Guidance for Competent Authorities
when dealing with proposals affecting SAC freshwater sites

Natural Heritage Management

SCOTTISH NATURAL HERITAGE

Guidance for Competent Authorities when dealing with proposals affecting SAC freshwater sites

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Part One

1 PURPOSE AND SCOPE OF GUIDANCE

The purpose of this guidance is to assist 'Competent Authorities' with their roles in considering proposals affecting **freshwater** Special Areas of Conservation (SAC) sites. It aims to assist them in assessing whether the proposal is **likely to have a significant effect** on a qualifying interest. By enabling Competent Authorities to eliminate from consideration projects which are not significant, this will help reduce the level of consultation and allow focus on the remainder. Projects which are likely to have a significant effect require to be assessed in relation to effects on site integrity. Such an assessment is referred to as an **appropriate assessment**.

This guidance does not seek to provide generic advice on how to undertake an **appropriate assessment** of effect on the integrity of a European site owing to the complexities and range of different proposals affecting freshwater SACs. SNH will provide further advice on this in individual cases on request.

A major issue for the conservation of freshwater sites is that they have a greater potential for damage from management activities occurring outwith the site boundary (ie within the catchment of the site) than is generally the case for other SACs. The Habitats Regulations apply both within and outwith the boundaries of European sites in so far as the sites could be affected by a plan or project. Competent Authorities need to determine what the impacts of indirect or off-site activities might be and the types of plan or project (eg planning applications, drainage operations, plans, discharge consents, abstraction and land use activities within the catchment) which would require an appropriate assessment. In addition individual projects, whilst themselves not significant, could have undesirable impacts in combination with other plans and projects.

While SNH hopes to assist Competent Authorities in dealing with the assessment of likely significant effect through the production of this guidance, it is not exhaustive and authorities will need to take account of each plan or project and its context as it relates to the site's qualifying species and habitat interests. **If in any doubt please check directly with SNH**.

2 OBLIGATIONS ON COMPETENT AUTHORITIES

2.1 What are the obligations?

Article 6.2 of the Habitats Directive sets out an obligation on Member States in relation to SACs to take appropriate steps to avoid *"the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant"*.

These obligations relate to all "Competent Authorities" as specified in Conservation (Natural Habitats, & c.) Regulations 1994 (as amended 2004) and include any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office. These regulations state (3.4): *"Every competent authority in the exercise of any of their functions, shall have regard to the requirements of the Habitats Directive so far as they may be affected by the exercise of those functions"*.

2.2 How are these obligations managed?

Article 6.3 of the Habitats Directive requires that *"any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be* *subject to appropriate assessment of its implications for the site in view of the site's conservation objectives"*.

This process is implemented through domestic legislation in the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended 2004). Regulation 48 embodies this process and interpretation is given in Scottish Executive Circular 6/95 (updated June 2000) - Annex E, Appendix A.

While the term individual projects is self-explanatory, it is less clear what factors can be taken into account when determining *'in combination with'*. The European Commission gives helpful guidance in this matter, advising that the underlying intention of this provision is to take account of cumulative impacts, which can result from projects undertaken over a period of time, or several plans or projects all at the same time, or both.

The European Commission also advises that *'in combination with'* can include consideration of a plan or project alongside other plans or projects which are completed; approved but uncompleted, or at a formal proposal stage. It advises that theoretical plans or projects should not be taken into account but that consideration should be restricted only to those which have been proposed.

2.3 Competent Authority roles and obligations

2.3.1 What is SNH's role?

SNH has a duty under Habitats Regulation 3(2) to exercise its functions so as to secure compliance with the Habitats Directive. These functions include responding to requests for advice or to consultations from other Competent Authorities. Key areas include:

- SNH may give a view if requested by a Competent Authority as to whether a plan or project is likely to have a significant effect.

- Where a Competent Authority is of the view that the effect of a particular plan or project is likely to have a significant effect, it should consult SNH on the content of an appropriate assessment (Reg 48.3 and SE Guidance 6/95 (updated June 2000)- Annex E, Appendix A).

- SNH has been requested by the Scottish Executive (SE) to lodge a holding objection to proposals considered likely to have a significant effect until the outcome of an appropriate assessment has shown that the integrity of the site would not be adversely affected.

2.3.2 Role of other competent authorities - with particular reference to freshwater SACs

The following Competent Authorities may be involved in relation to various development proposals on freshwater SACs:

2.3.2.1 Local Authorities

Local Authorities will have to consider any planning proposal within or outwith the site boundary and its likely impact on the qualifying interests within the site. This will include new river engineering works such as bank protection and the construction of new croys, flood defence works, housing/commercial developments, bridge repairs, roads, etc. Other local authority departments may also have to consider the SAC in relation to their remit. This applies particularly to local authority obligations under the Flood Prevention and Land Drainage (Scotland) Act 1997 to undertake remedial flood prevention work.

2.3.2.2 Forestry Commission

The Forestry Commission is responsible for the consideration of all forestry proposals within a catchment in the light of their possible impact on a freshwater SAC. Many are not likely to have a significant effect, but it is possible that specific operations will need to be amended in order to prevent adverse effects (eg through increasing water run-off and sediment loads, increased acidification, loss of wetlands).

2.3.2.3 Scottish Environmental Protection Agency

SEPA has extensive powers through issuing discharge consents to prevent pollution of watercourses and standing waters, and ground waters from the release of effluent or silt. Under its duty to conserve water resources, SEPA has powers to demand the removal of potentially polluting material from controlled waters and serve remedial notices for silage, slurry and agricultural fuel installation control. As of April 2006 these powers will be incorporated into The Water Environment (Controlled Activities) (Scotland) Regs.2005 which will also introduce additional powers to control engineering work, abstraction and impoundments.

2.3.2.4 District Salmon Fishery Boards

The Boards have a responsibility to exercise their powers in a manner compatible with the conservation of the qualifying interests. They will also provide advice and any available information to other competent authorities regarding possible impacts on salmon arising from developments proposed by other parties.

2.3.2.5 Other authorities

Many other public agencies, including Scottish Executive Environment and Rural Affairs Department, and Scottish Water may have to act as competent authorities in relation to their function as required.

3 PROCESS OF CHECKING WHETHER A PLAN OR PROJECT IS LIKELY TO HAVE A SIGNIFICANT EFFECT

3.1 Conservation objectives

As part of the process for ensuring compliance with Article 6.2, new plans and projects require to be assessed "in view of the site's conservation objectives", (Article 6.3). The term "conservation objectives" thus has a statutory basis, although it is not defined in the Directive. In general, conservation objectives are set to ensure that the obligations of the Directive are met: in particular, that there should be no deterioration or significant disturbance of the qualifying features. **The conservation objectives are also essential in determining whether a plan or project is likely to have a significant effect.** One set of conservation objectives is provided by SNH for each site. While these are customised to fit individual sites, Table 1 shows the approach and structure of these for both habitat and species interests in situations where restoration is not required.

Table 1: Checklist of elements for construction of *conservation objectives* and consideration of impact upon *integrity*

Habitat Conservation Objectives	To avoid deterioration of the qualifying habitat(s) [insert relevant habitat type from list] thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status (FCS) for each of the qualifying features
	To ensure for the qualifying habitat(s) that the following are maintained in the long term: • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of habitat

Species Conservation Objectives (NB not birds)	To avoid deterioration of the habitats of qualifying species, [insert relevant species type from list] or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving FCS for each of the qualifying features
	To ensure for the qualifying species that the following are maintained in the long term: • Population of the species, (including range of genetic types where relevant) as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species • Distribution and viability of the species' host species (where relevant) • Structure, function and supporting processes of habitats supporting the species' host species (where relevant)

Table 2: List of Natura qualifying freshwater species and habitats occurring in Scotland

Species	
1. Atlantic salmon	(*Salmo salar*)
2. Otter	(*Lutra lutra*)
3. Sea lamprey	(*Petromyzon marinus*)
4. River lamprey	(*Lampetra fluviatilis*)
5. Brook lamprey	(*Lampetra planeri*)
6. Freshwater pearl mussel	(*Margaritifera margaritifera*)
7. Great crested newt	(*Triturus cristatus*)
8. Slender naiad	(*Najas flexilis*)

Habitats
1. Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (also known as clear-water lochs)
2. Dystrophic Lakes (also known as acid peat-stained lakes and ponds)
3. Natural eutrophic lakes
4. Hard oligo-mesotrophic lakes
5. Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation
6. Oligotrophic waters containing very few minerals of Atlantic sandy plains
7. Alluvial forests with *Alnus* and *Fraxinus*

3.2 Determining whether a plan or project is likely to have a significant effect

Definitions of what is a likely significant effect are set out in a detailed guidance note agreed by Government headed 'Likely significant effect'. This is attached as Appendix 1. In essence, any plan or project which potentially has a small or greater effect upon the conservation objectives of a qualifying interest is significant, and should be checked out through an appropriate assessment. A plan or project has insignificant effects if those effects are trivial or inconsequential.

3.3 Undertaking an appropriate assessment

As previously stated, this guidance does not attempt to give generic advice on the appropriate assessment process once a plan or project has been deemed likely to have a significant effect on the site. SNH can provide advice on request on the contents of an appropriate assessment. Any supporting information required by the Competent Authority must be provided by the developer.

4 DETAILED ECOLOGICAL REQUIREMENTS OF QUALIFYING HABITATS AND SPECIES

4.1 Ecological requirements of Atlantic salmon (*Salmo salar*)

4.1.1 Introduction


Atlantic salmon (*Salmo salar*)

Atlantic salmon or 'King of the Fish' is a world famous inhabitant of a wide number of Scotland's rivers and burns. Despite such wide distribution it is vulnerable to many potential developments and activities. Salmon breed in fresh water, where the young grow for between 2 and 3 years before swimming to the sea and undertaking their migration into the North Atlantic. After one or more years feeding at sea the adult fish then return to their native river to breed, most often extremely close to the area of their birth.

4.1.2 Population structure

During their life cycle Atlantic salmon pass through a series of identifiable life stages (Table 3) of which stages 1 to 4 and 6 and 7 take place entirely or partly in fresh water. In Scottish rivers adult (grilse and multi-sea winter) salmon can return during any month of the year before spawning during late autumn and early winter. Adult salmon show strong homing to their natal stream and this has led to the development of genetically distinct populations, both between and within individual catchments. This diversity should be preserved by a presumption against stocking, with the populations remaining naturally self-sustaining.

Table 3: Atlantic salmon life stages

Stage	Name	Definition
1	Alevin	From hatching to end of dependence on yolk sac for primary nutrition
2	Fry	From independence of yolk sac to end of first summer
3	Parr	From end of first summer to migration as smolt
4	Smolt	Fully silvered juvenile salmon migrating to sea
5	Post-smolt	From departure from river to end of first winter in sea
6	Grilse	Adult salmon after first winter in sea
	Multi-Sea Winter (MSW)	Adult salmon after more than one winter in sea, commonly referred to as 'spring' fish when entering river before June
7	Kelt	Spent or spawned adult

4.1.3 Species distribution

Atlantic salmon are able to migrate considerable distances within catchments, from the river mouth right up to headwater streams for spawning, and they therefore have the potential to be widely distributed within a catchment. The spawning areas need to be accessible to adult salmon and there must be adequate holding areas to provide shelter for these large fish. Summer flows must be sufficient to maintain adequate depth and velocity in juvenile rearing areas. There should be no artificial barriers that significantly impede adults migrating upstream and smolts migrating downstream.

4.1.4 Distribution and extent of supporting habitat

The distribution of Atlantic salmon within a catchment is limited both by the presence of barriers to migration and the availability of suitable habitat. It is therefore important that no new barriers to migration are created. It is similarly important that the quality of the available habitat is maintained and does not become degraded.

4.1.5 Habitat structure, function and supporting processes

Salmon require a diversity of habitat in the river to support their different life stages. The typical riffle and pool sequence must be present and maintained as the riffles provide juvenile salmon habitat and spawning grounds occur at the tail of pools where the water velocity increases. The pools are also extremely important to adult salmon as they provide shelter and areas in which they can congregate prior to spawning.

Salmon require different substrates during different stages of their life cycle. For spawning, salmon use clean gravels in which they excavate a 'redd' and deposit their eggs. The eggs are then buried and require gravel beds clear of silt and sand so that sufficient water can penetrate into the gravel to maintain the supply of oxygen. Eggs and alevins incubate in the gravel until May and are unable to tolerate gravel becoming clogged with silt or sand. Juvenile salmon need a substrate of cobbles or boulders over which they establish territories for feeding.

Salmon need excellent water quality typical of that found in upland watercourses. They require water high in oxygen (to sustain eggs buried in the gravel and for resident fish), low in nutrients and suspended solids (as both can encourage clogging of gravel by algal growth or silt), neutral pH (eggs and young salmon are intolerant of very acid conditions), and with temperatures never exceeding 25°c. Increased nutrient concentrations, low dissolved oxygen levels, high sediment loads and heavy metals can all damage salmon populations.

4.1.6 Disturbance

Atlantic salmon can be disturbed at any stage in their complex life cycle, but they are most vulnerable to disturbance when their eggs are incubating in gravel beds. The eggs incubate through the winter and the alevins remain within the gravel beds until May. Activities likely to damage these stages should not be conducted in or adjacent to watercourses during these times.

Table 4: Seasonality of life cycle stages for Atlantic salmon in Scottish rivers

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	•	•	•	•	•						•	•
Salmon	•	•	•	•	•	•	•	•	•	•	•	•
(Section 4.1)	•	•	• •	• •	• •	•	•	•	•	•	•	•

- Spawning and hatching
- Downstream migration
- Alevin, parr and fry (salmon) in nursery areas
- Upstream migration

Table 5: Summary table showing months of greatest sensitivity for salmon

Months of greatest sensitivity

(**Note:** at all other times the species remain vulnerable to impacts: see ecological requirements)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salmon	•	•	•	•	•						•	•

4.2 Ecological requirements of Sea lamprey (*Petromyzon marinus*), River lamprey (*Lampetra fluviatilis*) and Brook lamprey (*Lampetra planeri*)

4.2.1 Introduction

Lampreys are primitive fish that live in many Scottish rivers but are vulnerable to many potential activities and developments. Of the three species, two are migratory and, like salmon, live and grow in the sea as adults before returning to the river to breed and reproduce.

Brook lamprey (*Lampetra planeri*)

Ammocoete

Juvenile lampreys (ammocoetes) live in silt beds within the river for several years before maturing (transforming) into adults and either leaving to feed (Sea and River lamprey) or immediately breeding and always staying within the river (Brook lamprey).

4.2.2 Population structure

All three lamprey species have a similar population structure with juvenile lampreys living in silt beds in slower-flowing reaches of the river. Adult sea and river lampreys are only present in the river after transformation from the juvenile stage until they migrate downstream to the sea, and then for several months before spawning when they return to the river. Adult Brook lamprey do not migrate to the sea; they are only present after transformation from the juvenile stage for a short period prior to spawning, after which they die.

4.2.3 Species distribution

It should be noted that lampreys are relatively poor swimmers and may be unable to ascend some obstacles or fish passes that allow the free passage of salmonids. Therefore the distribution of the migratory Sea and River lampreys in a catchment is often more restricted than that of salmon. Areas of poor water quality can also create a barrier to migration preventing River and Sea lampreys from reaching their spawning grounds. The non-migratory Brook lamprey can be far more widely distributed across a catchment, and populations can be found upstream from obstacles that prevent access for the other two species.

4.2.4 Distribution and extent of supporting habitat

Lampreys require two very different types of habitat during their life cycle. The adults breed in pits excavated in gravel beds, often near the tail of a pool, during the spring or summer. The gravel should be clean and in faster-flowing reaches where the current is able to supply the eggs with oxygen. The juveniles have very different habitat requirements and live buried in silt beds, usually at the river edge or behind boulders and other obstacles. The distribution of these species is limited by the availability of the above habitat types as well as the need for unimpeded upstream and downstream migration routes for sea and river lampreys.

4.2.5 Habitat structure, function and supporting processes

Lampreys use both fast and slower-flowing areas of a river during their life cycle. As described in 4.2.4, adult lampreys breed in faster-flowing areas and the juveniles live for 3 to 7 years in slower-flowing reaches. The need for silt beds in slower-flowing reaches by juvenile lampreys is an unusual requirement for a fish species and often neglected when considering the consequences of a development.

Lampreys require well-oxygenated water that is low in nutrients and suspended solids. Eutrophication can give rise to increased algal and bacterial production which, as with increased suspended solids, can smother spawning gravels and silt beds containing juveniles.

Rivers that support lamprey populations provide the diversity of water depths, flow regimes and substrate types necessary to meet the spawning, juvenile and migratory requirements of the three species. The close proximity of these varied river habitats allows lampreys to move easily from one habitat to another during their life cycle. Developments that widen, deepen and/or straighten the channel reduce the variations in habitat.

4.2.6 Disturbance

Lampreys are susceptible to disturbance at any stage during their life cycle. They are most often disturbed during spawning, when the normally nocturnal adults will openly congregate, often in shallow water, and can be vulnerable to a number of natural predators. After spawning the eggs can be disturbed during incubation, and the juveniles in silt beds are also vulnerable to disturbance.

4.2.7 Host species

Adult River and Sea lampreys both migrate to the sea in order to feed on other fish species. River and sea lamprey in the Endrick Water have the unusual habit of migrating to Loch Lomond where they normally feed on the rare Powan. It is essential that lampreys have access to suitable fish species to parasitise, whether in Loch Lomond or the sea, for the lampreys to complete their lifecycle.

Table 6: Seasonality of life cycle stages for River lamprey, Brook lamprey, Sea lamprey in Scottish Rivers

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brook Lamprey (Section 4.2)	Larvae	Larvae	Larvae	Spawning; Larvae	Spawning; Larvae	Spawning; Larvae	Larvae	Larvae	Larvae	Larvae	Larvae	Larvae
River Lamprey (section 4.2)	Larvae; Downstream; Upstream	Larvae; Downstream; Upstream	Spawning; Larvae; Downstream; Upstream	Spawning; Larvae; Downstream; Upstream	Spawning; Larvae; Upstream	Spawning; Larvae	Larvae	Larvae	Larvae; Downstream	Larvae; Upstream; Downstream	Larvae; Upstream; Downstream	Larvae; Downstream; Upstream
Sea Lamprey (Section 4.2)	Larvae	Larvae	Larvae	Larvae; Upstream	Larvae; Upstream	Spawning; Larvae; Upstream	Spawning; Larvae; Upstream	Spawning; Larvae	Larvae	Larvae; Downstream	Larvae; Downstream	Larvae

- Spawning and hatching
- Downstream migration
- Larvae (lamprey). in nursery areas
- Upstream migration

Table 7: Summary table showing months of greatest sensitivity for lamprey species

Months of greatest sensitivity

(**Note**: at all other times the species remain vulnerable to impacts: see ecological requirements)

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brook Lamprey				•	•	•						
River Lamprey			•	•	•							
Sea Lamprey						•	•					

4.3 Ecological requirements of Freshwater pearl mussel (*Margaritifera margaritifera*)

4.3.1 Introduction


Freshwater pearl mussel (*Margaritifera margaritifera*)

Freshwater pearl mussels are long-lived molluscs (over 100 years) that live buried or semi-buried in the sand and gravel on river beds. Pearl mussels live in rivers that are low in Calcium and are therefore not found in catchments that comprise extensive limestone or other calcareous rocks. Due to historical pearl fishing and pollution they are now an extremely rare species and the remaining Scottish populations are thought to represent at least half the known world-wide populations. Even in Scotland, however, it has recently been calculated that, on average, two populations have been lost from Scottish rivers every year for the past 30 years.

4.3.2 Population structure

Mature and young Freshwater pearl mussels are often found living together in the same river reach. Freshwater pearl mussels take approximately 10-12 years to become sexually mature. Those populations that contain juveniles, and therefore show signs of recent breeding success, are particularly scarce and are therefore considered to be of the highest conservation value.

4.3.3 Species distribution

Freshwater pearl mussels have a complex life cycle with the larvae, released by the adults during early summer, parasitising the gills of juvenile salmonids from around July- August until the following spring. This crucial early stage in their life cycle is entirely reliant on the presence of young salmon or trout, thus limiting the distribution of freshwater pearl mussel.

4.3.4 Distribution and extent of supporting habitat

Freshwater pearl mussels usually occur in fast-flowing rivers, often in the lee of boulders, but they are also found in slower-flowing areas (eg towards river margins). A sufficient current is needed to enable mussels to filter out small organic food particles suspended in the water, to maintain oxygen levels in summer, and to reduce sedimentation, especially in areas where juvenile mussels settle after leaving the gills of their host salmonid. Wherever these conditions prevail it is possible that freshwater pearl mussels may be present.

4.3.5 Habitat structure, function and supporting processes

Pearl mussels usually lie partly buried in coarse sand or fine gravel, although occasionally they may be found in finer substrates (eg peaty), or amongst the roots and stems of aquatic vegetation. Recent work at Aberdeen University indicates that adults and juveniles have broadly similar habitat preferences although adults occur in a wider range of physical conditions. Boulder-stabilised refugia, containing enough sand for burrowing, are ideal microhabitats for juvenile mussels. Adults are able to tolerate silty or muddy conditions for unknown lengths of time, but juveniles are never found in this type of habitat. Juvenile pearl mussels tend to live entirely buried within the river substrate and are therefore much more vulnerable to any increases in silt or suspended solids which can smother the gravel bed, preventing the supply of oxygen and organic food particles to the mussels.

Pearl mussel rivers are typically poor in calcium, mildly acidic, low in nutrients and suspended solids, well-oxygenated, with low levels of conductivity, and temperatures not exceeding 20˚c. Low oxygen levels, mild eutrophication, high sediment loads, pesticides and heavy metals are all known to be damaging to freshwater pearl mussel.

4.3.6 Disturbance

As well as being protected by measures in the Habitats Directive where they are a qualifying interest on a site, freshwater pearl mussels are fully protected under the Wildlife and Countryside Act (1981) as amended by the Nature Conservation (Scotland) Act 2004, making it, amongst other things, an offence to intentionally or recklessly disturb, damage or destroy them.

4.3.7 Host species

The presence of young salmon and trout is essential to the life cycle of pearl mussels. The larvae (glochidia) attach to fish gills in the summer and remain there until the following spring when they drop off and settle into the substrate. Therefore a healthy population of salmonids (salmon, sea trout and brown trout) is important to a freshwater pearl mussel population.

4.4 Ecological requirements of Great crested newt (*Triturus cristatus*)

Great crested newt

4.4.1 Introduction

The Great crested or Warty newt (*Triturus cristatus)* is the UK's largest newt species, reaching an adult length of up to 165 mm. There is extensive published information available on the ecology and management of this species, in particular the Great Crested Newt Conservation Handbook published by Froglife in 2001. In Scotland, Great crested newts have particular strongholds recorded in Dumfries and Galloway, Lothian, the Borders and the Inverness area.

4.4.2 Population structure

Adult and young Great crested newts overwinter in crevices, under tree roots etc from around mid-October to mid-February. After hibernation they become active and move to breeding ponds, usually arriving from mid-March. Once in the pond they breed and lay eggs on the folded leaves of plants. After breeding the adults leave the pond and the majority spend the summer on land, with some occasionally returning to water. The eggs take about three weeks to hatch and the emergent larvae grow rapidly, transforming into juvenile newts after three months. The young then usually leave the pond, generally during the period from late August to late September. In some cases the larvae will overwinter in the pond, emerging the following spring.

4.4.3 Species distribution

Distribution within the sites where Great crested newts occur should be maintained by a network of ponds connected by suitable areas of terrestrial habitat.

4.4.4 Distribution and extent of supporting habitat

Great crested newts prefer to breed in medium-sized ponds and require surrounding terrestrial habitats for foraging, refuge from predators and extremes of climate. Typically suitable terrestrial habitats include mature woodland, scrub, tussocky grassland and rough pasture.

4.4.5 Habitat structure, function and supporting processes

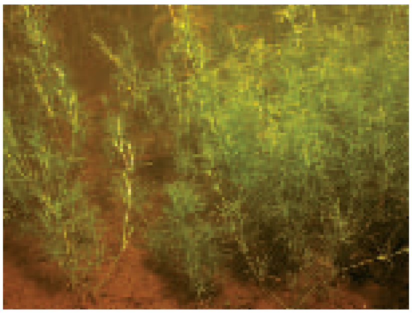
In standing water, the larvae are known to be particularly vulnerable to fish predation. Water bodies which dry out or occasionally become very shallow can be important breeding ponds, since the accumulation of fish stocks and other predatory species is thereby reduced or eliminated. Great crested newts tend to be found more frequently in neutral or slightly alkaline water. Ponds should have aquatic vegetation to provide substrates for egg-laying in the spring, and support invertebrates which serve as prey for larval newts (zooplankton is particularly important in the early stages of larval development). Ideally, there should be open, less vegetated areas within the pond to allow adult males to display in clear view of females. Ponds that lack shade on the southern margin may be preferred.

Terrestrial habitats are used for overwintering which tends to occur amongst tree roots, in crevices in rocky ground, in embankments, dry stone walls, or among piles of rubble, scree and boulders.

It is crucial that the linkages between ponds and terrestrial habitats are conducive to newt movement to permit migration between key areas. Studies have shown that the density of ponds may be important to the long-term survival of populations and that Great crested newts prosper where several ponds within a given area are connected by suitable habitat.

4.4.6 Disturbance

Great crested newts can be threatened in ponds by the excessive growth of vegetation, heavy siltation, pollution and the introduction of predatory fish species. The surrounding terrestrial habitat can be threatened by activities that disrupt the habitat structure. The timing of any management affecting the habitat is important. It is an offence under the Wildlife and Countryside Act 1981 and the Nature Conservation Scotland Act, 2004 to intentionally or recklessly disturb, kill, injure or take this species or to intentionally or recklessly damage or destroy any structure or place which it uses for shelter and protection. Furthermore, Great crested newt is also a "European Protected Species" and is therefore protected under the Natural Habitats Regulations 1994 (as amended 2004) from deliberate or reckless capture, killing (including destroying of their eggs) and disturbance as well as damage or destruction of their breeding site or resting place. Therefore breeding ponds and surrounding habitat used for resting etc. are protected all year round, even when the newts have migrated away to another part of their habitat.


Slender naiad

4.5 Ecological requirements of Slender naiad (*Najas flexilis*)

4.5.1 Introduction

Slender naiad is a rare aquatic plant that grows in clear water in moderately nutrient-rich (mesotrophic) lowland lochs. Often the loch will have some base enrichment from nearby limestone or be a machair loch with input from calcareous sand. Slender naiad is very rarely seen as it usually grows at depths of more than 1.5 m.

4.5.2 Population structure

Slender naiad is a relatively short plant (<30 cm) that never reaches the water surface living entirely submerged for all its life cycle. It is an annual plant that produces seeds every year because unlike many similar aquatic plants it cannot reproduce vegetatively. The need to produce seed successfully every year has implications for the species' survival as it can be very susceptible to any factors that interfere with its reproduction.

4.5.3 Species distribution

The species will be distributed throughout a site where conditions are suitable for its growth. As with all plants, Slender naiad is limited in its distribution by light availability. However it grows naturally at low light levels, and can thrive in water of low clarity. Plants tend to occur in more shallow conditions where waters are sheltered.

The natural flushing rate of the loch should be maintained in order to ensure dilution of nutrients and prevent undesirable increase in plankton biomass. Modifications to the inflows and changes in hydrological regime (eg abstraction) can lead to unnatural changes in loch levels.

4.5.4 Distribution and extent of supporting habitat

The plant grows over soft, silty substrates in lochs that are typically low in Phosphorus, slightly acidic, low in dissolved Carbon and have clear water. However, appropriate water quality standards need to be site-specific.

4.5.5 Habitat structure, functions and supporting processes

The two main threats to Slender naiad are believed to be eutrophication (which affects their ability to photosynthesise) and acidification which affects their ability to produce seed. Point sources of pollution or changes in land use within the catchment causing diffuse pollution and/or siltation have the potential to damage Slender naiad. Fish farming and aerially applied agro-chemicals are very likely to change the resident plant communities, with impacts on Slender naiad.

Slender naiad is typically found in clear water free from a significant sediment load. The quantity of sediment entering the loch should be minimised as increased sedimentation can lead to enrichment, smothering of the substrate and of Slender naiad populations. Significant sediment increases will bring about a rise in turbidity and can prevent light penetrating to the depth at which Slender naiad is found.

4.5.6 Disturbance

Negative impacts on Slender naiad can be experienced through the introduction of bottom-feeding fish and other organisms not characteristic of the habitat type. Loch management regimes (especially weed cutting) should take account of the presence of Slender naiad. It is an offence under the Wildlife and Countryside Act 1981 and the Nature Conservation Scotland Act, 2004 to intentionally or recklessly pick, uproot or destroy Slender naiad. Furthermore, Slender naiad is also a "European Protected Species" and is therefore protected under the Natural Habitats Regulations 1994 (as amended 2004) from deliberate or reckless picking, collecting, cutting, uprooting or destruction (this applies to all stages of its life cycle, including seeds etc).

4.6 Ecological requirements of Otter (*Lutra lutra*)

4.6.1 Introduction

The otter is a semi-aquatic mammal, which occurs in a wide range of ecological conditions, including inland freshwater and coastal areas. Inland populations use a range of running and standing fresh waters. These must have an ample supply of food (normally associated with high water quality), together with suitable habitat, such as vegetated river banks, islands, reedbeds and woodland, which are used for foraging, breeding and resting. Otters favour mid-channel islands and reedbeds for lying-up.

Otter

4.6.2 Population structure

The most important factor determining otter distribution and abundance in Scotland is fish biomass. Otters are largely nocturnal and are shy, secretive animals. Male otters are territorial, but females less so. Young cubs are born in breeding holts, which are often chambers in river banks and rocks or between tree roots. Otters may occasionally use artificial structures, such as old derelict cars, rock armouring and fishing huts for shelter.

4.6.3 Species distribution

Although otters are able to travel long distances across a catchment there are circumstances where the local topography, presence of man-made structures and the river's flow characteristics combine to impede otter movements, sometimes resulting in casualties. Conditions adverse to otters are found:

- where there is a permanent in-stream physical barrier with no opportunity for otters to leave the water to bypass it;
- where the watercourse is constricted so that the water velocity prevents otters swimming upstream and there is no bypass route;
- during spate conditions where no bypass route exists;
- where the watercourse is culverted and there is insufficient headroom (eg during spates).

Published guidance is available explaining how to overcome these problems.

4.6.4 Distribution and extent of supporting habitat

Within the range of natural values, water chemistry may affect otters through impacts on their food supply. For example, moderate eutrophication may benefit otters by leading to an increase in fish abundance, although excessive eutrophication is detrimental when it leads to the reverse effect. The extensive home ranges occupied by otters mean that, provided water quality overall in the river catchment is reasonably good, small sections of poorer quality water are unlikely to present serious problems. The pH of the water is only likely to become a problem when it changes to levels where fish populations are affected. Being at the top of the food chain, otters are very susceptible to toxic pollutants such as PCBs and Organochlorine pesticide residues which become concentrated as they pass from one trophic level to another.

Substrate characteristics affect otters indirectly by influencing prey availability. There is some evidence that in rivers with good salmonid populations, sections with riffles, large boulders and/or gravel are preferred over areas with sandy or muddy bottoms with stones. Large salmon tend to be taken on or near riffles. Where land-use practices in a river catchment lead to soil erosion problems, the effects of siltation on salmonid breeding success may have an indirect impact on otters.

4.6.5 Habitat structure, functions and supporting processes

Rivers with a natural or near-natural channel form and associated flow characteristics are likely to provide the greatest range of foraging opportunities. Deep pools tend to be avoided, whereas shallow areas and small tributaries with good fish populations are preferred. In general, a river system with a varied channel structure, located within a floodplain that has not been extensively drained, is likely to provide ideal conditions for otters. Nearby areas of wetland, including ponds and lochs, are very important in providing an abundance of alternative prey such as amphibians at certain of the year. Eels commonly form a major part of the diet of otters in lochs.

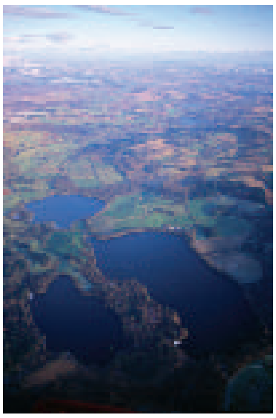
4.6.6 Disturbance

In the past, otters were hunted for their fur and trapped because they were thought to kill game birds and fish. Since 1994 it has been illegal to deliberately disturb an otter whether it is in its holt or not. It is an offence under the Wildlife and Countryside Act 1981 and the Nature Conservation Scotland Act, 2004 to intentionally or recklessly disturb, kill, injure or take this species or to intentionally or recklessly damage or destroy any structure or place which it uses for shelter and protection. Furthermore, otter is also a "European Protected Species" and is therefore protected under the Natural Habitats Regulations 1994 (as amended 2004) from deliberate or reckless capture, killing and disturbance as well as damage or destruction of their breeding site or resting place (e.g. holts and couches). Plans and projects around watercourses must consider of the presence of otters and ensure that they are not disturbed.

4.7 Ecological requirements of oligotrophic to mesotrophic standing waters (known as clear-water lochs)

4.7.1 Introduction

Nutrient-poor (oligotrophic) to moderately nutrient-rich (mesotrophic) lochs support a characteristic aquatic plant flora in Scotland, with Shoreweed (*Littorella uniflora*) considered a defining component. There are two distinct community types, one found in extremely oligotrophic conditions and the other found across a range of more nutrient-rich states.



Dunkeld - Blairgowrie lochs, Perthshire

4.7.2 Habitat extent and distribution

The extent and distribution of this habitat type, typified by the assemblage of plant species, should be maintained within each loch (and across the Special Area of Conservation if it comprises more than one loch).

4.7.3 Structure and functions of the habitat

This habitat type typically has clear water free from a significant sediment load. The quantity of sediment entering the loch should be minimised as increased sedimentation can lead to enrichment, smothering of the substrate and/or excessive growth of bulbous rush or algae. Increases in siltation can result from changes in land use, loch level fluctuations, changes to sewage treatment and increased lake enrichment.

The lochs supporting this habitat type have a variety of depth profiles and substrate types that provide conditions that favour the growth of a diverse plant community. Activities such as shoreline protection, pier/jetty construction and changes to water level all have the potential to reduce habitat diversity.

4.7.4 Supporting processes of the habitat

Typically this habitat type is low in Phosphorus, slightly acidic and low in dissolved carbon. However, appropriate water quality standards need to be site-specific. This habitat type is particularly vulnerable to changes in pH, increases in Phosphorus and, in some cases, increases in nitrate. Point sources of pollution or changes in land use within the catchment causing diffuse pollution and/or siltation have the potential to damage the site. Fish farming and aerially applied agro-chemicals are very likely to change the resident plant communities.

The natural flushing rate and loch level fluctuation should be maintained to ensure dilution of nutrients and to prevent an undesirable increase in plankton biomass. Modifications to the inflows and changes in hydrological regime (eg abstraction) can lead to unnatural changes in loch levels.

4.7.5 Distribution of typical plant species

This type of waterbody is characterised by Shoreweed (*Littorella uniflora*), and often occurs in association with Water lobelia (*Lobelia dortmanna*), Bog pondweed (*Potamogeton polygonifolius*), Quillwort (*Isoetes lacustris*) and Bulbous rush (*Juncus bulbosus*). Yellow water-lily (*Nuphar lutea*), Stoneworts (*Chara spp.*) and other Pondweeds (*Potamogeton spp.*) may be present in more nutrient-rich conditions. Most of these species are common components of the aquatic flora of standing waters in the mountainous regions of the north-west and their distribution and that of the associated fauna within each loch should be maintained.

4.7.6 Viability of typical plant species

A variety of shoreline substrates and depth profiles should be maintained to provide the diversity necessary to support the typical species. Several of the aquatic plant species and associated fauna found in this habitat type require a seasonal pattern of loch level fluctuation and this should be maintained by minimising unnatural changes to loch level.

4.7.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant species but also invertebrate and animal species. Loss of habitat within a loch can result from increased disturbance through activities such as the construction of dams or boat-mooring facilities, or catchment developments including flood defences and infrastructure schemes. Negative impacts on the species, and hence the habitat, can also result from the introduction of bottom-feeding fish and other organisms not characteristic of the habitat type, and increased disturbance from water-sports. There should be no introduction of fish not indigenous to the loch.

Potamogeton species

4.8 Ecological requirements of natural eutrophic lakes

4.8.1 Introduction

Natural nutrient-rich (eutrophic) lakes are uncommon due to pollution, have higher nutrient levels than most other types of water bodies and are typically species rich. The aquatic plant community is characterised by Broad leaved pondweeds (*Potamogeton spp.*) and associated species. The presence of alien species and coverings of filamentous algae are one indication that a site is deteriorating.

4.8.2 Habitat extent and distribution

The extent and distribution of this habitat type, typified by the assemblage of plant species, should be maintained within each loch (and across the Special Area of Conservation if it comprises more than one loch).

4.8.3 Structure and functions of the habitat

This habitat type typically has clear water with a minimal sediment load. The quantity of sediment entering the loch should remain low as increased sedimentation can lead to enrichment, smothering of the substrate and/or excessive growth of bulbous rush or algae. Increases in siltation can result from changes in land use, loch level fluctuations, changes to sewage treatment and increased lake enrichment.

4.8.4 Supporting processes of the habitat

This habitat type generally has a neutral to alkaline pH, oxygen-rich and clear water and moderate Phosphorus concentrations. Precise water quality targets should be set on a site-by-site basis with reference to baseline conditions, and after determining whether a loch is limited by Phosphorus or Nitrogen. Catchment activities that can cause a deterioration in water quality include land-use changes leading to diffuse pollution and/or siltation, point source discharges and fish farming.

Several of the aquatic plant species that are found in this habitat type require a seasonal pattern of loch level fluctuation. The natural flushing rate of the loch should also be maintained in order to ensure dilution of nutrients and prevent undesirable increase in plankton biomass. Modifications to the inflows and changes in the hydrological regime (e.g. abstraction) can lead to unnatural changes in loch levels.

4.8.5 Distribution of typical plant species

Natural eutrophic lochs are characterised by aquatic macrophyte communities dominated by Pondweeds (*Potamogeton spp.*), Spiked water-milfoil (*Myriophyllum spicatum*), Yellow water-lily (*Nuphar lutea*), and occasionally by associations of Stoneworts (*Chara spp*). Shorelines may have Reed-canary grass - Shoreweed - Spike-rush (*Phalaris - Littorella -*

Eleocharis) associations. These components of the aquatic flora, their distribution and associated fauna within each loch should be maintained.

4.8.6 Viability of typical species

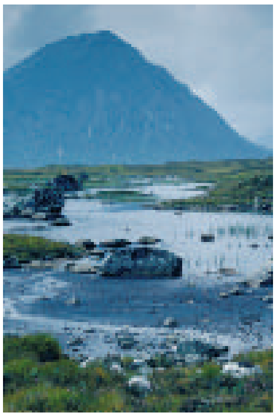
Variety of shoreline substrates and depth profiles should be maintained to provide the diversity necessary to support the typical species. Several of the aquatic plant species and associated fauna that are found in this habitat type require a seasonal pattern of loch level fluctuation and this should be maintained by minimising unnatural changes to loch level.

4.8.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant species but also all types of natural animal species. Wave-washed rocky shores as well as areas of softer sediment form an important part of this habitat. Loss of habitat can result from increased disturbance through activities such as the construction of dams or boat mooring facilities, or catchment developments affecting lochs including flood defences and infrastructure schemes. Catchment management plans can substantially contribute to the conservation of this habitat type by addressing some of the catchment changes that can cause disturbance by affecting its functioning and supporting processes.

Eutrophic lochs and their plant species are especially at risk from impacts that act as ‘forward switches’ to plankton dominated and turbid water conditions. Forward switches include nutrient increases, mechanical damage to plants, herbicides, pesticides and selective killing of piscivores. There should be no introduction of fish not indigenous to the loch.

4.9 Ecological requirements of dystrophic lakes



Rannoch Moor lochs

4.9.1 Introduction

Peat stained nutrient-poor (dystrophic) lochs are widespread in Scotland and typically occur on blanket bog. They are most often found as irregularly shaped pools and small lochs. They may also be found on raised bogs situated on valley bottoms. Dystrophic pools and lochs often support very few aquatic plant species with some sites almost completely devoid of species or dominated by mosses, yet in richer sites several plant species can be present.

4.9.2 Habitat extent and distribution

The extent and distribution of this habitat type, typified by the assemblage of plant species, should be maintained within each loch (and across the Special Area of Conservation if it comprises more than one loch).

4.9.3 Structure and functions of the habitat

There are a range of dystrophic systems including isolated seasonal pools, and random collections of irregularly shaped more or less permanent waters. Water in dystrophic lochs and pools is usually brown due to dissolved humic material, but the water bodies should experience a minimal sediment loading. Increases in the quantity of sediment can lead to enrichment or smothering of base sediments and allow excessive growth of bulbous rush or algae. Increases in siltation can result from changes in land use (particularly over-grazing, peat harvesting), loch level fluctuations, and increased enrichment.

4.9.4 Supporting processes of the habitat

Dystrophic lochs and pools should be acidic and nutrient poor. They are stained by dissolved humic material and will usually be visibly brown. Phosphorus and Nitrogen concentrations can be very variable with plant development often limited by the unavailability of nitrogen in the peat. Catchment activities that can cause a deterioration in water quality include land-use changes leading to diffuse pollution and/or siltation, point source discharges and the aerial application of agro-chemicals.

4.9.5 Distribution of typical plant species

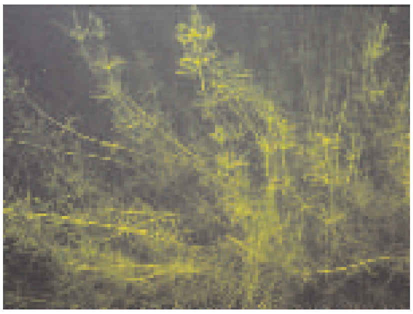
In northern Scotland bog-mosses (*Sphagnum spp.*) are typically dominate these lochs and pools and Lesser bladderwort (*Utricularia minor*) is often found. Some dystrophic lochs have developed a 'schwingmoor' or floating mat where bog-mosses are found in association with Cottongrass (*Eriophorum angustifolium*) and White water-lily (*Nymphaea alba*). A littoral zone is often absent from dystrophic pools and lochans.

4.9.6 Viability of typical species

Several of the aquatic species that are found in this habitat type require a seasonal pattern of loch level fluctuation. The natural flushing rate of the loch should also be maintained in order to ensure dilution of nutrients and prevent an undesirable increase in plankton biomass. Modifications to the inflows and changes in the hydrological regime (e.g. abstraction) can lead to unnatural changes in loch levels.

4.9.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant species but also invertebrate and animal species. Loss of habitat within the loch can result from increased disturbance through activities such as the construction of artificial structures or catchment developments, including land drainage and infrastructure schemes. Negative impacts on the habitat can also result from atmospheric emissions and inappropriate coniferous forestry. There should be no introduction of fish not indigenous to the loch.



Chara spp.

4.10 Ecological requirements of hard oligo-mesotrophic lakes

4.10.1 Introduction

These waters are scarce in Scotland and the UK. Lochs in this category are characterised by water with a high base content, most often calcium, and are usually confined to areas of limestone and other base-rich substrates from which the dissolved minerals are derived. Lochs of this type are characterised by Charophyte (*Chara*) species, often with nationally scarce, endangered, or threatened species present.

4.10.2 Habitat extent and distribution

The extent and distribution of this habitat type, typified by the assemblage of plant species, should be maintained within each loch (and across the Special Area of Conservation if it comprises more than one loch).

4.10.3 Structure and functions of the habitat

Some sedimentation in the form of marl is desirable, but increases in non-calcium carbonate siltation can result in enrichment, increase water turbidity and smothering of base sediments and aquatic plants. Increases in non-calcium carbonate siltation can result from changes in land use (particularly over-grazing, land drainage), loch level fluctuations, changes to sewage treatment and increased lake enrichment.

Loss of habitat within the loch can result from increased disturbance through activities such as the construction of dams or boat-mooring facilities, or catchment developments affecting the loch including flood defences and infrastructure schemes.

4.10.4 Supporting processes of the habitat

Hard-water lochs should have crystal clear water that is base rich and therefore they are often alkaline. Precise water quality targets should be set on a site-by-site basis with reference to baseline conditions. Phosphorus concentrations can be variable between lochs but should not reach enriched (eutrophic) levels and filamentous algae should not be present. Catchment activities that can cause a deterioration in water quality include land-use changes leading to diffuse pollution and/or siltation, point source discharges and fish farming.

4.10.5 Distribution of typical species

Abundant charophytes (stoneworts) are typically the most prominent component of the vegetation; they can occur as dense beds that cover a significant part of the lake bottom over muddy marl deposits.

4.10.6 Viability of typical species

Several of the aquatic species that are found in this habitat type require a seasonal pattern of loch level fluctuation. The natural flushing rate of the loch should also be maintained in order to ensure dilution of nutrients and prevent an undesirable increase in plankton biomass. Modifications to the inflows and changes in the hydrological regime (eg abstraction) can lead to unnatural changes in loch levels.

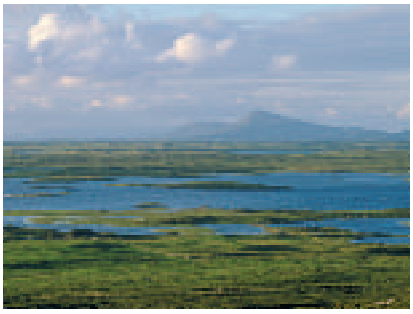
4.10.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant and animal species but also all naturally occurring animal species. Hard-water lochs and their associated species are at risk from impacts that act as 'forward switches' to plankton dominated and turbid water conditions. Forward switches include nutrient increases, mechanical damage to plants, herbicides, pesticides and selective killing of piscivores. There should be no introduction of fish not indigenous to the loch.

4.11 Ecological requirements of oligotrophic waters containing very few minerals of Atlantic sandy plains

4.11.1 Introduction

This is a very rare habitat type in the UK and is restricted to lochs on sandy plains that are acidic and low in nutrients. The only known high quality example of this habitat type in Scotland occurs on sand deposits of marine origin in the South Uist Machair.



South Uist Machair Lochs

4.11.2 Habitat extent and distribution

The extent and distribution of this habitat type, typified by the assemblage of plant species, should be maintained within each loch and across the Special Area of Conservation.

4.11.3 Structure and functions of the habitat

Nutrient-poor lochs on sandy plains should, like other loch types, experience a minimal sediment loading. Increases in the quantity of sediment can lead to enrichment or smothering of base sediments and allow excessive growth of bulbous rush or algae. Increases in siltation can result from changes in land use (particularly over-grazing, peat harvesting), loch level fluctuations, changes to sewage treatment and increased lake enrichment.

4.11.4 Supporting processes of the habitat

The lochs should be acidic and nutrient poor. Precise water quality targets should be set on a site-by-site basis with reference to baseline conditions. As a guide, the pH should always be less than 7 and the annual mean usually around 5.5. Catchment activities that can cause a deterioration in water quality include land-use changes leading to diffuse pollution and/or siltation, point source discharges and the application of agro-chemicals.

Negative impacts on the habitat can also be experienced through atmospheric emissions and inappropriate coniferous forestry.

4.11.5 Distribution of typical plant species

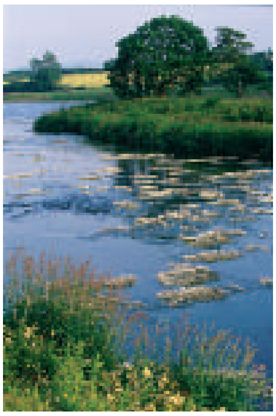
The habitat type is characterised by the presence of Littorelletalia-type vegetation, including Water lobelia (*Lobelia dortmanna*), Shoreweed (*Littorella uniflora*), or Quillwort (*Isoetes lacustris*). Typically the vegetation consists of zones in which the individual species form submerged lawns.

4.11.6 Viability of typical species

Several of the aquatic plant species that are found in this habitat type require a seasonal pattern of loch level fluctuation. The natural flushing rate of the loch should also be maintained in order to ensure dilution of nutrients and prevent an undesirable increase in plankton biomass. Modifications to the inflows and outlets or changes in the hydrological regime (eg abstraction and flood control) can lead to unnatural changes in loch levels.

4.11.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant species but also invertebrate and animal species. Loss of habitat within the loch can result from increased disturbance through activities such as the construction of artificial structures or catchment developments including land drainage and infrastructure schemes. There should be no fish farming or introduction of fish not indigenous to the loch.



River Tweed

4.12 Ecological requirements of water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation

4.12.1 Introduction

Rivers of this habitat type are characterised by the abundance of aquatic plant species, especially Water-crowfoots (*Ranunculus spp.*). The abundant aquatic plants may modify water flow, promote fine sediment deposition, and provide shelter and food for fish and invertebrates. There are several variants of this habitat type in the UK, depending on geology and river type, but only one Special Area of Conservation in Scotland, the River Tweed. Within the River Tweed there are several of the variants of this habitat type, as the river flows from its headwater reaches through the valley bottoms to the richer lowlands near the sea.

4.12.2 Habitat extent and distribution

The extent and distribution of this habitat type, typified by the assemblage of plant and animal species, should be maintained throughout the river catchment.

4.12.3 Structure and functions of the habitat

River flow affects a range of factors critical to the river habitat including velocity, depth, wetted area, substrate quality, dissolved oxygen levels and water temperature. It is vital that base flows experienced during the summer and flushing flows experienced during spates based on natural processes are maintained. Flows can be altered by activities such as abstraction (where headwaters can be very vulnerable), bank protection works and dam and weir construction.

River channels supporting this habitat type should be dominated by clean gravel. Siltation of gravel is a major threat to the habitat as this can interfere with the establishment of sensitive aquatic plant species. Sources of siltation include run-off from arable land, the widespread trampling of banks by livestock, sewage and industrial discharges. Catchment management plans can substantially contribute to the conservation of this habitat type by addressing some of the catchment changes that can affect its functioning and supporting processes.

4.12.4 Supporting processes of the habitat

A wide variety of water quality can be recorded between the variants of this habitat type and a number of parameters may affect the species of interest and the wider habitat. Increased phosphorus concentrations can influence the competitive interactions between the different plant species leading to a loss of species and decreased oxygen levels. Increased siltation can lead to the smothering of the vegetation and a loss of associated fish and animals. Decreases in water quality can result from a wide range of other activities within the catchment including land-use changes leading to diffuse pollution and increased sediment input, point source discharges, and pesticide and herbicide applications.

The long-term presence of this diverse habitat type depends on a near-natural channel, preferably where the river is allowed to meander freely leading to the formation of natural islands, shingle banks, backwaters and other features characteristic of natural river systems. Activities such as widening or deepening of channels, and extensive artificial reinforcement of banks, can all threaten the habitat type.

4.12.5 Distribution of typical plant species

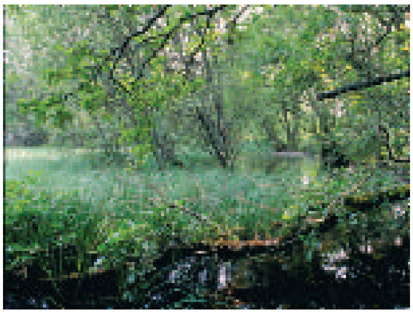
The distribution of the species in this habitat reflects the varying conditions in the River Tweed catchment. Close to the headwaters the plants reflect the more nutrient-poor conditions, with species of aquatic moss alongside some Starworts (*Callitriche spp.*) and Water crowfoot (*Ranunculus spp.*). Further downstream, where the flow is slower and the water less nutrient-poor, the plant community is dominated by a wide range of water crowfoot species alongside a wider range of other aquatic plant species including Pondweeds (*Potamogeton spp.*).

4.12.6 Viability of typical species

The different species that typify this habitat type require a range of flow conditions which are vulnerable to artificial reductions in river flows and to unsympathetic channel engineering works. These species can also be threatened by the introduction of non-indigenous plants and animals as well as by nutrient enrichment, mainly from sewage inputs and agriculture, and by siltation from agricultural activities.

4.12.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant species but also invertebrate and animal species. Cutting of the aquatic vegetation and river engineering are often undertaken for fishery and flood alleviation purposes. Both have the potential to disturb the typical species and threaten the habitat. Consideration must be given to the needs of the typical plant species and the habitat when contemplating such schemes.


Floodplain alder wood

4.13 Ecological requirements of alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*

4.13.1 Introduction

Alluvial forests are found on floodplains where the substrate has been deposited, often temporarily, by the river. They are dominated by Alder (*Alnus glutinosa*) and Willow (*Salix spp.*), and are found in a range of situations from islands in river channels to low-lying wetlands in freshwater and estuarine deltas. Substrates range from organic to shingle-dominated. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation.

4.13.2 Habitat extent and distribution

The extent and distribution of this habitat should be maintained within each Special Area of Conservation. These woods tend to be dynamic, being part of a successional series of habitats from open ground to closed canopy, but are much reduced in cover in the more intensively agricultural and long-settled lowlands, often restricted to just narrow strips or lines of trees.

4.13.3 Structure and functions of the habitat

The structure and functioning of these dynamic woods are best maintained within a larger unit that includes the open communities, mainly fen and swamp, of earlier successional stages. Alluvial woods are vulnerable to habitat loss from the pressures of agricultural improvement and development. Meanders and back channels often represent the oldest stands and are important for species associated with dead wood - an important habitat niche that should be retained where possible.

4.13.4 Supporting processes of the habitat

Alluvial forests tend to occur on moderately base-rich soils; however, run-off with concentrates of fertilisers, pesticides and herbicides may cause enrichment and have deleterious impacts on the diversity of ground flora.

River engineering, and modification of river systems by canalisation, abstraction and drainage, could be undesirable as these activities alter the supply of water and sediment to the forest and are likely to affect the dynamism of the alluvial woodlands. Schemes which reduce the frequency of flooding may also be deleterious by cutting off the sediment and water supply and reducing woodland dynamics.

4.13.5 Distribution of typical plant species

Although this habitat type usually occurs on floodplains, on the drier margins other tree species, notably Ash (*Fraxinus excelsior*), may become abundant. In other situations, the alder woods occur as a stable component within transitions to surrounding dry-ground forest. The ground flora is correspondingly varied. Some stands are dominated by tall herbs while others have lower-growing communities.

4.13.6 Viability of typical plant species

Several of the species in this habitat type require regular inundation and are part of a larger successional series of habitats. It is important that the dynamic is maintained with neighbouring watercourses.

4.13.7 Disturbance of typical species

It is important to bear in mind that this habitat type not only covers the plant species but also invertebrate and animal species. Being subject to regular inundation, alluvial woods have a continuous supply of seed from sources outwith the site. They are therefore particularly vulnerable to colonisation from non-native trees, shrubs and ground flora, these often having originated from gardens.

5 SIGNIFICANCE OF ACTIVITIES LIKELY TO AFFECT QUALIFYING FEATURES

5.1 Introduction

With any development plan or project, there is the potential for both direct and indirect effects on the qualifying species. The degree of effect can be influenced by the scale, longevity and reversibility of effects and whether the proposal contributes to cumulative or incremental effects with other projects. The following questions may help Competent Authorities establish whether a particular proposal is likely to have a significant effect. They can be applied to each qualifying feature. If the answer to any question is 'yes' or 'don't know', further investigation of the proposal and its effects should be undertaken.

• Direct: will the qualifying feature be disturbed, damaged, destroyed, altered or lost to any extent as a result of the proposal (eg by construction, vehicular access, excavation of habitat, pollution or trampling)?	☐

Indirect impacts could affect any aspect of the ecological requirements of individual freshwater species and habitats to any extent and include:

5.2 River flow:

• Will the plan or project affect the flow?	☐
• Will the velocity be changed or the flow diverted?	☐
• Will the quantity of water be affected (e.g. by abstraction, increase or impoundment)?	☐
• Will the flow regime change so that the river responds more quickly (e.g. through the effects of drainage on adjacent land)?	☐
• Will summer flows be changed (altering water temperatures and oxygen levels) or will winter floods be altered (e.g. through construction of embarkments)?	☐

5.3 Channel substrate:

• Will the plan or project affect the substrate?	☐
• Will there be physical damage/disturbance to the habitat structure?	☐
• Will the diversity of channel morphology be reduced?	☐
• Will the plan or or project affect the river sediments such as sand; gravel; cobbles and boulders (eg through more sediment being added or removed)?	☐
• Will the plan or project lead to changes in the nature of river bed sediments (eg changes in land management altering the amount of fine sediment reaching the channel)?	☐

5.4 Water quality in running and standing water:

• Will the plan or project affect water quality?	☐
• Will oxygen levels be altered (eg through nutrient input)?	☐
• Will the water chemistry be changed (eg through runoff from land-based activites, effluent discharge, pesticide treatments)?	☐
• Is there additional risk of accidental pollution?	☐
• Will the plan or project increase the water turbidity?	☐
• Will water temperature be changed?	☐

5.5 Loch hydrology:

• Will the plan or project change the hydrology of the loch?	☐
• Will general loch levels change (eg through abstraction)?	☐
• Will there be frequent change in the loch levels through drawdown and recharge?	☐
• Will the inflow or outflow of the loch be changed altering the flushing rate of the loch?	☐
• Will there be a change in the seasonal variability in loch levels?	☐

6 SPECIES PROTECTED UNDER THE 1994 HABITATS REGULATIONS AS AMENDED 2004 AND THE WILDLIFE AND COUNTRYSIDE ACT (1981) AND NATURE CONSERVATION (SCOTLAND) ACT (2004)

Freshwater pearl mussel, Otter, Great crested newt and the aquatic plant species Slender naiad are protected under the Wildlife and Countryside Act (1981) and the Nature Conservation (Scotland) Act 2004. This legislation makes it at offence to intentionally or recklessly disturb, kill, injure or take the relevant animal species or to intentionally or recklessly damage or destroy any structure or place which they use for shelter and protection. Plants are protected from intentional or reckless picking, uprooting or destruction. Some defences and excemptions do apply, and licences are available under certain circumstances.

Stronger protection is given to certain species under Part III of the 1994 Regulations (amended 2004). These species are known as "European Protected Species" and include Otter, Great crested newt and Slender naiad. The arrangements for protection of these particular species are quite distinct from the arrangements in Parts II and IV of the Regulations, which govern the protection of European sites. For European Protected Species of animal, the Regulations make it an offence to deliberately or recklessly capture, kill or disturb any animal or deliberately or recklessly take or destroy the eggs of such an animal. It is also an offenceto damage or destroy a breeding site or resting place of such an animal. For European Protected Species of plant, the Regulations make it an offence to deliberately or recklessly pick, collect, cut, uproot or destroy such a plant. In order to allow work of an imperative nature to proceed, a licence can be granted in certain specified circumstances. In most cases involving development, the Scottish Executive are the licensing authority. Details of the requirements to be fulfilled to obtain a licence can be found on the Scottish Executive web-site:

http://www.scotland.gov.uk/library3/environment/epsg-00.asp

APPENDIX 1: LIKELY SIGNIFICANT EFFECT

(Copy of guidance provided to SNH staff)

Consistency in applying the requirements of the Habitats Directive, and in interpreting the Conservation (Natural Habitats & c.) Regulations 1994 (as amended 2004), is important for all the conservation agencies in their casework on international sites. One of the key procedures is under Regulations 48-53, the consideration of plans and projects affecting the Natura 2000 series. If a plan or project is not connected with or necessary for the management of the site **and is likely to have a significant effect**, the Competent Authority is required to carry out an appropriate assessment to determine whether it will have an adverse effect on site integrity.

This note provides guidance to staff on how to decide whether or not a plan or project "is likely to have a significant effect". It applies also to the other parts of the Conservation Regulations where the same test is used (eg Regulations 20, 24 & 60).

Summary of principles in judging significant effect

The test of significant effect ('significance test') must be made by the 'Competent Authority', but exchange of advice between the Competent Authority and the conservation agency is strongly encouraged.

The 'significance test' is a coarse filter intended to identify which proposed plans and projects require further assessment. It is the first stage of the process, and is distinct from the appropriate assessment of 'adverse effect on integrity' that follows.

Consideration of 'likely significant effect' will have practical and legal consequences and must be based on sound judgement and bear scientific or expert scrutiny.

Judgements of likely significant effect should be made in relation to the features for which the European site was designated and their conservation objectives - (Regs 20, 33 and 48); judgements should be made on a case-by-case basis.

Proposals having no, or *de minimis*, effects can be progressed without further consideration under the Habitats Regulations although reasons for reaching this decision must be justified and recorded.

Some cases require more systematic evaluation of risk, but if a clear judgement cannot be made on the basis of available information, then an appropriate assessment will be required.

In all cases, the reasons for reaching the judgement must be recorded by the Competent Authority and by the conservation agency when advice is given.

The purposes of the test of significance

The 'significance' test acts as a coarse filter for all proposed plans and projects which are not directly connected with or necessary to the management of the site (whether or not the effect is likely to be adverse or beneficial) so directing attention to those which require further assessment. The importance of the international conservation interest of the site should be at the forefront of decision-making.

The conservation agencies must clearly distinguish their advice on likely significant effect, from that given on the effects on site integrity which Competent Authorities are required to obtain during an appropriate assessment (Reg. 48(3)). The separate stages in this process are explained in other guidance such as PPG9, Scottish Executive Circular June 2000 (Scotland) and TAN5 (Wales). However there may be circumstances where a fuller, more in depth level of consideration may be needed in order to determine whether significant effects are likely.

Implications of the test of significance

All judgements about 'significance' need to be fully documented and dealt with in a systematic manner by all Competent Authorities including conservation agencies. A judgement that a plan or project is likely to have a significant effect can have financial implications for developers. For example, it brings development which is otherwise permitted under the Town and Country Planning (General Permitted Development) Order 1995 (in England and Wales) and Town and Country Planning (General Permitted Development) (Scotland) Order, 1992 (in Scotland), under the scrutiny of the local planning authority. Conversely, the opinion (under Regulation 61(3) of the Habitats Regulations) of the conservation agencies that a permitted development is not likely to have a significant effect is conclusive and cannot be amended. Agencies will be held accountable for the advice given and will need to be able to justify decisions both for and against a 'significant effect'.

Making judgements of 'likely significant effect'

Likely significant effect is, in this context, any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects.

The likely scale of impact is important. In some cases the decision that no significant effect is likely will be obvious. Very short-lived impacts would generally require only minimal further consideration under such conditions, provided there were no persistent, cumulative effects from repeated or simultaneous impacts of the same nature. Even here there will be exceptions, however. For example, very brief disturbance to a seabird colony may have a lasting effect on the population (as determined by careful monitoring), even though activity may appear (through casual observation at the time) to return rapidly to normal.

At the other extreme, some cases will very clearly be likely to have a significant effect. Any proposal which would require an environmental assessment under the Environmental Assessment Directive (85/337/EEC) (as amended) on account of its effects, among others, on a European site, can be judged as being likely to have a significant effect, although reasons for this must still be recorded. This will then require an appropriate assessment under the Habitats Regulations, which may be addressed by the Competent Authority alongside or as part of the wider environmental assessment.

In some cases the judgement about a likely significant effect will be less clear cut and it will be necessary to look particularly at the nature of the effect and its timing, duration and reversibility, taking into account any readily available information on the site, and especially its conservation objectives.

Permanent reductions in habitat area or species populations are likely to be significant unless they are very small scale. In the case of certain sites a loss of, say, a few square metres of the site area may not be considered significant (for example, there may be circumstances when this might apply in the case of estuarine SPAs which are selected for their bird interest), in others, such as limestone pavement, any further loss of the area of qualifying interest may be unacceptable. Any activity which affects the attainment of conservation objectives will be significant.

The following is a list of examples of types of effects which are likely to be significant and therefore need to be considered more fully as part of the consideration in the flow chart (Annex A). It is important to remember that they may result from either on-site or off-site activities and may need to be considered in combination with other plans or projects:

- Causing change to the coherence of the site or to the Natura 2000 series (eg presenting a barrier between isolated fragments, or reducing the ability of the site to act as a source of new colonisers).

- Causing reduction in the area of habitat or of the site.
- Causing direct or indirect change to the physical quality of the environment (including the hydrology) or habitat within the site.
- Causing ongoing disturbance to species or habitats for which the site is notified;
- Altering community structure (species composition).
- Causing direct or indirect damage to the size, characteristics or reproductive ability of populations on the site.
- Altering the vulnerability of populations etc to other impacts.
- Causing a reduction in the resilience of the feature against external change (for example its ability to respond to extremes of environmental conditions).
- Affecting restoration of a feature where this is a conservation objective.

When there is 'no significant effect'

When it is clear that the plan or project is not likely to have a significant effect then only limited further consideration, to enable the reasons for reaching this decision to be justified and recorded, is required. After this, permission for the plan or project may be granted.

Use of evidence in judging likely significant effect

The judgement of whether a significant effect is likely should be based on the best readily available information. Where full information does not exist or is not readily available it will not usually be appropriate for further data (eg survey work) to be collected at this stage in the process although in some circumstances further information may be requested in order to clarify decision-making. Sources of information may include evidence of similar operations affecting sites with similar conservation objectives and the judgement of relevant specialists that an effect is likely, based on available evidence. However, cases will always be different, and consideration must be given to the local circumstances. Early consultation between project promoters, Competent Authorities and Country Agencies is encouraged, in order that the best information can be made available to help to define the likely significance of effects.

Suggested process for documenting judgement of 'likely significant effect'

Preliminary Considerations: The Competent Authority should, with advice from the Country Agencies, first consider and record the features for which the site has been selected and the conservation objectives for the site. In all cases, the following should be recorded:

- What are the qualifying interest features?
- What are the conservation objectives?
- What other relevant site information is available? eg site (SSSI, NNR, SAC/SPA, European Marine site) management plans; list of operations which may cause damage or deterioration.

As a first step it is necessary to determine whether the proposal is connected with or necessary for the management of the site for its conservation objectives. A judgement then needs to be made as to whether to proceed to a fuller consideration or to state at this stage that an appropriate assessment is not needed (ie that there is no likely significant effect). The latter would be the case only when it was beyond doubt that the interest features would not be directly or indirectly affected.

Fuller Considerations: Where there is not a clear cut case for there being no likely significant effect on the interest features or conservation objectives, you should carry out and record a brief risk assessment, eg:

The **potential hazards** of the plan or project and their likely consequences for the conservation objectives of the SAC/SPA features.

For each hazard, the **probability** that the hazard will affect the SAC/SPA conservation objective in this case.

For each hazard, the **magnitude**, likely duration and irreversibility or reversibility of the effect (recording briefly the assumptions made or evidence used in reaching that conclusion).

It may be possible to reach a decision as to whether a significant effect is likely at this stage, or you may wish to ask for further information - although not at this stage requiring an appropriate assessment. If such information is not readily available, or if the results are inconclusive, then an appropriate assessment would normally be required.

The outcome of this fuller consideration should be a fully justified decision that either:

- an appropriate assessment is not needed; or
- an appropriate assessment is needed, together with some guidance on the likely scope of this assessment.

If in doubt please seek advice from the relevant SNH specialist.

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