**Calculating catches of demersal and migratory fish guilds tourist and recreational fishing activity**

**Introduction**

Arctic Fisheries Working Group (AFWG) reports since 2010 include catches of cod by non-commercial fishing activity in assessments for the coastal cod stock which inhabits the inshore waters of western and northern Norway. Coastal cod are considered to be distinct from the more abundant Northeast Arctic cod which are mostly found offshore but migrate inshore to breed in the spring. The non-commercial activity includes both fishing-tourism (businesses offering fishing trips to visitors), and recreational fishing by Norwegian residents. The former is a rapidly growing sector in Norway, but still smaller in terms of catch than the recreational sector. In some years the combined tourist and recreational catch was estimated to account for up to one-third of the total catch of coastal cod. According to ICES(2020), since 2010 seven thousand tonnes of the Norwegian cod quota has been set aside annually to cover the catches taken in the recreational and tourist fisheries and to motivate young people to become fishers.

The fishing methods for non-commercial activity are primarily hooks for the tourist sector, and hooks and gillnets for the recreational sector. Many tourist businesses operate a catch and release system. Fish which are released are assumed to survive and are not included in assessments of tourist catch (Vølstad et al. 2011). Likewise, some recreational fishers offer a proportion their catches for sale. ICES assessments assume that these sales are already included in the catch statistics compiled by the Norwegian Directorate for Fisheries, and hence not classified as part of the recreational catch.

**Estimation of Norwegian tourism and recreation catches**

Subject to the above limitations, the 2010 AFWG prepared a record of both recreational and tourist catches of coastal cod between 1984 and 2009, based on studies by Anon (2005), Hallenstvedt & Wulff (2004), and annual surveys on the number of Norwegian residents who said they had been fishing in the sea. These strands of evidence indicated the total recreational and tourist catch of cod to be 13,400 tonnes in 2004 and the tourist catch 1,100 tonnes. It was estimated that participation in sea fishing tourism increased by 19% per year between 1995 and 2000, by 16% per year until 2004, and then by 10% per year up to 2009 (ICES 2010). No new data have become available since 2009 and subsequent AFWGs up to 2020 have simply projected the 2009 estimated total catch of 12,700 tonnes forwards year on year, without distinguishing between the tourist and recreation sectors (ICES 2020). Here, we have conservatively assumed that tourism catches have increased by 5% year-on-year since 2009, and derived the recreational catch as the difference between the stated total (ICES 2020) and our estimated tourist catch (Table 1).

Table 1 provides the total annual recreational and tourist catches of coastal cod, which occurs in western and northern Norway, northward of around 62N. However, we required the catch not just of cod but also of the other species taken by these fisheries, and the subset of these that originate from our Barents Sea model area. Data from Vølstad et al. (2011) provide some information to attempt this extrapolation.

Vølstad et al. (2011) surveyed Norwegian sea fishing tourism businesses in 2009 (Figure 1) to gather data on the level of activity (boat days), participants and catch composition. Catch quantities by species were integrated for regions north and south of 62N (Table 2). There was a clear different in composition, with cod forming over 50% of the catch north of 62N, and less than 10% to the south. By way of corroboration, ICES (2010) also estimated that cod formed around 50% of the recreational and tourism catch north of 62N during the early 2000’s. South of 62N, saithe was the main species caught, followed by mackerel in 2009 (Vølstad et al., 2011). Apart from mackerel, all the species were members of the demersal fish guild in our model.

In the absence of any other catch composition data we estimated the total demersal catch, and the mackerel catch for the area north of 62N in each year from the 2009 data, assuming a constant ratio of all demersal species : cod of 1.857, and mackerel : cod of 0.0086 (Table 2).

Tourism and recreation catches along the Norwegian coast bordering our Barents Sea model would clearly be less than the total north of 62N. However, the breakdown of catches in 2009 at finer resolution than that reported by Vølstad et al. (2011) was not available. Hence we crudely estimated the proportion of annual catches from north of 62N that might have been taken in our model area based on the proportion of sea fishing tourism businesses participating in the 2009 study which were located in the Troms and Finmark areas (Figure 1; 11 out of 52 businesses north of 62N; 21.57%). The results are estimates, albeit obviously crude, of the catch of demersal fish and migratory fish (mackerel) guilds in our Barents Sea model domain (Table 3).

**Estimation of Norwegian fishing activity**

Data on the level of fishing activity by recreation and tourism sectors is even more hard to locate than catch quantities and composition. We could only find one estimate – 1.43 x 105 boat days by the entire Norwegian tourism sector in 2009 (Vølstad et al., 2011). Across the 4000 boat-days sampled in 2009, the mean number of fishing tourists per boat was typically 2–3, and the mean catch per boat-day ranged from 7 to 27 kg.

Lacking any other data, we crudely apportioned the total annual activity in 2009 to the Troms and Finmark regions in proportion to the numbers of businesses participating in the 2009 study (Figure 1; 11 in Finmark and Troms out a Norway total of 79; 13.92%) – Troms and Finmark activity = 1.99 x 104 boat days. We further assumed that each boat day involved a notional 4h of hooks-in-the-water time, so that the effective activity was 79,646 hours. Finally, the most challenging assumptions – firstly that the 2009 total catch per unit activity by the tourist sector (7.86 kg/h) was constant over the years covered by the ICES 2020 time series, and secondly that this was identical for both the tourist and recreational sectors. The latter is extremely problematic since there is evidence that some recreational fishers operate more powerful gears than the predominantly rod and line tourist sector, such as gill nets and longlines. So our assumption will certainly lead to a biased estimate of total activity depending on the proportion of total catch due to tourism (Table 4).

**Estimates of Russian tourism and recreational catches and activity**

Recreational sea fishing in Russia is extremely popular, and subsistence fishing provided an important source of nutrition during the decades immediately following World War II. Artisanal fishing has also been an important source of food with the landings not being recorded in official records. Sea fishing tourism at the Barents Sea and White Sea coastal areas has expanded rapidly since 1990, with an emphasis on salmon fishing especially in the Kola Peninsula. However, assembling quantitative data on the catches from these fisheries is extremely difficult. Popov & Zeller (2018) provide the only accessible estimates, based on analyses of salmon catches, coastal population data and dietary records, and assumed fractions of the total reported Russian landings from the region (Table 5).

Species composition data for the artisanal, subsistence and recreational fisheries are not accessible, but discussion in Popov & Zeller (2018) indicates that a significant fraction of the recreational catch is represented by salmon, while demersal fish make up the bulk of everything else. Hence we assumed that 50% of recreational landings were planktivorous fish (salmon) and everything else was demersal (Table 5).

No effort or activity data were reported by Popov & Zeller (2018). We therefore crudely assumed that the catch per unit activity in the Noirwegian tourist fishery was also applicable to the Russian recreational, artisanal and subsistence fisheries, in order to estimate activity rates.

**Total catches and activity for recreational and tourist fisheries in the Barents Sea region**

The combined Russian and Norwegian estimates of annual fish guild catches and overall activity are shown in Table 6. Clearly these should be treated as highly uncertain given the heroic assumptions which have been applied.

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Table 1. Coastal cod catch from ICES areas 1 and 2 by tourist businesses recreational fishers. Between 1984 and 2009 the tourist-only catch is from ICES (2010; Table 2.1c), while the combined tourist + recreation catch (1984-2019) is from ICES (2020; Table 2.1e). Between 2010 and 2019 the tourist catch (grey shaded) is assumed to increase at 5% per year (ICES 2020). The recreation-only catch is the difference between the total and tourism.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Combined tourism & recreation catch (tonnes) from ICES 2020 | Tourist catch (tonnes) from ICES 2010 | Implied recreation catch (tonnes) = total- tourist |
| 1984 | 13300 | 0 | 13300 |
| 1985 | 13400 | 0 | 13400 |
| 1986 | 13500 | 0 | 13500 |
| 1987 | 13500 | 0 | 13500 |
| 1988 | 13600 | 0 | 13600 |
| 1989 | 13700 | 100 | 13600 |
| 1990 | 14500 | 100 | 14400 |
| 1991 | 15300 | 100 | 15200 |
| 1992 | 16100 | 100 | 16000 |
| 1993 | 14800 | 100 | 14700 |
| 1994 | 14700 | 100 | 14600 |
| 1995 | 14700 | 200 | 14500 |
| 1996 | 14500 | 200 | 14300 |
| 1997 | 14500 | 300 | 14200 |
| 1998 | 14600 | 300 | 14300 |
| 1999 | 13900 | 400 | 13500 |
| 2000 | 13600 | 500 | 13100 |
| 2001 | 13400 | 700 | 12700 |
| 2002 | 13600 | 800 | 12800 |
| 2003 | 13900 | 900 | 13000 |
| 2004 | 13400 | 1100 | 12300 |
| 2005 | 13200 | 1200 | 12000 |
| 2006 | 13000 | 1300 | 11700 |
| 2007 | 13000 | 1500 | 11500 |
| 2008 | 12800 | 1600 | 11200 |
| 2009 | 12700 | 1800 | 10900 |
| 2010 | 12700 | 1890 | 10810 |
| 2011 | 12700 | 1985 | 10716 |
| 2012 | 12700 | 2084 | 10616 |
| 2013 | 12700 | 2188 | 10512 |
| 2014 | 12700 | 2297 | 10403 |
| 2015 | 12700 | 2412 | 10288 |
| 2016 | 12700 | 2533 | 10167 |
| 2017 | 12700 | 2659 | 10041 |
| 2018 | 12700 | 2792 | 9908 |
| 2019 | 12700 | 2932 | 9768 |
|  |  |  |  |
| Mean 2011-2019 | 12700 | 2431 | 10269 |

Table 2. Data for the 2009 national survey of tourist recreational fishing in Norway from Vølstad et al. 2011, Table 2. The data were presented for two regions, North and South of 62N. The additional column shown here for the Finmark and Troms area is a 21.57% subset of the data for “North of 62N” based the proportion (11 out of 52) of the tourist businesses in “North of 62N” which were located in these administrative areas.

|  |  |  |  |
| --- | --- | --- | --- |
|  | North of 62N | South of 62N | Estimated Finmark and Troms regions (21.57% of “North of 62N”) |
|  | Annual catch weight (tonnes) | Annual catch weight (tonnes) | Annual catch weight (tonnes) |
| Cod | 1586 | 27 | 335.5 |
| Haddock | 115.1 | 9.4 | 24.3 |
| Saithe | 825.2 | 208 | 174.6 |
| Pollack | 81.1 | 21.4 | 17.2 |
| Hallibut | 79.7 | 0.2 | 16.9 |
| Mackerel | 13.6 | 54.4 | 2.9 |
| Ling | 68.5 | 40.4 | 14.5 |
| Tusk | 173.7 | 15.9 | 36.7 |
| Wolffish | 15.3 | 0.3 | 3.2 |
|  |  |  |  |
| Total weight | 2958.2 | 377.0 | 625.8 |
| Total weight excl. mackerel | 2944.6 | 322.6 | 622.9 |
| Ratio of total demersal guild : cod | 1.857 | 11.948 | 1.857 |
| Ratio of mackerel : cod | 0.00858 | 2.015 | 0.00858 |

Table 3. Finmark and Troms area tourism and recreation catch quantity (tonnes) and composition derived from the data in Tables 1 and 2.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Tourist | | | Recreation | | | Combined tourist and recreation | |
| Year | Cod | Total Demersal | Mackerel | Cod | Total Demersal | Mackerel | Total Demersal | Mackerel |
| 1984 | 0 | 0 | 0 | 2479 | 4603 | 21 | 4603 | 21 |
| 1985 | 0 | 0 | 0 | 2498 | 4638 | 21 | 4638 | 21 |
| 1986 | 0 | 0 | 0 | 2516 | 4673 | 22 | 4673 | 22 |
| 1987 | 0 | 0 | 0 | 2516 | 4673 | 22 | 4673 | 22 |
| 1988 | 0 | 0 | 0 | 2535 | 4707 | 22 | 4707 | 22 |
| 1989 | 19 | 35 | 0 | 2535 | 4707 | 22 | 4742 | 22 |
| 1990 | 19 | 35 | 0 | 2684 | 4984 | 23 | 5019 | 23 |
| 1991 | 19 | 35 | 0 | 2833 | 5261 | 24 | 5296 | 24 |
| 1992 | 19 | 35 | 0 | 2982 | 5538 | 26 | 5573 | 26 |
| 1993 | 19 | 35 | 0 | 2740 | 5088 | 23 | 5123 | 24 |
| 1994 | 19 | 35 | 0 | 2721 | 5053 | 23 | 5088 | 23 |
| 1995 | 37 | 69 | 0 | 2703 | 5019 | 23 | 5088 | 23 |
| 1996 | 37 | 69 | 0 | 2665 | 4950 | 23 | 5019 | 23 |
| 1997 | 56 | 104 | 0 | 2647 | 4915 | 23 | 5019 | 23 |
| 1998 | 56 | 104 | 0 | 2665 | 4950 | 23 | 5053 | 23 |
| 1999 | 75 | 138 | 1 | 2516 | 4673 | 22 | 4811 | 22 |
| 2000 | 93 | 173 | 1 | 2442 | 4534 | 21 | 4707 | 22 |
| 2001 | 130 | 242 | 1 | 2367 | 4396 | 20 | 4638 | 21 |
| 2002 | 149 | 277 | 1 | 2386 | 4430 | 20 | 4707 | 22 |
| 2003 | 168 | 312 | 1 | 2423 | 4500 | 21 | 4811 | 22 |
| 2004 | 205 | 381 | 2 | 2293 | 4257 | 20 | 4638 | 21 |
| 2005 | 224 | 415 | 2 | 2237 | 4153 | 19 | 4569 | 21 |
| 2006 | 242 | 450 | 2 | 2181 | 4050 | 19 | 4500 | 21 |
| 2007 | 280 | 519 | 2 | 2143 | 3980 | 18 | 4500 | 21 |
| 2008 | 298 | 554 | 3 | 2088 | 3877 | 18 | 4430 | 20 |
| 2009 | 336 | 623 | 3 | 2032 | 3773 | 17 | 4396 | 20 |
| 2010 | 352 | 654 | 3 | 2015 | 3742 | 17 | 4396 | 20 |
| 2011 | 370 | 687 | 3 | 1997 | 3709 | 17 | 4396 | 20 |
| 2012 | 388 | 721 | 3 | 1979 | 3675 | 17 | 4396 | 20 |
| 2013 | 408 | 757 | 3 | 1959 | 3638 | 17 | 4396 | 20 |
| 2014 | 428 | 795 | 4 | 1939 | 3601 | 17 | 4396 | 20 |
| 2015 | 450 | 835 | 4 | 1918 | 3561 | 16 | 4396 | 20 |
| 2016 | 472 | 877 | 4 | 1895 | 3519 | 16 | 4396 | 20 |
| 2017 | 496 | 920 | 4 | 1871 | 3475 | 16 | 4396 | 20 |
| 2018 | 520 | 967 | 4 | 1847 | 3429 | 16 | 4396 | 20 |
| 2019 | 546 | 1015 | 5 | 1821 | 3381 | 16 | 4396 | 20 |
|  |  |  |  |  |  |  |  |  |
| Mean 2011-2019 | 453 | 842 | 4 | 1914 | 3554 | 16 | **4396** | **20** |

Table 4. Derivation of annual activity for the combined tourism and recreation sectors in the Troms and Finmark regions (hours of gear-in-the-water time). Total catch weight per unit activity (CPUA) for the tourist sector in 2009 was estimated to be 7.86 kg/h (626 tonnes (highlighted in red) as a result of 79,646 hours gear-in-the-water time (see text). This rate was then used to derive the total activity for the combined tourism and recreation sectors (total catch/CPUA).

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Tourist sector catch (tonnes) – from Table 3 | Total catch (tourist + recreation; tonnes) – from Table 3 | Total annual activity (hours of wet gear time) |
| 1984 | 0 | 4625 | 588492 |
| 1985 | 0 | 4659 | 592917 |
| 1986 | 0 | 4694 | 597342 |
| 1987 | 0 | 4694 | 597342 |
| 1988 | 0 | 4729 | 601767 |
| 1989 | 35 | 4764 | 606191 |
| 1990 | 35 | 5042 | 641589 |
| 1991 | 35 | 5320 | 676987 |
| 1992 | 35 | 5598 | 712385 |
| 1993 | 35 | 5146 | 654864 |
| 1994 | 35 | 5112 | 650439 |
| 1995 | 70 | 5112 | 650439 |
| 1996 | 70 | 5042 | 641589 |
| 1997 | 104 | 5042 | 641589 |
| 1998 | 104 | 5077 | 646014 |
| 1999 | 139 | 4833 | 615041 |
| 2000 | 174 | 4729 | 601767 |
| 2001 | 243 | 4659 | 592917 |
| 2002 | 278 | 4729 | 601767 |
| 2003 | 313 | 4833 | 615041 |
| 2004 | 382 | 4659 | 592917 |
| 2005 | 417 | 4590 | 584068 |
| 2006 | 452 | 4520 | 575218 |
| 2007 | 522 | 4520 | 575218 |
| 2008 | 556 | 4451 | 566368 |
| 2009 | **626** | 4416 | 561944 |
| 2010 | 657 | 4416 | 561944 |
| 2011 | 690 | 4416 | 561944 |
| 2012 | 725 | 4416 | 561944 |
| 2013 | 761 | 4416 | 561944 |
| 2014 | 799 | 4416 | 561944 |
| 2015 | 839 | 4416 | 561944 |
| 2016 | 881 | 4416 | 561944 |
| 2017 | 925 | 4416 | 561944 |
| 2018 | 971 | 4416 | 561944 |
| 2019 | 1020 | 4416 | 561944 |
|  |  |  |  |
| Mean 2011-2019 | 845 | 4416 | 561944 |

Table 5. Annual catches (tonnes) of fish by the artisanal, subsistence and recreational fisheries in Russia, digitised from Figure 2 of Popov & Zeller (2018). Catches have been combied and distributed between planktivorous fish and demersal fish assuming that 50% of recreational catches are salmon and all others are demersal. Annual activity (hours of wet gear time) was estimated by assuming the same catch per unit activity as for the Norwegian tourist fishery (7.86 kg/h).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Artisinal catch (tonnes) | Subsistence catch (tonnes) | Recreational catch (tonnes) | Planktivorous fish catch (tonnes) | Demersal fish catch (tonnes) | Total catch (tonnes) | Total annual activity (hours of wet gear time) |
| 1984 | 736 | 613 | 123 | 61 | 1411 | 1472 | 187327.3 |
| 1985 | 859 | 736 | 123 | 61 | 1656 | 1718 | 218548.5 |
| 1986 | 613 | 491 | 61 | 31 | 1135 | 1166 | 148300.8 |
| 1987 | 368 | 675 | 61 | 31 | 1074 | 1104 | 140495.5 |
| 1988 | 307 | 552 | 61 | 31 | 890 | 920 | 117079.6 |
| 1989 | 245 | 491 | 982 | 491 | 1227 | 1718 | 218548.5 |
| 1990 | 123 | 491 | 859 | 429 | 1043 | 1472 | 187327.3 |
| 1991 | 491 | 429 | 3988 | 1994 | 2914 | 4908 | 624424.4 |
| 1992 | 1104 | 368 | 11166 | 5583 | 7055 | 12638 | 1607893 |
| 1993 | 982 | 613 | 8098 | 4049 | 5644 | 9693 | 1233238 |
| 1994 | 613 | 1104 | 6258 | 3129 | 4847 | 7975 | 1014690 |
| 1995 | 491 | 1350 | 4785 | 2393 | 4233 | 6626 | 842972.9 |
| 1996 | 491 | 1350 | 5399 | 2699 | 4540 | 7239 | 921025.9 |
| 1997 | 491 | 1227 | 4908 | 2454 | 4172 | 6626 | 842972.9 |
| 1998 | 429 | 1166 | 4785 | 2393 | 3988 | 6380 | 811751.7 |
| 1999 | 429 | 1104 | 4479 | 2239 | 3773 | 6012 | 764919.8 |
| 2000 | 491 | 1104 | 5031 | 2515 | 4110 | 6626 | 842972.9 |
| 2001 | 736 | 1104 | 6135 | 3067 | 4908 | 7975 | 1014690 |
| 2002 | 859 | 1104 | 9448 | 4724 | 6687 | 11411 | 1451787 |
| 2003 | 491 | 1104 | 6258 | 3129 | 4724 | 7853 | 999079 |
| 2004 | 307 | 1104 | 3497 | 1748 | 3160 | 4908 | 624424.4 |
| 2005 | 307 | 1080 | 3583 | 1791 | 3178 | 4969 | 632229.7 |
| 2006 | 307 | 1166 | 3681 | 1840 | 3313 | 5153 | 655645.6 |
| 2007 | 368 | 1288 | 3926 | 1963 | 3620 | 5583 | 710282.7 |
| 2008 | 368 | 1472 | 3558 | 1779 | 3620 | 5399 | 686866.8 |
| 2009 | 491 | 1718 | 4540 | 2270 | 4479 | 6748 | 858583.5 |
| 2010 | 491 | 2025 | 5828 | 2914 | 5429 | 8344 | 1061521 |
| 2011 | 491 | 2086 | 5644 | 2822 | 5399 | 8221 | 1045911 |
| 2012 | 491 | 2086 | 5399 | 2699 | 5276 | 7975 | 1014690 |
| 2013 | 613 | 2086 | 6503 | 3252 | 5951 | 9202 | 1170796 |
| 2014 | 552 | 2025 | 5276 | 2638 | 5215 | 7853 | 999079 |
|  |  |  |  |  |  |  |  |
| Mean 2011-2014 | 537 | 2071 | 5706 | 2853 | 5460 | 8313 | 1057619 |

Table 6. Combined data on catches of fish guilds and overall activity for Norwegian and Russian artisanal, subsistence, tourist and recreational fisheries in the Barents Sea. ‘nd’ indicates no data for Russia and hence no combined total.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Planktivorous fish catch (salmon; tonnes) | Demersal fish catch (tonnes) | Migratory fish catch (mackerel; tonnes) | Total fish catch (tonnes) | Activity (hours of wet gear time) |
| 1984 | 61 | 6014 | 21 | 6097 | 193424 |
| 1985 | 61 | 6295 | 21 | 6377 | 224926 |
| 1986 | 31 | 5808 | 22 | 5860 | 154161 |
| 1987 | 31 | 5746 | 22 | 5799 | 146294 |
| 1988 | 31 | 5597 | 22 | 5649 | 122729 |
| 1989 | 491 | 5969 | 22 | 6482 | 225030 |
| 1990 | 429 | 6062 | 23 | 6514 | 193842 |
| 1991 | 1994 | 8210 | 24 | 10228 | 634652 |
| 1992 | 5583 | 12628 | 26 | 18236 | 1626129 |
| 1993 | 4049 | 10767 | 24 | 14840 | 1248078 |
| 1994 | 3129 | 9935 | 23 | 13087 | 1027777 |
| 1995 | 2393 | 9321 | 23 | 11737 | 854710 |
| 1996 | 2699 | 9559 | 23 | 12281 | 933307 |
| 1997 | 2454 | 9191 | 23 | 11668 | 854641 |
| 1998 | 2393 | 9041 | 23 | 11457 | 823209 |
| 1999 | 2239 | 8584 | 22 | 10846 | 775765 |
| 2000 | 2515 | 8818 | 22 | 11355 | 854328 |
| 2001 | 3067 | 9546 | 21 | 12635 | 1027325 |
| 2002 | 4724 | 11394 | 22 | 16140 | 1467927 |
| 2003 | 3129 | 9535 | 22 | 12686 | 1011765 |
| 2004 | 1748 | 7798 | 21 | 9567 | 633992 |
| 2005 | 1791 | 7747 | 21 | 9559 | 641789 |
| 2006 | 1840 | 7812 | 21 | 9674 | 665319 |
| 2007 | 1963 | 8119 | 21 | 10103 | 720386 |
| 2008 | 1779 | 8050 | 20 | 9850 | 696716 |
| 2009 | 2270 | 8874 | 20 | 11165 | 869748 |
| 2010 | 2914 | 9825 | 20 | 12760 | 1074281 |
| 2011 | 2822 | 9795 | 20 | 12637 | 1058548 |
| 2012 | 2699 | 9672 | 20 | 12392 | 1027081 |
| 2013 | 3252 | 10347 | 20 | 13619 | 1184414 |
| 2014 | 2638 | 9611 | 20 | 12269 | 1011348 |
| 2015 | nd | nd | nd | nd | nd |
| 2016 | nd | nd | nd | nd | nd |
| 2017 | nd | nd | nd | nd | nd |
| 2018 | nd | nd | nd | nd | nd |
| 2019 | nd | nd | nd | nd | nd |
|  |  |  |  |  |  |
| Mean 2011-2014 | 2853 | 9856 | 20 | 12729 | 1070348 |

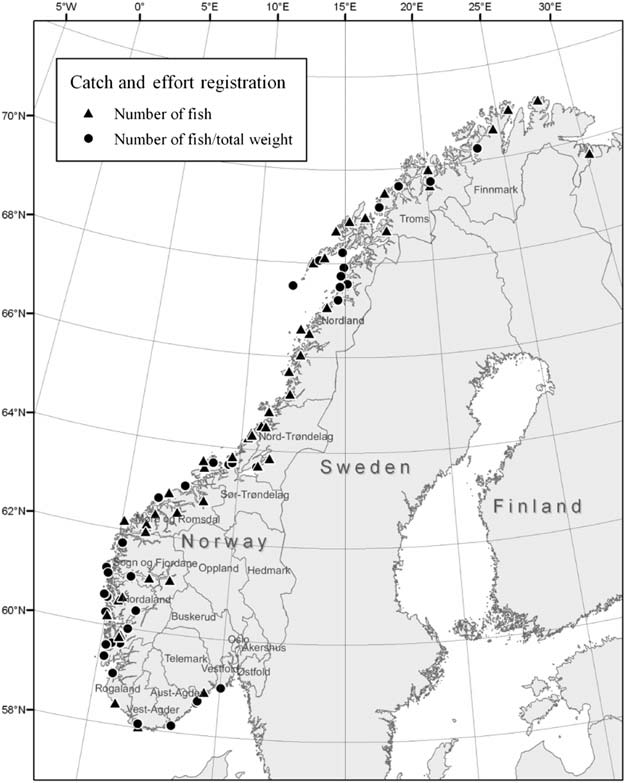


Figure 1. From Vølstad et al. 2011 (Figure 2). Map of tourist-fishing businesses from which catch and effort data were gathered in 2009.