



THE TAY ESTUARY AT BARRY BUDDON, ANGUS

DEFINITION

An estuary is a partially enclosed area at least partly composed of soft tidal shores, open to saline water from the sea and receiving freshwater from rivers, land run-off or seepage. An estuary may broadly be divided into three zones: the constantly submerged, the inter-tidal, and the sea-washed. These core areas are associated with a number of significant related habitats such as sub-tidal sandbanks, inter-tidal mud and sand, eel- or seagrass (*Zostera*) beds, shingle, saltmarsh, reedswamps and coastal grazing-marsh.

KEY SITES

Tay	- 12,265 hectares (LNR, SSSI, SPA, pSAC, Ramsar); south shore to be included in the Fife Biodiversity Action Plan
Montrose Basin	- 842 ha. (LNR, SSSI, SPA, Ramsar)
North Esk Kinnaber (SSSI)	
Lunan Water	
Elliot Water	
Pitairlie Burn	
Buddon Burn	

CURRENT STATUS AND EXTENT OF HABITAT

About 50% of the UK coastline (9,849 km) is estuarine and of this 2.5% is in Tayside. There are two major estuaries in Tayside - the Inner Tay (12,265 ha., of which 5,720 ha. are inter-tidal) and Montrose Basin (842 ha., of which 739 ha. are inter-tidal). These make up most of the region's estuarine habitat, the remainder being accounted for by five much smaller river mouths – Pitairlie, Buddon, Lunan, Elliot and North Esk - all of which are in Angus.

The Firth of Tay is one of the largest estuaries in Scotland and has the highest freshwater inflow of any estuary in Britain. It can be divided into the strongly marine outer firth (seaward of Broughty Ferry), a middle zone between Broughty Ferry Castle and the rail bridge which exhibits the greatest variation in salinity, and the upper estuarine reaches upstream of the bridge. The influence of spring tides penetrates 50 km inland to about 4 km beyond Perth, but saline conditions occur only as far upstream as Newburgh.

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CE1 Estuaries (including saltmarshes and eelgrass beds)

For the purposes of this Habitat Action Plan the upper limit of the estuary is defined by the confluence of the Earn with the Tay – about 8 km downstream of Perth. The lower limit is less easy to define but because estuarine conditions are vital to otherwise coastal species such as Common seal *Phoca vitulina*, Sparling *Osmerus eperlanus*, and Eider *Somateria mollissima*, their ranges within the estuary have been taken into consideration. Consequently, the area between Buddon Ness and Tentsmuir Point Nature Reserve (Fife) is covered by this Action Plan.



P. & A. MACDONALD

THE TAY'S ESTUARINE REEDBEDS

Montrose Basin, at the mouth of the River South Esk, is one of the finest examples of an enclosed estuarine basin in the UK. It is shallow and drains almost completely at low water, exposing a large area of mud and sand flats. 88% of the basin is inter-tidal.

There are extensive estuarine reedbeds in the Tay (over 240 ha.) and smaller areas elsewhere. This specific habitat will be covered by a Reedbed Action Plan. The majority of Tayside's saltmarshes occur at Montrose Basin. The north shore of the Tay estuary holds 47 ha. A further 16 ha. occur at the smaller river mouths along the Angus coast. Compared to the national UK figure of 44,400 ha., the total area of saltmarsh in Tayside is clearly very small, but its ungrazed nature at Montrose is relatively uncommon.

There is also a small area of perched saltmarsh in Angus, splashed by the sea on the cliffs within Rickle Craig Scurdie Ness SSSI, near Montrose. This is discussed in the Maritime Cliff and Slope Action Plan.

KEY SPECIES

2 P = UK Priority species C = UK species of conservation concern

Mammals	Otter	<i>Lutra lutra</i>	P
	Common seal	<i>Phoca vitulina</i>	C
Birds	Shelduck	<i>Tadorna tadorna</i>	C
	Red-breasted merganser	<i>Mergus serator</i>	C
	Goosander	<i>Mergus merganser</i>	C
	Pink-footed goose	<i>Anser brachyrhynchus</i>	C
	Redshank	<i>Tringa totanus</i>	C
	Bar-tailed godwit	<i>Limosa lapponica</i>	C
	Eider	<i>Somateria mollissima</i>	C
	Mute swan	<i>Cygnus olor</i>	C
	Wigeon	<i>Anas penelope</i>	C
	Teal	<i>Anas crecca</i>	C
	Pintail	<i>Anas acuta</i>	C
	Goldeneye	<i>Becephala clangula</i>	C
	Water rail	<i>Rallus aquaticus</i>	C
	Marsh harrier	<i>Circus aeruginosus</i>	C
	Bearded tit	<i>Panurus biarmicus</i>	C
	Reed bunting	<i>Emberiza scheoniclus</i>	P
	Swallow	<i>Hirundo rustica</i>	C
Sand martin	<i>Riparia riparia</i>	C	
Greylag goose	<i>Anser anser</i>	C	

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Estuaries (including saltmarshes and eelgrass beds)

CE1

Fish	Atlantic salmon	<i>Salmo salar</i>	C
	River lamprey	<i>Lampetra fluviatilis</i>	C
	Sparling/smelt	<i>Osmerus eperlanus</i>	C
	Twaite shad	<i>Alosa fallax</i>	P
Higher Plants	Common reed	<i>Phragmites australis</i>	
	Narrow-leaved eelgrass	<i>Zostera angustifolia</i>	
	Dwarf eelgrass	<i>Zostera noltii</i>	
	Marine eelgrass	<i>Zostera marina</i>	C

NATURE CONSERVATION IMPORTANCE

Sub-tidal zone

Estuaries have extensive underwater habitats in the sediments supporting a variety of algae (including seaweeds), plants, invertebrates and fish, which in turn support species further up the food chain such as seals and birds. These areas are also important nursery grounds for young fish.

Mudflats

Mudflats are highly productive areas which, together with other intertidal habitats, support large numbers of predatory birds and fish. They provide feeding and resting areas for internationally important populations of migrant and wintering waterfowl and are also important nursery areas for flatfish. Mudflats are characterised by high biological productivity and abundance of organisms, but low diversity with few rare species.

Seagrass Beds

Three species of *Zostera* occur in the UK and all are considered to be scarce: Dwarf eelgrass *Zostera noltii*, Narrow-leaved *Zostera angustifolia* and Marine eelgrass *Zostera marina*. All three species are found in Tayside: the largest area being in Montrose Basin. The plants are an important source of organic matter and provide shelter and a surface for attachment by other species. Eelgrass is an important source of food for wildfowl, particularly Brent goose *Branta bernicia* and Wigeon *Anas penelope* which feed on intertidal beds. The shelter provided by seagrass beds makes them important nursery areas for fish, including Pollack *Pollachius pollachius*, Two-spotted goby *Gobiusculus flavescens*, Pipefish species and various Wrasse.



SEAGRASS

SUE SCOTT

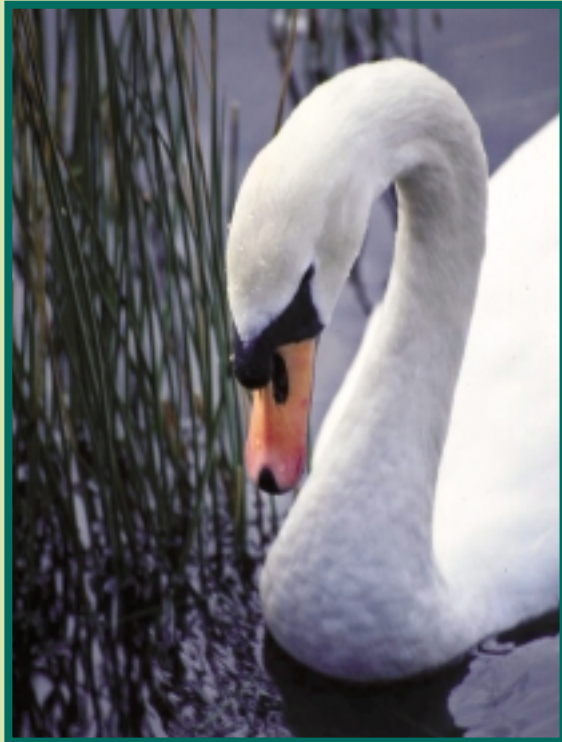
Case Study

Swan Management Demonstration Project - Montrose Basin

Mute swans *Cygnus olor* are present in nationally important numbers on Montrose Basin; the wintering flock consists of approximately 260 birds. They feed mainly on the *Zostera* beds in the Basin and move onto the adjacent arable land in December when the density of the *Zostera* is reduced. Attracted to fields of oilseed rape, cereals and grass, they cause damage to these crops by feeding and 'puddling' the fields with their feet.

To keep the swans off the arable land, a Swan Management Demonstration Project was set up in 1998 to provide an area of arable crop adjacent to Montrose Basin as a safe haven for them to feed in. A Swan Scarer is employed for several weeks during the winter to ensure the birds use the correct field.

The Project is a partnership between four of the local farmers, Angus Council, Scottish Executive Environment and Rural Affairs Department and Scottish Natural Heritage, together with the British Association for Shooting and Conservation, the National Trust for Scotland, Scottish Agricultural College and the Scottish Wildlife Trust.



SIMON BROAD

MUTE SWAN

Saltmarsh

Saltmarshes form the upper vegetated parts of intertidal mudflats. They are built up by a community of salt tolerant plants and are an important resource for wading birds and wildfowl. They act as high tide refuges for birds feeding on adjacent mudflats, as breeding sites for waders, gulls and terns and as a source of food for passerine birds particularly in autumn and winter. In winter, grazed saltmarshes are used as feeding grounds by large flocks of wild ducks and geese.

Mammals

There is a population of approximately 650 Common seals *Phoca vitulina* in the Tay Estuary which represents over 1% of the total European population and is therefore of international importance. Otters *Lutra lutra* are found in both the Montrose Basin and Tay Estuary, but only anecdotal evidence is available as regards their distribution and population numbers as there is little existing data to call upon.



LORNE GILL/SNH

COMMON SEAL

Estuaries (including saltmarshes and eelgrass beds)

CE1

Birds

The expansive mudflats and tidal nature of the Tay Estuary and Montrose Basin are attractive as safe roost sites for geese. Other bird species are attracted not only by the safety, but also by the food supplies available. Waders feed on a range of invertebrates whilst Wigeon and Mute swans at Montrose feed primarily on *Zostera*. Montrose is a nationally important moulting site for many of Tayside's Mute swans.

Both Montrose Basin and the Tay Estuary support nationally and internationally important populations of wildfowl and waders. This is recognised by their designation as Special Protection Areas (SPA) under the European Birds Directive and as Ramsar Sites under the Ramsar Convention.



LORNE GILL/SNH

REDSHANK

Nationally and Internationally important waterfowl populations wintering on Tayside Estuaries

Species	Estuary	International Importance	National Importance
Mute Swan	Montrose Basin		✓
Pink-footed Goose	Montrose Basin Tay	✓ ✓	
Greylag Goose	Tay	✓	
Shelduck	Montrose Basin		✓
Widgeon	Montrose Basin		✓
Eider	Montrose Basin Tay		✓ ✓
Goosander	Montrose Basin Tay		✓ ✓
Knot	Montrose Basin	✓	
Bar-tailed godwit	Tay	✓	
Redshank	Montrose Basin	✓	
Sandwich Tern	Tay		✓
Common Tern	Tay		✓
Arctic Tern	Tay		✓

Species for which the two estuaries are locally important include Oystercatcher *Haematopus ostralegus*, Golden plover *Pluvialis apricaria*, Sanderling *Calidris alba*, and Black-tailed godwit *Limosa limosa*. Montrose Basin holds a large late-summer tern roost which has numbered in recent years over 2,000 mixed terns including Sandwich *Sterna sandvicensis*, Common *Sterna hirundo* and Arctic Terns *Sterna paradisaea*.

Fish

The Tay Estuary provides nursery grounds for fish such as Dover sole *Solea solea*, Sand eel spp. and Herring *Clupea harengus*. Several species use the estuary to migrate to their freshwater spawning grounds such as Atlantic salmon *Salmo salar*, Sea trout *Salmo trutta* and Twaite shad *Alosa fallax*. The Tay Estuary supports one of only three spawning grounds for Sparling (smelt) *Osmerus eperlanus* in Scotland.

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Sparling (or smelt) *Osmerus eperlanus*

This inshore migratory fish was at one time widespread in many estuaries. It is now restricted to just three in Scotland - the River Cree, River Forth and River Tay. Its population in the Tay Estuary has been very little studied and its ecology not yet clearly understood. Sparling use gravel beds and areas of small pebbles at the limit of the tidal limit in which to spawn, the prime time for which is triggered by the first full moon in March. As they are very selective in choosing their spawning sites (using only clean estuaries) they were, in the past, very susceptible to pollution.

There are at present three boats on the Tay which fish for Sparling on a small scale between September and early March.



ALASTAIR STEPHEN

NATIONAL BIODIVERSITY CONTEXT

There is a UK Broad Habitat Statement for Estuaries. This gives the following conservation direction:

Maintain and enhance the extent and quality of estuarine habitats in the UK, including the full diversity of estuarine communities.

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Measures to be considered further include:

- Protect estuaries from coastal development and other activities which cause environmental damage.
- Review the powers and duties of coastal and other authorities for safeguarding this habitat.
- Identify the full diversity of wildlife features and maintain the extent and quality of this resource.
- Promote management within the framework of SACs and other coastal zone strategies which permit the natural functioning of sediment systems.
- Improve water quality via catchment management and other pollution control mechanisms.
- Develop plans for new estuarine habitats to help compensate for losses because of a rise in sea level.
- Reduce the environmental impact of fisheries.

There are UK Habitat Action Plans for Coastal and Floodplain Grazing Marsh; Coastal Saltmarsh; Mudflats (revised); and Seagrass Beds.

ECOLOGY AND MANAGEMENT

- Much survey work has been carried out in the Tay Estuary and Montrose Basin as part of the designation processes and ongoing monitoring.
- A full habitat survey of all the estuarine habitats in Tayside is needed in order to set up effective, area-wide monitoring, particularly for the areas not subject to designation.
- Site Condition Monitoring of SSSIs is carried out in a 6 year cycle.

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CURRENT FACTORS CAUSING LOSS OR DECLINE

- Land claim and development
- Climate change and consequent sea level rise
- Nutrient enrichment from farmland and waste effluent
- Marine pollution
- Human disturbance
- Bait digging
- The introduction of new or non-native species
- Maintenance dredging
- Shipping accidents
- Beam trawlers and scallop dredgers
- Waste tipping
- Laying of cables and pipelines

MAIN THREATS TO KEY SPECIES

Common seal	- Pollution - Disturbance - Future sea level rise	
	UK importance of Tayside population:	high
Otter	- Pollution - Disturbance - Development	
	UK importance of Tayside population:	moderate
Bar-tailed godwit	- Habitat loss - Disturbance - Future sea-level rise	
	UK importance of Tayside population:	high
Twaite shad	National threats include - Pollution - Overfishing - Habitat destruction Specific threats in Tayside not known. Lack of information makes it difficult to assess types and levels of threat.	
	UK importance of Tayside population:	high
Sparling (smelt)	- Disturbance of nursery areas Lack of information makes it difficult to assess levels of threat.	
	UK importance of Tayside population:	high
Eelgrass (<i>Zostera</i>)	- Pollution - Mobile fishing gear - Development.	
	UK importance of Tayside population:	moderate

OPPORTUNITIES AND CURRENT ACTION

- The Tay Estuary Forum is developing a Management Plan for the whole estuary
- The pSAC Tay Estuary, if adopted as an SAC, will require a management scheme for the designated area
- There is a Montrose Basin Management Plan in place
- Inner Tay Local Nature Reserve (LNR): Management Agreements and Prescriptions are in place for landowners who have signed up to the LNR
- All estuarine SSSIs are subject to conservation legislation

OBJECTIVES & TARGETS

Objectives	Targets	
1	Ensure no net loss in area or reduction in quality of estuarine habitats in Tayside. Where necessary and where possible improve estuarine habitats in order for them to sustain typical estuarine wildlife, especially those of international and national importance.	Encourage land managers and planners to develop policies that will prevent loss of the quality and quantity of the habitat by 2005.
2	Meet and maintain Class A (Excellent) water quality standards in all of the region's estuaries using the Scottish Environment Protection Agency (SEPA) Classification Scheme to monitor chemical and biological quality.	All estuaries to have Class A water quality by 2005. Class A standard to be maintained beyond 2005.
3	Establish adequate site safeguard policies in relevant strategic and other plans, including organisations' workplans, such that decision-makers and users of estuaries take account of the conservation of biodiversity in all matters relating to estuarine habitats.	Policies to be in all relevant plans by 2003.
4	Maintain and protect the quality and integrity of designated sites. Ensure that a comprehensive set of management plans is completed and that monitoring programmes are put in place. Seek to apply prescriptions and principles to all estuarine habitats in the region.	Management plans to be written for all designated areas by 2003.
5	Set up a five-year programme to raise awareness of biodiversity, its importance and the need for its conservation in Tayside. Include estuaries in this programme.	Set up a public awareness programme by 2003. Run public awareness programme until 2005.

Stakeholders

- Landowners, land managers and advisors, fishermen, tourists and local users.

ACTION FOR BIODIVERSITY

		Action - Estuaries	Deliverers		To take place by								Meets Objective No.
			Lead Partners	Partners	02	03	04	05	06	07	11	16	
LBAP Ref.	A	Policy and legislation											
CEI	1	Assist with development of planning policies aimed at preventing any further loss of estuarine habitat.	PKC AC	TBP			#	#	#	#	#		1,3
CEI	2	Complete SAC and SPA processes and subsequent designations.	SNH	SE EU	#								1
CEI	3	Ensure that all consented discharges meet national and international water quality standards.	SEPA	Dischargers	#	#	#	#	#	#	#	#	2
CEI	4	Ensure that all discharge consents granted minimise impact on biodiversity.	SEPA	SNH	#	#	#	#	#	#	#	#	1,2
	B	Site safeguard and management											
CEI	1	Influence decision-makers to find soft engineering solutions to potential flood problems related to development.	PKC DCC AC	SEPA SNH	#	#	#	#	#	#	#	#	1,3
	C	Species management and protection											
CEI	1	Promote and support the work of species groups such as the Tay Ringing Group and other groups working on species management.	SNH	TBP	#	#	#	#	#	#	#	#	4,5
	D	Advisory											
CEI	1	Identify a demonstration site of managed realignment, possibly at Montrose Basin.	AC SNH SWT RSPB	Landowners	#	#							1,3
	E	Research and monitoring											
CEI	1	Site Condition Monitoring of Montrose Basin and Tay Estuary - on a 6 year cycle.	SNH		#	#	#	#	#	#	#	#	4
CEI	2	Survey of Tay and requisite estuarine sub-littoral estuarine habitats occurring under EU SAC designations.	SNH	Universities	#	#							1,4
CEI	3	Support Mute Swan Management Project at Montrose Basin.	AC SWT	SNH SAC	#	#	#	#	#	#	#	#	4
CEI	4	Continue to support and improve the coverage of the Wetland Birds Survey (WeBS).	WWT	BTO SNH BASC	#	#	#	#	#	#	#	#	4
CEI	5	Estuaries Action Plan review process - ensure that this plan is being delivered annually and reviewed after 5 years.	TBP		#	#	#	#	#	#	#	#	All
	F	Promotion and awareness-raising											
CEI	1	Develop opportunities to raise awareness amongst developers, engineers and decision-makers about estuarine processes.	TBP		#	#	#	#	#	#	#	#	All

Estuaries

This illustrative map shows a few key examples of the habitat. Please note that many sites of interest are privately owned and owners' permission should be sought for any access.

