

Marine Scotland Science

Locational Guidelines for the Authorisation of Marine
Fish Farms in Scottish Waters

JANUARY 2015



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science

// **LOCATIONAL GUIDELINES FOR THE AUTHORISATION OF MARINE FISH FARMS IN SCOTTISH WATERS:**

Category 1, 2 and 3 areas designated on the basis of Marine Scotland Science (MSS) predictive models to estimate environmental sensitivity of sea lochs

The following tables and maps describe the Category 1, 2 and 3 areas for the Scottish Government Locational Guidelines, designated on the basis of MSS predictive modelling to estimate nutrient enhancement and benthic impact in sea lochs or similar water bodies supporting aquaculture. For a detailed explanation of how these categorisations were derived, refer to the Scottish Fisheries Research Report 'Scottish Government Locational Guidelines for fish farming: Predicted levels of nutrient enhancement and benthic impact'. Predictive models were used to assign each sea loch an index of 'nutrient enhancement' and 'benthic impact'. The sum of these indices was used for the categorisation of areas as indicated below.

Combined 'nutrient enhancement' and 'benthic impact' indices	Category
7 - 10	1
5 - 6	2
0 - 4	3

These tables and maps were last updated on 22/01/2015

The next update will be on 22/03/2015

**Please note that the Sealoch parameters used in the MSS Locational
Guidelines predictive models for the calculation of the sea loch
Categories can now be found at the end of this document.**

Category 1 areas

Loch	Maximum biomass (tonnes)†	Total biomass (tonnes)#	'Nutrient enhancement' index	'Benthic impact' index	'Combined' index
1 Loch Airdbhair (inc Loch na Droigniche)	750	750	4	4	8
2 Burwick Bay	600	600	5	3	8
3 Calbha Bay	1080	1080	4	3	7
4 Collafirth Voe	1225	1225	4	3	7
5 Gruting Voe	4395	4395	4	3	7
6 Laxfirth	1892	1892	4	3	7
7 Loch Meanervagh	453	453	4	4	8
8 Northra Voe	500	500	4	3	7
9 Sandsound Voe	5136	5136	4	3	7
10 Loch Sheilavaig	1211	2111	4	4	8
11 Stromness Voe	1650	1650	4	3	7
12 Swining Voe	3840	5760	4	3	7
13 Vala Sound	5515	5515	4	3	7
14 Vidlin Voe	3295	3430	4	3	7
15 Weisdale Voe	3952	3952	4	3	7

† Biomass as consented by SEPA at time of modelling, taking into consideration grouped and rotational sites.

Biomass as consented by SEPA at the time of modelling on a site by site basis.

Category 2 areas

	Loch	Maximum biomass (tonnes)†	Total biomass (tonnes)#	'Nutrient enhancement' index	'Benthic impact' index	'Combined' index
1	A'Choire	1440	1440	3	3	6
2	Loch Ainort	1800	1800	2	3	5
3	Aith Voe	3484	3484	3	2	5
4	Loch A'Laip	750	750	3	3	6
5	Badcall Bay	1250	1560	3	3	6
6	Baltasound	1220	1220	3	2	5
7	Basta Voe	4461	4461	3	3	6
8	Loch Boisdale	2600	2600	3	3	6
9	Brindister Voe / Vementry Sound	2666	2666	3	2	5
10	Busta Voe	1050	1050	3	2	5
11	Loch Carnan	410	410	3	3	6
12	Cat Firth	1343	1343	3	2	5
13	Loch Clash	540	1030	2	3	5
14	Clift Sound	5039	5039	3	3	6
15	Dales Voe North	850	850	3	2	5
16	Dury Voe	5460	5460	3	2	5
17	East Loch Tarbert	12164	12164	2	3	5
18	Loch Eport	1814	1814	2	3	5
19	Loch Erisort / Leurbost	5227	5227	2	3	5
20	Loch Greshornish	2195	2195	2	3	5
21	Loch Grimshader	622	622	3	3	6
22	Loch Grosebay	2451	2451	3	3	6
23	Loch Harport	2000	2000	2	3	5
24	Loch Kishorn	3550	4849	2	3	5
25	Mid Yell Voe	1210	1210	3	3	6
26	Loch Nedd	250	250	2	3	5
27	Loch Odhairn	2886	2886	3	3	6
28	Olna Voe	2500	2500	3	3	6
29	Loch Pooltiel	2700	2700	3	2	5
30	Loch Portree	2622	2622	2	3	5
31	Ronas Voe	2633	2633	3	2	5
32	Loch Seaforth	6950	6950	2	3	5
33	Loch Shell	6453	6453	2	3	5
34	Loch Skipport	2460	2460	3	3	6
35	Swarbacks Minn	18149	18649	3	3	6
36	Swinister Voe	16983	18903	3	3	6
37	Loch Uiskevagh	1455	1455	3	3	6
38	Wadbister Voe	800	800	3	2	5

Category 3 areas

Loch	Maximum biomass (tonnes) [†]	Total biomass (tonnes) [#]	'Nutrient enhancement' index	'Benthic impact' index	'Combined' index
1 Loch Ailort	300	300	1	1	2
2 Loch Aline	0	0	0	0	0
3 Loch Alsh (inc Loch Long)	5100	5100	1	2	3
4 Loch Arnish	0	0	0	0	0
5 Loch Bay	500	500	1	1	2
6 Loch Bracadale	2075	2075	1	1	2
7 Broad Bay	2240	2240	1	1	2
8 Loch Broom	1050	1050	1	1	2
9 Loch Cairnbhain (inc. Loch Glendhu and Loch Glencoul)	3000	3000	2	2	4
10 Loch Caolisport	192	192	1	1	2
11 Loch Carron	3100	3100	1	2	3
12 Loch Claidh	0	0	0	0	0
13 Loch Craignish	3183	3183	2	2	4
14 Loch Creran	3000	3000	2	2	4
15 Dales Voe	0	0	0	0	0
16 Loch Duich	2125	2125	1	2	3
17 Loch Dunvegan	5323	5323	2	2	4
18 Loch Eishort	1200	1200	2	2	4
19 Loch Eriboll	1338	1338	1	1	2
20 Loch Etive	3775	3775	2	2	4
21 Loch Ewe	1370	1370	1	1	2
22 Loch Eynort	20	20	1	1	2
23 Loch Feochan	0	0	0	0	0
24 Loch Fyne	11110	11110	1	1	2
25 Loch Geocrab	200	200	2	2	4
26 Loch Hourn	4175	4175	1	2	3
27 Loch Inchard	0	0	0	0	0
28 Loch Kilerivagh	0	0	0	0	0
29 Kirk Hope	0	0	0	0	0
30 Loch Laxford	1390	1840	2	2	4
31 Loch Leven	1450	1450	2	2	4
32 Loch Linnhe (inc. Loch Eil)	4490	4490	1	2	3
33 Little Loch Broom	2062	2062	1	2	3
34 Loch Long (inc. Loch Goil)	500	500	1	1	2
35 Loch Melfort	615	615	1	1	2
36 Loch Mharabhig	0	0	0	0	0
37 Loch Moidart	0	0	0	0	0
38 Loch na Keal	2741	2741	1	2	3
39 Loch Nevis	4000	4000	1	2	3
40 Pierowall Bay	165	165	2	2	4

Loch	Maximum biomass (tonnes)†	Total biomass (tonnes)#	'Nutrient enhancement' index	'Benthic impact' index	'Combined' index
41 Loch Riddon	500	500	2	2	4
42 Loch Roag	13582	13582	2	2	4
43 Loch Ryan	0	0	0	0	0
44 Loch Scridain	1900	1900	1	1	2
45 Selivoie	963	963	3	1	4
46 Loch Slapin	350	350	1	2	3
47 Loch Sligachan	0	0	0	0	0
48 Loch Snizort Beag	500	500	1	2	3
49 Loch Spelve	1050	1050	1	1	2
50 Loch Stockinish	495	495	2	2	4
51 Loch Striven	4673	4673	2	2	4
52 Loch Sunart	5740	5740	1	2	3
53 Loch Sween	0	0	0	0	0
54 Tobermory Bay	0	0	0	0	0
55 Loch Torridon	6626	6626	1	2	3
56 Loch Tuath	2850	2850	1	1	2
57 Uig Bay	1000	1000	2	2	4
58 West Burra Firth	0	0	0	0	0
59 West Loch Tarbert	4658	4658	2	2	4
60 Whalefirth Voe	813	813	2	2	4
61 Whiteness Voe	500	500	3	1	4

† Biomass as consented by SEPA at time of modelling, taking into consideration grouped and rotational sites.

Biomass as consented by SEPA at the time of modelling on a site by site basis.

Sealoch parameters* used in the MSS Locational Guidelines predictive models

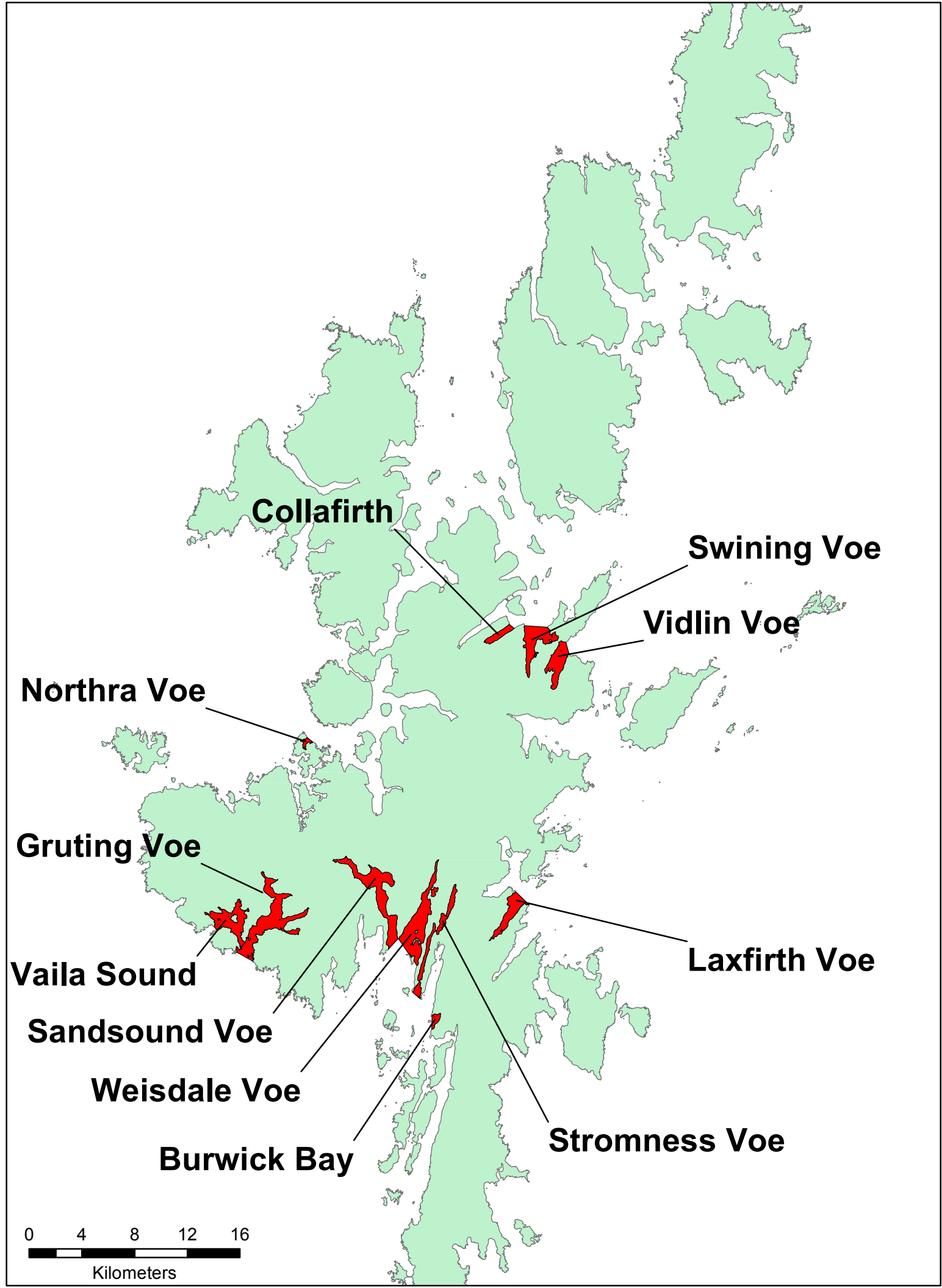
Loch Name	Length (km)	Area (km ²)	Volume (Mm ³)	Tidal Range (m)	Tf (days)	Q (Mm ³ yr ⁻¹)
A'CHOIRE	2.3	1.3	17.1	3.4	3.0	2077
AILORT	8.1	8.7	91.3	4.3	1.9	17542
AINORT	3.9	3.5	52.5	4.6	2.5	7665
AIRDBHAIR	2.2	0.4	2.1	4.2	0.9	839
AITH HOPE	1.8	0.6	3.0	2.3	1.7	644
AITH VOE	4.0	4.8	117.7	1.7	10.7	4015
A'LAIP	2.5	1.1	5.7	3.9	1.0	2072
ALINE	3.5	1.8	17.5	3.4	2.2	2903
ALSH	13.1	27.2	933.9	4.6	5.6	60873
ARNISH	2.0	2.0	61.1	3.2	7.2	3097
BADCALL BAY	1.9	1.3	13.9	3.6	2.3	2208
BALTASOUND	2.9	3.7	30.5	1.9	3.3	3375
BASTA VOE	5.2	5.7	75.5	1.9	5.2	5298
BAY	6.9	15.4	343.0	4.5	3.7	33837
BOISDALE	5.7	4.7	55.1	3.8	2.3	8749
BRACADALE	10.5	45.8	1053.9	3.1	5.6	68693
BRINDISTER	5.5	5.0	46.2	1.7	4.1	4112
BROAD BAY	14.0	82.5	1357.7	4.1	3.0	165188
BROOM	14.7	16.0	391.6	4.5	4.1	34864
BURWICK	0.9	0.4	4.4	0.9	8.5	189
BUSTA	3.0	3.0	50.7	1.7	7.3	2537
CAIRNBHAIN	14.9	14.0	330.6	4.2	4.2	28727
CALBHA BAY	1.4	0.7	8.2	3.6	2.6	1153
CAOLISPORT	8.3	14.9	163.4	0.9	9.1	6552
CARNAN	1.8	0.7	2.1	3.9	0.6	1294
CARRON	26.7	20.6	602.5	4.7	4.7	46791
CAT FIRTH	3.0	2.8	26.9	1.8	4.1	2395
CLAIDH	6.7	4.5	97.6	4.2	3.9	9134
CLASH	1.6	1.0	17.2	4.2	3.0	2096
CLIFT SOUND	10.0	8.5	123.6	1.4	7.8	5782
COLLAFIRTH	2.4	0.9	11.5	1.8	5.1	820
CRAIGNISH	8.8	14.6	202.0	2.1	5.0	14750
CRERAN	12.8	12.4	161.1	3.3	3.0	19600
DALES VOE	4.9	3.2	47.3	1.2	9.2	1877
DALES VOE NORTH	5.1	3.1	48.2	1.8	6.4	2751
DUICH	8.3	11.2	510.7	4.6	7.4	25191
DUNVEGAN	10.4	21.7	1255.5	4.5	9.6	47736
DURY VOE	6.5	13.0	308.5	1.4	13.1	8597
EAST LOCH TARBERT	8.5	26.2	518.5	4.2	3.6	52575
EISHORT	5.2	2.5	19.4	4.3	1.4	5045
EPORT	7.0	3.9	27.4	4.1	1.3	7695
ERIBOLL	15.5	37.5	954.1	4.3	4.4	79150
ERISORT/LEURBOST	14.6	15.8	227.0	4.1	2.6	31873
ETIVE	29.5	28.3	948.7	1.8	13.9	24913
EWE	11.9	43.0	846.3	4.4	3.4	90853
EYNORT	4.3	2.2	17.3	4.1	1.4	4502
FEOCHAN	6.7	2.8	17.9	3.3	1.5	4356
FYNE	60.5	183.3	9440.2	3.1	12.4	277876
GEOCRAB	2.5	0.6	5.4	4.2	1.6	1227
GRESHORNISH	5.9	4.7	74.1	4.6	2.6	10403
GRIMSHADER	3.5	0.9	8.4	4.1	1.7	1806

* The majority of these parameters have been taken from Edwards and Sharples (1986), however the volumes and areas were re-calculated in 2006 by digitising the depth contours on Admiralty charts.

Loch Name	Length (km)	Area (km ²)	Volume (Mm ³)	Tidal Range (m)	Tf (days)	Q (Mm ³ yr ⁻¹)
GROSEBAY	2.6	2.9	47.9	4.2	2.9	6025
GRUTING	7.6	6.7	95.7	1.1	9.7	3600
HARPORT	12.5	7.2	108.8	4.3	2.7	14710
HOURN	21.3	34.5	1905.0	4.2	9.8	70953
INCHARD	6.6	3.7	77.1	4.2	3.7	7608
KILERIVAGH	4.2	1.0	2.2	3.9	0.5	1606
KIRK HOPE	1.8	0.6	4.4	2.3	2.4	669
KISHORN	4.1	7.8	191.3	4.7	3.9	17901
LAXFIRTH	3.8	2.3	21.1	1.8	3.9	1977
LAXFORD	7.0	7.2	107.5	4.2	2.7	14528
LEVEN	13.4	8.1	149.2	3.7	3.8	14335
LINNHE	29.1	33.7	1303.7	3.7	7.8	61006
LITTLE L BROOM	12.7	23.0	914.7	4.5	6.6	50587
LONG	26.9	44.0	1758.0	3.1	9.6	66840
MEANERVAGH	1.4	0.2	0.8	3.9	0.9	315
MELFORT	6.0	10.2	256.5	2.3	8.2	11418
MHARABHIG	1.3	0.5	1.7	4.1	0.7	864
MID YELL	3.3	1.7	11.7	1.9	2.7	1576
MOIDART	2.8	2.9	8.6	4.3	0.6	5232
NA KEAL	10.7	32.2	694.7	3.8	4.3	58966
NEDD	2.4	0.5	3.3	4.2	1.1	1110
NEVIS	17.2	29.9	1505.0	4.3	8.8	62424
NORTHRA VOE	1.0	0.3	2.2	1.5	4.2	187
ODHAIRN	3.6	1.8	29.8	4.1	3.1	3511
OLNA VOE	4.6	4.0	79.6	1.7	8.7	3341
PIEROWALL HARBOUR	1.6	1.1	3.5	2.3	1.0	1286
POOL TIEL	3.9	3.9	111.4	3.1	7.0	5808
PORTREE	4.9	4.1	88.3	4.6	3.5	9212
RIDDON	5.3	2.8	49.8	2.6	5.1	3561
ROAG	14.0	68.3	1135.5	3.6	3.5	118419
RONAS VOE	9.4	9.4	176.0	1.7	8.2	7834
RYAN	13.4	36.6	166.4	2.8	1.3	46720
SANDSOUND	8.6	6.0	69.7	1.1	7.9	3219
SCRIDAIN	12.0	27.0	734.2	3.7	5.5	48721
SEAFORTH	22.6	24.6	604.1	4.2	4.4	50111
SELIVOE	4.0	4.8	88.9	1.1	12.5	2597
SHEILAVAIG	3.0	0.6	1.5	4.1	0.5	1105
SHELL	7.5	15.0	391.5	4.1	4.8	29769
SKIPORT	4.6	3.0	38.9	4.1	2.4	5919
SLAPIN	3.4	2.1	11.6	4.3	1.0	4219
SLIGACHAN	4.4	1.7	15.7	4.6	1.5	3809
SNIZORT BEG	4.7	6.9	101.9	4.6	2.5	14884
SPELVE	7.7	8.9	144.9	3.5	3.5	15111
STOCKINISH	3.5	1.5	17.8	4.2	2.1	3093
STRIVEN	12.9	14.3	546.7	2.6	11.0	18142
STROMNESS VOE	4.6	2.3	13.6	1.1	4.1	1209
SUNART	30.7	50.6	1754.0	4.0	6.5	98493
SWARBACKS MINN	13.0	30.9	995.1	1.7	14.1	25759
SWEEN	14.8	17.4	216.9	1.6	5.9	13418
SWINING VOE	4.0	3.5	63.1	1.8	7.6	3031
SWINISTER VOE	6.3	14.9	367.5	1.8	4.9	27377
TOBERMORY BAY	1.6	1.6	36.6	3.7	4.7	2842
TORRIDON	22.2	68.5	3300.2	4.9	7.4	162779
TUATH	9.5	23.4	412.4	3.5	3.8	39616

Loch Name	Length (km)	Area (km ²)	Volume (Mm ³)	Tidal Range (m)	Tf (days)	Q (Mm ³ yr ⁻¹)
UIG BAY	8.8	3.1	64.8	3.1	5.1	4639
UISKEVAGH	3.3	1.9	10.0	4.1	1.0	3652
VAILA SOUND	3.5	3.6	35.6	1.2	6.1	2128
VIDLIN VOE	3.0	2.7	37.3	1.8	5.7	2392
WADBISTER VOE	2.1	1.6	18.2	1.8	4.7	1416
WEISDALE	6.7	6.0	104.0	1.1	11.7	3244
WEST BURRA FIRTH	1.6	0.9	10.4	1.3	6.7	567
WEST LOCH TARBERT	6.5	23.2	396.9	3.8	3.4	42614
WHALEFIRTH	6.3	3.1	28.0	1.9	3.6	2839
WHITENESS VOE	4.5	3.0	36.0	1.1	8.3	1583

* The majority of these parameters have been taken from Edwards and Sharples (1986), however the volumes and areas were re-calculated in 2006 by digitising the depth contours on Admiralty charts.



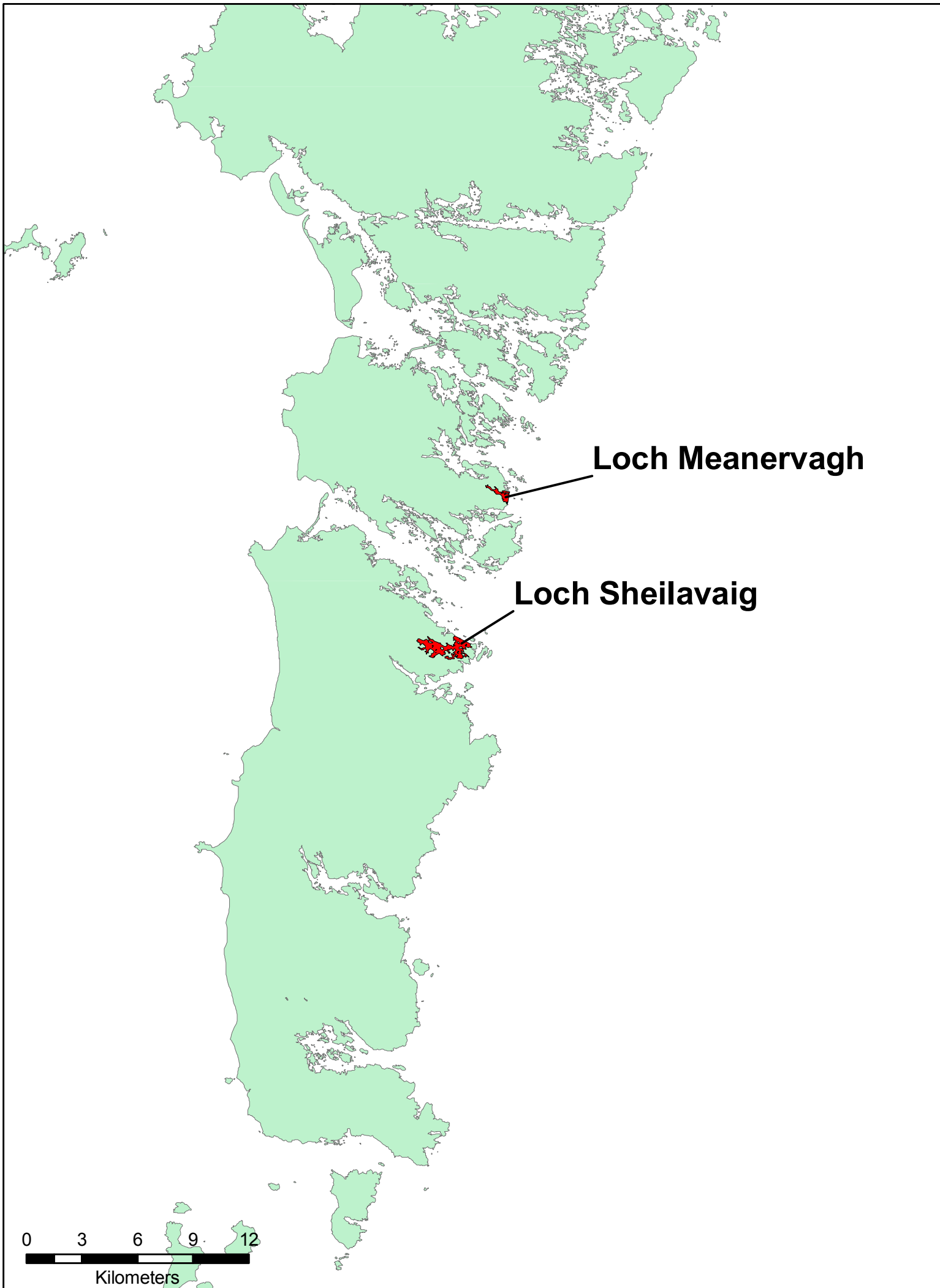
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Category 1 Areas - Shetland Crown © January 2015**

Calbha Bay

**Loch Airdbhair
(inc. Loch Droigniche)**

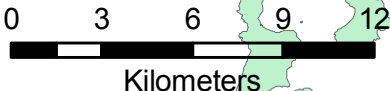
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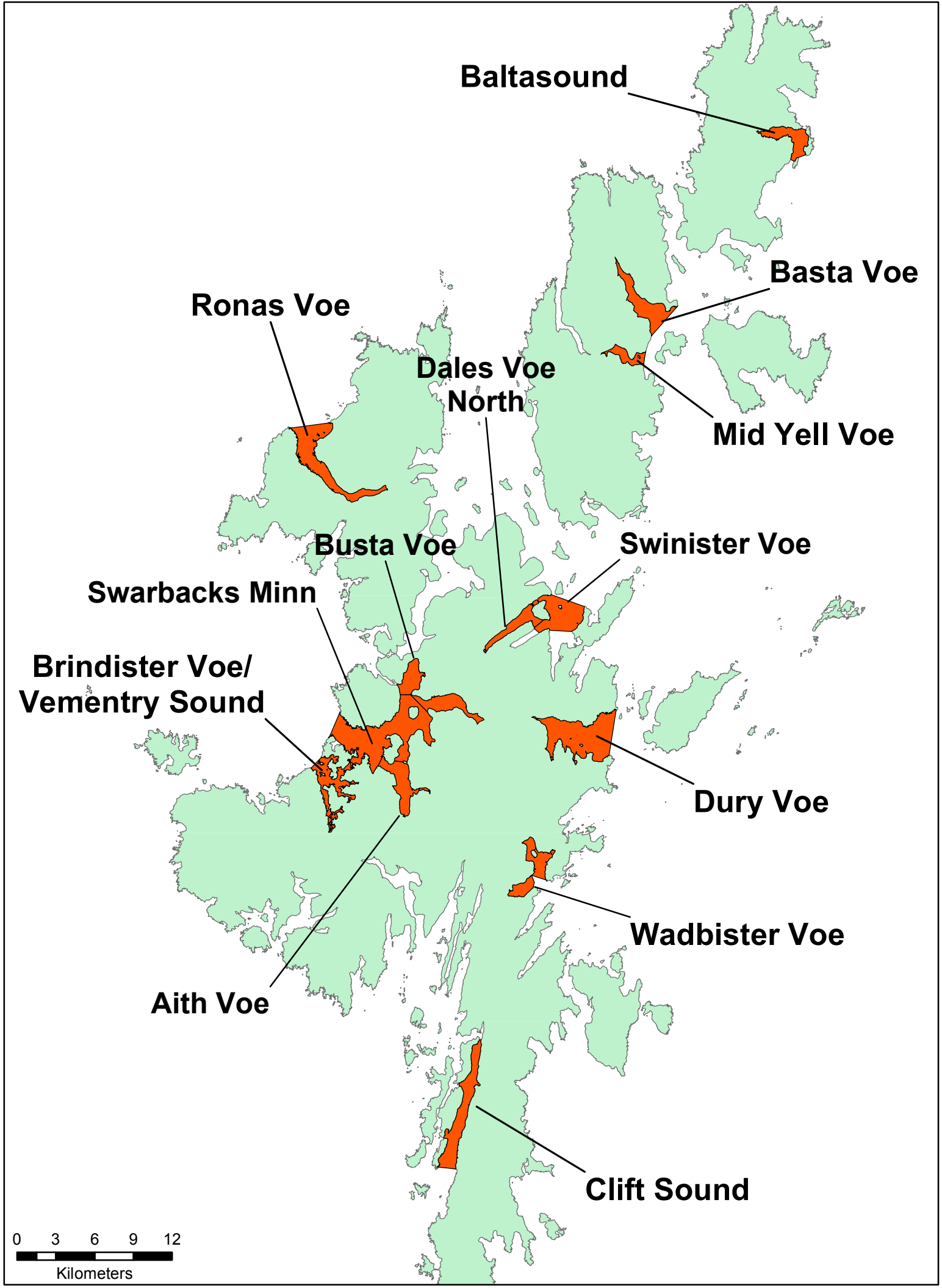
Kilometers

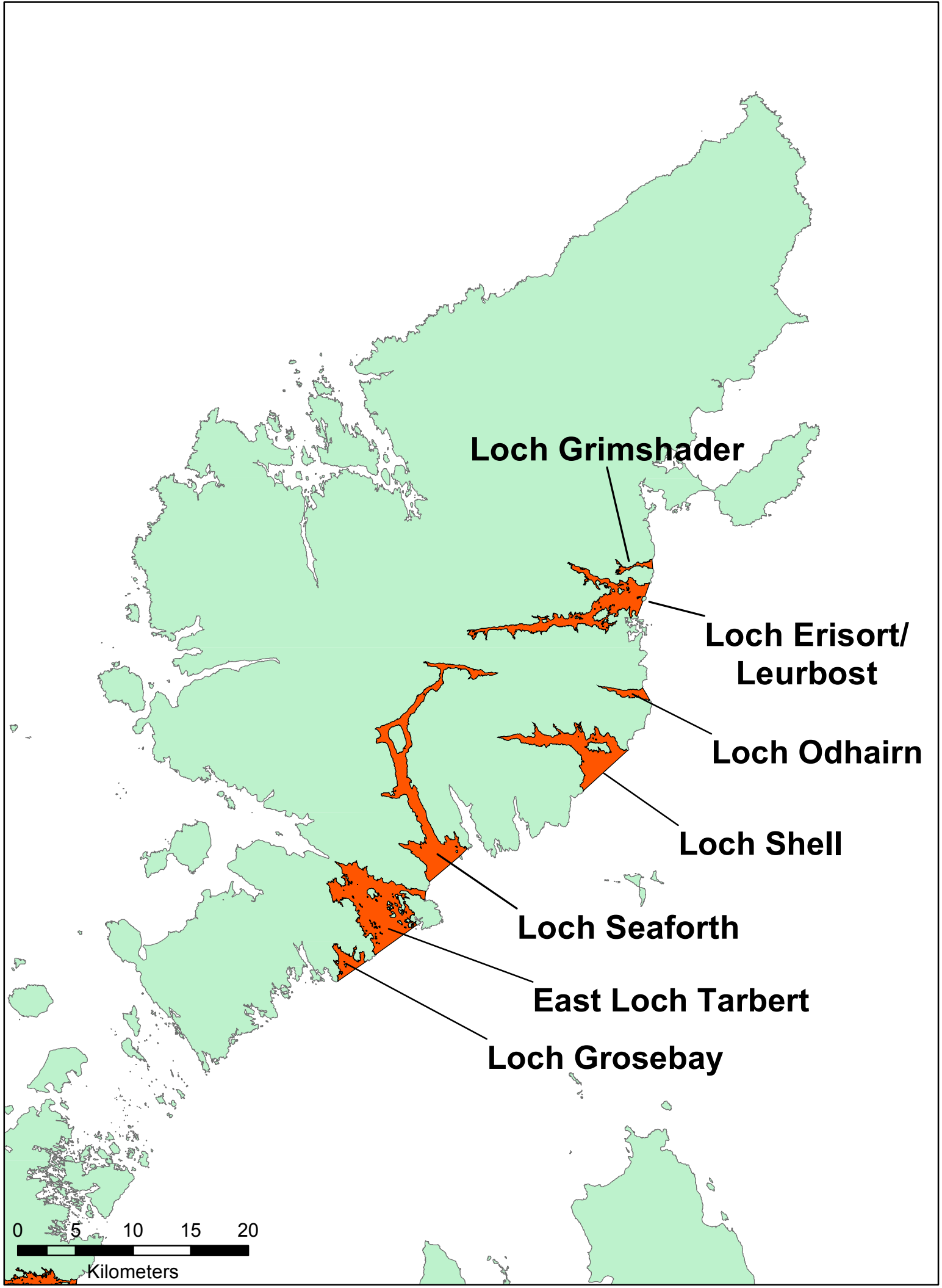


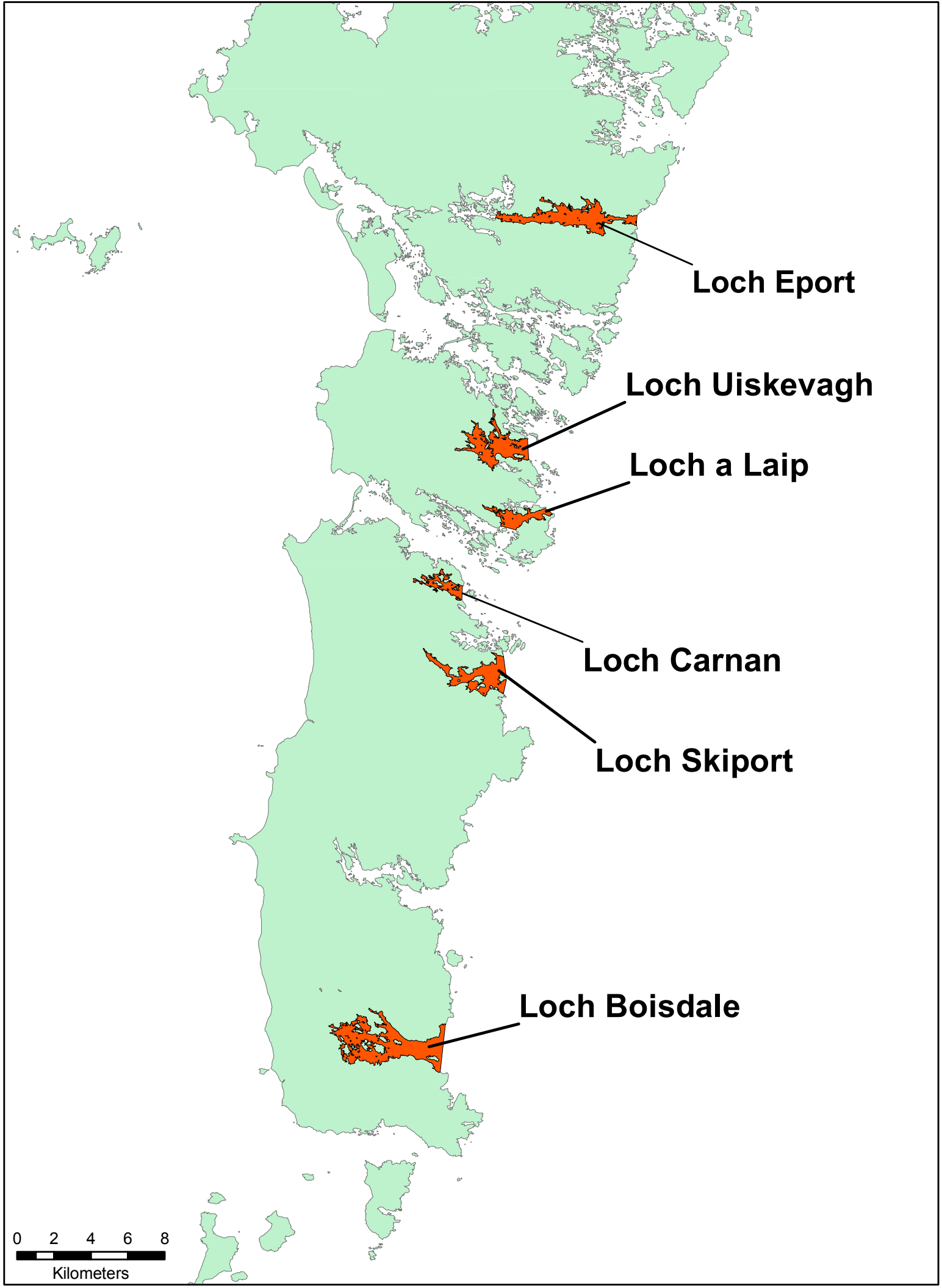
Loch Meanervagh

Loch Sheilavaig









Loch Eport

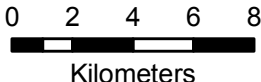
Loch Uiskevagh

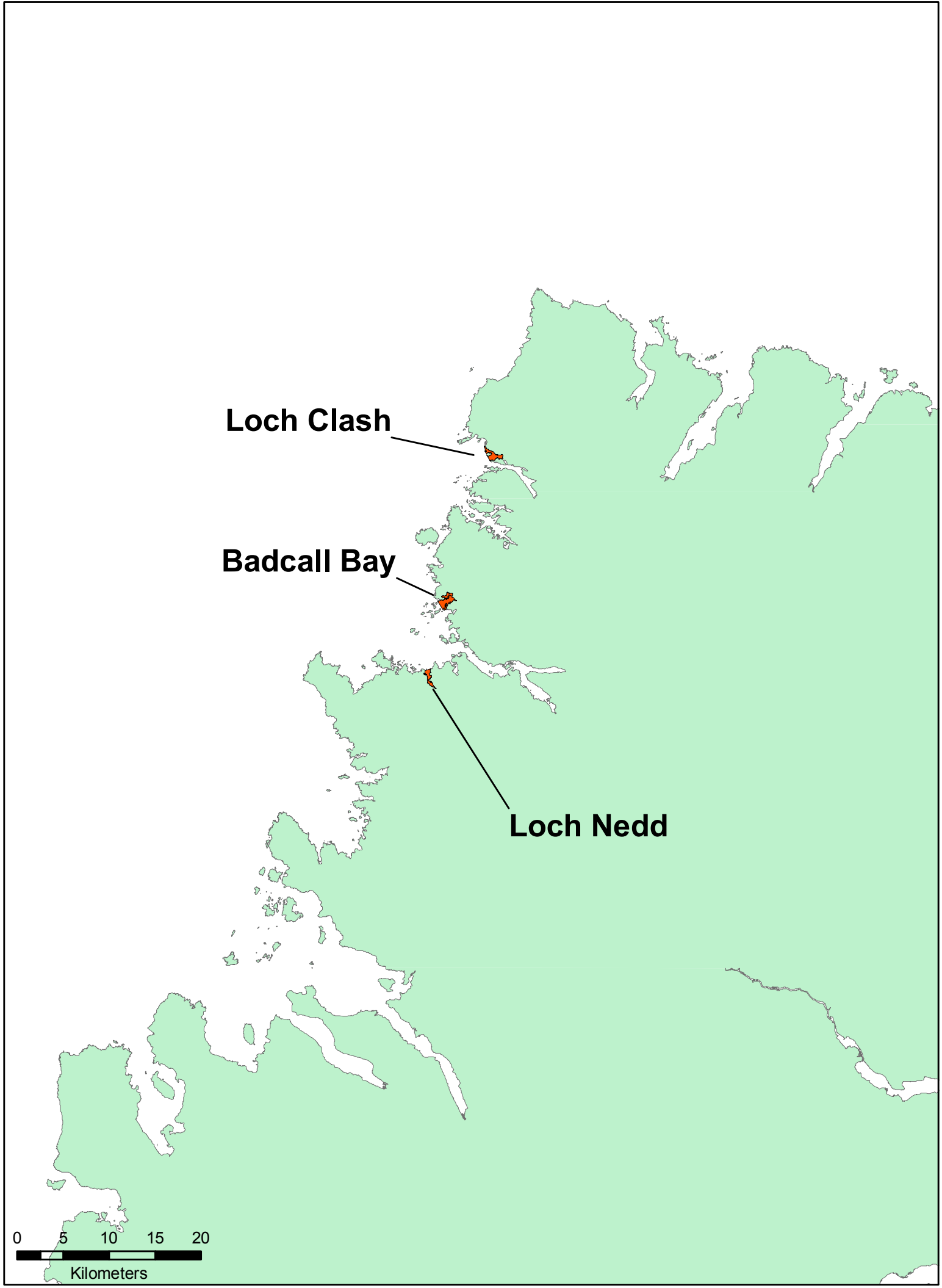
Loch a Laip

Loch Carnan

Loch Skipport

Loch Boisdale





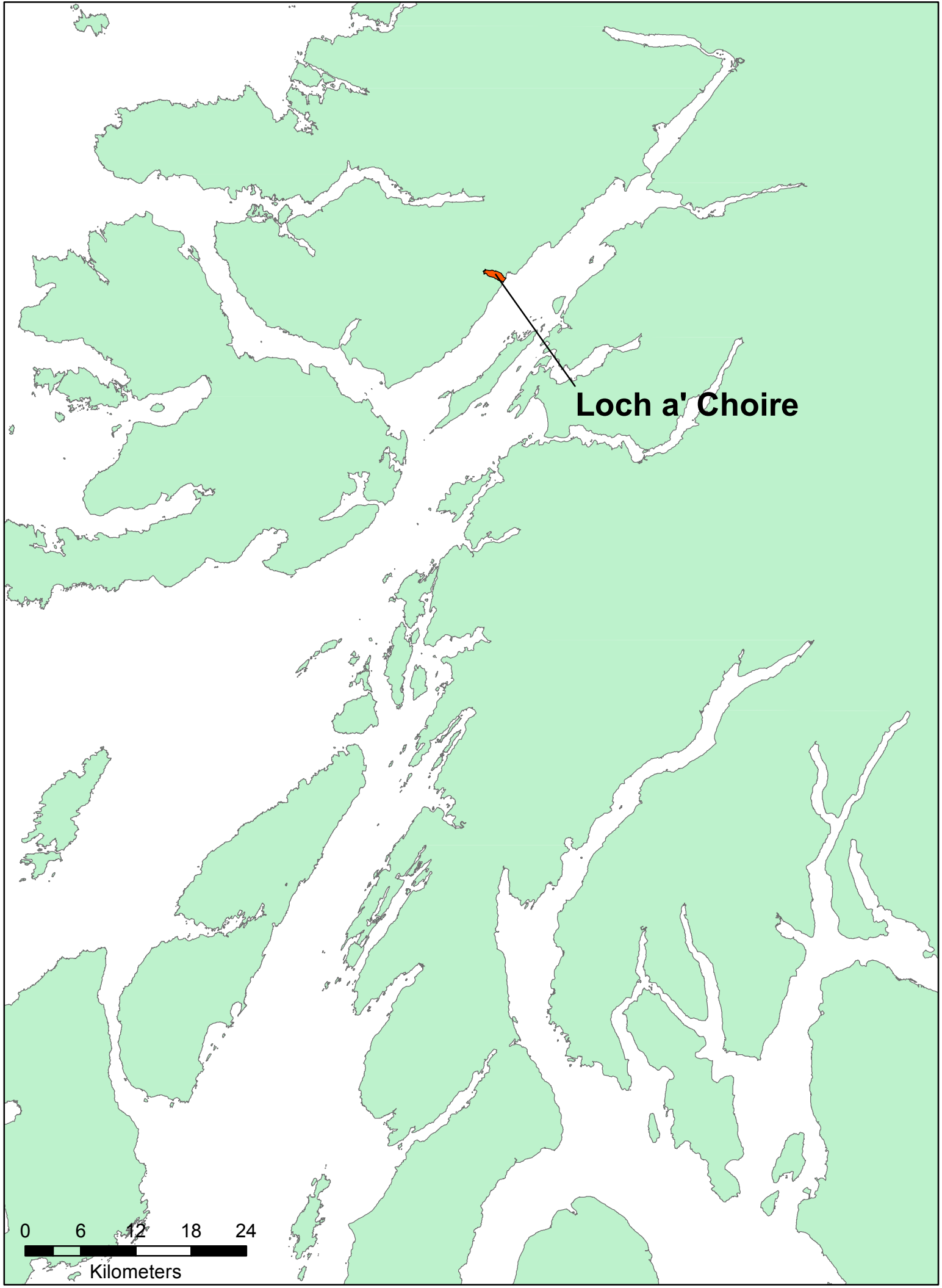
Loch Clash

Badcall Bay

Loch Nedd

0 5 10 15 20

Kilometers



Loch a' Choire



Loch Greshornish

Loch Portree

Loch Kishorn

Loch Pooltiel

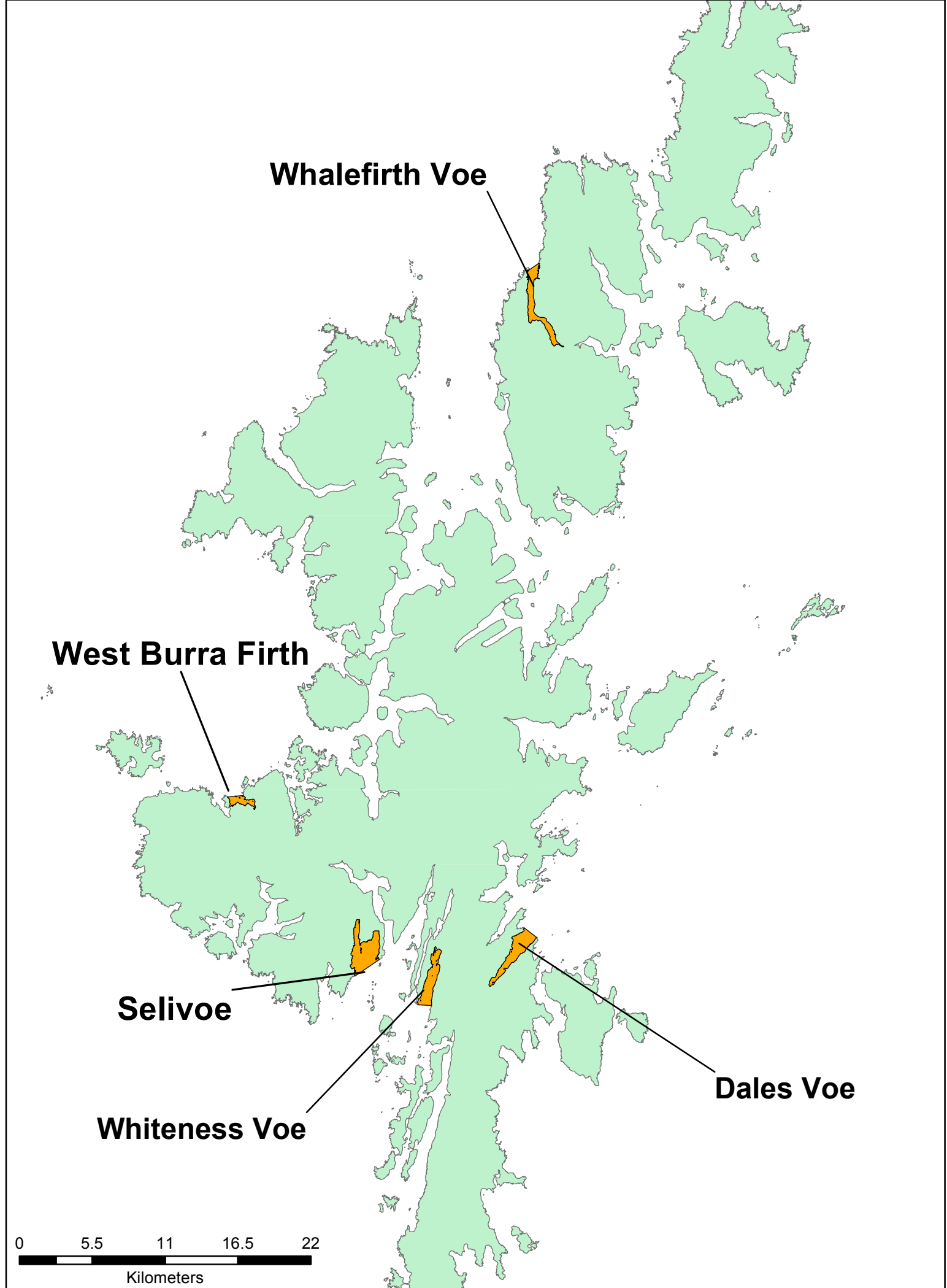
Loch Harport

Loch Ainort

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Kilometers



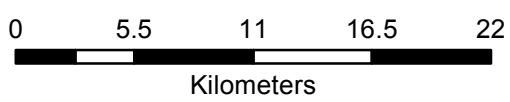
Whalefirth Voe

West Burra Firth

Selivoe

Whiteness Voe

Dales Voe

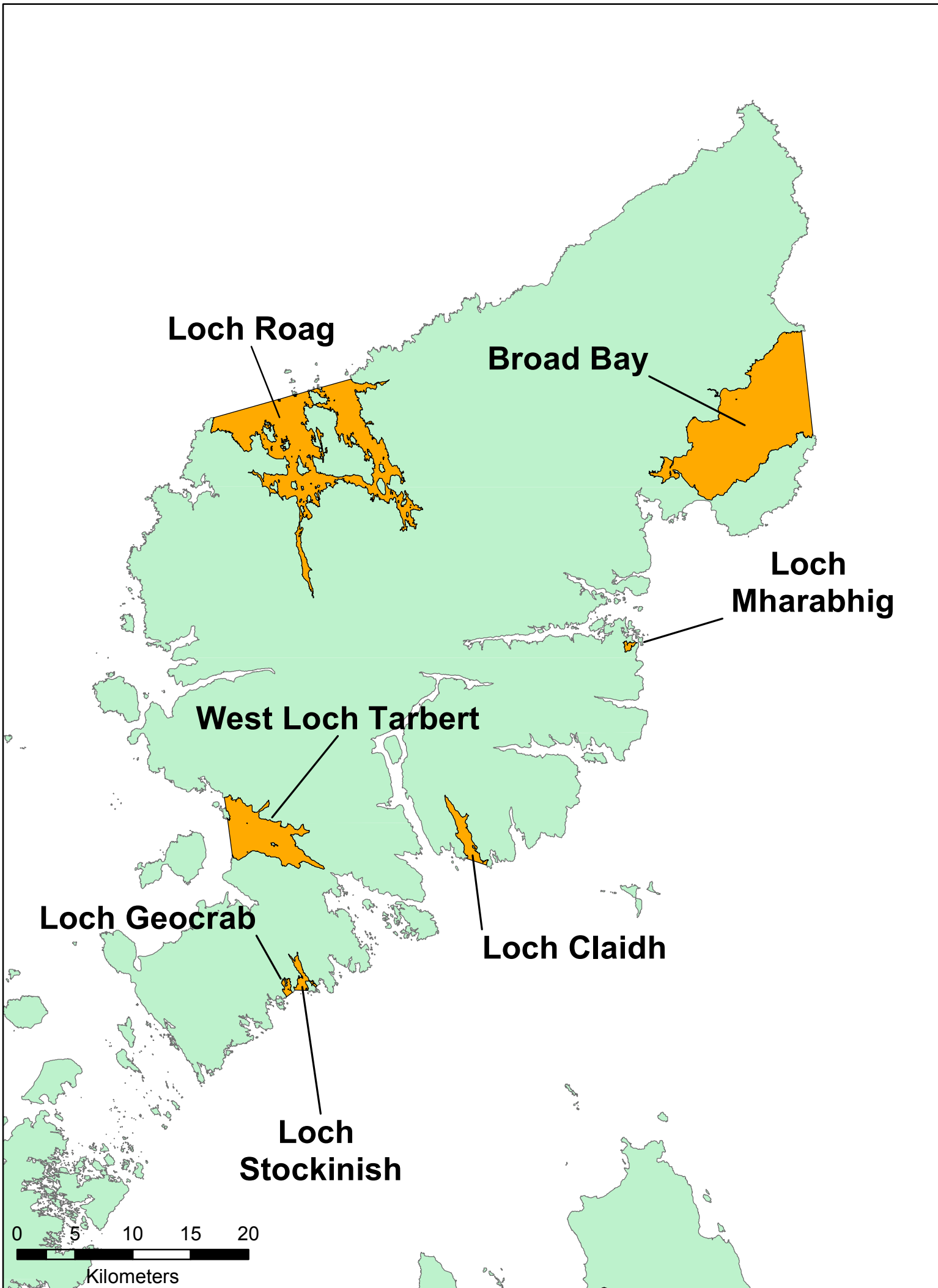


Pierowall Bay

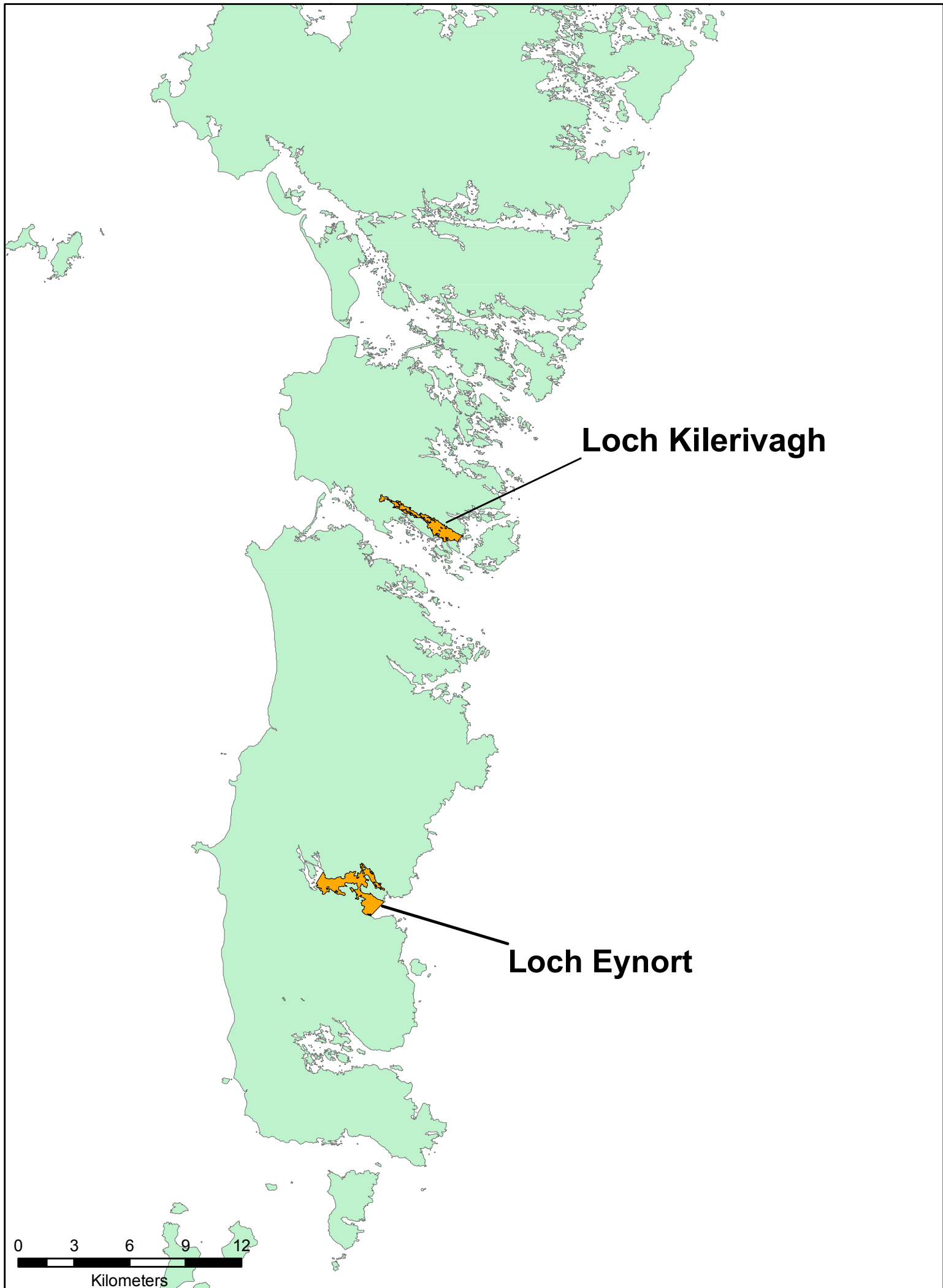
Kirk Hope

0 5 10 15 20

Kilometers

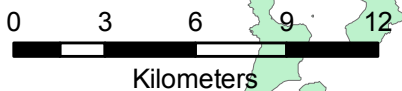


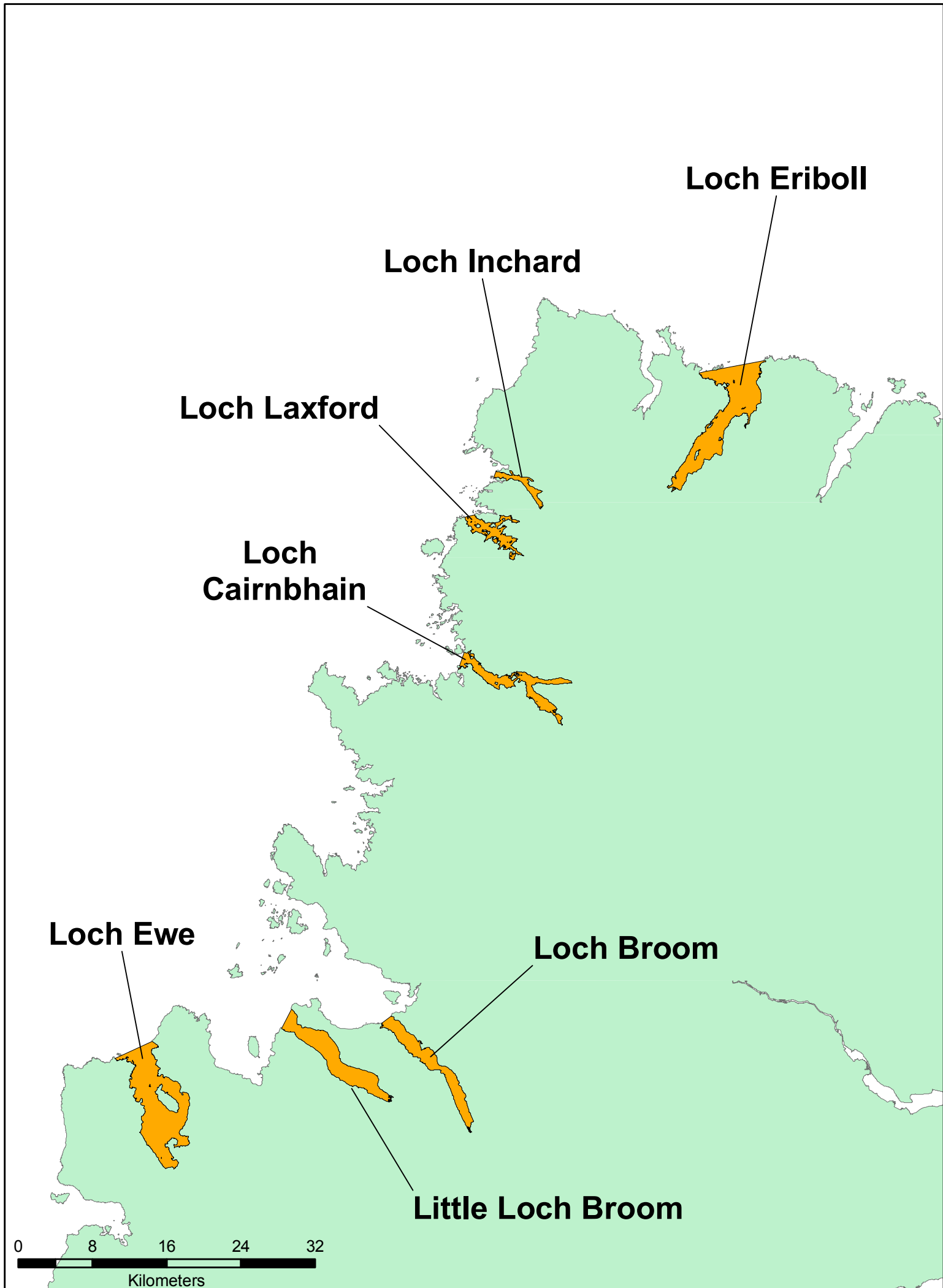
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Category 3 Areas - Lewis & Harris Crown © January 2015



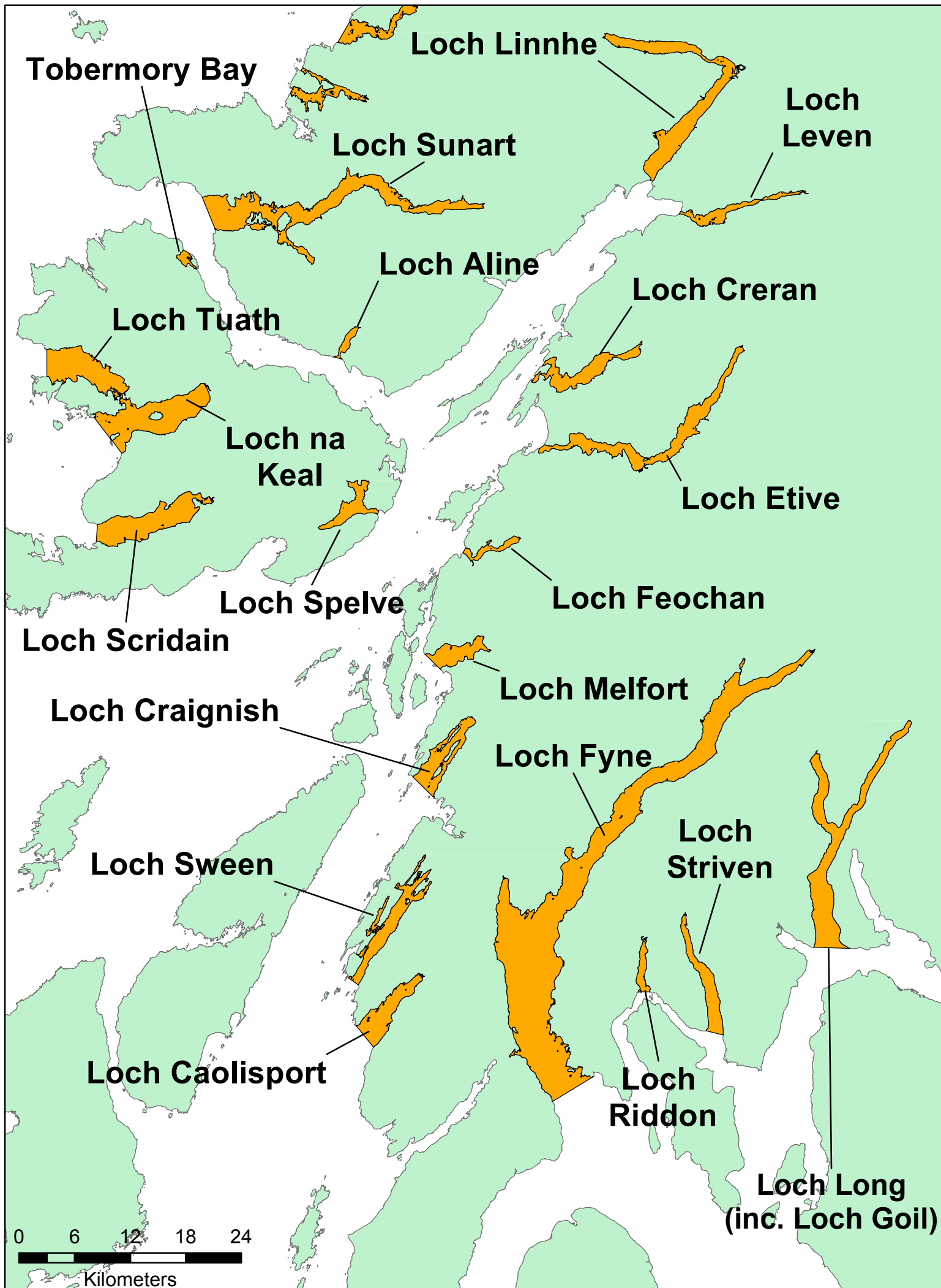
Loch Kilerivagh

Loch Eynort



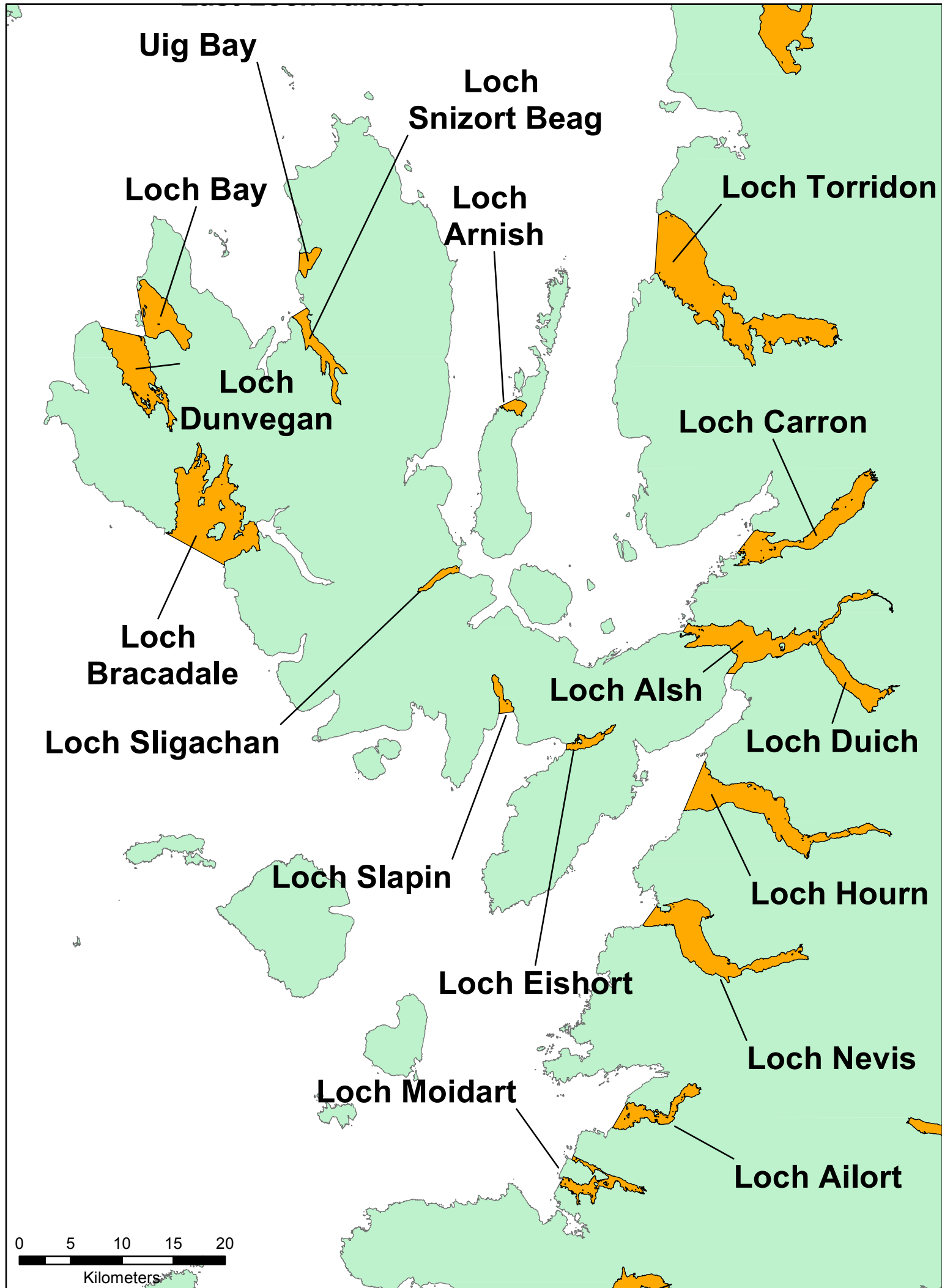


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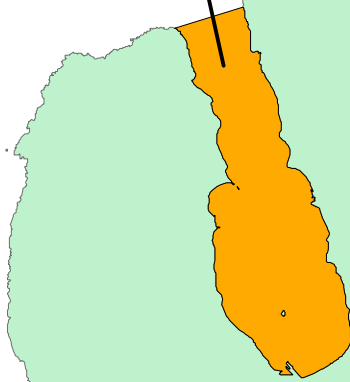
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