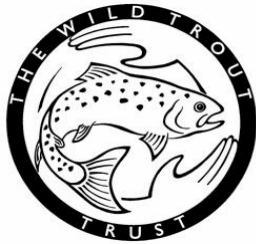


ADVISORY VISIT TO LOCH ACHRAY, TROSSACHS, ON 10 MAY, 2005

Undertaken on Behalf of the Wild Trout Trust, sponsored by Orvis



ORVIS®



Frontispiece: Loch Achray: View west to Ben Venue

By Dr Andy Walker, Ellwyn, Moulin, Pitlochry PH16 5ER
(Tel: 01796 472743; E-mail: libisandy@aol.com)

1.0 OBJECTIVES

Keith Niven, Chairman of the Loch Achray Conservation Association, requested an advisory visit by the Wild Trout Trust to Loch Achray, in the Trossachs, to consider how best to develop the trout population as part of the angling fishery resources of the loch and to offer any advice on the future management of the fishery. This approach followed a similar advisory visit carried out by WTT during April at nearby Loch Venachar, where the problems appear to be broadly similar.

2.0 BACKGROUND

2.1 Description of Loch Achray



Plate 1: Loch Achray from north-east shoreline

Loch Achray (c. 82 ha) lies upstream of Loch Venachar, above the town of Callander, in Central Scotland, in the headwaters of the River Teith, the major river in the Forth system, (Fig. 1). Now part of the new Loch Lomond and Trossachs National Park, it is an outstandingly beautiful loch in mixed wooded surroundings overlooked by Ben Venue, Ben Ledi and other mountains. It is about 1.5 km long and has a maximum breadth of about 0.5 km, a mean depth of 11m and a maximum depth of 29.6 m. Forming part of the catchment of the River Teith, Loch Achray is fed from Loch Katrine at the western end by the Achray Water. There are only two other significant inflow streams, the Allt a'Cham-ruidhe and the Allt Ardcheanachrochan. Another stream, the Gleann Riabhach, runs into the Achray Water shortly before it enters the loch. Loch Achray is undammed and the outflowing Black Water meanders through a marshy area, meeting the Water of Turk from Loch Finglass, before discharging to Loch Venachar. Loch Katrine supplies drinking water to Glasgow and is dammed at the eastern end, where there is a fish ladder for migratory fish. This is a series of short, stepped pools, fed by several sluice gates, like the main part of the ladder at Loch Venachar. The Water of Achray is subject to flow modification as agreed

between Scottish Water, the Scottish Environmental Protection Agency (SEPA) and the Forth District Salmon Fishery.

Extensive native hardwoods, especially ancient oak, are a prime feature of the northern shore and ends of Loch Achray, with mixed broadleaves and conifers higher up. The southern shore also is afforested, in this case, largely commercial spruces. For landscape benefit and conservation reasons, the area around Loch Achray and Loch Katrine under mixed or broadleaved trees is being extended substantially by Forest Enterprise.

According to long-term (50 yrs) data from FRS Freshwater Laboratory, Pitlochry, Loch Achray is mildly acidic in water chemistry (pH 5.8 – 6.7), has low to moderate Alkalinity by Highland standards (32 – 75 $\mu\text{equ. l}^{-1}$) and may be classified as oligotrophic. Acidity levels are liable to be higher during periods of greater flushing. Much of the catchment is shown by the Ordnance Survey Geological Survey to be underlain by metamorphic schists and slates.

The fish community of Loch Achray comprises salmon, brown and sea trout, perch and pike, stickleback, minnow, eel and lampreys. The loch is also believed to contain Arctic charr, although none was found during a survey by Gavin Alexander of the University of Glasgow in 1997, therefore their present status is unknown. According to Hardie (1940), Lochs Katrine, Achray and Venachar all held “some” charr which, like salmon, are a species of high conservation status in a British and wider European context. Loch Achray also supports European otter and feral mink and, among its many bird species are osprey, goosander, red-breasted merganser, red-throated diver, heron and dipper (*pers. comm.* D. Anderson).

As with Loch Venachar, Loch Achray has a long history of trout fishing. Calderwood (1909) considered it “as more of a trouting loch than a place where the capture of salmon can be relied upon.” The trout fishing appears to have been good until at least as late as the early 1970s (McLaren and Currie, 1972). However, there is also a long history of supportive stocking with non-indigenous brown trout from fish farms. In 1999, 10,000 sea trout fry were stocked with permission from the Forth District Salmon Fishery Board, although there appears to have been no lasting effect in terms of reported captures of returning adults (see below). In 1998/99 several thousand takeable-size trout were stocked from the Howietoun Fishery at Bannockburn, by Stirling, in conjunction with gill-netting to cull pike. Forestry Commission Scotland issue permits for pike and perch fishing from their land on the banks of the south and west shores, while Holiday Property Bond (Tigh Mor) issue permits for all types of fishing by boat. Catch records for 2000 show that 443 brown trout weighing 491 lbs were taken. Also, 160 pike weighing 1481 lbs were reported caught (Aberfoyle Forest District Fishings). Since then, no further stocking has been carried out while the fishing proprietors consider their options. The cessation of stocking has undoubtedly had an effect on trout catches because the equivalent records for 2003 and 2004 show fewer than ten caught, although the records are almost certainly incomplete. Again, numerous pike were caught, to a maximum weight of 21.75 lbs (9.9 kg) and, as has become commonplace, nearly all were returned alive. No salmon or sea trout were reported, although numbers of both, particularly sea trout, have been taken in former years (*pers. comm.* J. Wilson). Oddly, none of the catch records mentions perch, a species that was common in Loch Achray during the 1970s when

staff from the Department of Agriculture Freshwater Fisheries Laboratory (now FRS Freshwater Laboratory) carried out perch trapping studies (*pers. comm.* B Morrison). The absence of records of perch caught by anglers in recent years may be due to lack of fishing interest in this species, or because it has become uncommon. Perch populations are subject to occasional crashes and periods of recovery may take several years as their growth in highland lochs is relatively slow. Perch are very popular as a table fish in many European countries and may be an untapped resource in much of Scotland.

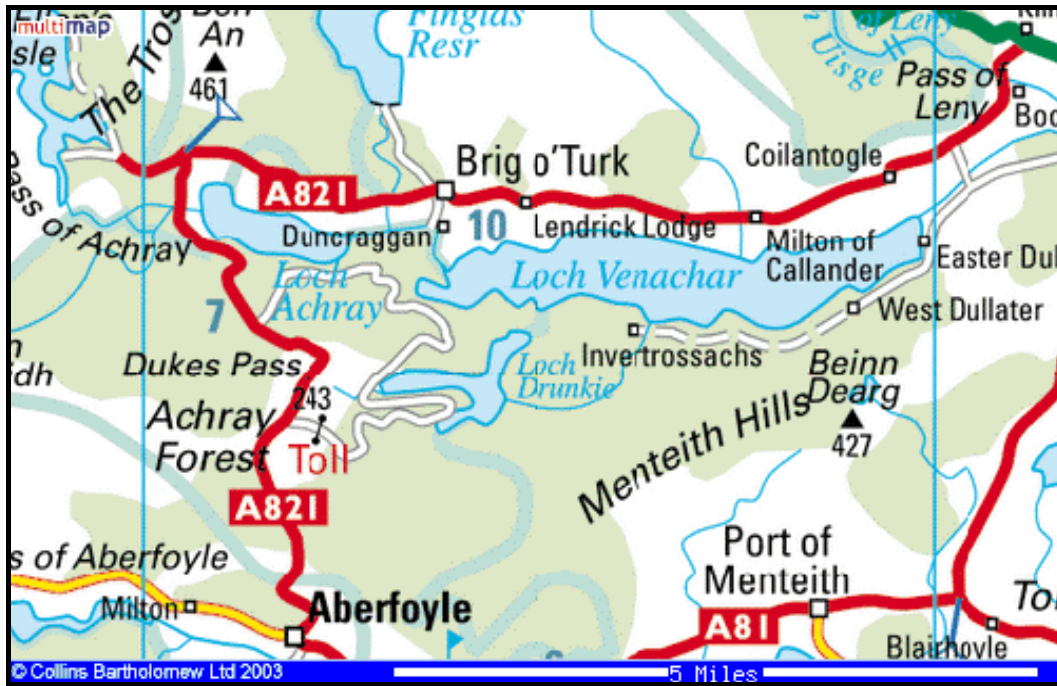


Figure 1: OS Multimap showing Loch Achray

3.0 THE ADVISORY VISIT

An advisory visit was made to Loch Achray on 10 May, 2005. As Keith Niven was unable to be present that day, the Loch Achray Conservation Association was represented by Jim Wilson, Manager of the Holiday Property Bond Tigh Mor development, which is situated at the formerly Trossachs Hotel, on the north shore of the loch. Peter Clark, representing Forest Enterprise, took part in a very helpful introductory meeting, accompanied by David Anderson, Forestry Commission Conservation Manager, Cowal and Trossachs Forest District and supplied a number of maps and relevant material, including a report by Wood-Gee and Coulthard (2000) which addresses the management of Loch Achray in a wider ecological and recreational resource context. Jim Wilson and I then toured the shores of the loch and made a cursory inspection of inflowing streams as spawning and nursery areas for wild trout. The findings of the visit point towards the need for a detailed survey of the fishery to be undertaken in order to provide more robust information.

3.1 The Tigh Mor Complex

One of the major features overlooking Loch Achray is the HPB Tigh Mor holiday complex. Its many apartments, cottages, recreational and sports, restaurant and other indoor and outdoor facilities are almost fully utilised throughout the year. The complex draws water from Loch Achray and discharges effluent back to the loch by large septic tanks followed by an attractive and well-managed pond and reed bed system, exited by a small stream flowing to a reedy bay. This arrangement for water treatment is highly successful and is regularly monitored by SEPA. The discharging stream appeared to be well-oxygenated and may even be suitable for trout.



Plate 2: Reed Bed Water Treatment – Tigh Mor



Plate 3: Outflow Stream From the Reed Bed System

3.1 Allt Ardcheanachrochan

One of the two main streams that enter Loch Achray, the Allt Ardcheanachrochan, runs through the holiday complex.



Plate 4: Allt Ardcheanachrochan (upper)



Plate 5: Allt Ardcheanachrochan (lower)

The lower part is fully accessible to adult trout spawners up to the holiday complex, but above this area the channel is much steeper where the banks and bed have had to be strengthened after spate damage. Spawning and nursery conditions seemed adequate in the lower part and, on brief inspection, the invertebrate population found

beneath stones in the stream was diverse and moderately abundant. However, the flow is liable to extreme fluctuations and much of the bed will be dried out during drought conditions. The stream flows into the loch into deep water over a gravel bar.



Plate 6: Allt Ardcheanachrochan outflow at Loch Achray

Guests staying at Tigh Mor are main potential users of the boating and fishing facilities available at this site.



Plate 7: Boats at Tigh Mor, Loch Achray

3.2 Achray Water

The Achray Water flowing from Loch Katrine to Loch Achray is over 1 km in length including a break around an island section. It contains some rocky shelves and

waterfalls, but also substantial gravel areas that, depending upon adequacy of flow, may be used for spawning by migratory fish and brown trout.



Plate 8: **The Achray Water (mid-section)**

However, the Forth Fisheries Foundation has reported that salmonid densities during 2002-2004 were low at their annual monitoring site in the Water of Achray compared with other River Teith tributaries. Salmon were less common than trout and in fact were very scarce in 2004 despite apparently favourable habitat. The fact that trout were in low numbers could be because this species is more likely to spawn in lower order tributaries entering Loch Achray itself and in the Gleann Riabach (unseen) which flows through conifer forestry plantations into the Achray Water nearer its lower end.

3.3 The Katrine Dam Fish Ladder



Plate 9: **Katrine Dam Fish Ladder**

It seemed likely that that the heavy degree of turbulence and absence of resting pools in the Loch Katrine fish ladder would make for difficulty in salmon and sea trout/brown trout entering the loch. W. L. Calderwood (1909), then Inspector for Salmon Fisheries for Scotland, also doubted that many salmon made the attempt, although some were seen in the pass. Gardiner and Egglisshaw's distribution map for

salmon in Scottish rivers (1985) indicates that they reach the dam but do not pass into Loch Katrine. In view of the apparent scarcity of juvenile salmon even downstream in the Achray Water, where the habitat conditions seem favourable, it seems improbable that the expense of easing the old fish ladder could be justified. Calderwood (1909) considered in any case that spawning grounds for salmon at Katrine would be confined to the Glen Gyle Burn. It is possible that some potential sea trout smolts descend from Loch Katrine but, as they would be unlikely to be able to migrate back up again, any genetic tendency for anadromy would be likely to be lost, as in trout populations that live entirely above impassable waterfalls. Some accidental downstream displacement of brown trout from Loch Katrine during spates is possible but may not be significant.

3.4 Allt a'Cham-ruidhe

This attractive, relatively steep, rocky stream enters the loch on the middle of the southern side. It emerges through open broadleaved woodland close to a picnic site, but flows through forestry plantations higher up. The bed of the stream was distinctively green with dense algae. No fish were seen and invertebrates were noticeably scarce or absent under inspected stones. Although there was plenty of spawning gravel, the water chemistry could be over-acidic, similar to acidified streams entering nearby Lochs Chon and Ard. Quantitative electro-fishing would be required to establish whether the trout stock is unusually low or even absent, in which case the water chemistry should be investigated, unless the stream has been dry (unlikely), or there has been a known pollution episode. If the chemistry is confirmed as very acidic, it may be possible to neutralise this to an extent this by liming parts of the catchment, and by cutting back the extent of conifers close to the water course and replacing these with native broadleaves. This would be within the scope of the current policies of Forest Enterprise within the Achray catchment as a whole. Given the time available, it was not possible to walk the stream to any extent to assess how far upstream trout are able to penetrate for spawning, but this should be determined before considering the likely impact of attempted improvement of water chemistry.



Plate 10: Allt a'Cham-ruidhe (lower) showing dense algae covering much of the substrate

4.0 DISCUSSION

Few addressable problems in terms of wild trout habitat, populations and fisheries were noticed in this brief advisory visit to Loch Achray . Admirable efforts have been made at the Tigh Mor holiday complex, by Forest Enterprise and the other riparian owners in the Loch Achray Conservation Association to maintain high environmental quality. Yet the trout fishery has declined and been replaced primarily by a coarse fishery. Pike are the mainstay of the fishery at the present time. There are also questions about the present status of Arctic charr and perch. Is the decline in trout a consequence of previous acidification through industrial fall-out, or other anthropogenic activities such as forestry. Atmospheric pollution is generally believed to be reducing. Also, much of the timber surrounding Loch Achray is mixed broadleaf and conifer, rather than the dense conifer plantations seen in the past. Have the pike simply gained the upper hand in the dynamics of the overall fish population? Nowadays, pike angling is very popular and the popular view, supported by some research studies, is that heavy culling of large pike in favour of game fish species is unwise and only serves to increase the survival rate of smaller pike through easing cannibalism. The smaller pike are then able to increase the extent of predation upon small trout and smolts. According to local sources, the pike netting that took place in Loch Achray during 1999 did lead to a population explosion of jack pike (*pers. comm.* M Wilkinson).

The natural recruitment of juvenile trout to the loch at one, two and three years of age (100 – 1500 mm) is limited by the number, small size and steepness of the streams. Some trout may come down from the Water of Turk, especially when the flows back up into slower-flowing Black Water during some spates. More may migrate down from the Achray Water, but the Forth Fisheries Foundation found in their surveys that the densities of both trout and salmon found there in apparently suitable habitat were low. The limited natural recruitment of trout, together with predation pressure from pike in particular, probably means that there is only a modest trout population in Loch Achray, although the fish may grow well due to light competition.

There may be some scope to improve the nursery habitat and hence juvenile production in the Allt a'Cham-ruidhe and probably the Gleann Riabhach. Forest Enterprise is very amenable to such aspirations and should be fully consulted at all stages. The Wild Trout Trust views the improvement of wild trout habitat as a major aim in support of the species and welcomes any attempts towards that end. Realistically, however, the effect on recruitment would need to be substantial to allow the recovery of the Achray trout population to former levels, although the widespread planting of broadleaves may well result in lasting gains to the overall ecology of the loch. In addition, because of the heavy prevalence of pike, the trout may have to feed in the open water rather than in the littoral areas, which may curtail their food supply and limit their productivity, other than at times of abundance in terrestrial insects falling on the water surface. Wood-Gee and Coulthard (2000) report that there was concern about numbers of emaciated trout that were caught during the 1999 angling season after put-and-take stocking. This could be due to a scarcity of available food and emphasizes that there are limits to the numbers of large trout and other fish which a deep, cool, well-flushed and oligotrophic loch such as Achray can maintain. On the other hand, put-and-take stocking has the advantage that stocking can be arranged in

small batches throughout the season according to expected angling pressure. Due to the regular infusion of initially naïve stocked fish, trout catches should be more stable throughout the season, whereas fishing success for wild trout tends to peak in the spring and autumn and may be relatively unsuccessful in summer. However, put-and-take brown trout are expensive (c. £3.50 - £4.00/lb) and stocking in batches means additional transport charges.

Most biologists argue that only trout of local origin should be used because they are long-term, naturally-adapted strains, which have achieved maximum genetic fitness. In principle, local trout would be preferred by the Wild Trout Trust. However, large numbers of hatchery-bred, non-local trout have been stocked for many years and some level of cross-breeding will have occurred. The same situation exists at Loch Venachar. Unless a local hatchery and growing-on tanks can be established, the 'native' trout would have to be contract-reared at a fish farm, probably raising the costs of stocking and without any certainty that they would contribute significantly to natural spawning, once they are stocked in Loch Achray. An argument is sometimes made for stocking with sterile, triploid trout to protect endangered wild trout populations from genetic introgression. However, a genetic research sampling programme would be required to evaluate whether stocking of triploids would make practical sense for conservation at Loch Achray in view of the history of non-native stocking that has already taken place.

The Loch Achray Conservation Association is also interested in restoring/enhancing sea trout, which would also be of potential benefit to Loch Venachar and the River Teith. Larger runs of sea trout might also be encouraged by habitat improvement in the two feeder burns entering the loch and the Achray Water from the south, or by stocking of eggs or fry from sea trout parents, unless there is a fundamental problem with access through the Venachar Dam, an issue that was pointed out in the WTT report on that loch (Walker, 2004). Among the sites visited, the Water of Achray seems by far the most suitable place for stocking eggs or fry, targeting areas where spawning conditions are inadequate, and/or juvenile stocks are lower than expected. *[It should be noted that it is illegal to stock sea trout (or salmon) without obtaining the prior approval of the local Forth District Salmon Fishery Board.]* Again, if possible, local sea trout should be used as brood stock, but it will be difficult to source these fish in the absence of traps, or electro-fishing equipment for searching the burns. Also, to avoid depleting natural runs of sea trout for their eggs for stocking elsewhere, it would be better to arrange a programme of on-growing trout smolts or finnock to maturity for stripping purposes, perhaps in association with Howietoun Fishery, where staff have suitable experience and facilities. Alternatively, eggs might be obtained from other tributaries of the River Teith where there is not believed to be a shortage. These arrangements might be better left to the Forth DSFB. In practise, some of the progeny of sea trout would fail to migrate to sea and remain as brown trout. Hence, there would be some gain in recruitment of brown trout to Loch Achray if juvenile densities were able to be raised in the Achray Water. It is unlikely that there would be much gain locally from stocking salmon, as few might be caught if they arrive in the loch late in the year.

It would be highly desirable to commission a netting and acoustic survey of the present fish population to determine its current status. The apparent loss of Arctic charr and possible decline in perch, as well as trout, are significant changes that

should be followed up. Such a study might best be carried out by the Forth Fisheries Foundation and/or in conjunction with a university. Outside funding support may be obtained from other potential partners. Dr Colin Bull, lately Biologist for the Forth Fisheries Foundation, may be able to advise the Loch Achray Conservation Association. Colin is now Project Manager for the Conservation of Atlantic Salmon in Scotland Project (CASS), based at Clunie Power Station, by Pitlochry (e-mail: colin.bull@snh.gov.uk). The River Forth (Teith) is not included in the project, but Colin may be able to suggest where appropriate funding may be sought, including possibly Scottish Natural Heritage.

In the meantime, the best option may be to continue to utilise Loch Achray as a mixed coarse and occasional salmonid fishery, where a range of angling methods can be carried out in a non-intensive manner. Efforts should be made to improve the level of catch reporting as an indirect but practical means of assessing year to year changes in fish abundance and size. The current restriction to boat-only fishing may be unpopular with some anglers but has the advantages for the Association of greater ability for fishery supervision, limiting the development of many of the problems of litter and nuisance often seen at some large lochs in Perthshire and Argyllshire.

5.0 SUMMARY

Actions that are advised comprise:-

- Investigate densities of trout juveniles in the inflowing streams, perhaps through the Forth Fisheries Foundation, or by contracting a team of biologists. If the juvenile densities are unusually low and water chemistry problems are confirmed by sampling, explore ways of improving the nursery habitat. This may involve selective liming to reduce acidity levels and the creation of wider buffer strips where conifers appear to be over-dense. Continue to encourage the planting of native hardwoods. In addition, identify and remove any manageable stream blockages to permit better spawning penetration.
- Promote fencing of riparian corridors along the burns where likely to protect against overgrazing by sheep and deer and trampling by cattle. Grants may be available to farmers through the Rural Partnership Scheme (SERAD). However, stream bank overgrazing problems do not appear to be important at Loch Achray, although the Gleann Riabhach was not visited.
- Commission a survey of the diversity, current status and ecology of the fish population in Loch Achray. It may be possible to obtain some outside funding from other partners eg. Scottish Natural Heritage, especially in view of the apparent decline of Arctic charr. Develop the fishery on the loch on the basis of the results of this survey.
- Should any further put-and-take stocking of trout be undertaken, release the fish regularly in batches, expecting a fair degree of predation from large pike and little over-winter survival. Assess the impact of stocking by close supervision of catches. Stocked trout are usually easily recognisable by their shortened fins compared with wild trout. Numbers for release should be in accordance with

likely fishing demand and should not greatly exceed the carrying capacity for an oligotrophic loch. This can be assessed by monitoring the condition of the stocked trout after release.

- Consider any sea trout stocking programme in conjunction with the Forth Fisheries Foundation and District Salmon Fishery Board, and seek assurance about the optimal functioning of the fish ladder and sluice gates at Loch Venachar. A proportion of any stocked progeny of sea trout will remain in fresh water as brown trout and so augment the Loch Achray trout population. The most obvious place to stock with sea trout eggs or fry is the Achray Water.
- In the meantime, continue to operate a mixed coarse fish/occasional trout fishery, using a wide variety of angling methods. Promotion of the fishery, especially to visitors, may also be improved with display material resulting from the survey, illustrating the seasonal feeding behaviour, general movements and depth preferences of the various fish species.

LITERATURE CITED

- Calderwood, W. L. (1909). *The Salmon Rivers and Lochs of Scotland*. Edward Arnold, London.
- Gardiner, R and Egglisshaw, H. (1985). The Distribution in Scottish Rivers of the Atlantic Salmon, *Salmo salar* L. Map published by Ordnance Survey. Available from FRS Freshwater Fisheries Laboratory, Pitlochry.
- Hardie, R. P. (1940). *Ferox and Char*. Oliver and Boyd, Edinburgh, 226 pp.
- McLaren, M. and Currie W. B. (1972). *The Fishing Waters of Scotland*. John Mrray, London, 240 pp.
- Walker A.F. (2004). Advisory Visit to Loch Venachar, Trossachs, on 27 November, 2004. Wild Trout Trust Advisory Report. 15 pp.
- Wood-Gee V. and Coulthard N. (2000). *Loch Achray Management Plan*. 54 pp.