.56	0.24	0.4
69.9	-51.1	1.8	0.75	1.3
69.9	-51.2	3.5	1.5	2.5
69.9	-51.4	11	4.6	7.7

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
69.8	-50.2	0.006	0.0025	0.0043
69.8	-51.3	0.0096	0.004	0.0068
69.8	-28.3	0.031	0.0078	0.019
69.8	164.1	0.031	0.015	0.023
69.8	31.6	0.096	0.038	0.067
69.8	-50.6	0.14	0.058	0.098
69.8	-54.9	0.16	0.044	0.1
69.8	-50.3	0.34	0.14	0.24
69.8	-50.8	0.38	0.16	0.27
69.8	-51.2	300	120	210
69.7	-50.5	0.0087	0.0036	0.0061
69.7	-55.0	0.031	0.0086	0.02
69.7	-53.9	0.1	0.049	0.075
69.7	-54.9	0.12	0.032	0.075
69.6	-51.9	0.004	0.0017	0.0028
69.6	-54.7	0.028	0.0076	0.018
69.6	-54.8	0.039	0.011	0.025
69.6	-54.6	0.049	0.013	0.031
69.6	-50.4	0.11	0.047	0.079
69.6	-54.5	0.15	0.04	0.093
69.6	-54.3	0.14	0.067	0.1
69.6	-50.6	0.15	0.063	0.11
69.6	-139.5	0.45	0.17	0.31
69.6	-51.0	0.53	0.22	0.38
69.6	-54.2	1.2	0.58	0.87
69.6	177.5	10	4.3	7.4
69.5	-50.9	0.0053	0.0022	0.0038
69.5	-52.4	0.0072	0.0036	0.0054
69.5	-52.5	0.0072	0.0036	0.0054
69.5	-53.9	0.014	0.0069	0.01
69.5	-50.4	0.026	0.011	0.018
69.5	-51.0	0.025	0.011	0.018
69.5	-50.7	0.046	0.019	0.033
69.5	-53.8	0.19	0.094	0.14
69.5	-54.4	0.24	0.066	0.15
69.5	-53.7	0.25	0.12	0.19
69.5	-50.6	0.41	0.17	0.29
69.5	-50.5	1.3	0.54	0.92
69.5	-50.8	16	6.8	12
69.5	-54.3	320	160	240
69.4	-50.5	0.002	0.00085	0.0014
69.4	-24.1	0.0065	0.0023	0.0044
69.4	-53.0	0.0087	0.0043	0.0065

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
69.4	-50.9	0.015	0.0064	0.011
69.4	-54.3	0.29	0.14	0.22
69.4	-54.2	4.7	2.3	3.5
69.3	-53.2	0.002	0.00098	0.0015
69.3	-53.1	0.004	0.002	0.003
69.3	-50.8	0.015	0.0062	0.011
69.3	-50.9	0.018	0.0074	0.013
69.3	-50.5	0.042	0.018	0.03
69.3	-53.4	0.086	0.042	0.064
69.3	-53.3	0.2	0.097	0.15
69.3	-54.0	0.22	0.11	0.16
69.3	-130.8	0.43	0.15	0.29
69.3	-52.9	0.45	0.22	0.33
69.3	-54.1	43	21	32
69.2	-54.0	0.018	0.0086	0.013
69.2	-51.2	0.066	0.028	0.047
69.2	-50.1	0.13	0.052	0.089
69.2	-50.7	0.14	0.059	0.1
69.2	-50.8	0.16	0.068	0.11
69.2	-50.5	0.33	0.14	0.23
69.2	168.8	0.86	0.4	0.63
69.2	36.0	2.8	1.3	2
69.1	-50.3	0.0022	0.00091	0.0015
69.1	-50.2	0.0035	0.0015	0.0025
69.1	-51.0	0.049	0.02	0.035
69.1	-50.4	0.071	0.029	0.05
69.1	-50.8	0.1	0.042	0.071
69.1	-53.6	0.3	0.15	0.22
69.1	-50.7	0.37	0.16	0.26
69.1	-53.5	0.77	0.38	0.57
69.1	17.6	50	46	48
69.0	-51.2	0.00024	0.0001	0.00017
69.0	-51.1	0.031	0.013	0.022
69.0	-50.9	0.043	0.018	0.031
69.0	-52.3	0.067	0.033	0.05
69.0	-53.4	0.074	0.036	0.055
69.0	-50.4	0.71	0.3	0.5
68.9	-179.4	0.00029	0.000088	0.00019
68.9	-53.1	0.048	0.024	0.036
68.9	-53.4	0.32	0.15	0.24
68.9	69.0	0.51	0.19	0.35
68.9	-52.4	0.48	0.23	0.36
68.8	-52.3	0.00079	0.00039	0.00059

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
68.8	-53.2	0.0016	0.00078	0.0012
68.8	-50.7	0.0054	0.0023	0.0038
68.8	-50.8	0.013	0.0056	0.0094
68.8	-52.4	0.028	0.014	0.021
68.8	-53.5	0.046	0.023	0.034
68.8	-136.5	0.076	0.022	0.049
68.8	-53.1	0.073	0.036	0.054
68.8	37.5	6.6	4	5.3
68.7	-26.7	0.0067	0.0032	0.0049
68.7	-50.4	0.017	0.007	0.012
68.7	-52.5	0.016	0.008	0.012
68.7	-52.7	0.025	0.012	0.018
68.7	-52.0	0.033	0.016	0.025
68.7	-52.3	0.034	0.017	0.025
68.7	-52.2	0.073	0.036	0.054
68.7	-52.6	0.12	0.061	0.092
68.7	-51.1	0.51	0.21	0.36
68.7	-51.5	2.1	0.88	1.5
68.7	-50.9	12	4.8	8.2
68.6	-52.8	0.0004	0.0002	0.0003
68.6	-51.3	0.0027	0.0011	0.0019
68.6	-51.2	0.0043	0.0018	0.0031
68.6	-53.5	0.0045	0.0022	0.0033
68.6	-51.8	0.011	0.0052	0.0079
68.6	-52.0	0.04	0.019	0.029
68.6	-51.9	0.35	0.17	0.26
68.6	-51.1	0.71	0.3	0.51
68.6	-50.9	7.4	3.1	5.3
68.5	-52.9	0.0048	0.0024	0.0036
68.5	-32.0	0.008	0.002	0.005
68.5	-51.8	0.013	0.0056	0.0094
68.5	-51.7	0.018	0.0076	0.013
68.5	-53.2	0.029	0.014	0.022
68.5	-50.9	0.24	0.098	0.17
68.5	-51.4	0.6	0.25	0.43
68.5	-50.8	0.63	0.26	0.45
68.5	-52.7	0.62	0.3	0.46
68.4	-51.4	0.0014	0.0006	0.001
68.4	-28.4	0.0037	0.00095	0.0023
68.4	-51.1	0.0092	0.0039	0.0065
68.4	-53.7	0.013	0.0035	0.0081
68.4	-51.3	0.016	0.0068	0.012
68.4	-51.7	0.018	0.0077	0.013

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
68.4	-51.5	0.032	0.013	0.023
68.4	-52.9	0.031	0.015	0.023
68.4	-53.1	0.037	0.018	0.028
68.3	-53.0	0.0014	0.00071	0.0011
68.3	-51.3	0.0077	0.0032	0.0054
68.3	-51.4	0.13	0.055	0.093
68.2	-51.9	0.019	0.0096	0.015
68.2	-51.4	0.025	0.01	0.018
68.2	-53.2	0.027	0.013	0.02
68.2	-51.0	0.054	0.023	0.038
68.2	-53.4	0.11	0.03	0.069
68.2	-52.0	0.15	0.074	0.11
68.2	-52.8	0.16	0.079	0.12
68.2	-53.3	0.2	0.099	0.15
68.2	-52.5	0.23	0.11	0.17
68.2	-51.2	1.1	0.45	0.76
68.1	-53.6	0.011	0.0029	0.0067
68.1	-31.5	0.02	0.0051	0.013
68.1	-31.7	0.02	0.0051	0.013
68.1	-51.1	0.024	0.013	0.019
68.1	-51.6	0.045	0.019	0.032
68.1	-52.7	0.048	0.024	0.036
68.1	-52.0	0.051	0.025	0.038
68.1	-51.9	0.057	0.028	0.043
68.1	-51.0	0.063	0.035	0.049
68.1	-52.3	0.075	0.037	0.056
68.1	-52.6	0.3	0.15	0.22
68.0	-52.3	0.0013	0.00065	0.00099
68.0	-53.0	0.0086	0.0042	0.0064
68.0	-50.4	0.01	0.0055	0.0078
68.0	-53.3	0.013	0.0035	0.008
68.0	-51.0	0.48	0.26	0.37
67.9	-51.9	0.009	0.0044	0.0067
67.9	-50.6	0.0093	0.0051	0.0072
67.9	-51.5	0.01	0.0056	0.0079
67.9	-51.0	0.011	0.0063	0.0088
67.9	-50.5	0.014	0.008	0.011
67.9	-53.5	0.016	0.0045	0.011
67.9	-51.3	0.14	0.075	0.1
67.9	-51.7	0.2	0.097	0.15
67.9	-52.3	0.5	0.25	0.38
67.9	-51.4	0.52	0.29	0.4
67.9	-52.1	0.58	0.28	0.43

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
67.9	-51.2	0.67	0.37	0.52
67.9	-50.4	1.4	0.8	1.1
67.8	-52.5	0.0013	0.00065	0.00099
67.8	-53.7	0.002	0.00055	0.0013
67.8	-51.4	0.0032	0.0018	0.0025
67.8	-51.6	0.0046	0.0026	0.0036
67.8	-53.3	0.0058	0.0016	0.0037
67.8	-175.8	0.0055	0.0024	0.0039
67.8	-53.9	0.01	0.0027	0.0064
67.8	-53.8	0.019	0.0051	0.012
67.8	-50.7	0.023	0.013	0.018
67.8	-51.1	0.025	0.014	0.019
67.8	-52.6	0.033	0.016	0.025
67.8	-50.8	0.041	0.022	0.032
67.8	-53.0	0.06	0.029	0.045
67.8	-50.9	0.069	0.038	0.054
67.8	-52.8	0.13	0.061	0.093
67.8	-51.3	0.24	0.13	0.18
67.8	-52.4	0.29	0.14	0.21
67.7	-51.2	0.0036	0.002	0.0028
67.7	-52.3	0.0045	0.0022	0.0034
67.7	-51.5	0.0046	0.0026	0.0036
67.7	-51.0	0.0053	0.0029	0.0041
67.7	-51.4	0.0067	0.0037	0.0052
67.7	-53.5	0.0096	0.0026	0.0061
67.7	-53.0	0.013	0.0062	0.0094
67.7	-52.9	0.069	0.034	0.052
67.7	-175.3	0.096	0.041	0.069
67.7	-52.1	0.099	0.049	0.074
67.7	-51.8	0.18	0.097	0.14
67.7	-53.1	0.41	0.11	0.26
67.7	-51.1	0.38	0.21	0.29
67.7	-51.6	0.47	0.26	0.36
67.7	-52.8	0.51	0.25	0.38
67.7	-51.9	0.64	0.35	0.49
67.7	-51.3	0.64	0.36	0.5
67.6	-51.1	0.0027	0.0015	0.0021
67.6	-53.8	0.01	0.0027	0.0064
67.6	-53.3	0.016	0.0044	0.01
67.6	-53.2	0.027	0.014	0.021
67.6	-175.2	0.069	0.03	0.05
67.6	-51.6	0.075	0.042	0.058
67.6	-51.0	0.18	0.1	0.14

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
67.6	-53.7	0.3	0.083	0.19
67.5	-52.0	2.5	1.4	2
67.5	-174.6	40	17	29
67.4	-52.7	0.015	0.0077	0.011
67.4	-34.3	0.035	0.0088	0.022
67.3	-53.4	0.0024	0.0012	0.0018
67.3	-53.9	0.25	0.11	0.18
67.2	-53.9	0.033	0.015	0.024
67.2	-53.8	0.19	0.083	0.14
67.2	-62.5	110	39	76
67.1	-173.6	0.0047	0.0016	0.0031
67.1	-54.0	0.064	0.028	0.046
67.1	-172.7	0.92	0.31	0.61
67.0	-53.6	0.0045	0.0023	0.0034
67.0	-54.1	0.033	0.014	0.024
66.9	-53.0	0.0013	0.00067	0.001
66.9	-51.7	0.0032	0.0018	0.0025
66.9	-52.5	0.0038	0.0019	0.0028
66.9	-52.3	0.01	0.0051	0.0076
66.9	-51.0	0.022	0.012	0.017
66.9	-52.1	0.053	0.029	0.041
66.9	-171.6	0.075	0.025	0.05
66.9	-51.1	0.12	0.068	0.095
66.9	-52.4	0.26	0.13	0.19
66.9	-53.1	2.2	1.1	1.7
66.9	-61.8	160	56	110
66.8	-53.1	0.021	0.011	0.016
66.8	-53.6	0.028	0.014	0.021
66.8	-53.3	0.037	0.019	0.028
66.8	-52.9	0.13	0.068	0.1
66.7	-53.4	0.0027	0.0013	0.002
66.7	-53.6	0.0064	0.0032	0.0048
66.7	-51.9	0.0088	0.0049	0.0068
66.7	-53.1	0.014	0.0072	0.011
66.7	-53.0	0.019	0.0094	0.014
66.7	-51.0	0.025	0.014	0.019
66.7	-53.3	0.027	0.013	0.02
66.7	68.8	0.6	0.41	0.51
66.7	-171.4	7	2.4	4.7
66.6	-174.2	0.059	0.02	0.04
66.6	-50.8	0.2	0.11	0.15
66.6	-171.2	5.8	2	3.9
66.6	-18.0	1100	650	880

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
66.5	-52.5	0.013	0.0058	0.0095
66.5	-52.7	0.11	0.047	0.078
66.5	-52.2	0.68	0.3	0.49
66.5	-170.7	0.85	0.29	0.57
66.5	-22.6	750	440	600
66.4	-53.0	0.031	0.016	0.024
66.4	-51.7	120	69	96
66.3	-34.9	0.013	0.0047	0.009
66.3	-35.1	0.029	0.01	0.02
66.3	-170.2	0.059	0.02	0.04
66.3	-53.8	0.39	0.17	0.28
66.2	-49.8	0.0043	0.0024	0.0033
66.2	-50.8	0.037	0.02	0.028
66.2	-53.6	0.14	0.07	0.1
66.2	-51.7	1.1	0.6	0.84
66.1	-53.3	0.0027	0.0012	0.0019
66.1	-35.6	0.011	0.0038	0.0072
66.1	-53.2	0.01	0.0045	0.0073
66.1	-53.7	0.01	0.0053	0.0078
66.1	-50.8	0.012	0.0065	0.0092
66.1	-51.8	0.4	0.18	0.29
66.1	-169.7	0.75	0.26	0.5
66.1	-22.7	3.2	1.9	2.5
66.0	-170.3	0.0046	0.0016	0.0031
66.0	-52.8	0.023	0.0099	0.016
66.0	-51.9	0.16	0.07	0.12
66.0	-52.0	0.23	0.1	0.17
66.0	-51.8	0.45	0.2	0.33
66.0	-169.7	2.1	0.73	1.4
66.0	-52.2	2.4	1	1.7
66.0	-52.6	3	1.3	2.2
66.0	-52.5	68	30	49
65.9	-53.5	0.008	0.0035	0.0057
65.9	-53.0	0.0093	0.0041	0.0067
65.9	-52.8	0.013	0.0055	0.0091
65.9	-52.1	0.015	0.0067	0.011
65.9	-53.1	0.048	0.021	0.035
65.9	-52.3	0.24	0.11	0.18
65.9	-52.5	0.29	0.13	0.21
65.9	-52.4	0.3	0.13	0.22
65.8	-53.2	0.0064	0.0028	0.0046
65.8	-170.5	1.4	0.46	0.91
65.8	-169.0	670	230	450

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
65.7	-52.7	0.0093	0.0041	0.0067
65.7	-48.8	0.015	0.0085	0.012
65.7	-53.3	0.033	0.015	0.024
65.7	-50.8	0.34	0.19	0.26
65.7	-171.3	0.5	0.17	0.34
65.7	-52.6	77	34	56
65.6	-52.7	0.0014	0.00064	0.001
65.6	-53.2	0.0031	0.0013	0.0022
65.6	-52.6	0.004	0.0018	0.0029
65.6	-51.8	0.0059	0.0026	0.0042
65.6	-53.3	0.014	0.0061	0.01
65.6	-52.5	0.056	0.025	0.04
65.6	-170.7	0.27	0.092	0.18
65.5	-171.0	0.0031	0.001	0.002
65.5	-52.0	0.021	0.0092	0.015
65.5	-53.1	0.033	0.015	0.024
65.5	-52.7	0.71	0.31	0.51
65.5	-24.5	1700	1000	1400
65.4	-53.0	0.00016	0.00007	0.00011
65.4	-53.2	0.0027	0.0012	0.0019
65.4	22.4	0.0059	0.0057	0.0058
65.4	-49.7	0.06	0.033	0.046
65.3	-175.9	0.0068	0.0029	0.0048
65.3	-52.8	0.0095	0.0041	0.0068
65.3	-49.0	0.018	0.01	0.014
65.3	-51.5	0.065	0.03	0.048
65.3	-172.2	17	5.7	11
65.3	-23.0	490	290	390
65.1	-52.5	0.0016	0.0007	0.0011
65.1	-172.1	0.0036	0.0012	0.0024
65.0	-52.5	0.00079	0.00035	0.00057
65.0	-175.8	0.0069	0.003	0.0049
65.0	-175.9	0.0071	0.003	0.005
65.0	-52.2	0.054	0.024	0.039
65.0	-52.1	0.13	0.059	0.093
64.9	-50.7	0.01	0.0047	0.0074
64.9	-52.2	0.074	0.032	0.053
64.9	-172.4	0.21	0.07	0.14
64.8	-52.0	0.011	0.0052	0.0081
64.8	-172.8	1.1	0.36	0.71
64.8	-172.4	12	4.2	8.3
64.7	-51.3	0.00056	0.00026	0.00041
64.7	-52.2	0.015	0.0067	0.011

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
64.7	-172.7	0.08	0.027	0.053
64.7	177.6	0.24	0.1	0.17
64.7	-50.6	0.94	0.44	0.69
64.7	-50.7	7.7	3.6	5.6
64.6	-50.6	0.021	0.0096	0.015
64.6	-51.2	2.3	1.1	1.7
64.6	-172.5	14	4.8	9.5
64.6	-172.3	34	12	23
64.5	-52.2	0.057	0.025	0.041
64.5	-51.3	1.1	0.51	0.81
64.5	-172.4	2.3	0.77	1.5
64.5	35.5	1.7	1.3	1.5
64.5	-51.4	2.3	1.1	1.7
64.5	-22.3	97	58	77
64.4	-50.9	0.006	0.0028	0.0044
64.4	-50.2	0.035	0.016	0.025
64.3	-48.0	0.0056	0.0018	0.0037
64.3	-173.7	0.0076	0.0026	0.0051
64.3	-40.7	0.012	0.0037	0.0077
64.3	-51.4	0.02	0.0093	0.015
64.3	-51.5	0.03	0.014	0.022
64.2	-51.1	0.0016	0.00074	0.0012
64.2	-50.4	0.0024	0.0011	0.0018
64.2	-52.1	0.0026	0.0011	0.0018
64.2	-173.1	0.0056	0.0019	0.0037
64.2	-51.5	0.014	0.0064	0.01
64.2	-52.2	0.29	0.13	0.21
64.2	-51.2	0.3	0.14	0.22
64.2	-50.9	1	0.49	0.77
64.1	-51.9	0.00024	0.0001	0.00017
64.1	-52.2	0.00048	0.00021	0.00034
64.1	-51.0	0.005	0.0023	0.0037
64.1	-51.8	0.0053	0.0023	0.0038
64.1	-50.1	0.01	0.0047	0.0073
64.1	-48.9	0.021	0.0059	0.013
64.1	-51.1	0.025	0.012	0.018
64.0	-51.8	0.0021	0.00092	0.0015
64.0	-51.7	0.0026	0.0011	0.0018
64.0	-52.1	0.077	0.033	0.055
64.0	-51.9	0.12	0.052	0.086
64.0	-16.3	1.7	1	1.4
63.9	-51.2	0.0013	0.00062	0.00098
63.9	-51.6	0.019	0.008	0.013

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
63.9	-51.5	0.26	0.12	0.19
63.8	-51.2	0.021	0.0097	0.015
63.8	-51.8	0.047	0.02	0.033
63.8	-51.5	0.053	0.025	0.039
63.8	-51.6	0.14	0.06	0.099
63.8	-51.7	6.8	2.9	4.9
63.7	-50.2	0.0073	0.0021	0.0047
63.7	-51.4	0.013	0.0062	0.0097
63.7	-23.0	130	77	100
63.6	-51.5	0.0045	0.002	0.0032
63.6	-51.1	0.014	0.0065	0.01
63.6	-51.4	0.028	0.013	0.021
63.6	-51.6	0.059	0.026	0.042
63.6	-51.2	0.11	0.051	0.08
63.5	-51.4	0.0032	0.0014	0.0023
63.5	-40.8	0.04	0.013	0.026
63.5	-50.6	0.04	0.011	0.026
63.5	-51.5	0.051	0.022	0.037
63.5	-50.4	0.067	0.019	0.043
63.4	-51.3	0.0042	0.002	0.0031
63.4	-51.2	0.0071	0.0033	0.0052
63.4	-51.4	0.072	0.031	0.051
63.4	-51.1	0.31	0.14	0.22
63.4	20.0	0.83	0.69	0.76
63.4	-20.3	22	13	18
63.3	-51.2	0.0033	0.0015	0.0024
63.3	-50.4	0.028	0.008	0.018
63.3	-51.3	0.08	0.037	0.059
63.2	-50.3	0.017	0.0049	0.011
63.2	179.2	0.047	0.016	0.031
63.2	-51.2	0.13	0.038	0.085
63.2	7.7	410	310	360
63.1	-51.1	0.019	0.0053	0.012
63.1	-50.9	0.044	0.013	0.028
63.1	-51.0	0.15	0.042	0.094
63.1	179.5	170	56	110
63.0	-50.7	0.0069	0.002	0.0045
63.0	-82.0	24	15	20
62.9	-50.6	0.00095	0.00027	0.00061
62.8	-50.1	0.002	0.00058	0.0013
62.8	-49.2	0.0075	0.0024	0.005
62.8	-50.5	0.008	0.0023	0.0051
62.8	-48.9	0.012	0.004	0.0082

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
62.7	-50.5	0.017	0.0048	0.011
62.7	-50.6	0.066	0.019	0.043
62.7	164.5	1.4	0.95	1.2
62.7	179.6	700	240	470
62.6	-50.4	0.00079	0.00023	0.00051
62.6	-47.8	0.047	0.011	0.029
62.6	-49.1	0.057	0.018	0.038
62.6	179.6	0.44	0.15	0.29
62.6	164.7	1.8	1.2	1.5
62.6	-77.6	260	140	200
62.5	-50.3	0.013	0.0037	0.0082
62.5	164.7	0.59	0.39	0.49
62.4	163.5	0.0065	0.0043	0.0054
62.4	-50.2	0.094	0.027	0.06
62.4	-50.1	0.099	0.029	0.064
62.4	-50.3	0.11	0.032	0.071
62.4	164.6	2.2	1.5	1.8
62.3	-50.1	0.022	0.0064	0.014
62.3	-114.4	0.035	0.033	0.034
62.3	-6.7	0.055	0.03	0.043
62.3	-50.0	0.29	0.088	0.19
62.3	-6.4	0.82	0.45	0.63
62.3	-49.4	1.6	0.52	1.1
62.3	-6.5	8.2	4.5	6.3
62.3	-6.8	17	9.2	13
62.3	-6.3	19	11	15
62.3	21.3	95	84	89
62.2	-48.9	0.0033	0.0011	0.0022
62.2	-6.9	8.8	4.8	6.8
62.1	-49.0	0.0033	0.0011	0.0022
62.1	-49.7	0.0093	0.003	0.0061
62.1	-49.1	0.018	0.0058	0.012
62.1	-49.5	0.039	0.012	0.026
62.1	-7.6	92	49	71
62.1	-7.0	100	55	78
62.1	-7.3	120	74	99
62.0	-49.4	0.003	0.00096	0.002
62.0	-49.5	0.004	0.0013	0.0026
62.0	-49.2	0.21	0.068	0.14
62.0	-49.0	0.31	0.1	0.21
62.0	-49.3	0.45	0.15	0.3
62.0	-7.0	1.2	0.65	0.92
62.0	-6.6	2.2	1.2	1.7

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
62.0	-6.8	17	9.3	13
61.9	-65.0	47	18	33
61.9	-6.8	89	49	69
61.8	159.5	0.0043	0.0023	0.0033
61.8	-49.4	0.0067	0.0021	0.0044
61.8	158.8	0.0062	0.0033	0.0048
61.8	160.4	0.0062	0.0033	0.0048
61.8	-49.5	0.015	0.0046	0.0096
61.8	159.4	26	14	20
61.8	159.3	61	32	46
61.8	-6.8	220	120	170
61.7	159.9	0.0044	0.0023	0.0033
61.7	157.3	0.0052	0.0028	0.004
61.7	158.1	0.0052	0.0028	0.004
61.7	159.4	0.0053	0.0028	0.0041
61.7	159.6	0.0053	0.0028	0.0041
61.7	173.7	2	0.9	1.4
61.7	160.2	7.4	3.9	5.6
61.7	-6.8	39	21	30
61.6	-49.2	0.004	0.0013	0.0026
61.6	173.5	3.3	1.5	2.4
61.6	-6.7	11	6.1	8.7
61.5	-49.4	0.0014	0.00045	0.00095
61.5	160.0	0.0057	0.0031	0.0044
61.5	-49.0	0.027	0.0085	0.018
61.5	173.4	0.97	0.44	0.71
61.5	156.7	2.2	1.8	2
61.5	-6.8	150	84	120
61.4	-49.0	0.013	0.003	0.0079
61.4	159.9	0.17	0.09	0.13
61.4	160.1	0.36	0.19	0.28
61.4	173.1	13	6	9.5
61.3	-48.1	0.0024	0.00057	0.0015
61.3	-47.9	0.0049	0.0012	0.003
61.3	-48.9	0.013	0.0031	0.008
61.3	-48.7	0.019	0.0044	0.012
61.3	173.0	2.5	1.1	1.8
61.3	159.9	3.1	1.6	2.4
61.3	-48.0	19	4.6	12
61.3	172.8	31	14	23
61.3	159.8	54	29	41
61.2	-45.4	0.00084	0.00054	0.00069
61.2	156.6	0.0047	0.0039	0.0043

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
61.2	-47.8	0.04	0.0095	0.025
61.2	172.8	0.61	0.28	0.45
61.2	159.8	80	43	62
61.1	-48.3	0.02	0.0048	0.013
61.1	-48.5	0.021	0.005	0.013
61.1	-48.4	0.042	0.0099	0.026
61.1	-48.2	0.058	0.014	0.036
61.1	-46.4	0.18	0.12	0.15
61.1	172.4	1.7	0.79	1.3
61.1	172.5	73	33	53
61.0	-45.7	0.00016	0.0001	0.00013
61.0	160.3	0.0091	0.0049	0.007
61.0	-48.0	0.019	0.0044	0.011
61.0	-46.6	0.027	0.017	0.022
61.0	-46.4	1.4	0.9	1.1
61.0	172.5	1.9	0.86	1.4
61.0	172.2	5.9	2.7	4.3
60.9	159.8	0.0047	0.0025	0.0036
60.9	-48.2	0.1	0.024	0.063
60.9	-46.7	0.091	0.059	0.075
60.9	-48.3	0.3	0.072	0.19
60.9	-48.4	0.39	0.093	0.24
60.9	-135.1	0.25	0.26	0.26
60.9	172.2	0.75	0.34	0.55
60.9	-46.6	0.74	0.48	0.61
60.9	172.1	5.7	2.6	4.2
60.9	159.9	14	7.7	11
60.8	-47.1	0.00087	0.00021	0.00054
60.8	-47.6	0.0021	0.0005	0.0013
60.8	-47.9	0.0024	0.00057	0.0015
60.8	160.2	0.0047	0.0025	0.0036
60.8	-47.4	0.0067	0.0016	0.0041
60.8	162.8	0.0078	0.0052	0.0065
60.8	-47.5	0.047	0.011	0.029
60.8	-48.3	0.073	0.017	0.045
60.8	-45.9	0.072	0.047	0.06
60.8	171.7	0.41	0.19	0.3
60.8	-45.6	0.77	0.5	0.64
60.8	171.9	3.9	1.8	2.8
60.8	172.1	16	7.2	11
60.8	-48.4	71	17	44
60.7	-47.4	0.0012	0.00029	0.00075
60.7	160.8	0.0061	0.0056	0.0059

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
60.7	-45.8	0.014	0.0094	0.012
60.7	-47.9	0.02	0.0047	0.012
60.7	-46.7	0.016	0.011	0.013
60.7	-47.3	0.025	0.006	0.016
60.7	-48.1	0.043	0.01	0.027
60.7	-47.6	0.067	0.016	0.041
60.7	-46.8	0.083	0.054	0.068
60.7	160.5	0.084	0.077	0.08
60.7	155.8	0.5	0.42	0.46
60.7	-47.7	0.92	0.22	0.57
60.7	160.4	0.93	0.85	0.89
60.7	171.6	1.5	0.69	1.1
60.7	155.9	2.6	2.1	2.3
60.7	4.9	520	510	520
60.6	-0.9	0.00011	0.000073	0.000089
60.6	-46.5	0.017	0.011	0.014
60.6	-46.2	0.024	0.016	0.02
60.6	-46.7	0.029	0.019	0.024
60.6	-45.8	0.24	0.16	0.2
60.6	169.2	0.37	0.17	0.27
60.6	171.3	1.1	0.49	0.78
60.6	168.6	16	7.2	11
60.5	-46.1	0.0015	0.00098	0.0012
60.5	-45.4	0.0024	0.0016	0.002
60.5	-46.0	0.0093	0.006	0.0077
60.5	-45.8	0.027	0.017	0.022
60.5	-45.6	0.12	0.081	0.1
60.5	-45.7	0.25	0.16	0.21
60.5	171.0	0.83	0.38	0.61
60.5	167.9	1.3	0.59	0.93
60.5	170.9	2.2	0.98	1.6
60.5	162.3	15	9.8	12
60.5	169.5	51	23	37
60.5	169.2	64	29	46
60.4	-1.7	0.00054	0.00039	0.00047
60.4	-45.3	0.038	0.025	0.032
60.4	-1.1	0.068	0.049	0.058
60.4	-44.1	0.15	0.099	0.13
60.4	-45.1	0.17	0.11	0.14
60.4	-45.0	0.75	0.49	0.62
60.4	170.7	2.2	0.99	1.6
60.4	27.8	1.7	1.6	1.6
60.4	167.6	7.8	5.2	6.5

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
60.4	-1.2	10	7.2	8.6
60.4	-1.3	19	13	16
60.4	-68.1	400	260	330
60.3	-44.1	0.0023	0.0015	0.0019
60.3	-44.0	0.0029	0.0019	0.0024
60.3	-45.5	0.05	0.032	0.041
60.3	167.0	0.5	0.33	0.42
60.3	-1.5	0.53	0.38	0.45
60.3	167.3	2.5	1.7	2.1
60.3	169.8	3.1	1.4	2.3
60.3	-1.2	4.8	3.5	4.1
60.3	28.3	5	5.8	5.4
60.3	170.7	14	6.5	10
60.3	-1.3	330	240	280
60.2	-45.1	0.0024	0.0016	0.002
60.2	-44.1	0.0085	0.0055	0.007
60.2	-134.7	0.066	0.067	0.066
60.2	-148.3	0.14	0.09	0.12
60.2	165.6	1.4	0.95	1.2
60.2	170.5	2.2	1	1.6
60.2	-1.4	120	58	91
60.1	-45.1	0.0027	0.0017	0.0022
60.1	30.0	0.011	0.012	0.011
60.1	169.9	3.4	1.6	2.5
60.1	170.5	49	23	36
60.0	-45.3	0.011	0.0069	0.0088
60.0	-45.2	0.024	0.016	0.02
60.0	-45.4	0.084	0.055	0.07
60.0	165.2	0.81	0.54	0.67
60.0	166.2	4.8	3.2	4
60.0	170.1	69	31	50
59.9	-43.7	0.002	0.0013	0.0016
59.9	170.3	37	17	27
59.8	-43.9	0.004	0.0026	0.0033
59.8	-44.1	0.0051	0.0033	0.0042
59.8	-45.0	42	27	35
59.4	19.2	1.2	1.1	1.1
59.3	-78.0	0.028	0.023	0.025
59.2	-2.7	1.1	0.62	0.87
59.2	23.6	67	71	69
59.1	-2.8	0.0096	0.0053	0.0075
59.1	-3.0	1.7	0.93	1.3
59.1	-4.0	22	15	18

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
59.1	-2.9	120	64	91
59.0	-136.1	0.0032	0.0025	0.0028
59.0	-3.0	9.1	5	7.1
59.0	-3.1	140	75	110
58.9	-136.7	0.016	0.0096	0.013
58.9	-136.6	0.029	0.017	0.023
58.9	-136.8	0.03	0.018	0.024
58.9	-136.3	0.028	0.023	0.026
58.9	-135.9	0.031	0.024	0.027
58.8	-2.9	0.000064	0.000035	0.00005
58.8	-136.0	0.0016	0.0012	0.0014
58.8	-136.2	0.02	0.016	0.018
58.8	-136.3	0.14	0.11	0.13
58.8	-136.5	0.18	0.1	0.14
58.7	-3.1	0.0004	0.00028	0.00034
58.7	-136.2	0.019	0.015	0.017
58.7	-136.3	0.021	0.017	0.019
58.7	-136.0	0.027	0.022	0.024
58.7	-136.1	0.52	0.42	0.47
58.7	9.3	45	49	47
58.6	-136.4	0.00024	0.00016	0.0002
58.6	-137.7	0.00044	0.0003	0.00037
58.6	-3.1	0.0016	0.0011	0.0014
58.6	-4.4	0.0041	0.0019	0.003
58.6	-3.4	0.014	0.01	0.012
58.6	-4.6	0.36	0.17	0.26
58.6	-137.6	0.44	0.3	0.37
58.6	-136.0	0.44	0.35	0.39
58.6	-4.7	9.1	4.3	6.7
58.6	-4.8	90	43	67
58.5	-3.3	0.00024	0.00017	0.0002
58.5	-136.0	0.0006	0.00048	0.00054
58.5	-3.7	0.0013	0.00089	0.0011
58.5	-3.4	0.0092	0.0064	0.0078
58.5	-133.9	0.036	0.033	0.035
58.5	-135.9	0.077	0.061	0.069
58.5	-3.5	0.11	0.078	0.094
58.5	-4.6	0.13	0.06	0.094
58.5	-4.8	15	7	11
58.5	-4.7	27	13	20
58.4	-134.6	0.0049	0.0045	0.0047
58.4	-4.6	0.22	0.11	0.16
58.4	-5.0	0.69	0.33	0.51

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
58.4	-136.9	0.7	0.41	0.55
58.4	-4.9	2	0.94	1.4
58.4	-3.4	8.6	6	7.3
58.4	-3.3	35	24	29
58.4	-7.4	330	270	300
58.3	-136.9	0.0032	0.0019	0.0026
58.3	-5.0	0.0041	0.002	0.003
58.3	-5.1	0.0062	0.0049	0.0055
58.3	-7.5	0.017	0.014	0.015
58.3	-6.3	0.02	0.011	0.016
58.3	-136.4	0.17	0.11	0.14
58.3	-136.5	0.33	0.2	0.26
58.3	-134.1	0.36	0.33	0.34
58.3	-7.6	0.75	0.61	0.68
58.3	-3.3	4.4	3.1	3.8
58.3	-3.4	160	110	130
58.2	-3.9	0.000084	0.000049	0.000067
58.2	-135.0	0.011	0.01	0.01
58.2	-4.3	0.014	0.0067	0.01
58.2	-135.5	0.012	0.0098	0.011
58.2	-135.3	0.013	0.013	0.013
58.2	-136.6	0.097	0.057	0.077
58.2	-6.6	0.11	0.06	0.085
58.2	-136.8	0.22	0.13	0.18
58.2	-3.5	0.29	0.21	0.25
58.2	-136.4	0.38	0.25	0.32
58.1	-135.5	0.0049	0.0039	0.0044
58.1	-135.3	0.039	0.038	0.038
58.1	-4.7	0.083	0.04	0.061
58.1	-136.4	0.12	0.079	0.099
58.1	-136.6	0.26	0.16	0.21
58.1	-7.3	12	9.5	11
58.0	-3.9	0.00013	0.000076	0.0001
58.0	-5.4	0.043	0.036	0.039
58.0	-6.9	8.1	4.4	6.3
58.0	-7.5	83	68	75
57.9	-5.2	0.0097	0.0048	0.0072
57.9	-5.5	0.2	0.16	0.18
57.9	-5.3	2.4	2	2.2
57.9	-8.1	13	11	12
57.9	-7.2	130	110	120
57.8	24.3	0.00015	0.00014	0.00015
57.8	-4.2	0.00033	0.0002	0.00027

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
57.8	-4.7	0.069	0.034	0.052
57.8	-8.6	0.072	0.059	0.066
57.8	-4.4	0.11	0.087	0.096
57.8	21.9	0.11	0.12	0.12
57.8	-136.4	0.27	0.18	0.22
57.8	-5.0	0.7	0.35	0.52
57.8	-4.8	7.1	3.5	5.3
57.7	-2.9	0.0012	0.001	0.0011
57.7	-2.6	0.0017	0.0015	0.0016
57.7	-6.4	0.0031	0.0017	0.0024
57.7	-5.0	0.005	0.0025	0.0037
57.7	-3.3	0.0078	0.0065	0.0072
57.7	-3.0	0.02	0.017	0.019
57.7	-4.6	0.52	0.26	0.39
57.7	-3.1	0.75	0.63	0.69
57.7	-4.0	1.1	0.64	0.86
57.7	-3.2	1.1	0.93	1
57.7	-7.1	6.9	5.6	6.2
57.7	-2.3	7.1	6	6.5
57.7	9.0	140	150	150
57.6	-4.0	0.00079	0.00065	0.00072
57.6	-1.8	0.0058	0.0049	0.0054
57.6	-1.9	0.068	0.057	0.063
57.6	-136.3	0.076	0.05	0.063
57.6	-2.2	0.068	0.058	0.063
57.6	-3.9	0.095	0.078	0.086
57.6	-136.2	0.14	0.091	0.11
57.6	-7.2	0.32	0.26	0.29
57.6	-4.6	0.9	0.45	0.67
57.6	-7.3	1.4	1.2	1.3
57.6	-2.1	77	65	71
57.5	-1.9	0.002	0.0017	0.0019
57.5	-3.9	0.0048	0.0039	0.0043
57.5	-136.0	0.011	0.0073	0.0092
57.5	-3.5	0.015	0.0087	0.012
57.5	-7.3	0.016	0.013	0.015
57.5	-3.1	0.026	0.022	0.024
57.5	-3.8	0.033	0.027	0.03
57.5	-79.8	0.32	0.26	0.29
57.5	-4.2	0.43	0.35	0.39
57.5	-7.1	0.61	0.5	0.55
57.5	-6.5	0.72	0.39	0.56
57.5	-6.6	3.9	2.1	3

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
57.4	-4.0	0.00038	0.00031	0.00035
57.4	-4.3	0.0036	0.003	0.0033
57.4	-4.2	0.12	0.098	0.11
57.4	10.9	0.16	0.16	0.16
57.4	-3.3	2.2	1.9	2.1
57.4	-6.4	2.6	2.1	2.4
57.4	-6.3	2.8	2.3	2.6
57.4	-6.5	5.4	4.3	4.9
57.4	-1.9	6.4	3.6	5
57.3	-6.2	0.0014	0.0012	0.0013
57.3	-1.9	0.0093	0.0052	0.0072
57.3	-6.0	0.032	0.026	0.029
57.3	-2.0	0.038	0.022	0.03
57.3	-4.1	0.035	0.028	0.031
57.3	-135.9	0.46	0.38	0.42
57.3	18.0	2.8	3.3	3
57.2	-6.1	0.008	0.0065	0.0072
57.2	-2.2	0.019	0.011	0.015
57.2	-3.9	0.02	0.0097	0.015
57.2	-135.9	0.022	0.018	0.02
57.2	-3.7	0.16	0.077	0.12
57.2	-2.7	0.43	0.24	0.34
57.1	-2.8	0.00049	0.00023	0.00036
57.1	-6.5	0.00064	0.00031	0.00047
57.1	-132.7	0.006	0.005	0.0055
57.1	-2.1	5.7	3.2	4.5
57.0	-135.8	0.0029	0.0024	0.0027
57.0	-3.2	0.02	0.0086	0.015
57.0	-2.2	0.04	0.019	0.029
57.0	-2.9	0.12	0.048	0.082
57.0	-6.4	2.3	1.9	2.1
57.0	-135.9	3.9	3.2	3.6
57.0	-135.7	9.9	8.2	9.1
57.0	-6.3	11	8.6	9.7
56.9	-134.3	0.0027	0.0024	0.0026
56.9	-135.4	0.026	0.022	0.024
56.9	-5.8	0.063	0.051	0.057
56.9	-6.2	0.18	0.15	0.16
56.9	-6.1	3.5	2.9	3.2
56.9	10.2	4	4.1	4.1
56.9	-2.2	72	34	53
56.8	-135.4	0.00025	0.00021	0.00023
56.8	-5.9	0.0049	0.004	0.0045

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
56.8	-132.8	0.0062	0.0052	0.0057
56.8	-5.8	0.044	0.035	0.04
56.8	-135.6	0.049	0.041	0.045
56.8	-2.9	0.064	0.069	0.067
56.8	-2.7	0.21	0.12	0.16
56.8	-79.7	0.28	0.23	0.25
56.8	-135.5	1.7	1.4	1.6
56.7	-5.2	0.00042	0.00023	0.00032
56.7	16.7	0.00045	0.00053	0.00049
56.7	-135.2	0.00059	0.00049	0.00054
56.7	-2.5	0.02	0.0093	0.015
56.7	-132.6	0.02	0.017	0.018
56.7	-135.4	0.14	0.12	0.13
56.7	-135.3	0.16	0.13	0.14
56.7	11.6	0.14	0.18	0.16
56.6	-3.6	0.00027	0.00017	0.00022
56.6	-132.3	0.0026	0.0026	0.0026
56.6	-3.9	0.17	0.11	0.14
56.6	-135.2	0.31	0.26	0.28
56.6	-2.5	5.2	2.5	3.8
56.5	-6.5	0.00064	0.00031	0.00047
56.5	-3.2	0.041	0.044	0.043
56.5	-3.0	0.37	0.39	0.38
56.5	-3.6	1	0.66	0.84
56.4	-2.8	0.00008	0.000046	0.000063
56.4	-6.7	0.0018	0.00085	0.0013
56.4	-3.4	0.15	0.096	0.12
56.4	-77.7	0.27	0.26	0.27
56.4	-60.6	11	5.4	8.3
56.3	-6.0	0.0027	0.002	0.0024
56.3	-3.1	0.013	0.014	0.013
56.3	-133.7	0.045	0.039	0.042
56.3	-6.1	0.051	0.038	0.045
56.3	-6.3	0.17	0.11	0.14
56.3	-2.7	4.4	2.5	3.5
56.2	-134.7	0.000079	0.000073	0.000076
56.2	-3.4	0.006	0.005	0.0055
56.2	-4.4	0.02	0.011	0.016
56.2	-6.4	0.055	0.041	0.048
56.2	-6.3	0.057	0.043	0.05
56.2	-4.2	0.068	0.038	0.053
56.2	-6.0	0.32	0.24	0.28
56.2	-2.6	24	14	19

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
56.2	-6.1	22	16	19
56.2	162.3	1400	930	1200
56.1	-3.8	0.059	0.038	0.049
56.1	10.8	0.12	0.13	0.13
56.1	-4.7	0.18	0.11	0.14
56.1	-133.7	0.22	0.2	0.21
56.1	-3.1	0.45	0.38	0.42
56.1	-3.2	4.9	4.1	4.5
56.1	-6.1	11	8.1	9.4
56.1	-2.7	14	8.1	11
56.1	-6.2	14	11	12
56.1	-6.3	29	22	25
56.1	-2.6	220	130	170
56.0	-2.9	0.000032	0.000018	0.000025
56.0	-4.5	0.00042	0.00025	0.00033
56.0	-4.1	0.00056	0.0005	0.00053
56.0	-3.7	0.0043	0.0028	0.0036
56.0	-4.4	0.004	0.0035	0.0038
56.0	-3.8	0.029	0.019	0.024
56.0	-3.9	0.036	0.023	0.03
56.0	-4.0	0.11	0.085	0.098
56.0	-3.1	0.61	0.51	0.56
56.0	-3.4	0.84	0.7	0.77
56.0	-2.6	1.2	0.63	0.91
56.0	8.3	1.4	1.6	1.5
56.0	-3.3	1.8	1.5	1.6
55.9	-4.5	0.0062	0.0037	0.005
55.9	-4.8	0.01	0.0062	0.0083
55.9	-133.7	0.019	0.017	0.018
55.9	-4.2	0.072	0.064	0.068
55.9	-2.2	0.099	0.052	0.076
55.9	-4.4	0.11	0.098	0.11
55.9	-4.7	0.2	0.12	0.16
55.9	-4.3	0.18	0.16	0.17
55.9	-5.8	0.63	0.52	0.58
55.9	-134.6	0.93	0.86	0.89
55.9	11.7	1.2	1.4	1.3
55.9	10.7	2.9	3.8	3.4
55.9	10.2	5.9	5.9	5.9
55.9	-2.1	40	21	31
55.8	-133.7	0.0069	0.006	0.0065
55.8	-4.0	0.008	0.0062	0.0071
55.8	-2.4	0.0095	0.005	0.0072

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
55.8	-4.3	0.0081	0.0071	0.0076
55.8	-4.6	0.024	0.014	0.019
55.8	-3.4	0.061	0.038	0.05
55.8	-134.3	0.89	0.83	0.86
55.7	-4.9	0.0046	0.0028	0.0037
55.7	-4.3	0.0046	0.0041	0.0044
55.7	-3.7	0.0081	0.0062	0.0071
55.7	-4.4	0.037	0.033	0.035
55.7	-4.2	0.074	0.065	0.07
55.7	-133.6	0.11	0.099	0.11
55.7	12.8	0.29	0.36	0.32
55.7	-133.8	0.41	0.36	0.39
55.7	-133.7	0.68	0.6	0.64
55.6	-4.1	0.00012	0.000091	0.00011
55.6	-133.7	0.0033	0.0029	0.0031
55.6	-3.3	0.0072	0.0045	0.0058
55.6	-3.1	0.013	0.0073	0.01
55.6	-4.5	0.045	0.03	0.038
55.6	-4.8	0.14	0.095	0.12
55.6	-5.1	0.27	0.18	0.23
55.6	-1.6	0.51	0.28	0.4
55.6	-1.8	1.2	0.67	0.95
55.6	-5.0	1.6	1.1	1.3
55.6	10.2	3.7	4.2	4
55.6	-1.7	28	15	21
55.5	-5.2	0.00022	0.00018	0.0002
55.5	-4.2	0.035	0.029	0.032
55.5	-3.7	0.12	0.089	0.1
55.5	8.3	0.1	0.11	0.11
55.5	-1.8	0.17	0.094	0.13
55.5	21.0	0.27	0.36	0.31
55.5	-2.9	1.2	0.69	0.96
55.5	21.1	1.2	1.6	1.4
55.5	-5.0	3	2.1	2.5
55.5	-1.6	4.4	2.4	3.4
55.4	-133.7	0.00035	0.0003	0.00033
55.4	-133.8	0.0029	0.0026	0.0028
55.4	-3.7	0.0086	0.0066	0.0076
55.4	-2.8	0.021	0.012	0.016
55.4	-1.6	0.046	0.025	0.035
55.4	-133.6	0.19	0.16	0.18
55.4	165.9	820	390	610
55.3	-8.2	0.00012	0.0001	0.00011

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
55.3	-1.9	0.36	0.19	0.27
55.3	15.2	2.7	3.2	3
55.3	-4.8	4.6	4.3	4.5
55.3	-6.3	6.6	3.2	4.9
55.3	-6.2	65	32	48
55.3	-5.1	130	110	120
55.2	-4.7	0.0057	0.0053	0.0055
55.2	-8.0	0.018	0.015	0.016
55.2	-6.3	0.03	0.014	0.022
55.2	-8.1	0.062	0.05	0.056
55.2	-7.9	0.073	0.058	0.065
55.2	-133.4	0.11	0.093	0.1
55.2	-133.3	0.21	0.19	0.2
55.2	-6.7	0.27	0.24	0.26
55.2	-4.9	0.9	0.73	0.81
55.2	-6.8	1.4	1.3	1.4
55.2	-5.0	2.5	2.1	2.3
55.2	-6.2	6.2	3	4.6
55.1	-5.0	0.0001	0.000083	0.000092
55.1	-2.2	0.0011	0.0008	0.00093
55.1	-8.3	0.0022	0.0019	0.002
55.1	-4.6	0.0031	0.0029	0.003
55.1	-6.0	0.013	0.0062	0.0095
55.1	-6.3	0.12	0.058	0.089
55.1	-6.1	0.12	0.06	0.092
55.1	-7.9	0.33	0.27	0.3
55.1	-5.1	0.62	0.51	0.56
55.1	-8.0	1.8	1.4	1.6
55.1	-8.2	4.3	3.7	4
55.1	12.3	3.9	4.7	4.3
55.1	-8.1	8.8	7.6	8.2
55.0	-4.6	0.0015	0.0013	0.0014
55.0	-1.6	0.0024	0.0021	0.0023
55.0	-3.6	0.0037	0.0031	0.0034
55.0	-4.1	0.0048	0.0025	0.0037
55.0	-5.1	0.0047	0.0038	0.0042
55.0	-7.5	0.017	0.017	0.017
55.0	-6.2	0.13	0.063	0.097
55.0	10.3	0.11	0.13	0.12
55.0	-6.0	1.1	0.51	0.78
55.0	-1.4	0.97	0.84	0.91
55.0	-8.3	1.1	0.93	1
55.0	-1.5	1.8	1.5	1.7

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
55.0	-8.2	6.2	5.4	5.8
55.0	137.6	13	6.5	9.5
54.9	-4.2	0.00023	0.00012	0.00017
54.9	-4.8	0.0021	0.0017	0.0019
54.9	-4.7	0.0022	0.0018	0.002
54.9	-3.6	0.013	0.011	0.012
54.9	-133.5	0.024	0.015	0.019
54.9	166.4	0.036	0.017	0.027
54.9	-4.6	0.05	0.041	0.046
54.9	-4.0	0.098	0.051	0.074
54.9	-3.8	0.21	0.11	0.16
54.8	-8.7	0.0059	0.0051	0.0055
54.8	-4.1	0.013	0.0068	0.0099
54.8	-4.9	0.023	0.019	0.021
54.8	-5.8	0.023	0.019	0.021
54.8	-6.2	0.32	0.2	0.26
54.8	-3.9	0.98	0.51	0.75
54.8	-4.0	1.1	0.57	0.84
54.8	-4.6	1.1	0.87	0.97
54.8	-133.6	1.8	1.1	1.4
54.8	-57.3	1.8	1.1	1.4
54.8	-133.5	31	19	25
54.7	-2.4	0.00012	0.000055	0.000087
54.7	-6.5	0.0084	0.0071	0.0078
54.7	-6.6	0.0086	0.0072	0.0079
54.7	-4.6	0.013	0.011	0.012
54.7	-6.1	0.023	0.014	0.019
54.7	-5.5	0.07	0.058	0.064
54.7	-4.8	1.1	0.89	0.99
54.7	-4.7	11	8.9	10
54.6	-1.1	0.0003	0.00027	0.00029
54.6	-1.6	0.00093	0.00089	0.00091
54.6	-3.1	0.001	0.00093	0.00099
54.6	-0.8	0.0029	0.0026	0.0028
54.6	-6.5	0.025	0.021	0.023
54.6	-1.2	0.032	0.031	0.031
54.6	-5.5	0.035	0.029	0.032
54.6	-6.6	0.09	0.066	0.078
54.6	-5.6	0.11	0.092	0.1
54.6	-130.7	0.12	0.098	0.11
54.6	-3.2	0.22	0.2	0.21
54.6	-130.2	0.25	0.19	0.22
54.6	-1.0	1.4	1.2	1.3

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
54.6	-4.9	2.4	1.9	2.2
54.6	-0.9	4.3	3.8	4.1
54.5	-6.4	0.0046	0.0029	0.0037
54.5	-6.5	0.035	0.022	0.028
54.5	-3.3	0.098	0.088	0.093
54.5	-7.8	0.11	0.091	0.099
54.5	-5.7	0.25	0.21	0.23
54.5	-2.7	0.59	0.32	0.45
54.5	-5.6	1.5	1.3	1.4
54.5	-3.6	4.5	3.9	4.2
54.4	19.0	0.00012	0.00017	0.00015
54.4	-4.5	0.00032	0.00017	0.00025
54.4	-7.6	0.00046	0.00039	0.00042
54.4	-4.4	0.0011	0.00061	0.00088
54.4	-9.8	0.0048	0.0041	0.0045
54.4	-7.8	0.021	0.018	0.019
54.4	-8.6	0.16	0.14	0.15
54.4	-5.7	0.24	0.2	0.22
54.4	-8.7	0.98	0.85	0.91
54.4	-0.5	3.6	2.7	3.2
54.4	-3.2	4.6	4.1	4.4
54.4	-57.3	7.9	4.8	6.3
54.4	-3.4	23	20	22
54.3	-5.5	0.061	0.05	0.056
54.3	-0.6	0.074	0.057	0.066
54.3	-0.3	0.074	0.07	0.072
54.3	-7.7	0.23	0.2	0.22
54.3	-5.7	0.25	0.21	0.23
54.3	-8.7	0.49	0.35	0.42
54.3	-130.6	1.6	1.2	1.4
54.3	-130.7	3.3	2.5	2.9
54.3	-0.4	4.7	3.6	4.2
54.3	19.5	6.7	8.6	7.6
54.2	-3.3	0.022	0.022	0.022
54.2	-130.6	0.038	0.03	0.034
54.2	-10.0	0.064	0.055	0.06
54.2	-131.6	0.14	0.092	0.12
54.2	-133.1	0.2	0.12	0.16
54.2	-9.9	0.24	0.2	0.22
54.2	-0.3	0.3	0.28	0.29
54.2	-4.5	0.39	0.21	0.3
54.2	-4.7	0.57	0.31	0.44
54.2	-133.0	1.8	1.1	1.5

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
54.2	-4.6	16	8.4	12
54.1	-2.6	0.00023	0.00012	0.00017
54.1	-4.8	0.00051	0.00028	0.00039
54.1	-10.2	0.00043	0.00037	0.0004
54.1	-3.2	0.001	0.001	0.001
54.1	-4.6	0.08	0.043	0.062
54.1	-6.8	0.077	0.061	0.069
54.1	-4.7	3.2	1.7	2.5
54.1	8.0	2.3	2.9	2.6
54.1	-9.7	4.5	3.8	4.1
54.1	-9.9	15	13	14
54.1	-0.2	18	17	18
54.1	-0.1	55	52	53
54.0	-2.9	0.000064	0.000064	0.000064
54.0	-1.5	0.00019	0.00017	0.00018
54.0	-2.7	0.028	0.028	0.028
54.0	-1.4	0.36	0.31	0.33
54.0	-10.0	0.44	0.37	0.4
54.0	-166.1	0.69	0.35	0.52
54.0	-9.9	2.7	2.3	2.5
54.0	159.9	12	11	11
54.0	-56.5	50	30	40
53.9	-166.6	0.0017	0.00085	0.0013
53.9	-6.2	0.0031	0.0024	0.0027
53.9	-2.8	0.0039	0.004	0.0039
53.9	-9.8	0.11	0.092	0.1
53.9	-0.9	0.13	0.088	0.11
53.9	-9.9	0.49	0.41	0.45
53.9	-133.2	1.3	0.78	1
53.9	-2.7	1.6	1.6	1.6
53.9	-2.9	6.2	6.3	6.3
53.9	-166.0	16	8	12
53.9	-168.0	79	29	54
53.8	-9.2	0.000096	0.000076	0.000086
53.8	-9.5	0.0038	0.003	0.0034
53.8	-3.4	0.012	0.011	0.011
53.8	-10.0	0.014	0.012	0.013
53.8	-1.4	0.032	0.022	0.027
53.8	-9.7	0.06	0.051	0.056
53.8	-133.1	0.13	0.079	0.1
53.8	-56.1	5.2	3.1	4.2
53.8	11.6	5.8	8.6	7.2
53.7	-1.3	0.000076	0.000052	0.000064

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
53.7	-0.6	0.000076	0.000056	0.000066
53.7	-0.7	0.00017	0.00012	0.00014
53.7	-166.4	0.0097	0.0048	0.0072
53.7	-166.3	0.038	0.019	0.028
53.7	-9.2	0.039	0.031	0.035
53.6	0.1	0.00078	0.00075	0.00077
53.6	-3.0	0.0031	0.0031	0.0031
53.6	-9.9	0.0087	0.0074	0.008
53.6	-10.0	0.01	0.0085	0.0092
53.6	-6.0	0.017	0.019	0.018
53.6	-0.9	0.047	0.032	0.04
53.6	-10.3	0.051	0.043	0.047
53.6	-166.7	0.19	0.068	0.13
53.5	-10.3	0.00054	0.00046	0.0005
53.5	-3.0	0.006	0.0062	0.0061
53.5	-166.7	0.031	0.011	0.021
53.5	-166.8	0.031	0.011	0.021
53.5	-9.9	0.09	0.077	0.083
53.5	-166.6	0.11	0.057	0.086
53.5	-166.9	0.17	0.06	0.11
53.5	6.3	0.18	0.22	0.2
53.5	-10.0	0.35	0.3	0.33
53.5	-133.0	0.97	0.57	0.77
53.5	-10.1	1.8	1.6	1.7
53.5	-6.1	4.2	4.6	4.4
53.5	-6.0	11	12	11
53.4	0.2	0.00074	0.0007	0.00072
53.4	-4.6	0.007	0.0047	0.0058
53.4	-167.1	0.011	0.004	0.0076
53.4	-1.8	0.0096	0.0079	0.0087
53.4	-4.5	0.029	0.019	0.024
53.4	-9.5	0.04	0.031	0.036
53.4	-166.8	0.081	0.029	0.055
53.4	-9.6	0.064	0.05	0.057
53.4	-3.0	0.08	0.084	0.082
53.4	-131.9	0.42	0.39	0.41
53.4	5.5	1.2	1.3	1.2
53.4	-166.9	3	1.1	2
53.4	-6.1	4.5	4.9	4.7
53.4	-6.0	36	40	38
53.3	-3.4	0.0012	0.0011	0.0012
53.3	-167.6	0.012	0.0044	0.0082
53.3	-9.8	0.046	0.036	0.041

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
53.3	-4.6	0.055	0.037	0.046
53.3	-3.6	0.052	0.048	0.05
53.3	-4.2	0.074	0.05	0.062
53.3	5.0	0.13	0.15	0.14
53.3	-3.5	0.24	0.22	0.23
53.3	5.3	0.28	0.29	0.28
53.3	-131.8	0.32	0.3	0.31
53.3	-167.4	0.49	0.18	0.34
53.3	-9.9	0.45	0.38	0.41
53.3	-167.3	1	0.38	0.71
53.2	-4.5	0.000055	0.000037	0.000046
53.2	-0.6	0.0017	0.0013	0.0015
53.2	-4.3	0.0037	0.0025	0.0031
53.2	-7.8	0.0095	0.0077	0.0086
53.2	-3.0	0.019	0.018	0.018
53.2	-3.4	0.034	0.031	0.032
53.2	-9.7	0.15	0.13	0.14
53.2	-4.4	0.19	0.13	0.16
53.2	-0.8	0.27	0.2	0.23
53.2	-167.7	1.6	0.59	1.1
53.2	-9.8	1.9	1.8	1.9
53.2	-168.2	3.6	1.3	2.4
53.1	-9.6	0.00021	0.00019	0.0002
53.1	0.3	0.0032	0.0031	0.0031
53.1	4.9	0.014	0.016	0.015
53.1	-1.7	0.031	0.024	0.028
53.1	-169.8	0.042	0.015	0.029
53.1	4.8	0.18	0.2	0.19
53.1	-168.4	0.54	0.2	0.37
53.1	-4.4	0.64	0.43	0.54
53.1	-6.0	1	0.85	0.94
53.1	-8.8	1.7	1.6	1.7
53.1	-4.2	5.3	4.2	4.8
53.1	-4.3	6.4	4.3	5.3
53.1	140.8	53	51	52
53.0	0.6	0.000028	0.000029	0.000028
53.0	0.9	0.00071	0.00073	0.00072
53.0	-168.8	0.0018	0.00066	0.0012
53.0	-2.8	0.0025	0.0016	0.0021
53.0	5.4	0.032	0.038	0.035
53.0	-9.4	0.059	0.054	0.057
53.0	-6.1	0.19	0.16	0.17
53.0	-6.0	0.56	0.46	0.51

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
53.0	0.8	0.69	0.71	0.7
53.0	172.9	1.7	0.83	1.3
53.0	0.7	1.6	1.6	1.6
53.0	-132.4	2.1	1.2	1.6
53.0	-168.9	2.4	0.89	1.7
53.0	-168.4	6.3	2.3	4.3
53.0	-168.5	6.7	2.4	4.6
53.0	-4.5	16	10	13
53.0	-169.7	32	12	22
52.9	0.8	0.00023	0.00024	0.00023
52.9	-1.5	0.0021	0.0021	0.0021
52.9	1.1	0.0096	0.0098	0.0097
52.9	0.9	0.019	0.02	0.019
52.9	4.8	0.02	0.023	0.021
52.9	-128.1	0.066	0.065	0.065
52.9	-169.0	0.13	0.047	0.088
52.9	1.2	0.1	0.11	0.1
52.9	-168.8	0.15	0.056	0.1
52.9	-169.2	0.22	0.081	0.15
52.9	-170.1	0.22	0.08	0.15
52.9	0.7	0.32	0.34	0.33
52.9	-131.5	0.4	0.37	0.38
52.9	-8.4	0.41	0.38	0.4
52.9	173.4	0.85	0.41	0.63
52.9	-168.7	1.1	0.4	0.75
52.9	173.3	1.3	0.63	0.97
52.9	-169.8	1.7	0.61	1.2
52.9	172.7	2	0.96	1.5
52.9	173.1	3	1.4	2.2
52.9	172.4	9.2	4.4	6.8
52.9	-9.5	22	20	21
52.8	-9.5	0.0012	0.0011	0.0011
52.8	-1.6	0.0027	0.0028	0.0028
52.8	-2.0	0.011	0.0087	0.0099
52.8	4.7	0.024	0.027	0.026
52.8	-1.7	0.12	0.091	0.11
52.8	-170.1	0.19	0.07	0.13
52.8	0.6	0.14	0.15	0.15
52.8	-4.8	0.24	0.12	0.18
52.8	173.4	0.95	0.46	0.71
52.8	172.8	1.6	0.8	1.2
52.8	173.2	2.5	1.2	1.9
52.8	173.9	3.3	1.6	2.4

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
52.8	-9.6	4.9	4.6	4.8
52.8	173.1	9.5	4.6	7.1
52.7	-1.8	0.0011	0.00084	0.00099
52.7	-0.9	0.0027	0.0026	0.0027
52.7	-9.7	0.013	0.012	0.013
52.7	-2.7	0.017	0.011	0.014
52.7	-9.6	0.077	0.071	0.074
52.7	4.7	0.14	0.17	0.16
52.7	-0.7	0.18	0.18	0.18
52.7	-131.3	0.27	0.18	0.22
52.7	-0.3	0.27	0.22	0.25
52.7	174.1	1.4	0.66	1
52.7	174.0	9.6	4.7	7.1
52.6	-1.7	0.037	0.027	0.032
52.6	-170.7	1	0.36	0.68
52.6	-171.1	610	220	410
52.5	-9.7	0.00032	0.0003	0.00031
52.5	-1.5	0.00087	0.00064	0.00076
52.5	-1.9	0.015	0.015	0.015
52.5	-1.6	0.12	0.087	0.1
52.5	-131.3	0.27	0.19	0.23
52.5	-131.4	0.39	0.27	0.33
52.5	-129.5	6.6	4.5	5.5
52.5	173.7	15	7.1	11
52.4	0.0	0.54	0.65	0.59
52.4	5.4	8.6	9.9	9.2
52.4	173.6	14	6.6	10
52.4	173.7	19	9.2	14
52.3	0.3	0.000076	0.00009	0.000083
52.3	-2.1	0.00015	0.00016	0.00015
52.3	-10.0	0.00032	0.00027	0.0003
52.3	-6.4	0.00064	0.00055	0.00059
52.3	-6.3	0.002	0.0017	0.0018
52.3	0.0	0.0024	0.0029	0.0027
52.3	-0.7	0.0026	0.0029	0.0028
52.3	-10.1	0.0056	0.0048	0.0052
52.3	-3.9	0.018	0.015	0.017
52.3	-3.4	0.034	0.026	0.03
52.3	-0.8	0.078	0.088	0.083
52.3	1.7	0.2	0.16	0.18
52.3	-131.3	0.91	0.52	0.71
52.3	175.9	190	86	140
52.2	-0.3	0.0018	0.0013	0.0015

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
52.2	1.6	0.003	0.0024	0.0027
52.2	-2.2	0.0036	0.0037	0.0036
52.2	1.4	0.007	0.0056	0.0063
52.2	-2.4	0.016	0.015	0.015
52.2	-0.6	0.025	0.018	0.021
52.2	-6.4	0.18	0.15	0.16
52.2	-10.1	0.19	0.16	0.18
52.2	1.3	0.23	0.19	0.21
52.2	-6.5	0.26	0.22	0.24
52.2	-174.6	0.45	0.22	0.33
52.2	-131.1	0.69	0.48	0.58
52.2	-174.4	0.83	0.4	0.62
52.2	-6.7	1.3	1.1	1.2
52.2	-175.1	6.9	3.4	5.1
52.2	-175.5	9.9	4.8	7.4
52.1	1.5	0.00055	0.00043	0.00049
52.1	-0.5	0.0029	0.0026	0.0027
52.1	1.6	0.0093	0.0074	0.0084
52.1	-10.0	0.047	0.041	0.044
52.1	177.7	0.16	0.055	0.11
52.1	-7.5	0.11	0.11	0.11
52.1	-176.1	0.22	0.11	0.16
52.1	-173.9	0.5	0.24	0.37
52.1	-131.2	0.9	0.51	0.71
52.1	-7.3	1.3	1.1	1.2
52.1	-7.4	1.4	1.2	1.3
52.1	1.4	2.9	2.3	2.6
52.1	-10.3	6.2	5.3	5.8
52.1	-6.6	27	23	25
52.1	177.6	260	90	180
52.0	-3.3	0.0002	0.00015	0.00018
52.0	-2.1	0.002	0.0023	0.0021
52.0	-175.7	0.0097	0.0047	0.0072
52.0	-176.6	0.023	0.011	0.017
52.0	-176.1	0.043	0.021	0.032
52.0	1.3	0.082	0.066	0.074
52.0	-176.2	0.13	0.064	0.098
52.0	-175.5	0.18	0.087	0.13
52.0	177.7	0.2	0.069	0.14
52.0	-176.0	0.22	0.11	0.16
52.0	-174.4	0.23	0.11	0.17
52.0	-174.5	0.25	0.12	0.19
52.0	-131.0	0.3	0.21	0.25

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
52.0	-175.6	0.4	0.2	0.3
52.0	-175.4	0.51	0.25	0.38
52.0	-10.5	0.61	0.52	0.56
52.0	-4.7	0.74	0.41	0.58
52.0	177.6	0.94	0.32	0.63
52.0	-174.7	1.4	0.67	1
52.0	177.5	1.5	0.52	1
52.0	179.6	1.5	0.52	1
52.0	-10.4	1.3	1.2	1.3
52.0	-7.4	1.4	1.2	1.3
52.0	-175.9	2.2	1.1	1.6
52.0	179.8	3.4	1.1	2.3
52.0	178.3	4	1.4	2.7
52.0	178.1	79	27	53
51.9	-7.9	0.0026	0.0022	0.0024
51.9	177.5	0.027	0.0093	0.018
51.9	177.3	0.044	0.015	0.029
51.9	177.7	0.077	0.026	0.051
51.9	177.8	0.082	0.028	0.055
51.9	-175.9	0.076	0.037	0.056
51.9	-176.6	0.15	0.072	0.11
51.9	-175.8	0.23	0.11	0.17
51.9	-176.1	0.27	0.13	0.2
51.9	-176.5	0.28	0.14	0.21
51.9	-176.0	0.34	0.16	0.25
51.9	-131.0	0.34	0.24	0.29
51.9	-176.4	0.44	0.21	0.33
51.9	178.5	0.62	0.21	0.41
51.9	-2.2	0.47	0.56	0.52
51.9	-177.4	2.1	1	1.6
51.9	4.1	1.4	1.8	1.6
51.9	-10.5	2.2	1.9	2
51.9	-10.4	4.1	3.5	3.8
51.9	-5.0	7.2	6.7	7
51.9	179.6	13	4.5	8.8
51.9	-4.9	14	13	14
51.8	-177.8	0.000018	0.0000088	0.000013
51.8	-0.7	0.0024	0.0027	0.0026
51.8	-9.8	0.0037	0.0032	0.0034
51.8	1.0	0.0042	0.005	0.0046
51.8	-176.9	0.0062	0.003	0.0046
51.8	-3.7	0.0063	0.0047	0.0055
51.8	-176.4	0.034	0.016	0.025

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
51.8	177.3	0.063	0.021	0.042
51.8	-176.3	0.06	0.029	0.045
51.8	-176.1	0.1	0.05	0.077
51.8	4.0	0.092	0.11	0.1
51.8	-2.3	0.13	0.15	0.14
51.8	-176.2	0.2	0.097	0.15
51.8	0.9	0.24	0.29	0.26
51.8	-176.8	0.45	0.22	0.33
51.8	178.3	0.67	0.23	0.45
51.8	-177.9	0.65	0.32	0.48
51.8	-5.1	1.7	1.6	1.7
51.8	-5.3	2.3	2.2	2.2
51.8	-5.0	21	19	20
51.8	-178.8	130	63	97
51.8	-10.5	140	120	130
51.7	-1.9	0.0019	0.0019	0.0019
51.7	-0.2	0.0023	0.003	0.0027
51.7	-9.7	0.0038	0.0033	0.0036
51.7	-1.4	0.014	0.015	0.015
51.7	-176.7	0.031	0.015	0.023
51.7	-176.4	0.034	0.016	0.025
51.7	-176.9	0.047	0.023	0.035
51.7	-178.1	0.049	0.024	0.036
51.7	-177.7	0.086	0.042	0.064
51.7	-176.5	0.11	0.056	0.085
51.7	-176.6	0.2	0.099	0.15
51.7	-177.3	0.39	0.19	0.29
51.7	-5.0	0.39	0.36	0.38
51.7	-8.7	1	0.77	0.89
51.7	0.7	1	1.2	1.1
51.7	0.9	1.2	1.5	1.3
51.7	-177.2	2.1	1	1.5
51.7	-8.9	1.8	1.4	1.6
51.7	-5.1	150	140	140
51.7	143.2	200	130	170
51.6	-178.5	0.0036	0.0017	0.0027
51.6	-1.9	0.0043	0.0043	0.0043
51.6	-3.8	0.019	0.019	0.019
51.6	-178.0	0.046	0.022	0.034
51.6	-9.7	0.046	0.039	0.042
51.6	-8.9	0.075	0.058	0.067
51.6	-9.4	0.088	0.075	0.082
51.6	-3.0	0.1	0.099	0.1

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
51.6	-178.8	0.18	0.087	0.13
51.6	-4.3	0.13	0.13	0.13
51.6	-4.2	0.14	0.14	0.14
51.6	-178.6	0.38	0.18	0.28
51.6	-9.2	0.36	0.27	0.31
51.6	-176.8	0.44	0.21	0.33
51.6	-9.1	0.37	0.28	0.33
51.6	-179.1	0.51	0.25	0.38
51.6	-9.3	0.67	0.51	0.59
51.6	-4.0	0.62	0.6	0.61
51.6	-8.7	0.72	0.55	0.64
51.6	0.0	0.69	0.9	0.8
51.6	-8.6	2.1	1.6	1.9
51.6	-10.3	17	15	16
51.5	0.1	0.0015	0.0019	0.0017
51.5	-3.6	0.0036	0.0022	0.0029
51.5	-0.1	0.046	0.06	0.053
51.5	0.0	0.094	0.12	0.1
51.5	-178.3	0.21	0.1	0.16
51.5	179.0	12	4	7.8
51.4	179.1	0.000037	0.000012	0.000025
51.4	179.4	0.00086	0.00029	0.00058
51.4	1.0	0.00061	0.00073	0.00067
51.4	179.2	0.0022	0.00076	0.0015
51.4	0.8	0.0017	0.0021	0.0019
51.4	-0.9	0.0032	0.0034	0.0033
51.4	-3.1	0.0037	0.0035	0.0036
51.4	0.7	0.021	0.026	0.024
51.4	-3.5	0.035	0.021	0.028
51.4	3.8	0.049	0.058	0.053
51.4	3.2	0.064	0.066	0.065
51.4	-1.1	0.07	0.071	0.071
51.4	-127.7	0.11	0.065	0.088
51.4	-3.4	0.35	0.21	0.28
51.4	-178.9	0.74	0.36	0.55
51.4	-3.2	0.68	0.65	0.67
51.4	-2.8	2.2	2	2.1
51.3	-179.0	0.042	0.02	0.031
51.3	-127.8	0.2	0.12	0.16
51.3	-3.1	0.23	0.22	0.23
51.3	-56.5	0.45	0.28	0.37
51.3	-179.1	0.84	0.41	0.62
51.3	0.8	0.94	1.1	1

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
51.2	-3.1	0.0019	0.0018	0.0018
51.2	-4.7	0.0028	0.0028	0.0028
51.2	-3.7	0.011	0.0058	0.0086
51.2	1.0	0.015	0.017	0.016
51.2	1.3	0.06	0.058	0.059
51.2	-4.5	0.48	0.49	0.48
51.1	-3.0	0.015	0.012	0.014
51.1	-3.1	0.63	0.52	0.57
51.1	1.4	0.67	0.65	0.66
51.1	1.0	1.3	1.5	1.4
51.0	-55.6	1.3	0.83	1.1
51.0	-4.2	2.2	2.2	2.2
51.0	-127.7	15	8.7	12
50.9	0.9	0.0013	0.0015	0.0014
50.9	0.8	0.0051	0.0059	0.0055
50.9	-1.4	0.074	0.072	0.073
50.9	-4.3	0.086	0.087	0.086
50.9	0.7	0.21	0.24	0.23
50.9	1.6	8.9	10	9.5
50.8	-0.9	0.000016	0.000018	0.000017
50.8	-1.0	0.0002	0.00023	0.00022
50.8	-0.7	0.0026	0.0026	0.0026
50.8	0.4	0.0077	0.0053	0.0065
50.8	-1.4	0.012	0.011	0.012
50.8	-1.2	0.029	0.033	0.031
50.8	-4.1	0.31	0.29	0.3
50.8	0.1	0.55	0.38	0.47
50.8	-3.9	0.66	0.67	0.66
50.8	-0.6	0.82	0.81	0.82
50.8	-1.1	0.78	0.88	0.83
50.8	0.2	1.9	1.3	1.6
50.8	-128.8	11	7.7	9.6
50.7	-2.0	0.0005	0.00037	0.00044
50.7	-1.8	0.0039	0.0029	0.0034
50.7	-1.5	0.019	0.019	0.019
50.7	-1.9	0.16	0.12	0.14
50.7	-1.4	0.36	0.36	0.36
50.7	-1.6	0.45	0.34	0.39
50.7	-2.1	0.72	0.7	0.71
50.7	-3.9	1.3	1.2	1.3
50.7	-3.8	4.8	4.5	4.6
50.6	-2.2	0.00073	0.00071	0.00072
50.6	-2.5	0.0013	0.0013	0.0013

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
50.6	-1.3	0.017	0.017	0.017
50.6	-4.6	0.021	0.012	0.017
50.6	-2.3	0.11	0.1	0.1
50.6	-3.7	0.5	0.46	0.48
50.6	-2.1	1.4	1.1	1.2
50.5	-5.0	0.79	0.44	0.62
50.5	1.6	14	17	16
50.4	-5.1	0.19	0.11	0.15
50.4	-128.0	1.4	0.85	1.1
50.4	69.2	25	31	28
50.3	-5.3	0.009	0.005	0.007
50.3	-127.8	0.024	0.014	0.019
50.3	-4.9	0.55	0.3	0.43
50.3	-5.1	5.3	2.9	4.1
50.3	-5.0	5.9	3.3	4.6
50.2	-5.1	0.6	0.54	0.57
50.2	-5.3	1	0.56	0.79
50.2	64.1	0.69	1.5	1.1
50.2	-127.9	2.7	1.6	2.2
50.1	-124.8	0.2	0.24	0.22
50.0	-127.6	1.5	0.85	1.2
49.9	-6.4	0.24	0.23	0.24
49.9	-127.3	2.6	1.6	2.1
49.9	-125.0	2	2.4	2.2
49.9	-6.3	7.1	6.9	7
49.8	-126.4	0.012	0.0094	0.011
49.8	0.4	0.049	0.06	0.054
49.8	-53.2	470	380	430
49.7	-2.2	0.0022	0.0022	0.0022
49.7	-2.3	34	34	34
49.6	-126.8	0.056	0.043	0.049
49.6	-2.3	0.27	0.26	0.26
49.6	-53.8	1.1	1	1.1
49.6	-124.7	9.8	14	12
49.5	-1.1	0.03	0.031	0.031
49.5	-126.0	0.035	0.035	0.035
49.5	-2.3	0.034	0.036	0.035
49.5	-124.9	1.7	2.4	2
49.4	-2.4	0.00015	0.00015	0.00015
49.4	-2.2	0.0066	0.0071	0.0069
49.4	-123.7	0.27	0.37	0.32
49.3	-2.3	0.71	0.76	0.74
49.3	-124.1	1.2	1.5	1.4

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
49.3	-53.5	2.9	2.4	2.6
49.3	-2.2	10	11	10
49.2	-123.9	0.27	0.36	0.32
49.2	-2.1	0.32	0.34	0.33
49.2	-126.1	0.84	0.82	0.83
49.2	-123.1	5.6	8.1	6.8
49.0	83.8	1.5	2.2	1.9
49.0	-123.6	4.1	7.2	5.6
48.9	-1.8	1.1	1.3	1.2
48.9	-125.3	2.2	2.2	2.2
48.9	-123.3	7.9	12	9.8
48.9	-3.5	32	34	33
48.7	-123.6	0.15	0.2	0.17
48.7	-2.3	0.48	0.55	0.52
48.7	-3.9	2.1	2.1	2.1
48.7	-125.3	4.8	4.7	4.7
48.6	-4.6	0.0078	0.0081	0.008
48.6	-2.2	0.013	0.015	0.014
48.6	-123.4	1.5	2.3	1.9
48.5	-5.1	0.44	0.45	0.45
48.4	-4.9	4.3	4.4	4.3
48.4	-123.3	4.8	4.3	4.5
48.3	-4.6	0.62	0.65	0.64
48.2	153.2	1000	560	800
48.1	-4.6	0.3	0.3	0.3
48.1	-52.8	69	53	61
48.0	-66.2	2.1	2.3	2.2
48.0	-64.8	2.3	2.5	2.4
47.8	-65.3	0.94	0.95	0.94
47.8	84.6	4.1	6.1	5.1
47.7	-3.3	0.31	0.33	0.32
47.6	-52.7	13	9.8	11
47.4	-2.4	8.1	11	9.4
47.3	-122.8	37	59	48
47.2	-65.0	0.15	0.2	0.18
47.2	-52.8	140	150	140
47.1	38.1	0.54	1.3	0.94
47.0	37.3	0.049	0.12	0.085
47.0	-55.2	7.6	7.2	7.4
46.9	-55.6	0.45	0.43	0.44
46.9	-56.1	1.1	0.88	1
46.9	-54.7	2	1.7	1.8
46.9	51.7	8.7	22	15

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
46.8	-64.0	0.038	0.045	0.042
46.8	-64.5	0.19	0.25	0.22
46.8	36.8	1.7	4.2	2.9
46.8	-54.2	43	38	41
46.7	-60.3	0.48	0.57	0.52
46.6	-61.1	0.65	0.84	0.75
46.6	36.3	2.1	5.2	3.6
46.5	-64.7	0.0019	0.0024	0.0022
46.5	-63.8	2.2	2.8	2.5
46.5	31.6	4.4	11	7.7
46.5	38.4	5.3	13	9.3
46.4	-61.3	0.52	0.67	0.6
46.4	81.0	1.2	1.9	1.6
46.4	-60.4	2.9	3.4	3.2
46.3	61.0	0.034	0.084	0.059
46.3	35.3	3.4	8.4	5.9
46.3	49.5	4.3	11	7.4
46.3	31.8	7.5	19	13
46.2	34.6	0.99	2.4	1.7
46.2	81.8	1.5	2.4	1.9
46.1	-59.8	0.96	1.1	1
46.0	30.2	3.1	7.7	5.4
46.0	33.2	4.9	12	8.6
45.9	-60.1	0.47	0.53	0.5
45.9	-59.9	0.56	0.63	0.6
45.8	30.0	0.36	0.87	0.61
45.7	-60.2	0.2	0.22	0.21
45.6	-60.7	0.55	0.55	0.55
45.5	13.7	0.0015	0.0032	0.0024
45.4	141.0	0.017	0.015	0.016
45.4	32.6	0.23	0.57	0.4
45.4	32.5	0.65	1.6	1.1
45.3	35.9	3.2	7.9	5.5
45.2	142.3	0.0096	0.0075	0.0085
45.2	141.2	0.11	0.089	0.097
45.2	-66.1	2.1	2.1	2.1
45.2	48.0	1.5	3.7	2.6
45.2	37.1	17	42	30
45.1	-61.6	0.78	0.79	0.79
45.1	-66.9	16	13	14
45.0	35.3	0.11	0.27	0.19
45.0	142.5	0.85	0.66	0.76
45.0	48.3	3.4	8.6	6

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
45.0	-66.7	35	30	33
45.0	-85.4	140	160	150
44.9	50.4	0.14	0.36	0.25
44.8	-124.2	190	140	160
44.7	-1.1	0.13	0.22	0.18
44.7	-66.8	27	26	26
44.5	46.8	0.086	0.21	0.15
44.5	-67.1	0.95	0.71	0.83
44.4	28.6	0.065	0.16	0.11
44.4	141.3	33	39	36
44.3	145.3	7.9	4.8	6.4
44.2	-66.4	9.4	9.5	9.5
44.0	28.6	0.031	0.077	0.054
44.0	-59.9	4.8	5	4.9
43.7	141.3	0.04	0.048	0.044
43.7	28.6	0.033	0.071	0.052
43.7	76.6	3.8	8	5.9
43.6	-8.2	0.00032	0.00042	0.00037
43.6	28.6	0.039	0.082	0.06
43.6	-6.0	0.54	0.63	0.59
43.6	-7.1	0.88	1	0.96
43.5	-1.6	0.00012	0.0002	0.00016
43.5	-4.0	0.00036	0.00054	0.00045
43.5	4.3	0.28	0.69	0.48
43.5	-65.8	0.78	0.63	0.7
43.5	4.0	1.1	2.8	2
43.5	59.8	1.6	4.1	2.8
43.5	4.6	2	5	3.5
43.4	-2.7	0.00091	0.0016	0.0012
43.4	-4.8	0.23	0.34	0.29
43.4	-1.7	1.3	2.2	1.7
43.3	145.6	0.25	0.19	0.22
43.3	145.7	2.2	1.7	1.9
43.3	145.8	7.2	5.5	6.4
43.2	5.4	0.000091	0.00026	0.00018
43.2	145.5	0.21	0.16	0.19
43.2	-8.9	1.7	2.3	2
43.2	145.6	39	29	34
43.1	145.2	0.8	0.61	0.71
43.1	3.1	0.45	1.1	0.78
43.1	145.1	1.3	1.2	1.3
43.0	9.4	0.0084	0.021	0.015
43.0	145.0	0.1	0.11	0.1

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
43.0	144.4	0.77	0.69	0.73
43.0	6.3	0.64	1.4	1
43.0	131.8	34	40	37
43.0	144.9	47	43	45
42.9	144.4	0.054	0.049	0.052
42.9	144.5	0.063	0.057	0.06
42.9	3.0	1.4	3.5	2.5
42.6	27.6	0.0067	0.017	0.012
42.4	-9.0	1	1.3	1.1
42.3	141.0	0.004	0.0048	0.0044
42.3	8.6	0.46	1.1	0.81
42.3	-8.9	5.4	6.7	6
42.2	3.1	0.64	1.6	1.1
42.1	9.5	1.5	3.8	2.7
42.0	3.2	1.8	3.5	2.6
41.9	19.4	0.0036	0.0089	0.0062
41.9	19.3	0.0053	0.013	0.0092
41.9	8.6	0.14	0.36	0.25
41.9	143.2	0.3	0.28	0.29
41.9	12.2	1.7	4.1	2.9
41.8	123.4	0.0025	0.0054	0.004
41.8	19.6	0.0045	0.011	0.0078
41.8	140.7	0.043	0.063	0.053
41.8	57.4	3.1	7.7	5.4
41.6	36.1	0.0074	0.023	0.015
41.6	9.4	0.23	0.58	0.41
41.4	139.8	0.22	0.32	0.27
41.4	9.2	0.65	1.5	1.1
41.3	141.3	0.0025	0.0038	0.0032
41.3	2.1	1	2.5	1.8
41.2	29.5	0.27	0.66	0.46
41.1	37.8	0.14	0.33	0.23
41.1	28.5	0.64	1.6	1.1
41.1	28.7	14	35	24
41.0	25.3	2.2	5.6	3.9
41.0	66.9	6	15	11
40.9	68.8	2.6	6.4	4.5
40.9	26.0	12	29	20
40.8	52.9	0.041	0.1	0.072
40.8	-72.8	13	23	18
40.8	26.2	14	34	24
40.7	62.8	1.1	2.8	2
40.7	0.7	4.6	11	8

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
40.5	141.6	0.049	0.082	0.066
40.1	4.0	0.35	0.88	0.61
40.0	25.1	0.0049	0.012	0.0086
39.9	22.7	0.006	0.015	0.011
39.9	0.7	0.081	0.2	0.14
39.8	3.4	0.1	0.26	0.18
39.7	142.0	0.0023	0.0036	0.0029
39.7	3.4	0.077	0.19	0.13
39.7	-74.2	5.6	11	8.5
39.5	2.5	0.054	0.14	0.095
39.5	2.8	0.21	0.52	0.36
39.5	20.2	0.74	1.9	1.3
39.5	19.9	0.96	2.4	1.7
39.3	-0.3	5.2	13	9.1
39.2	2.9	0.13	0.33	0.23
39.2	109.9	0.42	0.82	0.62
39.0	73.5	0.0048	0.0055	0.0051
39.0	1.6	0.0064	0.016	0.011
38.9	24.5	0.0054	0.014	0.0095
38.7	-27.2	0.0011	0.0016	0.0014
38.7	1.4	0.068	0.17	0.12
38.7	26.8	0.35	0.86	0.61
38.7	1.5	0.37	0.92	0.64
38.6	141.4	0.00022	0.00041	0.00032
38.6	25.6	0.21	0.53	0.37
38.5	0.2	0.0018	0.0053	0.0036
38.5	26.9	1.3	3.3	2.3
38.4	48.8	1.9	4.6	3.2
38.3	141.5	3	5.7	4.4
38.1	-0.7	0.12	0.3	0.21
38.0	12.3	0.0045	0.013	0.0087
37.8	-0.8	0.011	0.028	0.02
37.8	20.7	0.17	0.42	0.29
37.6	-1.0	0.045	0.11	0.078
37.5	73.7	0.0029	0.0033	0.0031
37.5	8.9	0.0039	0.0098	0.0069
37.5	53.9	0.71	1.8	1.2
37.5	27.4	2.2	5.5	3.8
37.5	27.2	2.8	6.9	4.8
37.4	-76.3	3.3	8.2	5.7
37.4	49.5	5.9	15	10
37.3	26.8	0.11	0.27	0.19
37.3	53.9	3.2	8	5.6

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
37.3	49.9	3.3	8.4	5.9
37.2	-7.4	1.2	2.9	2
37.1	10.8	0.00099	0.0025	0.0017
37.0	26.4	0.0035	0.0086	0.006
37.0	21.7	1.4	3.4	2.4
36.8	53.8	0.0021	0.0052	0.0037
36.8	12.0	0.046	0.11	0.08
36.7	25.0	0.0041	0.014	0.0091
36.6	26.4	0.0024	0.0063	0.0044
36.6	136.6	0.31	0.77	0.54
36.6	-6.3	2.7	6	4.3
36.6	52.0	26	66	46
36.5	136.5	0.31	0.77	0.54
36.4	27.4	0.0021	0.0053	0.0037
36.2	138.0	0.00011	0.00026	0.00019
36.2	26.7	0.00037	0.0013	0.00083
36.2	23.1	0.095	0.24	0.17
36.0	-3.0	0.016	0.039	0.028
35.9	139.6	0.31	0.77	0.54
35.9	-75.6	8.6	21	15
35.7	-1.1	0.0049	0.012	0.0086
35.7	-121.4	350	270	310
35.6	139.8	0.31	0.77	0.54
35.6	140.1	0.61	1.5	1.1
35.5	134.2	0.31	0.77	0.54
35.4	27.0	0.0059	0.015	0.01
35.4	136.8	0.31	0.77	0.54
35.3	-1.4	0.012	0.03	0.021
35.2	-2.4	0.71	1.8	1.2
35.2	-2.9	1.4	3.5	2.4
35.1	-2.4	0.24	0.59	0.41
35.0	138.4	0.61	1.5	1.1
34.9	24.1	0.23	0.57	0.4
34.8	11.2	7.5	19	13
34.7	128.4	0.2	0.47	0.33
34.7	133.9	0.31	0.77	0.54
34.5	35.8	0.0018	0.0044	0.0031
34.4	10.3	0.7	1.7	1.2
34.3	134.0	0.31	0.77	0.54
34.2	139.2	0.00022	0.00055	0.00038
34.2	130.1	0.00065	0.0018	0.0012
34.2	132.2	0.31	0.77	0.54
34.1	134.6	1.6	4	2.8

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
33.7	10.6	16	39	27
33.6	131.2	0.31	0.77	0.54
33.6	131.3	0.31	0.77	0.54
33.6	10.8	5.6	14	9.8
33.5	133.5	0.31	0.77	0.54
33.3	131.6	0.61	1.5	1.1
33.1	139.7	0.00036	0.00091	0.00064
32.9	35.1	1.1	2.7	1.9
32.6	34.9	7.8	19	14
32.5	34.9	3.4	8.6	6
32.4	-117.4	0.39	0.59	0.49
32.4	-64.7	0.28	0.71	0.5
32.2	23.3	0.0012	0.0029	0.0021
32.0	131.4	0.61	1.5	1.1
31.8	-116.8	0.034	0.066	0.05
31.5	30.8	0.14	0.34	0.24
31.3	32.1	33	81	57
31.2	32.3	7.5	19	13
31.2	33.0	24	60	42
31.1	29.9	0.017	0.043	0.03
31.1	33.4	6.9	17	12
30.8	19.9	0.05	0.13	0.088
30.8	-116.2	0.41	0.78	0.59
30.5	140.3	28	70	49
30.3	32.3	0.13	0.33	0.23
30.2	48.7	1.2	3	2.1
30.0	122.2	0.000082	0.00021	0.00014
29.9	48.5	0.005	0.013	0.0088
29.8	-115.8	43	120	83
29.3	50.4	0.073	0.18	0.13
29.2	50.8	0.32	0.8	0.56
29.2	-113.3	310	770	540
29.1	48.5	0.0053	0.013	0.0092
29.0	-118.3	0.4	1	0.72
29.0	50.9	1.5	3.7	2.6
28.7	-95.8	13	31	22
28.4	-82.8	4.6	12	8.1
28.4	-177.3	460	1200	810
28.3	-177.6	0.14	0.36	0.25
28.3	-115.2	0.19	0.46	0.32
28.3	-115.6	0.98	2.6	1.8
28.3	-114.4	480	1200	840
28.2	51.3	5.2	13	9

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
28.1	-114.3	9.6	24	17
27.9	34.6	0.013	0.033	0.023
27.9	-115.2	44	120	83
27.8	51.5	0.49	1.2	0.85
27.7	142.1	0.14	0.36	0.25
27.6	142.2	0.0075	0.019	0.013
27.5	33.8	0.85	2.1	1.5
27.4	49.9	1.8	4.5	3.2
27.3	49.7	15	38	26
27.1	-114.4	0.31	0.77	0.54
27.1	56.8	0.38	0.96	0.67
27.0	49.7	0.17	0.42	0.29
26.9	-77.6	0.2	0.5	0.35
26.9	-173.2	31	79	55
26.9	-114.0	43	120	83
26.8	55.7	1.2	3.1	2.1
26.8	53.4	6.4	16	11
26.7	50.2	15	38	27
26.6	-78.5	0.0033	0.0083	0.0058
26.3	127.8	0.00089	0.0022	0.0016
25.9	50.5	0.093	0.23	0.16
25.8	-171.8	200	500	350
25.7	123.5	0.01	0.026	0.018
25.7	57.7	0.15	0.38	0.27
25.7	50.8	380	1000	710
25.4	51.6	0.00046	0.0012	0.00081
25.3	60.3	0.32	0.8	0.56
25.3	50.7	17	47	32
25.0	-115.7	0.049	0.12	0.086
24.8	141.3	0.012	0.037	0.025
24.8	125.3	0.8	2	1.4
24.7	125.3	0.00073	0.0018	0.0013
24.7	51.6	0.015	0.041	0.028
24.7	35.2	0.02	0.05	0.035
24.5	121.8	0.0024	0.006	0.0042
24.4	35.4	0.013	0.033	0.023
24.4	-164.9	0.15	0.38	0.27
24.4	-111.8	11	27	19
24.2	123.6	2.4	6	4.2
23.9	38.2	0.046	0.12	0.081
23.6	36.2	0.013	0.033	0.023
23.5	117.7	0.022	0.054	0.038
23.4	117.1	0.053	0.13	0.092

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
23.3	-163.9	8.7	22	15
22.8	36.2	0.019	0.046	0.032
22.5	114.4	0.011	0.027	0.019
22.1	-159.5	10	26	18
22.0	-75.2	0.14	0.35	0.25
21.9	-71.8	0.034	0.084	0.059
21.9	-160.2	0.92	2.5	1.7
21.8	-71.8	0.056	0.14	0.098
21.7	-71.5	0.015	0.036	0.025
21.5	-71.1	0.052	0.13	0.091
21.4	-157.7	0.21	0.62	0.41
21.4	39.2	0.36	0.89	0.62
21.4	-71.1	1.4	3.5	2.5
21.2	-71.3	0.045	0.11	0.079
21.2	-71.8	0.33	0.81	0.57
21.0	-17.0	5.7	14	10
20.8	37.3	0.077	0.19	0.13
20.1	-16.3	18	45	31
20.0	-71.8	0.0057	0.014	0.01
19.7	-80.0	3.7	9.3	6.5
19.3	-110.8	0.51	1.3	0.91
19.3	166.6	11	27	19
19.1	-104.3	22	59	41
19.0	41.1	0.04	0.099	0.07
18.8	-111.0	0.0016	0.0047	0.0032
18.8	38.0	0.075	0.19	0.13
18.5	-66.5	0.0034	0.0086	0.006
18.5	-67.0	0.089	0.22	0.16
18.5	-64.7	0.67	1.7	1.2
18.4	-72.3	0.035	0.096	0.066
18.4	-65.0	0.15	0.37	0.26
18.4	-75.0	1.1	2.8	1.9
18.4	-114.7	1.5	3.6	2.5
18.3	-68.7	0.047	0.12	0.082
18.3	-63.0	0.083	0.21	0.14
18.3	-65.3	0.5	1.3	0.88
18.3	-65.0	0.84	2.1	1.5
18.3	-63.2	1.5	3.7	2.6
18.3	-63.3	5.5	14	9.6
18.2	-63.2	0.013	0.033	0.023
18.1	-63.2	0.00063	0.0016	0.0011
18.1	-63.0	0.051	0.13	0.09
18.1	-67.9	0.56	1.4	0.98

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
18.1	-63.1	0.69	1.7	1.2
18.0	-66.9	0.0024	0.0061	0.0042
18.0	-62.9	0.013	0.032	0.022
18.0	-67.1	0.021	0.054	0.038
18.0	-63.1	0.3	0.75	0.53
18.0	-63.0	0.63	1.6	1.1
17.9	-62.8	0.0095	0.024	0.017
17.9	-62.9	0.028	0.07	0.049
17.8	-64.7	0.0076	0.019	0.013
17.8	41.9	0.012	0.03	0.021
17.8	-71.5	2.1	5.2	3.6
17.7	-64.7	0.0019	0.0047	0.0033
17.7	-77.2	0.09	0.22	0.16
17.6	-63.2	0.0003	0.00091	0.00061
17.6	-63.3	0.013	0.032	0.022
17.6	-61.8	1.3	3.2	2.2
17.5	-63.0	0.16	0.41	0.29
17.4	-76.0	2.2	5.5	3.9
17.4	-16.1	9.4	24	16
17.3	-62.7	0.19	0.46	0.32
17.2	-61.9	0.041	0.1	0.071
17.1	-61.9	0.018	0.046	0.032
17.1	-61.8	0.023	0.057	0.04
17.1	-61.7	0.047	0.12	0.083
17.1	-78.6	2	5	3.5
16.9	42.5	0.016	0.039	0.027
16.9	-62.3	0.3	0.76	0.53
16.8	42.0	0.87	2.2	1.5
16.7	-169.5	28	70	49
16.6	-24.6	0.013	0.034	0.023
16.6	-16.4	0.21	0.52	0.36
16.5	-61.5	0.022	0.057	0.04
16.4	-61.8	0.16	0.4	0.28
16.3	-61.3	0.00027	0.00067	0.00047
16.3	-61.2	0.013	0.034	0.024
16.2	-16.4	0.1	0.25	0.18
16.0	-61.3	0.098	0.25	0.17
16.0	-16.5	0.16	0.4	0.28
15.9	-16.5	1.2	2.9	2
15.7	40.1	0.29	0.74	0.52
15.5	145.9	4.5	11	7.9
15.4	74.0	0.034	0.085	0.06
15.3	-61.4	0.013	0.032	0.022

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
15.1	-16.9	0.071	0.18	0.12
15.0	-24.4	0.0015	0.0038	0.0026
15.0	-23.7	0.011	0.028	0.02
14.8	-60.9	0.028	0.07	0.049
14.8	-17.5	0.89	2.2	1.6
14.7	-60.9	0.0062	0.015	0.011
14.7	-17.5	0.024	0.062	0.043
14.4	-61.0	0.042	0.11	0.074
14.4	-17.0	0.17	0.42	0.29
14.4	-60.8	0.42	1.1	0.74
14.1	-16.8	0.3	0.74	0.52
13.9	-16.6	9.4	24	16
13.7	-60.9	0.0088	0.022	0.015
13.3	-59.6	0.00034	0.001	0.00069
13.0	-61.1	0.64	1.6	1.1
12.9	-61.1	0.16	0.4	0.28
12.8	-61.3	0.21	0.53	0.37
12.6	-61.4	0.0063	0.016	0.011
12.5	-70.0	0.042	0.11	0.074
12.5	53.8	0.66	1.8	1.2
12.4	-69.1	0.004	0.0099	0.0069
12.4	43.4	0.1	0.25	0.18
12.4	-69.9	0.5	1.3	0.88
12.3	-68.4	0.015	0.038	0.026
12.2	-68.3	0.0043	0.011	0.0074
12.1	-68.9	0.0017	0.0042	0.003
12.1	-68.3	0.026	0.064	0.045
12.0	-68.7	0.0022	0.0055	0.0039
11.5	-83.7	0.25	0.61	0.43
11.5	43.5	4.3	11	7.4
11.4	-60.5	0.22	0.55	0.38
11.3	-60.5	0.23	0.58	0.41
11.3	-16.0	1.6	4	2.8
11.2	47.3	1.1	2.7	1.9
10.6	-15.4	1.6	4	2.8
10.5	107.0	0.17	0.42	0.3
10.5	-14.6	0.18	0.46	0.32
10.5	-61.5	0.22	0.54	0.38
9.4	-13.8	0.16	0.39	0.27
8.7	-83.5	0.078	0.2	0.14
8.2	-12.9	0.12	0.29	0.2
8.2	119.1	2.1	5.2	3.6
8.2	-119.1	2.9	7.4	5.2

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
7.3	-80.1	0.015	0.038	0.026
6.5	2.0	0.053	0.13	0.092
6.4	-162.4	8	20	14
5.9	1.0	0.46	1.1	0.8
5.9	-162.1	56	140	97
5.8	0.5	1.5	3.8	2.6
5.6	-0.1	0.2	0.51	0.36
5.5	-0.3	1.8	4.5	3.2
5.4	132.2	1.6	3.9	2.7
5.3	-0.7	0.93	2.3	1.6
4.9	-2.3	0.073	0.18	0.13
4.8	-51.9	0.64	1.6	1.1
4.4	6.0	0.00088	0.0022	0.0015
4.0	-81.6	13	31	22
3.0	131.8	1.2	3.1	2.2
2.0	45.1	0.055	0.14	0.096
2.0	-157.3	230	570	400
1.4	7.3	130	340	230
0.8	-176.6	13	32	22
0.6	9.5	0.096	0.24	0.17
0.2	-176.5	830	2100	1500
-0.3	-160.0	63	160	110
-0.5	-80.4	0.0022	0.0056	0.0039
-0.8	36.4	0.045	0.052	0.048
-0.8	-91.1	13	33	23
-1.3	-81.1	0.026	0.064	0.045
-1.4	5.6	0.49	1.2	0.85
-2.2	-81.0	0.02	0.049	0.034
-2.5	-44.2	0.19	0.47	0.33
-3.2	40.1	0.062	0.15	0.11
-3.2	-80.4	2.5	6.2	4.3
-3.3	40.1	0.099	0.25	0.17
-3.6	-171.6	0.21	0.51	0.36
-3.6	-174.0	6.9	17	12
-3.7	55.2	12	30	21
-3.7	-170.7	50	130	88
-3.8	-32.4	4.5	11	7.8
-3.9	-33.8	4	10	7
-4.1	-155.0	4.4	11	7.6
-4.2	55.7	12	29	20
-4.3	55.7	3.3	8.6	6
-4.6	55.9	0.17	0.42	0.29
-5.2	154.6	0.0012	0.0035	0.0024

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-5.5	130.3	4.7	12	8.3
-5.6	-155.9	77	190	140
-6.1	124.6	8.3	21	15
-6.2	39.5	0.048	0.12	0.083
-6.8	39.3	0.34	0.85	0.59
-6.9	39.9	2.1	5.3	3.7
-6.9	122.2	3.8	9.4	6.6
-7.3	72.4	8.3	21	15
-7.9	-14.3	2.6	6.5	4.6
-8.0	39.5	0.29	0.72	0.51
-8.0	-14.4	5.1	13	8.9
-8.2	157.9	210	530	370
-8.9	-139.6	26	64	45
-9.2	-78.6	0.06	0.11	0.083
-9.4	46.4	4.7	12	8.3
-9.4	-140.1	13	32	23
-9.7	47.6	33	83	58
-10.0	-138.8	0.018	0.045	0.032
-10.0	-150.2	15	37	26
-10.1	-152.4	1.6	4	2.8
-10.2	51.1	7.7	19	14
-10.5	105.6	16	41	29
-10.8	142.2	21	52	37
-11.5	47.4	1.3	3.2	2.3
-12.1	96.7	8.9	22	16
-12.2	48.9	0.3	0.74	0.52
-12.3	43.7	0.0014	0.0042	0.0028
-13.1	48.8	0.024	0.061	0.043
-13.7	-172.4	55	140	99
-14.0	-76.4	870	960	910
-15.8	-39.0	11	29	20
-15.9	137.2	11	28	20
-16.0	-5.8	0.017	0.026	0.022
-16.0	45.7	0.15	0.37	0.26
-16.1	45.3	0.3	0.74	0.52
-16.2	-146.4	0.018	0.045	0.032
-16.6	59.6	0.97	2.4	1.7
-17.1	-61.9	0.01	0.025	0.017
-17.1	-149.6	1.4	3.4	2.4
-17.1	42.7	100	260	180
-17.4	178.4	0.5	1.3	0.88
-17.5	44.1	0.19	0.47	0.33
-17.8	-143.1	0.19	0.47	0.33

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-18.0	179.3	0.0022	0.0057	0.004
-18.1	179.3	0.0003	0.00078	0.00054
-18.2	146.0	17	44	31
-18.3	43.9	0.041	0.1	0.071
-19.3	-70.3	870	1200	1000
-19.6	119.9	50	130	89
-19.8	57.8	12	30	21
-19.9	57.8	1	2.7	1.9
-20.1	-70.5	1300	2700	2000
-20.5	164.0	0.17	0.56	0.37
-20.9	165.5	0.049	0.12	0.085
-20.9	165.6	0.18	0.48	0.33
-21.0	55.5	0.0014	0.0042	0.0028
-21.1	55.6	0.0076	0.02	0.014
-21.7	55.6	0.0014	0.0042	0.0028
-21.7	159.0	9.1	23	16
-21.7	-70.1	930	1900	1400
-21.8	55.5	0.14	0.36	0.25
-21.8	-154.7	0.22	0.58	0.4
-21.8	35.4	1.1	2.8	2
-21.8	14.0	29	67	48
-22.3	177.4	0.0071	0.018	0.012
-22.3	40.4	11	28	19
-22.4	172.1	0.075	0.19	0.13
-22.6	169.0	1.1	2.9	2
-22.7	14.6	340	800	570
-22.8	14.5	0.42	0.97	0.7
-22.8	-70.4	870	1000	940
-23.0	14.5	0.75	1.7	1.2
-23.0	167.0	2.3	6.5	4.4
-23.2	-137.1	0.018	0.045	0.032
-23.2	-135.0	0.095	0.24	0.17
-23.3	14.5	14	33	24
-23.9	-130.8	0.66	1.7	1.2
-24.3	-128.3	4.6	12	8.1
-24.7	-127.4	2.6	2.7	2.7
-24.7	-124.8	72	180	130
-25.1	44.2	0.39	0.97	0.68
-25.7	14.8	58	130	95
-26.3	-80.1	1.5	2	1.8
-26.3	14.9	180	420	300
-26.6	15.1	1.9	3.6	2.7
-27.0	15.2	31	58	44

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
-27.6	-144.3	0.013	0.03	0.021
-28.0	32.5	0.092	0.23	0.16
-28.6	16.5	11	21	16
-28.8	32.0	0.18	0.45	0.31
-29.0	168.0	4.2	7.3	5.7
-29.3	-177.8	5.3	11	8.2
-29.3	-177.9	380	800	590
-30.2	-178.5	1.7	1.8	1.7
-31.0	-50.7	0.1	0.25	0.18
-31.5	159.1	10	21	16
-31.9	152.6	0.027	0.059	0.043
-32.1	18.3	35	64	50
-32.2	125.7	1.3	3.2	2.2
-32.8	18.3	0.37	0.67	0.52
-33.2	18.1	210	380	300
-33.5	115.0	38	65	51
-33.8	18.5	0.21	0.39	0.3
-33.8	18.4	14	26	20
-33.8	-80.8	77	85	81
-33.8	26.0	900	1600	1200
-33.9	25.6	0.38	0.67	0.53
-34.1	18.5	28	50	39
-34.2	18.5	0.096	0.12	0.11
-34.7	20.0	0.15	0.25	0.2
-34.7	19.4	260	420	340
-34.8	-54.7	0.029	0.06	0.045
-35.5	174.7	8.9	14	11
-35.8	137.1	15	22	19
-35.9	174.7	1.8	1.9	1.8
-36.2	175.4	0.55	0.87	0.71
-36.2	174.1	83	86	84
-36.4	175.2	1	1.1	1.1
-36.6	175.9	0.000015	0.000022	0.000018
-36.7	175.7	2.1	3	2.5
-37.1	-12.3	11	10	11
-37.3	-12.7	77	70	73
-37.3	12.5	2400	3000	2700
-37.4	-12.5	100	92	97
-37.6	-57.3	0.031	0.052	0.041
-37.6	149.9	1.2	1.6	1.4
-37.8	77.6	0.039	0.037	0.038
-37.8	77.5	1300	1300	1300
-37.9	77.5	3.6	3.5	3.6

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-38.0	-57.6	0.13	0.22	0.17
-38.4	-73.9	0.51	0.59	0.55
-38.6	143.3	22	23	22
-38.7	77.5	0.0022	0.0021	0.0022
-38.7	177.9	13	14	13
-38.8	-62.0	0.44	1.1	0.77
-39.5	146.7	45	51	48
-40.2	-62.3	0.2	0.49	0.35
-40.3	-9.9	26	24	25
-40.5	172.9	0.14	0.15	0.14
-40.7	173.9	250	260	250
-40.9	173.9	0.77	0.96	0.86
-41.2	173.9	0.39	0.33	0.36
-41.3	174.8	0.0013	0.0014	0.0014
-41.5	-65.0	0.78	1.9	1.4
-41.8	171.6	19	19	19
-42.1	171.3	0.45	0.43	0.44
-42.5	-64.1	35	95	65
-43.1	-64.5	8.1	21	15
-43.6	146.7	20	13	16
-43.7	146.7	2100	1400	1800
-44.3	-176.2	86	89	88
-45.1	-66.5	99	160	130
-46.0	50.5	0.71	0.21	0.46
-46.0	166.8	9.5	9.9	9.7
-46.1	50.3	73	22	47
-46.2	50.3	16000	4800	10000
-46.4	50.4	2.9	0.86	1.9
-46.4	52.2	110	31	69
-46.4	51.8	13000	3900	8400
-46.5	51.8	5200	1500	3400
-46.5	52.2	11000	3300	7300
-46.6	166.9	25	19	22
-46.6	37.9	300	110	200
-46.8	167.6	37	36	37
-46.8	37.8	1400	530	970
-46.9	37.8	8800	3300	6100
-47.7	-75.7	0.023	0.017	0.02
-47.8	179.1	300	320	310
-48.0	166.6	660	640	650
-48.6	68.7	35	11	23
-48.7	69.0	0.11	0.036	0.074
-49.0	65.0	13000	4100	8300

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-49.2	70.4	0.23	0.076	0.15
-49.5	70.0	0.99	0.32	0.66
-49.6	69.4	0.021	0.0068	0.014
-49.6	68.8	0.36	0.12	0.24
-49.6	178.8	0.53	0.68	0.61
-49.7	70.0	0.36	0.12	0.24
-49.7	178.8	220	270	250
-50.3	-68.9	48	39	43
-50.6	166.0	490	240	360
-50.7	166.1	30	15	22
-50.7	166.2	41	20	30
-50.8	-75.2	2.2	1.3	1.8
-51.0	-61.2	1200	720	950
-51.1	-61.2	5900	3600	4800
-51.7	-61.3	23	14	19
-52.0	-60.0	16000	9500	13000
-52.4	-68.4	43	34	38
-52.5	169.2	40	18	29
-52.6	169.1	200	91	150
-52.8	-59.2	1700	1100	1400
-53.0	73.3	0.93	0.2	0.57
-53.1	72.6	5400	1200	3300
-53.1	73.5	6000	1300	3700
-54.0	-37.0	81000	16000	48000
-54.3	-36.8	220	42	130
-54.4	3.3	3.6	0.23	1.9
-54.4	3.4	750	48	400
-54.6	158.9	6400	2100	4200
-54.7	-64.5	1.9	1	1.5
-54.7	158.9	16000	5300	11000
-54.8	-67.7	1	0.54	0.78
-54.8	-64.3	360	200	280
-55.1	158.7	6.7	2.2	4.4
-55.6	-27.0	18	3.5	11
-55.8	-69.3	400	210	310
-55.9	-67.3	340	180	260
-56.3	-27.6	3400	670	2100
-56.5	-68.9	1500	800	1100
-57.1	-26.8	0.4	0.078	0.24
-57.1	-26.7	2.5	0.2	1.4
-57.8	-26.5	33000	2700	18000
-59.5	-27.3	280	22	150
-60.5	-45.5	33	6.3	20

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-60.6	-46.7	6.5	1.3	3.9
-60.6	-45.3	27	5.3	16
-60.6	-45.0	37	7.1	22
-60.6	-45.2	59	11	35
-60.6	-44.8	96	19	57
-60.6	-46.1	250	48	150
-60.6	-45.9	290	55	170
-60.6	-46.0	410	79	240
-60.6	-45.5	2300	440	1300
-60.7	-45.1	7.7	1.5	4.6
-60.7	-45.3	50	9.6	30
-60.7	-45.2	86	17	52
-60.7	-45.7	110	21	66
-60.7	-44.6	190	37	110
-60.7	-44.7	210	40	120
-60.7	-44.4	460	88	270
-60.7	-44.5	580	110	350
-60.7	-45.6	680	130	400
-60.7	-46.0	1200	230	720
-60.7	-44.8	2300	440	1400
-60.7	-45.0	8200	1600	4900
-60.8	-44.5	10	1.9	6
-60.8	-45.0	15	3	9.2
-60.8	-45.7	26	5	15
-60.8	-44.8	31	6.1	19
-60.8	-44.6	240	46	140
-60.8	-45.2	230	44	140
-60.8	-44.7	450	87	270
-60.9	-55.4	200	31	110
-61.0	-54.4	14	2.2	8.3
-61.2	-53.0	0.0039	0.0006	0.0022
-61.2	-54.0	22	3.5	13
-61.2	-55.0	3800	590	2200
-61.3	-54.1	0.7	0.11	0.4
-61.3	-54.0	1500	230	860
-61.5	-50.9	230	36	130
-61.5	-55.5	280	43	160
-61.9	-57.8	110	23	68
-61.9	-57.7	210	44	130
-61.9	-58.0	360	75	220
-61.9	-58.4	820	170	490
-62.0	-58.7	71	15	43
-62.0	-56.6	110	21	64

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
-62.0	-58.5	130	27	78
-62.1	-58.8	2.9	0.61	1.8
-62.1	-58.9	46	9.6	28
-62.1	-58.0	64	13	39
-62.1	-57.9	110	24	69
-62.1	-58.1	330	69	200
-62.2	-59.1	5.2	1.1	3.2
-62.2	-58.3	14	2.8	8.2
-62.2	-58.4	26	5.5	16
-62.2	-59.0	27	5.6	16
-62.2	-58.8	41	8.6	25
-62.2	-58.9	83	17	50
-62.2	-58.5	680	140	410
-62.3	-59.3	0.011	0.0022	0.0065
-62.3	-58.9	3	0.62	1.8
-62.3	-58.8	15	3.1	8.8
-62.3	-59.6	59	12	36
-62.3	-58.6	340	72	210
-62.3	-59.7	760	160	460
-62.3	-59.2	2100	440	1300
-62.4	-59.7	0.72	0.15	0.43
-62.4	-59.9	1.6	0.34	0.99
-62.4	-59.4	8.5	1.8	5.1
-62.4	-60.2	26	5.5	16
-62.4	-59.8	35	7.3	21
-62.5	-59.9	0.3	0.062	0.18
-62.5	-59.5	0.44	0.091	0.26
-62.5	-59.4	16	3.4	9.9
-62.5	-60.3	20	4.1	12
-62.5	-59.8	59	12	35
-62.5	-60.0	59	12	36
-62.5	-60.8	83	17	50
-62.6	-61.1	0.59	0.12	0.36
-62.6	-59.7	1.3	0.27	0.79
-62.6	-61.0	7.1	1.5	4.3
-62.6	-59.6	7.8	1.6	4.7
-62.6	-59.8	14	2.9	8.4
-62.6	-59.9	46	9.6	28
-62.7	-61.0	0.026	0.0055	0.016
-62.7	-61.1	0.98	0.2	0.59
-62.7	-60.9	11	2.3	6.5
-62.7	-60.4	14	3	8.6
-62.7	-60.6	23	4.8	14

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-62.7	-61.2	60	12	36
-62.8	-60.1	0.02	0.0041	0.012
-62.8	-61.4	0.98	0.21	0.6
-62.8	-61.3	16	3.4	9.9
-62.8	-61.6	16	3.4	9.9
-62.8	-61.5	17	3.6	10
-62.8	-60.3	140	30	86
-62.9	-61.4	9.2	1.9	5.5
-62.9	-62.3	16	3.5	9.9
-62.9	-60.6	500	110	300
-63.0	-56.5	0.41	0.079	0.24
-63.0	-55.9	0.59	0.091	0.34
-63.0	-60.6	26	5.5	16
-63.0	-60.7	620	130	380
-63.0	-60.5	1500	320	930
-63.1	-55.2	0.15	0.023	0.085
-63.1	-55.5	7.2	1.1	4.1
-63.1	-62.7	33	7	20
-63.2	-62.1	0.33	0.07	0.2
-63.2	-57.3	2.1	0.4	1.2
-63.2	-56.6	5.8	1.1	3.5
-63.2	-57.5	5.9	1.1	3.5
-63.2	-62.2	980	210	600
-63.3	-57.5	0.2	0.038	0.12
-63.3	-57.8	4.7	0.91	2.8
-63.3	-58.7	22	4.6	13
-63.3	-61.9	65	14	40
-63.3	-57.9	84	16	50
-63.3	-62.2	160	35	99
-63.3	-56.5	210	40	120
-63.4	-58.5	0.23	0.048	0.14
-63.4	-58.0	8.4	1.6	5
-63.4	-54.6	88	14	51
-63.4	-58.3	130	27	79
-63.4	-62.2	720	150	440
-63.4	-57.0	1400	270	840
-63.5	-58.7	0.29	0.061	0.18
-63.5	-56.7	3.6	0.7	2.2
-63.5	-56.9	120	23	71
-63.6	-59.7	0.033	0.0068	0.02
-63.6	-59.1	0.098	0.02	0.059
-63.6	-59.0	8.1	1.7	4.9
-63.6	-59.8	9.8	2	5.9

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-63.6	-59.9	9.8	2	5.9
-63.6	-55.8	940	150	540
-63.7	-59.4	0.99	0.21	0.6
-63.7	-57.6	1.8	0.34	1
-63.7	-60.8	10	2.1	6.2
-63.8	-59.9	0.065	0.014	0.04
-63.8	-60.8	4.6	0.96	2.8
-63.8	-57.3	60	12	36
-63.9	-60.7	0.013	0.0027	0.0079
-63.9	-61.0	2.6	0.55	1.6
-63.9	-61.4	3.3	0.7	2
-63.9	-60.9	10	2.2	6.3
-63.9	-60.8	43	9	26
-64.0	-61.4	0.78	0.17	0.48
-64.0	-61.0	1.8	0.37	1.1
-64.0	-61.5	6.5	1.4	4
-64.1	-61.6	0.065	0.014	0.04
-64.1	-61.0	8.4	1.3	4.8
-64.1	-62.6	34	7.3	21
-64.2	-61.7	3.3	0.7	2
-64.2	-61.0	4.9	0.63	2.7
-64.2	-63.6	5.2	1.1	3.2
-64.2	-61.6	6.5	1.4	4
-64.2	-61.8	26	5.6	16
-64.2	-56.6	170	28	97
-64.2	-61.1	170	22	97
-64.3	-62.0	0.16	0.035	0.099
-64.3	-61.2	0.95	0.12	0.54
-64.3	-62.1	2.6	0.56	1.6
-64.3	-63.7	23	4.9	14
-64.3	-56.8	130	23	79
-64.4	-61.6	0.26	0.056	0.16
-64.4	-64.7	110	24	68
-64.5	-61.9	2.1	0.44	1.3
-64.5	-61.8	4.9	1	3
-64.5	-64.0	13	2.8	8
-64.6	-62.2	0.16	0.035	0.099
-64.6	-62.6	20	4.2	12
-64.6	-64.3	57	12	34
-64.7	-62.9	1.6	0.35	0.99
-64.7	-62.8	2.9	0.63	1.8
-64.7	-62.7	42	9	26
-64.7	-64.3	89	19	54

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-64.7	-62.6	160	33	94
-64.7	97.5	220	3.2	110
-64.8	-63.1	0.66	0.14	0.4
-64.8	-62.8	1.5	0.33	0.94
-64.8	-62.7	3.3	0.7	2
-64.8	-62.9	5.2	1.1	3.2
-64.8	-64.4	15	3.2	9.1
-64.8	-63.5	53	11	32
-64.8	-63.8	54	12	33
-64.8	-64.1	280	60	170
-64.9	-63.1	0.98	0.21	0.6
-64.9	-63.5	1.3	0.28	0.8
-64.9	-62.5	1.6	0.35	1
-64.9	-63.0	4.9	1	2.9
-64.9	-63.4	6.6	1.4	4
-64.9	-63.6	9.8	2.1	6
-65.1	-64.0	1.6	0.34	0.97
-65.1	-63.9	2	0.42	1.2
-65.1	-64.1	25	5.2	15
-65.1	102.8	65	8.6	37
-65.2	-64.2	16	3.5	9.9
-65.3	-64.1	7.6	1.6	4.6
-65.3	-64.2	110	23	65
-65.4	-65.4	3.8	0.81	2.3
-65.4	-65.3	23	4.9	14
-65.5	-65.7	0.29	0.063	0.18
-65.5	-65.5	1.5	0.31	0.89
-65.7	-65.2	5.9	1.3	3.6
-65.7	-65.3	7.6	1.6	4.6
-65.9	53.7	29	3.8	17
-65.9	-66.3	75	16	45
-65.9	110.2	86	11	49
-65.9	81.9	650	110	380
-66.0	-65.4	23	5	14
-66.1	134.4	7	0.76	3.9
-66.2	-66.9	0.88	0.17	0.52
-66.2	110.2	3.2	0.43	1.8
-66.2	-65.7	6.4	1.4	3.9
-66.2	110.7	30	3.1	17
-66.2	51.4	29	3.8	17
-66.2	110.4	34	4.5	19
-66.2	110.6	41	5.4	23
-66.2	89.6	86	1.3	44

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 $year^{-1}$)	Scenario 2 (Mg NH_3 $year^{-1}$)	Scenario 3 (Mg NH_3 $year^{-1}$)
-66.3	110.4	60	8	34
-66.3	110.5	98	13	55
-66.4	-65.6	5.6	1.2	3.4
-66.4	-67.2	9.4	1.8	5.6
-66.4	110.5	28	3.7	16
-66.4	110.6	63	8.3	35
-66.4	110.4	70	9.3	39
-66.5	85.5	22	0.32	11
-66.5	110.5	120	16	68
-66.5	93.0	350	5.2	180
-66.6	139.2	59	0.78	30
-66.6	57.3	330	43	180
-66.6	93.0	1100	17	570
-66.7	163.1	6.1	0.081	3.1
-66.7	140.5	47	0.62	24
-66.7	140.9	59	0.78	30
-66.7	108.4	54	7.2	31
-66.7	140.0	760	10	380
-66.8	121.0	1.6	0.17	0.89
-66.8	-66.6	3.7	0.77	2.2
-66.8	163.2	5.3	0.07	2.7
-66.8	89.2	44	0.66	22
-66.8	140.4	70	0.94	36
-66.8	116.4	890	96	490
-66.9	-66.7	13	2.7	7.8
-66.9	-66.8	15	3.2	9.3
-67.0	163.3	60	0.8	31
-67.0	142.7	1400	19	710
-67.2	61.2	5.9	0.77	3.3
-67.3	59.4	34	4.5	19
-67.4	64.0	2000	260	1100
-67.5	164.6	0.059	0.0082	0.033
-67.5	60.9	460	60	260
-67.6	62.9	220	29	120
-67.6	62.5	260	34	150
-67.7	-67.8	4.1	0.78	2.4
-67.7	40.0	5.9	0.77	3.3
-67.7	-69.2	18	3.5	11
-67.7	144.0	260	3.5	130
-67.8	-68.7	18	3.4	10
-67.8	66.9	120	15	66
-67.8	69.8	220	9.5	110
-67.8	-68.9	420	80	250

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-67.8	66.8	880	110	500
-67.9	-67.4	10	2.1	6
-67.9	-68.7	29	5.6	17
-68.0	144.5	11	0.14	5.5
-68.1	43.1	10	1.4	5.8
-68.3	-67.2	7	1.5	4.2
-68.4	41.7	0.11	0.015	0.063
-68.5	41.5	5.8	0.76	3.3
-68.6	78.3	1200	190	670
-68.8	-90.7	0.58	0.023	0.3
-68.8	34.7	250	32	140
-68.9	77.8	620	100	360
-69.0	39.5	0.0059	0.00077	0.0033
-69.2	39.5	25	3.3	14
-69.3	158.5	1.8	0.023	0.89
-69.3	76.8	700	110	410
-69.4	15.5	1900	16	980
-69.5	-75.3	0.29	0.012	0.15
-69.7	-68.8	0.49	0.073	0.28
-69.7	158.5	3.9	0.052	2
-69.7	73.3	8.6	0.38	4.5
-70.3	-2.4	4.9	0.31	2.6
-70.5	-9.0	340	30	190
-70.6	166.1	1.1	0.15	0.6
-70.7	166.9	2	0.16	1.1
-70.8	11.7	0.018	0.00014	0.0089
-70.8	167.4	0.81	0.067	0.44
-71.3	170.2	5500	1000	3300
-71.6	170.0	78	14	46
-71.6	171.4	370	67	220
-71.9	171.2	1600	290	940
-72.0	-17.0	250	20	140
-72.0	171.2	710	130	420
-72.0	170.5	950	170	560
-72.3	170.2	1500	270	880
-72.5	170.3	1200	220	700
-72.6	170.2	48	4	26
-72.9	-19.4	280	22	150
-73.0	-126.3	28	0.91	14
-73.1	-126.2	6.8	0.22	3.5
-73.1	169.6	76	6.2	41
-73.1	169.3	220	18	120
-73.3	169.2	7.9	0.65	4.3

Latitude (°)	Longitude (°)	Scenario 1 (Mg NH_3 year^{-1})	Scenario 2 (Mg NH_3 year^{-1})	Scenario 3 (Mg NH_3 year^{-1})
-73.4	-126.8	360	12	190
-73.4	169.8	2700	220	1500
-73.5	169.8	740	60	400
-73.6	169.9	4.3	0.35	2.3
-74.0	-22.8	130	9.7	69
-74.3	165.1	74	10	42
-74.3	-132.5	230	13	120
-74.7	165.4	2600	370	1500
-74.8	-136.9	0.57	0.031	0.3
-74.8	-140.0	0.59	0.032	0.31
-74.8	165.1	270	38	160
-74.9	165.8	650	91	370
-75.7	-27.2	1900	160	1000
-76.1	168.3	2300	120	1200
-76.5	-29.0	500	41	270
-76.9	167.1	1300	66	690
-77.2	-166.4	210	12	110
-77.2	166.5	2600	130	1400
-77.5	-48.5	320	23	170
-77.5	169.4	5700	480	3100
-77.6	166.2	190	9.5	99
-77.7	166.4	0.17	0.0087	0.09