



LORNE GILL/SNH

LOCH LEVEN

INTRODUCTION

Mesotrophic lochs were identified by the UK Biodiversity Group as a key habitat of particular national importance that required specific work over and above that detailed in the standing open waters broad habitat plan. Much of the Standing Open Waters Habitat Action Plan therefore applies, but issues particularly relevant to mesotrophic lochs are examined here.

DEFINITION

Mesotrophic lochs are defined either as those with a moderately rich plant nutrient environment, particularly nitrogen and phosphorus, or those having a range of submerged plant communities, principally NVC (National Vegetation Classification) types 5A and 5B.

Type 5A is characterised by Shore-weed *Littorella uniflora*, Alternate flowered water milfoil *Myriophyllum alterniflorum*, Stoneworts *Nitella* spp., Small pondweed *Potamogeton berchtoldii* and Canadian pondweed *Elodea canadensis*, (an alien species). Type 5B is characterised by Floating pondweed *Potamogeton natans*, and White water lilies *Nymphaea alba*.

However, lochs may be historically mesotrophic but have been subsequently changed to eutrophic by human activity. This type of loch has been included within this Plan as it may be possible in the long term to return them to a more natural nutrient status.

CURRENT STATUS AND EXTENT OF HABITAT

There are several mesotrophic lochs in Tayside, mainly located along the fringe of the uplands. These are listed under key sites, together with a brief assessment of their current status. It is apparent from the list that many lochs that were probably historically mesotrophic have now become eutrophic and others are threatened by nutrient enrichment. The Lowes chain of lochs between Dunkeld and Blairgowrie, which is of international significance, remains of high quality, but is threatened. Remediation of culturally eutrophic lochs is usually difficult, but efforts are being made, for example, to restore Loch Leven to a more natural nutrient status.

Naturally mesotrophic lochs are severely threatened and positive action is required to ensure the survival of this important habitat. Formerly mesotrophic lochs which have lost their characteristic animal and plant communities are not regarded as a national priority for remediation as it is considered that resources are best directed at maintaining and improving relatively unimpacted examples.

KEY SITES

The national rarity and decline of naturally mesotrophic lochs means that all of those present within the region merit inclusion as key sites. However, a few that particularly stand out are the Lowes chain of lochs between Dunkeld and Blairgowrie (Craiglush, Lowes, Butterstone, Clunie and Marlee), the Black Loch at Cleish, and Loch Moraig. These represent relatively unpolluted or pristine examples. Loch Leven, possibly once a mesotrophic loch, but now highly eutrophic, is of considerable importance and represents a classic example of the challenges faced in restoring lochs such as these to their natural status.

<p>Loch Moraig (SSSI) -</p> <p>Black Loch, Cleish (SSSI)</p> <p>The Lowes chain of lochs of between Dunkeld and Blairgowrie of international significance (SSSIs and increasing candidate SAC):</p> <p>Loch of Lintrathen (SSSI) Long Loch of Lundie (SSSI) Crombie Reservoir Loch Monzievaird Drumore Loch (SSSI) Laird's Loch (SSSI) Loch Leven (SSSI, SPA, RAMSAR) Rescobie Loch Balgavies Loch</p>	<p>Mesotrophic, very high quality. A naturally mesotrophic loch, but there are indications that land use within the catchment is having an effect on the ecology of the loch.</p> <p>Mesotrophic, very high quality. The only known naturally mesotrophic loch in Tayside that has had no recent agricultural improvement or afforestation within its catchment.</p> <ul style="list-style-type: none"> - Loch of Craiglush - oligo/mesotrophic, high quality. - Loch of Lowes - mesotrophic, high quality, but indications of increasing nutrient levels. - Butterstone Loch - mesotrophic, high quality, but indications of nutrient levels. - Loch Clunie - mesotrophic, high quality, but indications of elevated nutrient levels. - Loch of Drumellie or Marlee - mesotrophic, high quality, but indications of increasing nutrient levels. <p>Mesotrophic/eutrophic, artificial loch.</p> <p>High quality, mesotrophic with notable fringing fen.</p> <p>Artificial waterbody.</p> <p>Status uncertain.</p> <p>Mesotrophic loch.</p> <p>Status uncertain.</p> <p>Now eutrophic, may historically have been mesotrophic. Still of very high conservation value.</p> <p>Eutrophic, may historically have been mesotrophic.</p> <p>Eutrophic, may historically have been mesotrophic.</p>
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Slender Naiad

A Naiad, the water nymph and lake dweller of Greek myth, is found in Scotland...

An inconspicuous plant, the wonderfully named Slender Naiad *Najas flexillis* is typically found growing submerged in clear mesotrophic lochs where there is soft silty substrata.

Classed as 'scarce' in Britain, all the UK populations are now only found in Scotland. Most of these populations are found on the islands off the west coast, but there are a few sites on the mainland. Tayside's only known population is found in the Lunan chain of lochs. It is thought to be in decline because of eutrophication, but it may also be due to excessive growth of other plants such as the invasive Canadian pondweed *Elodea canadensis*.



VALERIE JAMES

Mesotrophic Lochs

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NATURE CONSERVATION IMPORTANCE

Mesotrophic lochs are frequently of particular nature conservation importance for the exceptionally diverse plant communities they support and for rare species such as Slender naiad *Najas flexilis*. Most mesotrophic lochs have SSSI status and the Lowes chain of lochs is a candidate Special Area of Conservation (SAC) for its populations of Slender naiad. These designations reflect the importance and scarcity of this habitat.

KEY SPECIES

Some species, such as the Slender naiad are very characteristic of mesotrophic lochs and their distribution is restricted to these types of waterbodies. They, therefore, merit inclusion as key species for their nationally important populations.

Many of the key species associated with mesotrophic lochs such as the Common scoter *Melanitta nigra*, Black-necked grebe *Podiceps nigricollis* and the Osprey *Pandion haliaetus* are also associated with other open standing water, but mesotrophic lochs provide good habitat and may maintain significant populations.

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

Mammals	Water vole	<i>Arvicola terrestris</i>	P
	Otter	<i>Lutra lutra</i>	P
	Daubenton's bat	<i>Myotis daubentoni</i>	C
Birds	Common scoter	<i>Melanitta nigra</i>	P
	Osprey	<i>Pandion haliaetus</i>	C
	Black-necked grebe	<i>Podiceps nigricollis</i>	C
	Whooper swan	<i>Cygnus cygnus</i>	C
	Wigeon	<i>Anas penelope</i>	C
	Gadwall	<i>Anas strepera</i>	C
	Pink-footed goose	<i>Anser brachyrhynchos</i>	C
	Greylag goose	<i>Anser anser</i>	C
	Pochard	<i>Aythya ferina</i>	C
Goosander	<i>Mergus merganser</i>	C	
Amphibians	Palmate newt	<i>Triturus helveticus</i>	C
Plants	Slender naiad	<i>Najas flexilis</i>	P
	Slender stonewort	<i>Nitella gracilis</i>	P
	Pillwort	<i>Pilularia globulifera</i>	P

NATIONAL BIODIVERSITY CONTEXT

There is a UK Habitat Action Plan for mesotrophic lochs. This has the following objectives:

- Maintain the characteristic plant and animal communities of current mesotrophic lochs.
- Identify and implement effective remedial action to address nutrient enrichment and pollution in mesotrophic lochs by 2010.

ECOLOGY AND MANAGEMENT

The ecology of mesotrophic lochs is critically dependent on nutrient levels. The diverse macrophyte communities they support are due to the excellent conditions they have for rooted plant growth. The moderate levels of nutrients they have encourage plant growth, whilst not generally being sufficient to cause algal blooms which can shut light out from rooted plants. Maintenance of natural nutrient levels is, therefore, a key element in the management of mesotrophic lochs. To achieve this a catchment based approach is required.

Tayside Biodiversity Partnership

CURRENT FACTORS CAUSING LOSS OR DECLINE

All the factors affecting the habitat detailed in the Standing Open Waters statement can apply to mesotrophic lochs, but the single factor which is probably the greatest and most active threat is cultural eutrophication. This may be due to direct nutrient inputs from sewage or because of increased nutrient run-off from land due to agriculture, forestry and amenity use.

Catchment land use may be a significant influence in mesotrophic lochs with ploughing up of grassland and under-drainage potentially increasing the possibility of soil erosion and with a consequent increase in water-borne sediments. Settled sediments may introduce nutrients into the system and sediments in suspension can cause turbidity resulting in poor light transmission to rooted plants. This can increase the chances of algal dominance and consequent declines in the rooted plant communities.

Fisheries management can alter the natural integrity of mesotrophic lochs in various ways. Competition from introduced fish can also alter the native species composition. The structure of the food web can be altered - for example leading to increased predation on the invertebrates that graze algae.

MAIN THREATS TO KEY SPECIES

Otter	Nationally significant factors: <ul style="list-style-type: none"> - Pollution of watercourses, especially by PCBs. - Insufficient prey associated with poor water quality. Factors that may be locally important in Tayside: <ul style="list-style-type: none"> - Impoverished bankside habitat features needed for breeding and resting. - Incidental mortality, primarily by road deaths and drowning in eel traps. 	
	UK importance of Tayside population:	Moderate
Water vole	<ul style="list-style-type: none"> - Loss and fragmentation of habitats. - Disturbance of riparian habitats. - Predation by mink. - Pollution of watercourses and poisoning by rodenticides. 	
	UK importance of Tayside population:	Moderate
Common Scoter	<ul style="list-style-type: none"> - Eutrophication may affect food availability. - Fish stocking may have lead to increased competition for invertebrate food in some sites. - Predation by mink and foxes. - Afforestation and secondary effects such as sedimentation. - Illegal egg collecting. 	
	UK importance of Tayside population:	High
Grass wrack pondweed	<ul style="list-style-type: none"> - Eutrophication. - Neglect and drying out of ditches. - Increased recreational use of watercourses, including boat use and associated disturbance and pollution. 	
	UK importance of Tayside population:	Probably extinct in Tayside
Slender naiad	<ul style="list-style-type: none"> - Restrictions on light penetration because of heavy weed and algal growth, and nutrient enrichment from point sources such as sewage works, fish farms and diffuse agricultural sources. 	
	UK importance of Tayside population:	High

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Slender stonewort	Reasons for decline uncertain but the following are thought to be contributory factors: - Pollution from agricultural run off. - Acidification associated with afforestation in some catchments. - Encroachment of scrub and other vegetation at some sites.
	UK importance of Tayside population: High
Pillwort	- Nitrate/phosphate pollution and the associated increase in the growth of competitive species. - Abandonment of its main habitats, especially changes in grazing which lead to less disturbance. - Modification of water level regimes - Introduction of non-native competitive plants.
	UK importance of Tayside population: High

Common Scoter

The Common Scoter is anything but common nowadays; it is in fact the only duck to be included in the UK Red List and is highlighted in the UK Priority Species list.

It breeds on a few freshwater lochs in Northern Scotland and winters around the UK's coast. The male is our only totally black duck; its striking black and yellow bill can be seen at a very long range. Six of the top 14 over-wintering sites are in Scotland with Tayside holding important concentrations. Many more pass through on migration.

More and more UK BAP Lead Partners are becoming involved in local issues. 2002 sees the Common Scoter BAP Steering Group meeting in Edinburgh to discuss priority conservation issues with all those concerned with safeguarding this species.



JAMES SHARPE/WWT

OPPORTUNITIES AND CURRENT ACTION

Policy and Legal Status

Reference should be made to the policy and legal status section for standing open waters which also applies to mesotrophic lochs. Most mesotrophic lochs are notified as SSSIs and the Lowes chain of lochs is a candidate SAC.

Management, Research and Guidance

Specific ongoing actions detailed under the UK HAP for Mesotrophic Standing Waters include:

- Establishing water quality objectives and nutrient standards appropriate for mesotrophic lochs.
- Reviewing water resource uses where SSSI lochs are affected by excessive abstraction.
- Complete programmes for notification of mesotrophic loch SSSIs by 2001.
- Compile a priority list of lochs requiring remedial treatment.
- Ensure that all SSSI mesotrophic lochs have a site management plan implemented by 2005.
- Agree conservation strategies and consenting protocols for mesotrophic loch SSSIs with relevant statutory and non-statutory agencies.

Current Action

- Site Management Statements have been prepared by SNH for Loch Moraig, Black Loch (Cleish), Loch of Craiglush, Loch of Lowes, Butterstone Loch, Loch Clunie, Loch of Drumellie or Marlee, Loch of Lintrathen, Long Loch of Lundie, Drumore Loch, Loch Leven and Laird's Loch.
- A Catchment Management Plan exists for Loch Leven.
- The Loch of Lintrathen is managed as a wildlife reserve by the SWT.
- Loch of the Lowes is owned and managed by the SWT as a nature reserve.
- SAC and FWAG provide advice to landowners to help minimise the impact of agriculture in these sensitive catchments.
- Scottish Nature have undertaken studies of Black Necked Grebe and implemented management targets for nesting sites.
- SWT have produced a management plan for Balgavies Loch.

Opportunities

The UK HAP for Mesotrophic Standing Waters provides the framework and guidance for action at a local level to maintain or improve the quality of mesotrophic lochs. The identification of mesotrophic lochs as a key habitat clearly indicates a need for organisations with statutory responsibilities to prioritise resources for the protection of this habitat and for other organisations to recognise its importance.

A catchment level approach is required if the vitally important nutrient status of these lochs is to be maintained at, or returned to, near natural levels.

Considerable information already exists for the Lowes chain of lochs, a resource of international significance. Considerations are currently being made about the best approach to a catchment management scheme involving relevant organisations, interested parties, local farmers and residents.

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OBJECTIVES AND TARGETS

	Objectives	Targets
1	Identify and implement effective remedial action to address nutrient enrichment and pollution in Tayside mesotrophic lochs by 2010.	<p>Prepare Catchment Management Plans on a prioritised basis involving both statutory and non-statutory organisations. Seek to have these plans adopted by the Local Authority to inform planning decisions and provide a framework for integrated management. By 2011.</p> <p>Improve or maintain the water quality classification of all mesotrophic lochs in Tayside.</p> <p>Ensure that all SSSI mesotrophic lochs have a site management plan implemented by 2005.</p>
2	Maintain the characteristic plant and animal communities of current mesotrophic lochs in Tayside.	<p>Contribute information to the national inventory of mesotrophic lochs which provides information on environmental quality, biodiversity quality, impacts on biodiversity etc. By 2006.</p> <p>Ensure no net loss in area or reduction in quality of mesotrophic loch habitats.</p>

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Stakeholders

- Landowners, land managers and advisors, developers, angling clubs, tourists and local users.

ACTION FOR BIODIVERSITY

		Action - Mesotrophic Lochs	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											
WWI	1	Ensure that all mesotrophic lochs meet EU Directives in terms of designations for wildlife, importance and/or quality.	SNH SEPA					#					2
WWI	2	Following a survey of mesotrophic lochs designate important sites as 'Local Wildlife Sites' as appropriate and incorporate them into the planning system.	SWT	SNH PKC DCC AC						#			1
WWI	3	Contribute to the development of policies within land use development plans to safeguard the particular wildlife interest of mesotrophic lochs.	PKC DCC AC	SNH SEPA TBP	#	#	#	#	#	#	#	#	1, 2
	B	Site safeguard and management											
WWI	1	Ensure that all Tayside SSSI mesotrophic lochs have a site management plan implemented by 2005.	SNH					#					1
	C	Advisory											
WWI	1	Provide advice for managers and users of mesotrophic lochs to promote the biodiversity conservation of this habitat.	TBP		#	#	#	#	#	#	#	#	1
	D	Research and monitoring											
WWI	1	Review current water quality data to determine current status of the Lowes chain of lochs.	SEPA					#					2
WWI	2	Establish a monitoring programme to assess long term trends in the nutrient status of mesotrophic lochs in Tayside.	SEPA					#					2
WWI	3	Monitor the delivery of the action plan yearly and in detail every 5 years, starting in 2003.	TBP					#					
WWI	4	Continue Site Condition Monitoring for SACs and SSSIs.	SNH					#			#		
	E	Promotion and Awareness-raising											
WWI	1	Ensure widespread awareness of the biodiversity significance of mesotrophic lochs by dissemination of literature provided by the UK steering group.	TBP					-		#			1

Mesotrophic Lochs

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.

