Kinneil Lagoons

Management Plan 2014-2018
Maintenance Plan 2018-2028

Contents

1. SITE INFORMATION

1.1 Site location and relevant authorities

Site name	Kinneil Lagoons
Area (ha)	38.6ha
Grid ref (centre of reserve)	NS 9666 8116
District	Falkirk
Local Authority	Falkirk Council
Community Council	Grangemouth Community Council
SNH Office	Stirling or Edinburgh
Local SEPA Office	Stirling

1.2 Statutory, planning and other designations

Details of statutory, planning and other designations are given in the following table and shown in Map 2.

Designation	**All or part of site?**	**Name and other details**
SSSI/ASSI	Part	Firth of Forth SSSI (Ref: NS 9s/3) Area 542.6ha
SPA	Part	Firth of Forth SPA (UK9004411) Area 6313.72ha
RAMSAR	Part	Firth of Forth RAMSAR (UK9004411) Area 6313.72ha

1.3 Statutory site condition assessment

Land Owner Responsible			
SSSI/ASSI name	**Unit or feature**	**Assessment**	**Date**
Firth of Forth SSSI	Vascular plant assemblage	Unfavourable Declining	26/08/04
Firth of Forth SSSI	Saltmarsh	Unfavourable Declining	08/07/03
Firth of Forth SSSI	Pink-footed Goose (Anser brachyrhynchus) non-breeding	Favourable Maintained	27/10/10
Firth of Forth SSSI	Redshank (Tringa lpine) non-breeding	Favourable Maintained	27/10/10
Firth of Forth SSSI	Ringed plover (Charadrius hiaticula) non-breeding	Favourable Maintained	27/10/10
Firth of Forth SSSI	Shelduck (Tadorna tadorna) non-breeding	Favourable declining	01/11/10
Firth of Forth SSSI	Ringed plover (Charadrius hiaticula), breeding	Unfavourable Declining	30/06/07
Firth of Forth SSSI	Shelduck (Tadorna tadorna), breeding	Favourable Maintained	27/06/03
Land Owner not responsible			
SSSI/ASSI name	**Unit or feature**	**Assessment**	**Date**
Firth of Forth SSSI	Bar-tailed godwit (Limosa lapponica)	Unfavourable Declining	19/10/10
Firth of Forth SSSI	Cormorant (Phalacrocorax carbo) non-breeding	Favourable Maintained	19/10/10
Firth of Forth SSSI	Common scoter (Melanitta nigra)	Favourable Declining	19/10/10
Firth of Forth SSSI	Curlew (Numenius arquata)	Favourable Maintained	20/10/10

Firth of Forth SSSI	Dunlin (Calidris lpine)	Favourable Declining	26/10/10
Firth of Forth SSSI	Eider (Somateria mollissima) non-breeding	Favourable Declining	26/10/10
Firth of Forth SSSI	Great Crested Grebe (Podiceps cristatus) non-breeding	Unfavourable declining	26/10/10
Firth of Forth SSSI	Goldeneye (Bucephala clangula)	Unfavourable declining	26/10/10
Firth of Forth SSSI	Oystercatcher (Haematopus ostralegus) non-breeding	Favourable Maintained	27/10/10
Firth of Forth SSSI	Long-tailed duck (Clangula hyemalis) non-breeding	Unfavourable declining	27/10/10
Firth of Forth SSSI	Knot (Calidris canutus) non-breeding	Unfavourable declining	27/10/10
Firth of Forth SSSI	Red-breasted merganser (Mergus serrator) non-breeding	Favourable Declining	27/10/10
Firth of Forth SSSI	Grey plover (Pluvialis squatarola) non-breeding	Favourable Declining	27/10/10
Firth of Forth SSSI	Scaup (Aythya marila) non-breeding	Unfavourable declining	01/11/10
Firth of Forth SSSI	Velvet scoter (Melanitta fusca)	Favourable Maintained	01/11/10
Firth of Forth SSSI	Turnstone (Arenaria interpres)	Favourable Maintained	01/11/10
Firth of Forth SSSI	Palaeontology Arthropoda (excluding insects and trilobites)	Unfavourable no change	16/01/09
Firth of Forth SSSI	Red-throated diver (non breeding)	Favourable Maintained	29/03/09
Firth of Forth SSSI	Slavonian grebe (Podiceps auritus), non-breeding	Favourable Maintained	29/03/09
Firth of Forth SSSI	Golden plover (Pluvialis apricaria), non-breeding	Favourable Maintained	29/03/09
Firth of Forth SSSI	Lowland neutral grassland	Unfavourable Declining	17/08/09
Firth of Forth SSSI	Lower Carboniferous [Dinantian-Namurian (part)]	Unfavourable No change	26/03/08
Firth of Forth SSSI	Permian/Carboniferous Fish/Amphibia	Favourable Maintained	26/03/08
Firth of Forth SSSI	Carboniferous-Permian Igneous	Unfavourable No change	17/11/08
Firth of Forth SSSI	Palaeozoic Palaeobotany	Favourable Maintained	18/11/08
Firth of Forth SSSI	Northern brown Argus (Aricia artaxerxes)	Favourable Maintained	27/10/07
Firth of Forth SSSI	Eider (Somateria mollissima), breeding	Unfavourable no change	22/05/06
Firth of Forth SSSI	Transition grassland	Favourable Maintained	21-Sep-04
Firth of Forth SSSI	Coastal Geomorphology of Scotland	Favourable Maintained	15-Aug-02
Firth of Forth SSSI	Maritime cliff	Unfavourable Declining	09-Oct-02
Firth of Forth SSSI	Upper Carboniferous [Namurian (part)-Westphalian]	Favourable Maintained	11-Oct-02
Firth of Forth SSSI	Quaternary of Scotland	Favourable Maintained	28-Oct-02
Firth of Forth SSSI	Mineralogy of Scotland	Favourable Maintained	29-Oct-02
Firth of Forth SSSI	Beetles assemblage	Unfavourable Declining	09-Oct-00
Firth of Forth SSSI	Sand dune	Unfavourable Declining	09-Oct-00
Firth of Forth SSSI	Saline lagoon	Favourable Declining	Sept – 08
Firth of Forth SPA (excluding features listed above)			
Firth of Forth SPA (8499)	Mallard (non-breeding)	Unfavourable declining	26/10/10
Firth of Forth SPA (8499)	Lapwing (non-breeding)	Favourable maintained	27/10/10
Firth of Forth SPA (8499)	Sandwich tern (passage)	Favourable declining	1/11/10
Firth of Forth SPA (8499)	Waterfowl assemblage (non-breeding)	Favourable declining	1/11/10
Firth of Forth SPA (8499)	Wigeon (non-breeding)	Favourable recovered	1/11/10

2. EVALUATION and RATIONALE FOR MANAGEMENT

2.1 Current issues and constraints

- The site lies within a bigger area with SSSI and SPA designations. All proposed work will require consents for operations.
- Financial resources are limited to funding which has already been secured
- There are access issues for large machinery, which will be required to carry out habitat management work
- Antisocial behaviour (including fly tipping on and adjacent to site) is an issue within the area.
- Visitor perception/expectations will need to be managed very carefully to ensure people realise we are not creating a new reserve and that we are just carrying out some management work on behalf of Falkirk Council.
- Access to the site is via a single track road with limited passing places and regularly used by heavy goods vehicles
- Vehicular access is limited to the site to assist with management work due to parking restrictions.
- There are limited parking areas.
- There is a lack of biodiversity info (limited wintering bird info, no breeding bird info and no non avian info)

2.2 Identification of the Features Influencing Management of the site

The following tables list all the important features identified in Section 1.2-1.4 and identifies which of these are the **Features Influencing Management**.

These include:

** = Features which are the prime reason for maintaining the site and which will drive its management.

✓✓ = SSSI interest features which will influence the management undertaken at the site.

✓= SSSI interest features but which will not influence the management undertaken at the site.

* = other important conservation features whose requirements need to be taken into account when deciding upon management of the site.

Important feature	Influencing management?	Why?
Mudflats	**✓✓	SSSI, SPA and RAMSAR designation feature
Assemblage of wintering and passage waterfowl	**✓✓	SSSI, SPA and RAMSAR designation feature
Wintering and passage dunlin	✓	SSSI, SPA may reach National importance threshold
Wintering and passage redshank	✓	SSSI, SPA may reach National importance threshold
Passage and wintering ringed plover	✓	SSSI/SPA feature
Wintering cormorant	✓✓	SSSI/SPA feature
Wintering golden plover	✓✓	SSSI/SPA feature
Wintering grey plover	✓✓	SSSI/SPA feature
Wintering oystercatcher	✓✓	SSSI/SPA feature
Wintering knot	✓✓	SSSI/SPA feature
Wintering lapwing	✓✓	SSSI/SPA feature
Wintering bar tailed godwit	✓✓	SSSI/SPA feature
Passage black tailed godwit	**	
Reedbed	*	

2.3 Condition of the Features Influencing Management and the Main Factors affecting them

The following tables identify the target condition of the Features Influencing Management and the Main Factors influencing whether these target conditions are attained.

Feature	Attribute(s)	Current	Target(s) for attribute	Main factor(s)	Target for main factor(s)	Comments
Mud	Area	Approx 12ha	Maintain	Encroachment of scrub	Scrub control	
				Pollution	Monitor for pollution events	
	Wintering bird assemblage	Species diversity and numbers	Maintain	Weather	Not within our control.	
				Disturbance	Using signage to reduce disturbance	
Woodland/Scrub	Area	Approx 3.5ha	Maximum of 3.5ha	Lack of scrub control		
	Breeding bird assemblage	Unknown	Establish			
Wet grassland habitat	Area	Approx 11ha	Maintain			
	Breeding bird assemblage	Unknown	Establish			
	Wintering bird assemblage	Unknown	Establish			
Reedbed	Area	Unknown	Establish	Encroachment of scrub	Scrub control	
	Breeding bird assemblage	Unknown	Establish	Area drying out		
	Invertebrate assemblage	Unknown	Establish			

Assemblage of wintering and passage waterfowl	Number of species recorded over the course of a winter Maximum count from September to March			Weather Disturbance	Not within our control. Using signage to reduce disturbance	
Wintering Wildfowl	Maximum count from September to March			Food availability Disturbance	Area of muddy edges available Sept-March Using signage to reduce disturbance	
Wintering and passage waders	Number of species recorded over the course of a winter Maximum count from September to March			Food availability Disturbance	Area of muddy edges available Sept-March Using signage to reduce disturbance	
Wintering and post breeding shelduck	Maximum count from September to March Post breeding and moulting flock numbers			Food availability Disturbance	Maintain pools and muddy edges Sept-March Using signage to reduce disturbance	
Passage black tailed godwit	Maximum count from September to March			Food availability Disturbance	Area of muddy edges available Sept-March Using signage to reduce disturbance	

3. MANAGEMENT OBJECTIVES

3.1. Conservation Objectives

To maintain 36ha of intertidal habitats in favourable SSSI/SPA/RAMSAR condition

Species targets

- Maintain rich and diverse range of bird species using the mudflats for feeding/roosting
- Establish the presence of any RSPB's Saving Nature priority species (avian)
- Establish the presence of any RSPB's Saving Nature priority species (non avian)
- Establish the presence of any LBAP priority species

Habitat conditions

- Maintain approx 12 ha of mud/intertidal habitat
- Maintain approx 3.5ha of woodland/scrub habitat
- Maintain approx 11ha open grassland habitat
- Establish extent of current reedbed and maintain

Summary management

- Eradicate Japanese knotweed present on site
- Carry out annual scrub control
- Carry out initial woodland management
- Control rhododendron present on site
- Create wader scrape of up to 1 ha
- Enhance spit to increase available habitat
- Maintain site free of fly tipped rubbish
- Initial site clear up

Summary monitoring

- Establish breeding bird survey and carry out annually
- Monitor wintering birds monthly in conjunction with WeBS counts.
- Establish a butterfly transect
- Establish a dragon/damselfly transect
- Carry out small mammal trapping at least once during 2 year work plan
- Carry out annual monitoring of invasive non native species
- Monitor for pollution events

3.2 Objectives for People

To provide current visitors with a high value visitor experience while not promoting the site beyond current levels.

People targets

- Maintain current usage levels
- Provide interpretation material at appropriate locations on site
- Maintain a good level of pedestrian access across the site
- Ensure a safe environment for visitors

Summary management

- Install bus stop style hide/interpretation
- Maintain approx 2km of pedestrian access routes
- Remove remains of SWT hide
- Establish clearly marked boundaries of managed area
- Provide signage/interpretation at appropriate locations
- Maintain signage/interpretation in good condition
- Maintain steps and fencing at pedestrian entrance
- Maintain site free of fly tipped rubbish

4. WORK PROGRAMME

4.1 Delivery of Objectives

To maintain 36ha of intertidal habitats in favourable SSSI/SPA/RAMSAR condition

- Maintain rich and diverse range of species using the mudflats for feeding/roosting
    - Undertake monthly webs counts of the lagoons (September to March)
    - Provide signage at appropriate locations to educate about disturbance
- Establish the presence of any RSPB Saving Nature and LBAP priority species
    - Establish breeding bird survey and carry out annually
      (Undertake breeding bird survey biannually across the whole reserve following a modified O'Brien and Smith method for censusing lowland breeding wader populations)
    - Undertake monthly webs counts of the lagoons (September to March)
    - Establish a butterfly transect
      (Establish weekly butterfly transect to be carried out from April 1st to September 31st.)
    - Establish a dragonfly/damselfly transect
      (Undertake a monthly dragonfly/damselfly transect following standard methodology)
    - Carry out small mammal trapping at least once during 2 year work plan
      (Following a standard methodology, carry out small mammal trapping using longworth traps/trip traps to establish which small mammals occur o n the reserve)
- Maintain approx 12 ha of mud/intertidal habitat; approx 3.5ha of woodland/scrub habitat and approx 11ha of open grassland habitat
    - Carry out annual scrub control and at subsequent 3 yearly intervals
      (Using a chainsaw and bow saws as required remove any scrub encroaching on the open habitats during the month of September. Burn all brash on site but outside of the SSSI area.)
    - Cary out woodland management
      (Manage woodland move woodland edge back away from reed edge to prevent encroachment onto open habitat using chainsaws during the month of September and with a valid felling licence in place)
    - Obtain felling licence for woodland management
    - Carry out Rhododendron control within woodland
      (Carry out control of rhododendron by felling large bushes using a chainsaw and immediately applying glyphosphate to the cut stump and pulling small seedlings by hand during the month of March)
    - Monitor for pollution events
    - Create wader scrape of up to 1ha
    - Carry out spit maintenance
    - Eradicate Japanese knotweed present on site
      (Treat each Japanese Knotweed stem with 20% solution of glyphosphate by stem injection each August/September, cut dead stems in December to provide access for following year and burn all stems on site)
- Establish extent of current reedbed and maintain
    - Carry out survey to establish current extent of reedbed

To provide current visitors with a high value visitor experience while not promoting the site beyond current levels.

- Maintain site usage at current levels and do not promote it

- Provide interpretation material at appropriate locations on site
    - Install bus stop style hide/interpretation
    - Provide signage/interpretation at appropriate locations
    - Maintain signage/interpretation in good condition

- Maintain a good level of pedestrian access across the site
    - Maintain approx 2km of pedestrian access routes
    - Maintain steps and fencing at pedestrian entrance

- Ensure a safe environment for visitors
    - Remove remains of SWT hide
    - Maintain site free of fly tipped rubbish

4.2 RSPB TWO-YEAR WORK PROGRAMME

Red = high priority, orange = medium priority, green = low priority

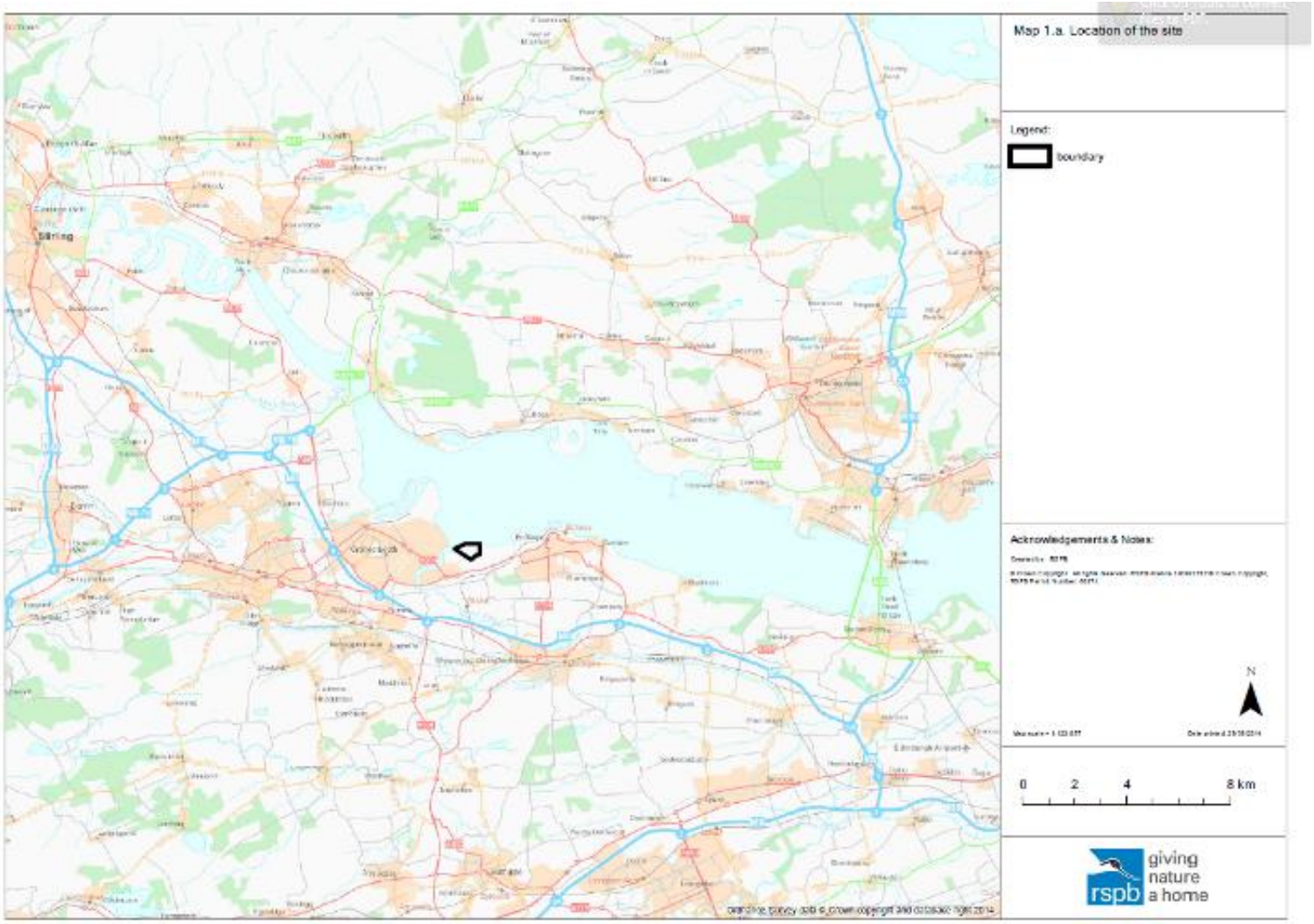
Activity	2014-15	2015-16	2016-17	2017-18
	Year 1	Year 2	Year 3	Year 4
Create wader scrape of up to 1 ha including islands	/	August	/	/
Maintain islands free of vegetation	/	/	August	August
Provide signage at appropriate locations	/	/	April	/
Control Japanese Knotweed	August	August	August	August
Control scrub	August/September	August/September	August/September	August/September
Woodland management	September	September	September	September
Rhododendron Control	March	March	March	March
Obtain felling Licence	/	June	/	/
Install bus stop style hide/interpretation	/	/	April	/
Remove remains of SWT hide	October	/	/	/
Undertake breeding bird survey across the whole site	/	April – June	/	April-June
Undertake monthly webs counts of the lagoons	September – March	September – March	September - March	September – March
Maintain site free of fly tipped rubbish	All year	All year	All year	All year
Maintain pedestrian access routes	All year	All year	All Year	All year
Initial site clear up	August-December	/	/	/
Maintain steps/fencing at site entrance	All year	All year	All year	All year
Establish clearly marked boundaries of managed area	/	/	April	/
Monitor for pollution events	All year	All year	All year	All year
Establish butterfly transect	/	April-September	April-September	April-September
Carry out butterfly transect	/	April-September	April-September	
Carry out small mammal trapping at least once during the four year work programme time period	All year	All year	All year	All year
Establish dragon/damselfly transect	/	May - September	May - September	May - September
Carry out dragon/damselfly transect	/	May - September	May - September	May - September

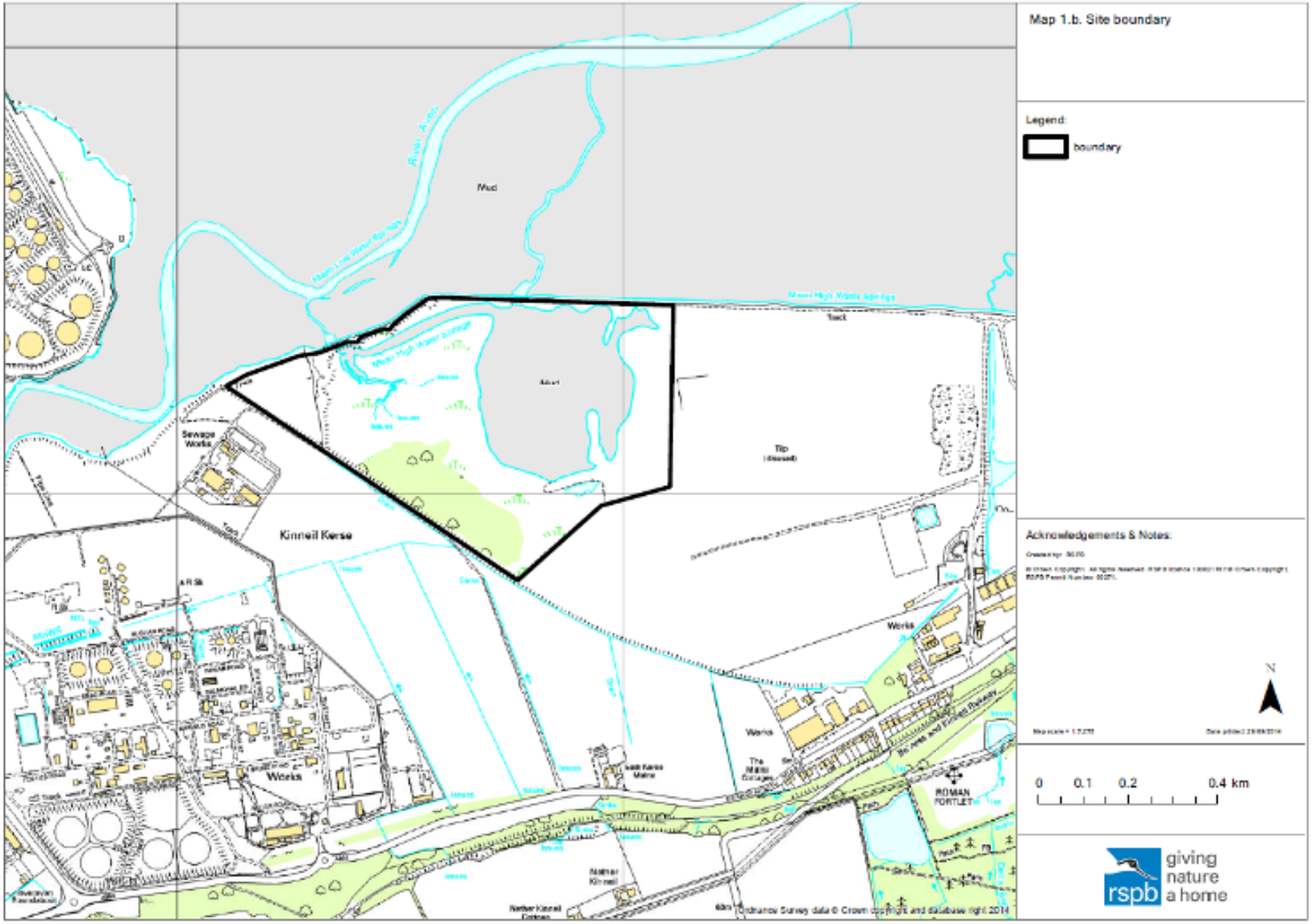
4.3 MAINTENANCE WORK PROGRAMME

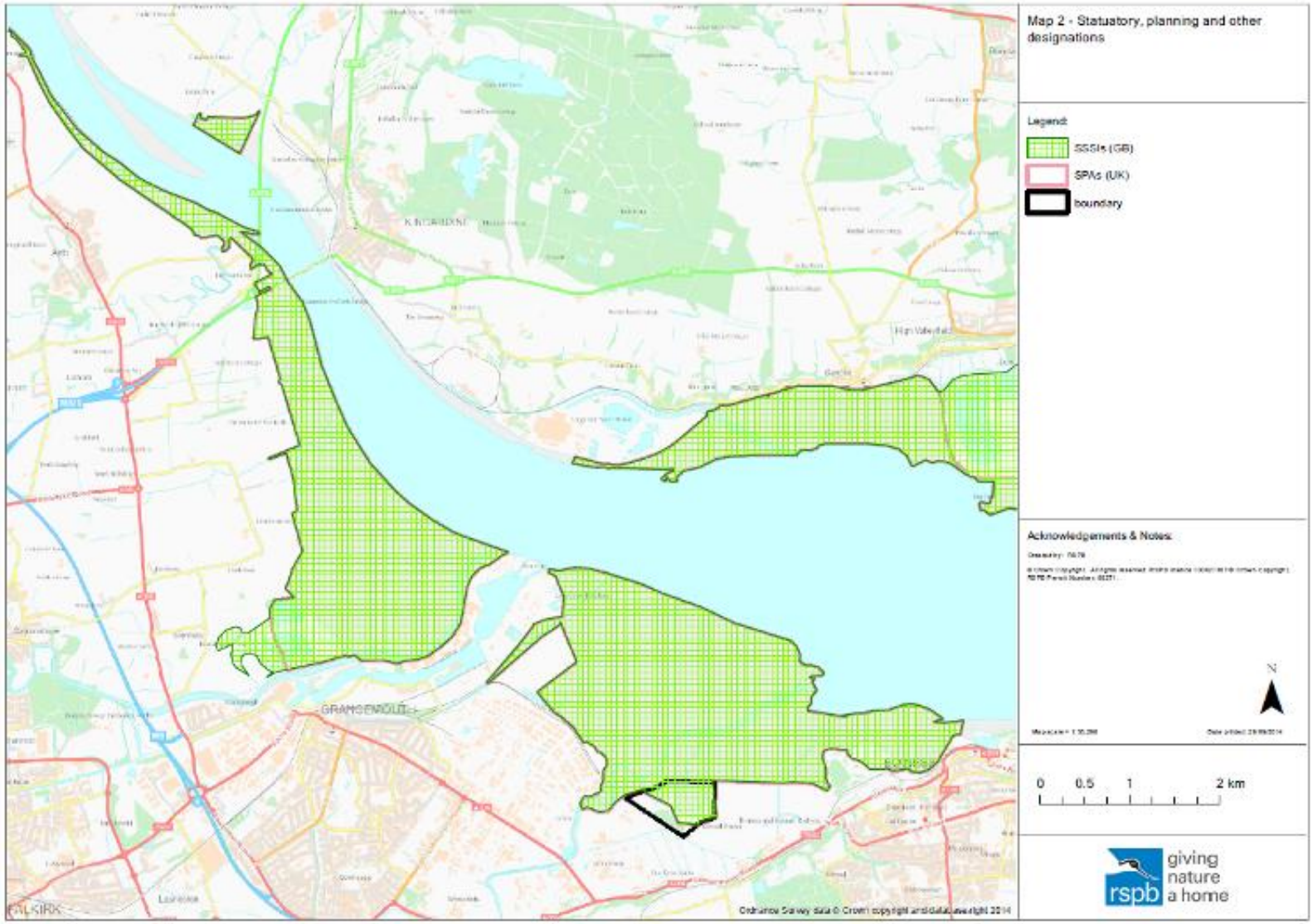
Red = high priority, orange = medium priority, green = low priority

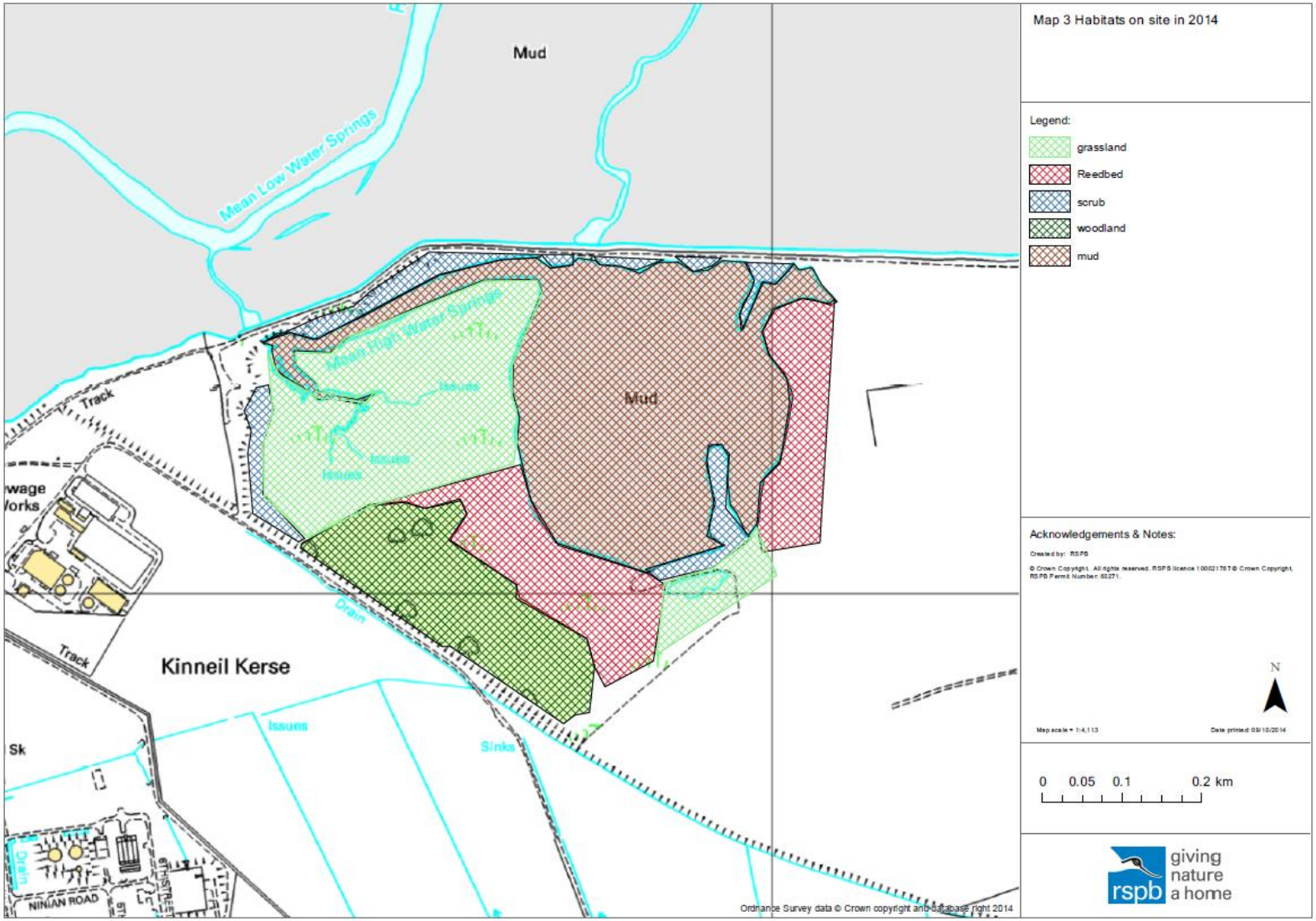
Activity	Lead Partner	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Manage scrub				August/ September			August/ September			August/ September	
Control Japanese knotweed		August	August	August	August	August	August	August	August	August	August
Undertake monthly webs counts of the lagoons		September - March	September - March	September - March	September - March	September - March	September - March	September - March	September - March	September - March	September - March
Undertake breeding bird survey across the whole site on alternate years		/	April – June	/	April – June	/	April – June	/	April – June	/	April – June
Monitor for Rhodendron regeneration and control if required		March	March	March	March	March	March	March	March	March	March
Maintain site free of fly tipped rubbish		All year	All year	All year	All year	All year	All year	All year	All year	All year	All year
Maintain pedestrian access routes		All year	All year	All year	All year	All year	All year	All year	All year	All year	All year
Maintain signage		All year	All year	All year	All year	All year	All year	All year	All year	All year	All year
Monitor for pollution events		All year	All year	All year	All year	All year	All year	All year	All year	All year	All year
Carry out butterfly transect		April-September	April-September	April-September	April-September	April-September	April-September	April-September	April-September	April-September	April-September
Carry out dragon/damselfly transect		May - September	May – September	May – September	May – September	May – September	May – September	May – September	May – September	May – September	May – September

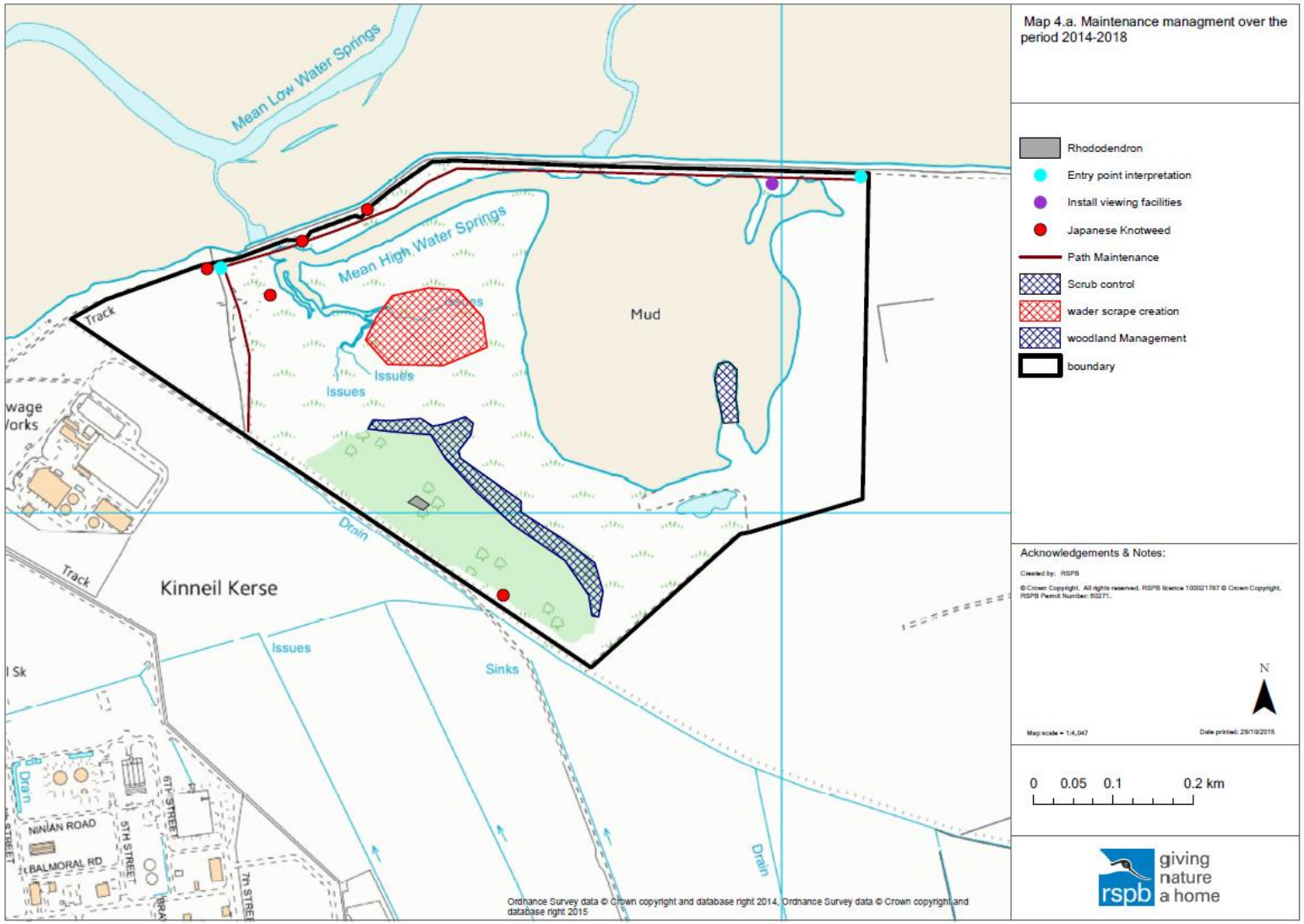
MAPS

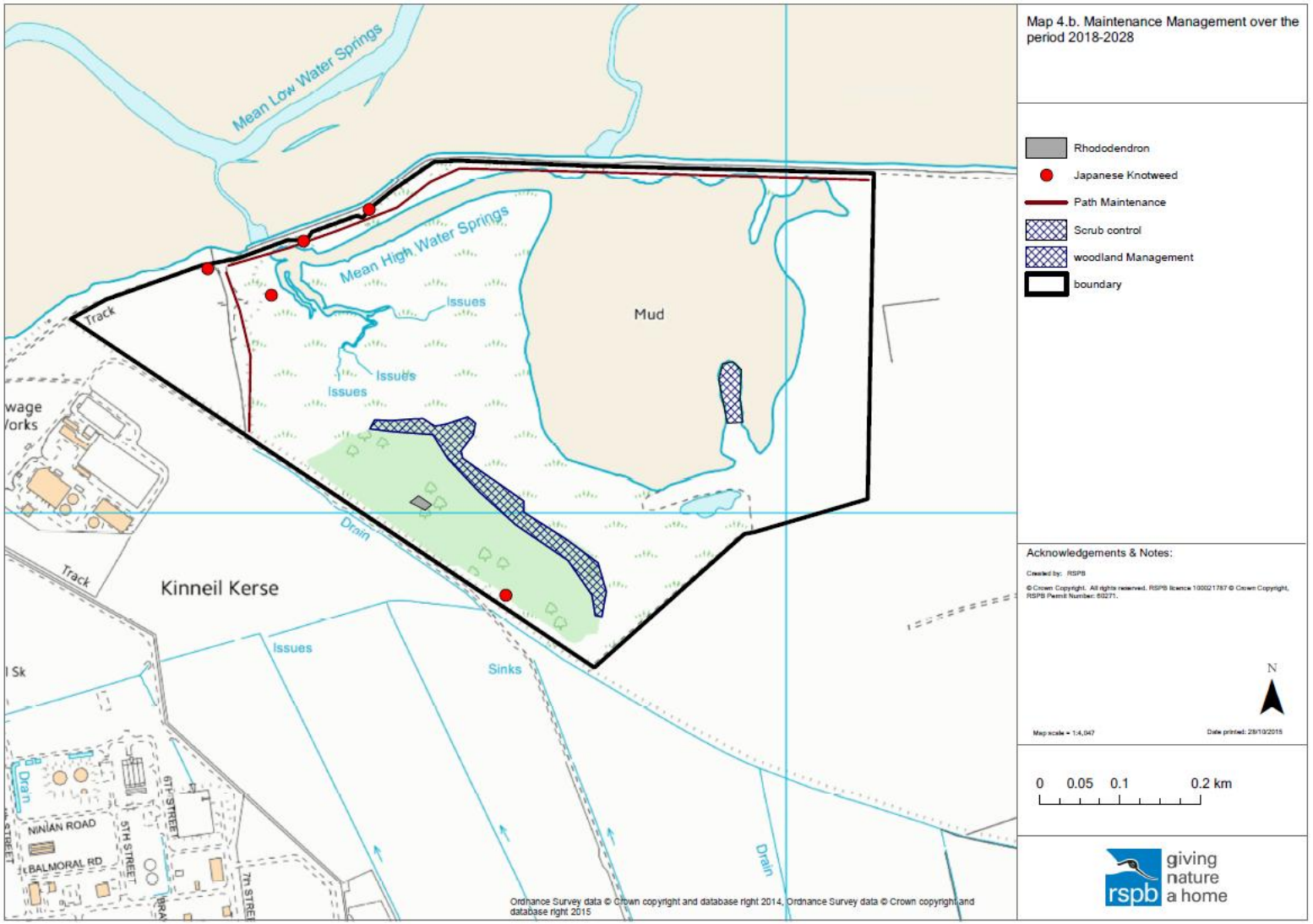

Map 1.a. Location of the site
Legend:
boundary
Acknowledgements & Notes:
N
0
2
4
8 km
rspb
giving
nature
a home


Map 1.b. Site boundary
Legend:
boundary
Acknowledgements & Notes:
Kinneil Kerse
Sewage Works
Mud
Tip
Works
ROMAN FORTLET
0 0.1 0.2 0.4 km
N
giving nature a home
rspb


Map 2 - Statuatory, planning and other designations
Legend:
SSSIs (GB)
SPAs (UK)
boundary
Acknowledgements & Notes:
N
0 0.5 1 2 km
giving nature a home
rspb
Ordnance Survey data © Crown copyright and database right 2014


Mud
Mean Low Water Springs
Mean High Water Springs
Issues
Issues
Issues
Mud
Track
wage
Works
Drain
Track
Kinneil Kerse
Issues
Sinks
Sk
Drain
NINIAN ROAD
Ordnance Survey data © Crown copyright and database right 2014
Map 3 Habitats on site in 2014
Legend:
grassland
Reedbed
scrub
woodland
mud
Acknowledgements & Notes:
Created by: RSPB
© Crown Copyright. All rights reserved. RSPB licence 100021787© Crown Copyright, RSPB Permit Number: 60271.
N
Map scale = 1:4,113
Date printed: 09/10/2014
0 0.05 0.1 0.2 km
rspb
giving nature a home


Map 4.a. Maintenance managment over the period 2014-2018
Rhododendron
Entry point interpretation
Install viewing facilities
Japanese Knotweed
Path Maintenance
Scrub control
wader scrape creation
woodland Management
boundary
Acknowledgements & Notes:
Created by: RSPB
© Crown Copyright. All rights reserved. RSPB licence 100021787 © Crown Copyright, RSPB Permit Number: 80271.
N
Map scale = 1:4,047
Date printed: 28/10/2015
0 0.05 0.1 0.2 km
giving nature a home
Mean Low Water Springs
Mean High Water Springs
Mud
Track
Issues
Drain
Kinneil Kerse
Sinks
NINIAN ROAD
BALMORAL RD
5TH STREET
6TH STREET
7TH STREET
Ordnance Survey data © Crown copyright and database right 2014. Ordnance Survey data © Crown copyright and database right 2015


Map 4.b. Maintenance Management over the period 2018-2028
Rhododendron
Japanese Knotweed
Path Maintenance
Scrub control
woodland Management
boundary
Mean Low Water Springs
Mean High Water Springs
Issues
Issues
Issues
Mud
Track
Track
Drain
Kinneil Kerse
Issues
Sinks
Drain
Drain
NINIAN ROAD
BALMORAL RD
5TH STREET
6TH STREET
7th STREET
Acknowledgements & Notes:
Created by: RSPB
© Crown Copyright. All rights reserved. RSPB licence 100021787 © Crown Copyright, RSPB Permit Number: 60271.
N
Map scale = 1:4,047
Date printed: 29/10/2015
0 0.05 0.1 0.2 km
giving nature a home
Ordnance Survey data © Crown copyright and database right 2014. Ordnance Survey data © Crown copyright and database right 2015

Appendix 1: SSSI/ASSI, SPA, pSAC, Ramsar, NNR citations

CITATION
FIRTH OF FORTH
SITE OF SPECIAL SCIENTIFIC INTEREST

Fife, Clackmannanshire, Stirling,
Falkirk, West Lothian, City of Edinburgh, East Lothian
Site code :8163

NATIONAL GRID REFERENCE : NS 851934 to NO 632087 & NT 678792
OS 1:50 000 Sheet NO : Landranger Series 58, 59, 65, 66, 67
1:25 000 Sheet NO : Explorer Series 349, 350, 351, 366, 367, 370, 371
AREA : 7423.19 hectares

NOTIFIED NATURAL FEATURES

Geological :

Stratigraphy : Lower Carboniferous [Dinantian – Namurian part)]
Upper Carboniferous [Namurian (part) - Westphalian]
Igneous petrology : Carboniferous – Permian Igneous
Mineralogy: Mineralogy of Scotland
Palaeontology: Arthropoda (excluding insects & trilobites)
Palaeozoic Palaeobotany
Permian - Carboniferous Fish/Amphibia
Quaternary geology and geomorphology : Quaternary of Scotland
Geomorphology : Coastal Geomorphology of Scotland

Biological :

Coastlands : Maritime cliff
Saltmarsh
Sand dunes
Intertidal marine habitats and saline lagoons: Mudflats
Saline lagoon
Lowland grassland: Lowland neutral grassland
Fens: Transition grassland
Vascular plants: Vascular plant assemblage
Invertebrates: Beetle assemblage
Butterflies: Northern brown argus (Aricia artaxerxes)
Birds: Red-throated diver (Gavia stellata), non-breeding
Great crested grebe (Podiceps cristatus), non-breeding
Slavonian grebe (Podiceps auritus), non-breeding
Cormorant (Phalacrocorax carbo), non-breeding
Pink-footed goose (Anser brachyrhynchus), non-breeding
Shelduck (Tadorna tadorna), non-breeding
Mallard (Anas platythynchos), non-breeding
Wigeon (Anas penelope), non-breeding
Scaup (Aythya marila), non-breeding
Eider (Somateria mollissima), non-breeding
Long-tailed duck (Clangula hyemalis), non-breeding
Common scoter (Melanitta nigra), non-breeding
Velvet scoter (Melanitta fusca), non-breeding
Goldeneye (Bucephala clangula), non-breeding
Red-breasted merganser (Mergus serrator), non-breeding
Oystercatcher (Haematopus ostralegus), non-breeding
Ringed plover (Charadrius hiaticula), non-breeding
Golden plover (Pluvialis apricaria), non-breeding
Grey plover (Pluvialis squatarola), non-breeding
Lapwing (Vanellus vanellus), non-breeding
Knot (Calidris canutus), non-breeding

Dunlin (Calidris alpina alpina), non-breeding
Bar-tailed godwit (Limosa lapponica), non-breeding
Curlew (Numenius arquata), non-breeding
Redshank (Tringa totanus), non-breeding
Turnstone (Arenaria interpres), non-breeding
Sandwich tern (Sterna sandvicensis), non-breeding
Eider (Somateria mollissima), breeding
Shelduck (Tadorna tadorna), breeding
Ringed plover (Charadrius hiaticula), breeding

The Firth of Forth Site of Special Scientific Interest (SSSI) is an extensive coastal area located on the east coast of Scotland. It stretches from Alloa to Crail on the north shore and to Dunbar on the south shore. It includes the estuary upriver from the Forth bridges and the firth east of the bridges. It is of importance for a variety of geological and geomorphological features, coastal and terrestrial habitats, vascular plants, invertebrates, breeding, passage and wintering birds.

GEOLOGY

Stratigraphy: Lower Carboniferous

The coastal margins of the Forth demonstrate an exceptional variety of rocks and fossils that have been crucial in understanding the palaeogeography and palaeoecology of Scotland during the Carboniferous geological period. At St Monans, between Elie and Anstruther on the Fife coast and on the southern margin of the Forth at South Queensferry, coastal exposures provide an insight into the Lower Carboniferous, or Dinantian sequences, beneath and surrounding the Forth. The Abden, Burdiehouse and Seafield Tower Limestones, the Pumpherston Shell Bed and Oil Shale, and the Dunnet Sandstones are all examples of names given to Lower Carboniferous rock layers, some of which (particularly the oil-shales, thicker limestones and coals) had economic significance.

Stratigraphy: Upper Carboniferous

Westphalian rock layer sequences on the coast at Buckhaven and at Joppa help illustrate the palaeogeography and palaeoenvironment of the area during the Upper Carboniferous, when the great coal forests flourished around 308 million years ago, and document the start of desert conditions over the area as a prelude to the Permian period.

Igneous Petrology

In intimate association with the Lower Carboniferous sedimentary rocks are various nationally significant volcanic rocks. Between East Wemyss and Anstruther and at North Berwick there are exceptional exposures of volcanic vents and igneous intrusions that document crustal instability and magmatic processes at the start of the Carboniferous. The vents at North Berwick are of particular note in that they contain blocks of rock that were derived from the lower levels of the crust. These have allowed an understanding of the structure of the lower crust in eastern Scotland. Burntisland, the east Fife coast, South Queensferry and Gullane all provide exposures illustrating a range of other nationally important volcanic features and structures.

Mineralogy

Elie Ness in Fife is of note mineralogically for the occurrence of xenocrysts of pyrope garnet, the famous ‘Elie Ruby’, found in a volcanic neck. The ‘rubies’, together with a range of other unusual minerals, provide an insight into the conditions under which the host rock, an alkali basalt, crystallised**.**

Palaeontology

Although of importance in understanding the Lower Carboniferous geology of the Forth area, and of Scotland as a whole, the sedimentary rock sequence has world-wide significance for fossil remains. At Burntisland in Fife, the Abden Bone Bed has yielded a rich and diverse fish fauna; other ‘fossil fish’ localities include Ardross Castle, also in Fife, Cheese Bay near Gullane, and Wardie Shore. Wardie is of international importance, yielding at least eighteen species of fish, including sharks, which are generally complete and in a fine state of preservation. Wardie and Cheese Bay have also yielded some of Europe’s earliest amphibian remains. Granton Shore yielded the first ever recognised body fossils of the conodont animal, an eel-like fish, the remains of which have been used worldwide in dating rock layer sequences. A rich and diverse fossil flora has been found at Pettycur in Fife, Oxroad Bay near North Berwick and at Weak Law near Gullane. The Pettycur locality yields one of the best preserved Lower Carboniferous plant petrifaction fossil floras known in the world.

Quaternary Geology & Geomorphology

Kincraig Point demonstrates an exceptionally well-displayed sequence of raised shorelines, eroded in the volcanic agglomerate bedrock following the retreat of the last ice sheet between about 16,000 and 13,000 radiocarbon years ago. The erosional character of the shorelines is unusual and, as

striking landforms, they complement the detailed sedimentary records of coastal change during the late glacial and postglacial periods that occur in more enclosed estuary situations in eastern Scotland.

At Dunbar, the coast is notable for a series of extensive shore platforms, including features that predate the last glaciation. Three of the platforms occur above present sea level, the highest with a crag and tail formation on its surface. These landforms are representative of the suite of erosional features found along the east coast of Scotland and demonstrate former sea-level changes and different phases of marine erosion. Dunbar is one of the best examples in eastern Scotland illustrating the development of multiple shore platforms, as well as highlighting the contribution of older elements to the form of the present coastal landscape.

Geomorphology

The coastline at Dunbar is also of note for the outstanding complexity of rocky coastal landforms which it exhibits. Of particular interest is a series of rock platforms representing different relative sea levels in the area but the associated cliffs, stacks, skerries and beaches are also of value. The exceptional diversity and intricacy of the landforms is related to the variety of sedimentary and volcanic rock types found here combined with structural weaknesses in these rocks and local variations in exposure and altitude.

HABITATS

The Firth of Forth SSSI comprises an extensive mosaic of intertidal and coastal habitats. Extensive mudflats make up much of the intertidal zone with areas of sand, shingle, rock and boulders. Associated coastal habitats include saltmarsh, grassland and sand dunes.

The site is considered to be of special interest for the following habitats and species:

Maritime cliff

Maritime cliff grassland is of limited occurrence, but between Burntisland and Kirkcaldy is the largest and most diverse coastal grassland in the SSSI, with abundant areas associated with the cliffs and rock outcrops. Thrift Armeria maritima, kidney vetch Anthyllis vulneraria and distant sedge Carex distans are typical species. Maritime cliff grassland also occurs along the East Wemyss to Anstruther coastline and on the Dunbar coast. In these grasslands, abundant rock rose Helianthemum nummularium is typical, with species such as thyme Thymus polytrichus, crested hair-grass Koeleria macrantha, burnet saxifrage Pimpinella saxifraga, agrimony Agrimonia eupatoria and purple milk-vetch Astragalus danicus.

Saltmarsh

Important areas of saltmarsh are supported at Skinflats, Tyninghame and Aberlady. Dumbarnie Links contains the largest area of saltmarsh on the north shore of the Firth of Forth. The largest area of pioneer saltmarsh in the Forth occurs on Alloa Inch. Saltmarsh communities in the Forth are characteristically zoned from low to high water mark and are dominated by sea aster Aster tripolium, common saltmarsh grass Puccinellia maritima, saltmarsh rush Juncus gerardii, and sea club-rush Bolboschoenus maritimus. Several of the saltmarsh plant communities are scarce on the east coast of Scotland.

Beach head saltmarsh occurs at scattered localities at Blackness Bay, Burntisland Bay, Torry Bay, and Ruddons Point. Here, greater sea-spurrey Spergularia media, sea plantain Plantago maritima, glasswort Salicornia europaea and sea arrowgrass Triglochin maritimum are common.

Sand dunes

The main areas of sand dune vegetation occur in the outer Firth. Between Gullane and Broad Sands is the largest and most complex sand dune system in the Lothian area, with its noteworthy lichen-rich dune slacks. Neighbouring Aberlady Bay contains the most extensive complex of sand dune, saltmarsh and mudflat in SE Scotland. The largest area of calcareous sand dunes in Fife, including representative areas of damp dune slack, herb-rich pasture, and intact foredune ridge occurs at Dumbarnie Links, which supports many local rarities and several ‘southern’ species which are rare in Scotland. Calcareous sand dunes are also found at Ruddons Point and its herb-rich dune pasture is of a type not found elsewhere in Fife.

Dune grassland has developed between East Wemyss and Anstruther, Aberlady, Tyninghame and the North Berwick coast, with characteristic species lyme-grass Leymus arenarius, marram grass Ammophila arenaria, cowslip Primula veris, lesser meadow-rue Thalictrum minus, bloody crane’s-bill Geranium sanguineum and restharrow Ononis repens. Mineral enriched grasslands are an unusual habitat in East Lothian.

Mudflats

The Firth of Forth contains large areas of mudflats which while not the of particular impotance for their invertebrate populations are important because of the large populations of birds which they support. Good examples can be found at Skinflats, Kinneil Kerse and Torry Bay.

Saline lagoon and Transition grassland
The intertidal bays of Skinflats and Kinneil Kerse support a range of other estuarine habitats and plant communities including brackish fen and coastal sluiced saline lagoons. The lagoons and brackish fen are characterised by transition zone species such as common reed Phragmites australis, sea club-rush Bolboschoenus maritimus, false fox-sedge Carex otrubae, common spike-rush Eleocharis palustris and abundant spiked water-milfoil Myriophyllum spicatum. Coastal lagoons are a rare habitat in SE Scotland and brackish fens are uncommon.
Extensive freshwater fen transition communities, uncommon elsewhere on the Forth, occur in the upper Forth estuary with reed sweet-grass Glyceria maxima, meadowsweet Filipendula ulmaria, yellow iris Iris pseudacorus and hemlock water-dropwort Oenanthe crocata.
Lowland neutral grassland
Extensive tall herb-rich neutral grassland occurs between Burntisland and Kirkcaldy where meadow crane's-bill Geranium pratense, false brome Brachypodium sylvaticum and the locally rare hemp agrimony Eupatorium cannabinum are common. Neutral grasslands also occur at Skinflats and Kinneil Kerse.
Species-rich coastal and semi-improved grassland is also found at Blackness Bay, where it forms the most diverse coastal grassland in West Lothian and Falkirk**.**

SPECIES
Vascular plant assemblage
The diversity of habitats within the Forth supports a high number of vascular plants, many of which are nationally or locally rare. Nationally scarce species include two eelgrasses – narrow-leaved eelgrass Zostera marina and dwarf eelgrass Z. noltei, which are supported on the extensive intertidal mudflats. The locally rare sea wormwood Seriphidium maritimum, wild cabbage Brassica oleracea, and purple ramping fumitory Fumaria purpurea are also found on drier coastal habitats.
The grasslands are particularly rich in flowering plant species and support many locally rare species such as shining crane's-bill Geranium lucidum, bulbous buttercup Ranunculus bulbosus, yellow horned-poppy Glaucium flavum, pyramidal orchid Anacamptis pyramidalis, viper's bugloss Echium vulgare and wild clary Salvia verbenaca. Nationally scarce thyme broomrape Orobanche alba and maiden pink Dianthus deltoides are also located in some grasslands.
Several sand dune areas hold the nationally scarce rush-leaved fescue Festuca arenaria and variegated horsetail Equisetum variegatum.
Beetle assemblage and Northern brown argus (Aricia artaxerxes)
Large numbers of insects occur throughout the site, reflecting the range of habitats encountered. Several nationally scarce species of invertebrates occur, including the sand dart moth Agrotis ripae, and the northern brown argus butterfly Aricia artaxerxes, scarce and declining in Britain, which has two Fife colonies, between Burntisland and Kirkcaldy, and East Wemyss and Anstruther. Several species of beetles are rare or very local in Scotland, including Cleonis pigra, Lebia (Lamprias**) chlorocephala, Microplontus rugulosus and Scymnus (Scymnus) schmidti.**
Birds: Wintering
The Firth of Forth supports abundant wildfowl and waders and is particularly important for its wintering bird species. The Firth of Forth is the second most important estuarine area for wintering birds in Scotland, and eleventh in the UK, and is significant both in terms of waterfowl density and abundance. Most of the wildfowl and waders in the Firth of Forth are found at internationally or nationally important levels.
The invertebrate-rich mudflats and sandflats are used for feeding at low tide whilst higher ground, including saltmarsh, is used for high tide roosts and feeding sites. The largest expanses of mud are in the inner Forth at Kinneil Kerse, Skinflats, Torry Bay and Alloa Inches while large sandflats are found in the outer Forth at Drum Sands, Tyninghame and Aberlady Bay. Rocky shorelines in the outer Forth are an important resource both for feeding and roosting birds. Lagoons at Kinneil Kerse, Torry Bay and Musselburgh are used by large numbers of birds for feeding and roosting.
The internationally important wintering species within the Forth are shelduck Tadorna tadorna, which includes an important post-breeding moult flock in the inner Forth; bar-tailed godwit Limosa lapponica; knot Calidris canutus; golden plover Pluvialis apricaria and redshank Tringa totanus, using the mud and sandflats; and turnstone Arenaria interpres, which are commonly found on shingle or rocky shorelines. Pink-footed geese Anser brachyrhynchus roost at Aberlady Bay while red-throated diver Gavia stellata and Slavonian grebe Podiceps auritus use offshore areas but also come close inshore at times.
The intertidal areas support nationally important numbers of grey plover Pluvialis squatarola, ringed plover Charadrius hiaticula, oystercatcher Haematopus ostralegus, dunlin Calidris alpina and curlew

Numenius arquata, while offshore, particularly in the outer Forth, there can be found large numbers of common scoter Melanitta nigra and velvet scoter Melanitta fusca, goldeneye Bucephala clangula, scaup Aythya marila, long-tailed duck Clangula hyemalis, red-breasted merganser Mergus serrator, eider Somateria mollissima, great crested grebe Podiceps cristatus and cormorant Phalacrocorax carbo.
An important post-breeding population of Sandwich terns Sterna sandvicensis uses the Forth whilst on passage. The coast just east of Edinburgh is a particularly important area for this species.
Wigeon Anas penelope, Mallard Anas platyrhynchos, and lapwing Vanellus vanellus are also found in important numbers in a variety of habitats.

Birds: Breeding

There are several breeding birds of importance in the Forth. Nationally important numbers of breeding eider occur at Aberlady Bay, on the North Berwick Coast, and between Gullane and Broad Sands where there are also important moulting eider flocks. Important breeding colonies of shelduck Tadorna tadorna occur at Aberlady Bay, Alloa Inch and Skinflats, with a large flock of post-breeding moulting shelduck, a rare feature in Britain, occurring at Kinneil Kerse. Nationally important breeding ringed plover occur at Gullane to Broad Sands, Tyninghame, Skinflats and Torry Bay.

NOTIFICATION HISTORY

The Firth of Forth SSSI includes 18 former SSSIs notified under the Wildlife and Countryside Act 1981, parts of which were previously notified under the National Parks and Access to the Countryside Act 1949. Dates of notification are listed below:
Aberlady Bay 1952, 1977 15 August 1983
Alloa Inches 1971 06 October 1988 1
Blackness Bay 24 August 1987
Burntisland - Kirkcaldy Coast 1955, 1971 16 November 1989 1
Dumbarnie Links 1955, 1971 11 October 1982 2
Dunbar Coast 30 April 1984
East Wemyss to Anstruther Coast 1953, 1971 07 May 1991 1
Forth Bridge - Granton Shore 1965, 1971, 1974 24 April 1986 1
Gosford Bay to Port Seton 1978 30 April 1984 1
Gullane to Broad Sands 1967, 1978 15 August 1983 1
Kinneil Kerse 1978 18 January 1988 1
Leith - Prestonpans 1972 24 April 1986 1
North Berwick Coast 1957, 1972, 1978 30 April 1984
Ruddons Point 21 February 1984
Skinflats 1973 10 March 1988 1
Torry Bay 1978 12 December 1991 2
Tyninghame Shore 1952, 1972, 1978 30 April 1984 2
Wardie Shore 30 November 1987
1 Site boundary amended with net increase in area
2 Site boundary amended with net decrease in area
Notified under the 1981 Act as Firth of Forth SSSI : 15 August 2000 with a 495 ha increase in area. (Notification confirmed on 10 May 2001 with a 90 ha reduction in area).
Notification reviewed under the 2004 Act: 29 March 2011

REMARKS

Measured area of site corrected (from 7420 ha).
Part of the Firth of Forth SSSI is designated as part of the Firth of Forth special protection area (SPA) for the birds listed below.

Birds:

Red-throated diver (Gavia stellata), non-breeding
Great crested grebe (Podiceps cristatus), non-breeding
Slavonian grebe (Podiceps auritus), non-breeding
Cormorant (Phalacrocorax carbo), non-breeding
Pink-footedgoose (Anser brachyrhynchus), non-breeding
Shelduck (Tadorna tadorna), non-breeding
Mallard (Anas platyrhynchos), non-breeding
Wigeon (Anas penelope), non-breeding
Scaup (Aythya marila), non-breeding
Eider (Somateria mollissima), non-breeding
Long-tailedduck (Clangula hyemalis), non-breeding
Common scoter (Melanitta nigra), non-breeding

Velvet scoter (Melanitta fusca), non-breeding
Goldeneye (Bucephala clangula), non-breeding
Red-breasted merganser (Mergus serrator), non-breeding
Oystercatcher (Haematopus ostralegus), non-breeding
Ringed plover (Charadrius hiaticula), non-breeding
Golden plover (Pluvialis apricaria), non-breeding
Grey plover (Pluvialis squatarola), non-breeding
Lapwing (Vanellus vanellus), non-breeding
Knot (Calidris canutus), non-breeding
Dunlin (Calidris alpina alpina), non-breeding
Bar-tailed godwit (Limosa lapponica), non-breeding
Curlew (Numenius arquata), non-breeding
Redshank (Tringa totanus), non-breeding
Turnstone (Arenaria interpres), non-breeding
Sandwich tern (Sterna sandvicensis), passage
Waterfowl assemblage, non-breeding

EC Directive 79/409 on the Conservation of Wild Birds: CITATION FOR SPECIAL PROTECTION AREA (SPA) FOR PUBLIC ISSUE FIRTH OF FORTH, STIRLING, CLACKMANNANSHIRE, FALKIRK, FIFE, WEST LOTHIAN, CITY OF EDINBURGH, EAST LOTHIAN (UK9004411)

Site description:

The Firth of Forth SPA is a complex of estuarine and coastal habitats in south east Scotland stretching east from Alloa to the coasts of Fife and East Lothian. The site includes extensive invertebrate-rich intertidal flats and rocky shores, areas of saltmarsh, lagoons and sand dune. The site is underpinned by the Firth of Forth SSSI.

Qualifying interest:

The Firth of Forth SPA qualifies under Article 4.1 by regularly supporting wintering populations (1993/94-97/98 winter peak means) of European importance of the Annex 1 species: red-throated diver Gavia stellata (90 individuals; 2% of GB), Slavonian grebe Podiceps auritus (84; 2% of NW Europe, 21% of GB), golden plover Pluvialis apricaria (2,949; 1% of GB) and bar-tailed godwit Limosa lapponica (1,974; 2% of Western Europe, 4% of GB).

The site further qualifies under Article 4.1 by regularly supporting a post-breeding (passage) population of European importance of the Annex 1 species sandwich tern Sterna sandvicensis (1,617, 6% of GB, 1% of East Atlantic).

The Firth of Forth SPA qualifies under Article 4.2 by regularly supporting wintering populations (1993/94-97/98 winter peak means) of both European and international importance of the migratory species pink-footed goose Anser brachyrhynchus (10,852; 6% of Icelandic/Greenlandic), shelduck Tadorna tadorna (moulting flock of 4,509; 2% of NW European), knot Calidris canutus (9,258; 3% of western European/Canadian), redshank Tringa totanus (4,341; 3% of European/West African) and turnstone Arenaria interpres (860 individuals; 1% of European).

The Firth of Forth SPA further qualifies under Article 4.2 by regularly supporting a wintering waterfowl assemblage of European importance: a 1992/93-96/97 winter peak mean of 95,000 waterfowl, comprising 45,000 wildfowl and 50,000 waders. This assemblage includes nationally important numbers of 15 migratory species: great crested grebe Podiceps cristatus (720; 7% of GB), cormorant Phalacrocorax carbo (682; 5% of GB), scaup Aythya marila (437; 4% of GB), eider Somateria mollissima (9,400; 13% of GB), long-tailed duck Clangula hyemalis (1,045; 4% of GB), common scoter Melanitta nigra (2,880; 8% of GB), velvet scoter M. fusca (635; 21% of GB), goldeneye Bucephala clangula (3,004; 18% of GB population), red-breasted merganser Mergus serrator (670; 7% of GB), oystercatcher Haematopus ostralegus (7,846; 2% of GB), ringed plover Charadrius hiaticula (328; 1% of GB), grey plover Pluvialis squatarola (724; 2% of GB), dunlin Calidris alpina (9,514; 2% of GB), and curlew Numenius arquata (1,928; 2% of GB). The assemblage also includes large numbers of the following species: wigeon Anas penelope (2,139 [1991/2-95/96]), mallard A. platyrhnchos (2,564 [1991/2-95/96]) and lapwing Vanellus vanellus (4,148 [1991/2-95/96]).

Area: 6,313.72 ha.

OS 1:50,000 sheets - 59, 65, 66 & 67
National Grid References: NS 865920 to NO 615075 and NT 678794
October 2001
Natura 2000 Scottish Natural Heritage