

THE SCIENTIFIC TRIAL RE-INTRODUCTION OF THE EUROPEAN BEAVER TO SCOTLAND

Summary

1. Following earlier approval from the Board to develop a trial re-introduction of the European Beaver, this paper updates the Board and outlines progress made in developing the trial. Further information regarding the application for a licence for the release of beavers was passed to the Scottish Executive in February of this year and we now await a response from the Minister. Significant progress has been made in regard to the management and funding of the trial in partnership with two non-government organisations.

Purpose

2. The purpose of this paper is to update the Board in relation to this project, and to seek further endorsement of the application to the Scottish Executive for a licence to undertake the trial. It seeks approval for the management arrangements and financing for the trial. Financing will be the subject of further discussions with the Executive and it is envisaged that a more detailed costing resulting from these discussions will be presented to the Board in due course.

Action

3. **The Board is asked to:**
 - (1) **note progress on the project especially in relation to the management arrangements with MTUK and the Scottish Wildlife Trust;**
 - (2) **Endorse the submission of the application for the licence to undertake the scientific trial (para 28) and;**
 - (3) **Agree that funding should be discussed further with the Scottish Executive, and note that the provisional budget does include provision to work with landowners in the management of the beavers as part of the trial;**

- (4) Note that an effective exit strategy will be in place for the duration of the trial and that a full review of the results from the trial will be undertaken on completion. This review will involve the Board and SAC, and will be ensure that the results underpin fully, any further activity.**

Preparation of paper

4. This paper has been prepared by Martin Gaywood, Dave Batty, and Colin Galbraith. It provides an update to Board papers SNH/98/6/8, SNH/00/2/11, SNH/00/5/12 and SNH/01/7/2.

Background

5. There are two main reasons why SNH considers the reintroduction of European beaver to Scotland to be appropriate. Firstly beavers are a missing element of Scotland's native biodiversity and were lost entirely through man's activities, principally hunting for their fur. Secondly beavers have an important role in the management of riparian and forest ecosystems such that they are termed a 'keystone species'. Their activities have benefits for other species and increase biodiversity.
6. At its meeting in November 1998, the Board approved, in principle, a time-limited, geographically restricted trial re-introduction of the European beaver to Scotland. However, the decision on whether to proceed with a licence application to the Scottish Executive was delayed pending the development of a detailed project plan. Staff, assisted by an Advisory Committee, comprising representatives of fishery, forestry, landowner, agriculture and conservation organisations, carried out the subsequent development of this plan. The conclusions of this group were reported in a Framework document presented to the Board in November 1999.
7. During its meeting in March 2000, the Board was asked to consider whether to proceed with the trial re-introduction. It was also informed that SNH had recently entered discussions with Forest Enterprise over the possibility of undertaking the trial on FE landholding. At this meeting, the Board approved proceeding with a field trial in collaboration with a partner organisation. Working with FE (Scotland) on this project would be a good example of joined up government.
8. During a further meeting on 5 September 2000, the Board was provided with details on collaborative work that had taken place between SNH and FE. The site selection process was described and Knapdale in Mid-Argyll identified as the most suitable FE site for a trial re-introduction. The Board approved the selection of Knapdale as the trial site, subject to public consultation. Shortly after the Board met, Martin Gaywood and Colin Galbraith gave a presentation to the Forestry Commissioners. The Commissioners agreed unanimously that the trial could proceed on their land at Knapdale.

9. During its meeting in November 2001, the Board was asked to approve the licence application to the Scottish Executive, the costs of the project and SNH's financial contribution. The Board ;
- agreed that SNH should now make an application to the Scottish Executive for a licence to release European beavers at Knapdale for the purposes of a trial re-introduction;
 - agreed that over 50% of the costs of any work, additional to the core project, must be funded from external sources;
 - agreed that if development costs rose to over 10% of the cost of the core project, further approval must be sought from the Board.

The relevant Minutes of the meeting are in Annex 1 to this paper.

10. The purpose of the trial is to assess the ecology of the beaver in the current Scottish environment and to assess the effects of beaver activities on the environment, including a range of land uses (primarily forestry and freshwater lochs). Background information to the proposed trial is in Annex 2 to this paper. Further details of the background reports are provided in Annex 3 to this paper and further information can be made available to Board members if requested.

Consultations with other bodies and individuals

11. Following the approval of Knapdale as a trial site by the Board and the Forestry Commissioners, SNH initiated a local consultation in the Knapdale area in autumn 2000.
12. Around 350 people were directly contacted through meetings, seminars and a drop in day for the public. A total of 63 written responses from individuals were submitted to SNH as a result. This local consultation resulted in a majority in favour of conducting the trial. Further detailed analysis of the results of this consultation can be provided to Board members if requested.
13. One local landowner, a former SNH Areas Board member, made strong representations during the consultation. His concerns focused on the potential impact of beavers straying into salmon spawning areas of the river Add and his fear that their damming activity would lead to the total and permanent loss of salmon from the whole of the river system. However, SNH has found little evidence from Europe and North America that indicates significant detrimental impacts of beaver on salmonid fish. In Norway beavers are not perceived as a problem on salmon rivers and the only, albeit limited, research work available indicates that salmon can successfully spawn upstream of beaver dams. Moreover, as trial animals will be monitored closely, any animals straying beyond the agreed boundaries of the trial site will be rapidly returned.
14. Concern was also raised initially that the trial site does not include a salmon river per se and it is, therefore, difficult to determine effects on those interests. This issue was considered within the site selection process as it poses a

challenge given the current concerns relating to wild salmon conservation. Whilst this limitation of the work is recognised, it was considered inappropriate to use a second site supporting a sustainable salmonid population at this time. However, the trial at Knapdale will provide fundamental information on the interaction of beavers and riparian habitat that is an important component of salmonid habitat. Fish populations in the lochs within the site will also be monitored. The proposed project has been developed to include an option to investigate further the European and Scandinavian experiences of beavers and salmonid fishery interests.

15. From an earlier national consultation in 1998 it was known that the NFUS was at that time opposed to the re-introduction of beavers. Discussions took place with local NFU Scotland members during the local consultation when they confirmed their opposition both nationally and locally. However recent discussions have been held with NFU Scotland officials, and a meeting is scheduled for 9 May with the local NFU group in Knapdale. The results of this meeting will be reported to the Board on 10 May.
16. Argyll and Bute Council. Remain supportive of the trial and their staff has been particularly helpful in helping to monitor the water quality of the site and in discussion of relevant issues with the local population.
17. Two management groups were set up in late 2000 in order to develop the project. The "Beaver Project Group" was an internal group of SNH staff who dealt with project planning and organisation. It included representatives from Advisory Services, Argyll and Stirling Area, Press and PR, Awareness and Involvement and Finance. The "Knapdale Beaver Management Group" consisted of representatives of the main partners involved in the project, namely SNH, FE, Argyll and Bute Council and Scottish Wildlife Trust. This group oversaw the implementation plans for the beaver trial re-introduction in Knapdale, including both pre- and post-release work. The Management Group provided input to the overall project plan and, in particular, input to the annual programme of work in Knapdale. Both these groups have not been particularly active over the past year but if the licence application were approved they would be reconvened.

Scottish Executive licence application and further consultations

18. Under domestic legislation, it is illegal to release into the wild any animal that is of a kind not ordinarily resident in Great Britain (Section 14 of the Wildlife and Countryside Act 1981). In order for the trial re-introduction to proceed at Knapdale, a licence is therefore required from the Scottish Executive. An initial meeting was held on 14 February 2001 between SNH and SERAD to explore their requirements for the licence application. The licence application and a business case were subsequently submitted to the Executive in January 2002. Correspondence has continued with them until February of this year when additional information requested by the Executive was sent to them.

Project timetable

19. Following discussions with European specialists, it was determined that autumn would be the optimum time of year to obtain animals from a donor country. The animals would require six months quarantine, hence release would be in the subsequent spring.

Project management and costs

20. Recent discussions with the Mammals Trust UK (MTUK) and the Scottish Wildlife Trust (SWT) have helped develop an effective partnership with these bodies. The MTUK are committed to substantial cash funding of the trial and have promised a further contribution to each year of the trial in the form of short term student placements (internships) to help with work on the ground. They will undertake further fundraising activities if the licence application is approved. SWT have a network of volunteers across the country and have committed to engage volunteers locally at Knapdale to help with the management of the trial. Again if the licence is approved they will undertake further fundraising activity. Both MTUK and SWT are keen to play an active part in the implementation of the trial, and in particular, to have staff working on the project at Knapdale. We have discussed an arrangement where they may provide the core personnel for the work, possibly hosted in an SNH office, to provide a local base. SNH will retain the oversight of the day to day work and will provide direction to the project overall.
21. A summarised breakdown of costs is provided in Annex 4. The revised total cash costs (as at April 2005) for the scientific trial i.e. the scientific element which is required to address the key aims of the trial) is £534897 after seven years. This excludes costs for existing SNH staff who are likely to contribute some of their time to the project as and when required and which amounts to an average of 1.25 posts over the seven-year period. Generally accepted conventions in obtaining approval from the SE for expenditure on this type of project would normally exclude the costs of existing SNH staff.
22. The research and monitoring element of the project is key to ensuring that the trial addresses its core scientific aims. Consequently this aspect is central to the costing of the project and results in the total cost being higher than the likely cost of a reintroduction that was not monitored, in such a systematic manner.
23. The total cost of the scientific trial is spread over seven years. Few of SNH's scientific projects are considered over this time scale. The total cash cost of c£535k should be viewed in this context (i.e. around a total of £76.5k per annum, with SNH contributing, on average, £36k per annum); also noting that £150k (£21.5k p.a.), has been confirmed from external sources so far. This leaves a total of £135k (£19k p.a.) to be delivered by further fundraising over the course of the trial period. This is assuming that the SNH contribution remains fixed at £250k with no allowance for inflation (with a total of c10% inflation over the 4 years since the original costing was prepared, the corresponding amount would be c£275k).

24. *Funding package.* On the basis of a cash costs total of c£535k for the project, an indicative funding package would be:

Funding source	Amount
<i>Agreed in principle:</i>	
SNH cash contribution	£250,000
Charitable Trust (agreed)	£150,000
<i>Funds remaining to be found (proposed sponsorship or 'in kind', identified but not secured):</i>	
Beaver air transportation, tracking & monitoring	£ 14,281
Field vehicle	£ 1,700
Veterinary services (possibly provided in kind)	£ 28,600
Others, for which no funding sources have been yet identified	£ 75,016
Total cost of core project	£534,897
<i>(Of which total funding confirmed to date</i>	<i>£400,000)</i>

Reintroductions in other European countries.

25. Gaining information on work in other European countries was one of the key areas stressed in discussions with the Executive. Re-introductions and translocations of European beaver have now taken place in 24 European countries. They began in the 1920s e.g. Sweden, Norway, Latvia, Russia and the Ukraine and have continued in the 1990s e.g. Belgium, Croatia, Czech Republic, Denmark, Hungary, Romania and Slovakia. In some countries these releases have also been augmented by natural immigration. Reintroduction to a country has usually involved release of animals over a number of years to several sites. They all seem to have been successful in terms of breeding, population growth and range expansion except for some in France and Switzerland. Over 150 re-introductions have now been undertaken across Europe, most without the detailed monitoring proposed in the current plan.

Damage and compensation

26. It is not anticipated that the beavers will cause any significant economic damage to neighbouring landowners and managers during the trial. We propose to deploy a range of techniques to minimise any damage. This will include; radio tagging animals to follow their movements and especially to return any straying animals to the study area; removal of any problem dams or other structures at any early stage; fencing of any particularly vulnerable areas, liaison with neighbours to discover any problems at an early stage; and, if necessary, the deployment of the exit strategy. However, recognising that there are concerns over the possibility of damage a contingency of up to £2,000 each year has been included within the budget for compensation.

Post project review

27. Once the fieldwork phase of the trial is completed we propose that a review of the results be undertaken. This should involve the Scientific Advisory Committee, and the conclusions reported to the Board and relayed to the Executive.

Options

28. There are two main options for the Board to consider at this time. The Board could decide now that they do not wish the work to proceed or they may confirm their earlier decisions to continue with the project. The following two options are outlined in relation to some of the likely issues surrounding each course of action.

Option 1: Cancel the project

The benefits are:

- No further cost to SNH including a freeing up of staff resources and no longer term possible costs resulting from a reintroduction
- No further criticism of SNH by opponents of beaver reintroduction

The disadvantages are:

- Loss of opportunity to restore a key missing element of Scotland's riparian ecosystems
- Significantly increased likelihood of less managed and less controlled future re-introductions by third parties
- Failure to secure full value of sunk project costs
- Negative impacts on other future re-introductions
- Criticism of SNH for failure to meet raised expectations
- Adverse impact on partners, in particular FE, MTUK and SWT
- Failure to meet international obligations for the European beaver

Option 2: Support the need to undertake the scientific trial.

The benefits of this option are:

- Delivers a robust scientific trial
- Will provide new information to help inform the decision over any further work.
- If the external funding package is completed, the project will secure support of c£285k (of which £150,000 already confirmed,) to a major conservation project in Scotland
- Maintains SNH cash contribution to £250,000
- Provides wider biodiversity benefits and reduces conservation management costs at Knapdale which would otherwise have to be undertaken by FE (e.g. beavers will contribute in scrub removal in wetland areas)

- Provides a good demonstration of a partnership approach which would encourage other joint initiatives relating to the natural heritage in Scotland in the future
- Provides opportunities for developing education, interpretation and community involvement.
- Creates eco-tourism potential which could have a significant impact on the local economy, and provides limited new employment through the creation of a Field Officer post based in mid Argyll

The disadvantages of this option are:

- SNH is required to confirm its cash commitment.
 - May continue to attract some criticism from some land use interests
 - The project will also require some level of existing SNH staff resources
29. Option 2 at a cash cost to SNH of £250,000 over seven years is recommended. It will result in a robust, scientific project, which will address the primary aims of the trial and prove acceptable to SNH's partners. The costs to SNH each year are relatively modest (average of £36,000 per annum) for a project that will bring in extra external funds, generate considerable public interest and result in the benefits identified above. The most significant financial risk to the project delivery at this stage is the failure to secure the remaining external funding shortfall of £19k p.a. However both MTUK and the SWT have indicated that they will undertake further fundraising if the project proceeds hence the level of funds required should not prove too difficult to raise.

Opportunities for developing the project

30. The budget outlined above will deliver the core scientific project. However it is recognised that there are opportunities to add further, educational, research and interpretative elements to the project thereby increasing its overall value to SNH. Examples are listed below. These would in due course provide additional opportunities for further external funding.
31. *Interpretation work.* The improvement of visitor facilities at Knapdale, specifically in relation to the beaver population (e.g. remote live video links to the beaver sites) would increase the general educational value of the project and could lead to increased visitor numbers to the area. Some additional external funds (approximately £10,000) have already been sourced for this work. There is considerable potential for increased tourism to the area with corresponding economic benefits for Mid Argyll and the local population.
32. *Educational opportunities and exchanges.* The educational value of the project has great potential, particularly in relation to schools local to the trial site. The British Embassy in Oslo has already made an initial approach to SNH (on the basis that trial beavers will come from Norway) offering assistance in arranging joint Norwegian-Scottish educational projects, such as school exchanges, which would be related to the beaver trial.

33. *Extended community involvement.* Information updates will be provided regularly to the local community through, inter alia, a local forum as the core project progresses. However, if additional projects are proposed which have wider educational and interpretation roles, then the local forum would allow the local community to play an active role in their development.
34. *An investigation into the effect of beaver dam presence on migratory salmonid fish.* This would be a field experiment undertaken at existing beaver sites in Europe in collaboration with resident institutions, building on some preliminary work on this subject undertaken in Norway.
35. *Other conservation projects.* The project could be used as an opportunity to stimulate the development of other conservation projects, in particular those relating to riparian woodland and aspen, both at Knapdale and in the wider countryside. Since riparian woodland is an important component of beaver habitat, and beavers will feed on aspen when available, then the beaver project could be used as a 'lever' to promote other projects that contribute towards their management and conservation

Conclusions

- 36 We believe that we have now answered all the queries raised by the Executive, satisfied the legal requirements for such a trial, ensured that the experience of other European countries has been taken into account, demonstrated that Knapdale is a suitable site, and that there is considerable public support and interest in the proposal. The proposed trial project, which will not be a full reintroduction, will allow the further examination of the ecology of the beaver and its interactions with the Scottish environment. At the end of the trial, information from the study will be presented to relevant parties for consideration and a way forward agreed with the Scottish Executive. We see part of this review stage at the end of the trial involving our Scientific Advisory Committee to help evaluate the conclusions.
37. It is, therefore, recommended that the beaver re-introduction project be taken forwards at Knapdale.

EXTRACTS FROM THE MINUTES OF THE BOARD MEETING OF NOVEMBER 2001

Item 9: Trial re-introduction of the European beaver to Scotland: the consultation and next steps (SNH/01/7/2)

1. The paper reported progress on the proposal to undertake a trial, with the approval of Forest Enterprise on its land, and the outcome of the local consultation. The Board noted the content of the paper and discussed the following points:
 - several Board members had visited the proposed release site and were impressed with the structure and containment arrangements. The situation of the site would also allow for non-intrusive public access;
 - containment of the beavers within the site would be guaranteed for the life of the seven-year trial;
 - the site had limitations as it would not allow for any study of the effects of beavers on salmon and agriculture and there was a need for this to be addressed at a later stage. During the period of the trial, experience from other European sites would be gathered and analysed but there was no guarantee that the beavers introduced to Scotland would behave in the same manner as those in other parts of Europe;
 - if the initial five year trial was successful, there would be a need for a further phase of limited and controlled roll-out. However, this would be an issue for the Board of the day to consider;
 - there was a mix of attitudes to the trial from the adjacent owners/occupiers. Any remaining concerns would be addressed through dialogue and negotiation. In addition, a local forum would be set up;
 - the paper referred to SNH's international obligations for the European beaver. This should be revised to reflect the fact that the trial would be an opportunity rather than an obligation;
 - the Scientific Advisory Committee had recommended that the quarantine facilities should take account of the ecology and natural behaviour of beavers. If the reserve family was not required for release onto the site, there was unlikely to be any problem with returning it to Scandinavia. However, some modelling exercises were being done to test the viability of introducing four families;
 - there were opportunities for developing the project beyond the basic trial but these would only be taken up if additional partnership funding became available. The cost of the additional development work was not included in the costings for the trial.

2. The Board:

- agreed that SNH should now make an application to the Scottish Executive for a licence to release European beavers at Knapdale for the purposes of a trial re-introduction;
 - welcomed the support from PTES;
 - endorsed the approach to raising funds from external sources currently being taken forward;
 - agreed that over 50% of the costs of any work, additional to the core project, must be funded from external sources;
 - agreed that if development costs rose to over 10% of the cost of the core project, further approval must be sought from the Board.
3. It was noted that Jeremy Rowan Robinson remained unhappy with the proposals as they appeared to commit SNH to a further, uncostered phase of work, following completion of the initial trial.
4. It was noted that Peter Mackay remained opposed to the trial re-introduction as he did not believe that it provided good value for money for SNH.

TRIAL RE-INTRODUCTION OF THE EUROPEAN BEAVER TO SCOTLAND: PROJECT BACKGROUND

1. The primary aims of the trial re-introduction of the European beaver to Knapdale are to:
 - Study the ecology of the beaver in the Scottish environment
 - Assess the effects of beaver activities on the environment, including a range of land uses

The European Beaver at Knapdale

2. The core area of Knapdale, which includes habitat suitable for beaver, ranges in altitude from sea level to 276 m. There are a number of small/medium size freshwater lochs (up to about 2km long) with small interconnecting burns up to approximately 2m in width. The forest consists predominantly of Sitka spruce but broadleaves, birch, willow, alder and hazel are mainly associated with the lochs. Oak, sycamore *and* aspen also occur but oak and sycamore are more common over the site. The core area of suitable habitat covers approximately 15km² and there is around 15km of suitable linear riparian habitat. This figure will increase as FE continues to remove conifers from riparian areas.
3. The extent of suitable habitat has been shown to be more than adequate for three beaver families to be translocated to the site, and should be sufficient to allow for any expansion of the beaver population over the five-year field trial period. Beaver specialists from Norway who have seen the site have confirmed this.
4. Knapdale has relatively good natural containment. It is bordered to the north by a ridge, with water flowing in a general southerly direction towards the coastline. The west and east sides are bordered by high-density conifer plantation and are not suitable beaver habitat. Since beavers tend to restrict their movements to riparian areas, it is hoped that they will therefore stay within the Knapdale catchment while the carrying capacity of the site allows.
5. On the basis of expert advice received from Norway and other European countries, autumn is the optimum period for the collection of beavers for export. This takes into account the difficulties of winter capture and the avoidance of problems due to capture during the breeding season. Animals captured and transported during autumn would be retained in quarantine for six months, with a view to a release in spring the following year.
6. It is the intention of the project to establish three family groups of beavers within the trial site. Three potential areas have been identified within Knapdale as suitable for the release of, and occupancy by, beavers.

Quarantine

7. The importation of beavers falls under the Rabies (Importation of Cats, Dogs and Other Mammals) Order 1974 (as amended). Consequently imported animals would be subject to statutory containment in approved quarantine facilities for a period of six months.
8. To date, SNH has received expressions of interest from several facilities within Scotland that are willing to undertake the necessary quarantine of the animals.

Release

9. Radio transmitters will be attached to the beavers. Release will involve the use of shelters for released animals. This provides the potential to reduce stress to the animals, especially in the early period of the trial.
10. At this stage, the location of release sites within the study area (i.e. where to build artificial lodges) has not been determined precisely since this level of detail is not yet required. In due course the advice of European specialists may be required for this purpose.

Beaver Management

11. Some animals may stray beyond the trial site. Whilst every effort will be made to detect these animals as rapidly as possible, provision will be made by SNH to recompense local landowners for economic damage caused by the trial animals. Assessment of such cases will be dealt with sympathetically under the protocols in existence for the assessment of wildlife damage by other species.
12. Trial animals will remain the property of SNH until such times as they are removed (if the trial is unsuccessful) or they are considered to be a resident part of the Scottish fauna. The latter will require an assessment of the species' status following the period of the trial.

Containment

13. The boundaries of this site are effectively around the land managed by FE at Knapdale. However, as the beaver is a mobile species, there can be no absolute guarantee that they will remain faithful to this site on release. Consequently provision is in place for deliberate containment of the animals.
14. There are three main approaches to containing released animals:
 - physical barriers, e.g. fencing
 - habitat manipulation
 - capture and removal of animals straying beyond the accepted boundaries of the study
15. The third option, involving the capture and removal of animals straying beyond the agreed boundaries of the study, is potentially the most reliable and

efficient method of containment available. Animals will therefore be radio tagged individually for the purpose of identification and tracking. Any strays will be caught and returned to the trial area.

16. Due to the possibility of tags failing or young animals dispersing prior to being tagged, the potential of un-tagged animals moving beyond Knapdale must be considered. In such cases, it is anticipated that the individual beavers would be reported to SNH within a relatively short period of time by local people, since the signs of their presence (e.g. gnawed woody material, dams etc.) are very characteristic. The rapid and efficient removal of animals straying outwith the trial area will be implemented where animals take up residence in an area against the wishes of the landowner, or are considered to be causing unacceptable levels of damage. Trapped beavers will be returned to the trial area.
17. Persistent offenders will be those that are caught repeatedly outside the trial area. They will be removed from the trial to an agreed site, or housed in a collection. Where no facilities are available for housing animals within existing collections, agreement will be sought with other European colleagues to donate surplus animals to re-introduction programmes elsewhere or return them to the donor country. Whatever situation arises a holding enclosure will be made available for transfer of animals from the trial to the captivity site.

Exit strategy

18. An exit strategy is an integral part of the project plan. This may be implemented during the trial if major, insurmountable problems occur. The reasons for considering implementation of an exit strategy are as follows:
 - Unsustainable and detrimental effects arise as a result of the re-introduction of beavers to the study area. This applies equally to forestry, agriculture, fishery or conservation interests.
 - There is an insupportable level of mortality in released animals as a result of persecution, human intervention or natural mortality attributed to trial procedures
 - The security of the site is compromised to the serious detriment of the animals.

19. There are four options for the methods of implementing an exit strategy:
- (i) Repatriation of animals to the country of origin/transfer to other re-introduction programmes.
 - (ii) Housing of animals in zoological collections.
 - (iii) Capturing, neutering and returning animals to live their lifespan in the wild.
 - (iv) Humane destruction of animals.

Research and Monitoring

20. An effective monitoring programme is key to ensure that sufficient and appropriate information is collated during the trial to underpin an informed decision on the feasibility and viability of restoring a widespread population of beavers to Scotland. Moreover, in order to ensure that the monitoring programme is effective, protocols for this must be in place prior to the introduction of any animals to the country.
21. In order to gauge the impacts of any dams built, it will be necessary to measure the frequency of construction and maintenance of beaver dams. Information on dam construction will be associated with habitat information to determine any characteristics commonly attributable to siting or construction of dams within Scottish waters.
22. Beavers, as all wild mammals, have the potential to transmit disease, and they have been associated in the public press with the human water borne diseases caused by *Giardia* and *Cryptosporidium*, and the fish parasite *Gyrodactylus salaris*. The former two pose an issue in terms of public health whilst the latter is an issue for fisheries. All of these pathogens will be sampled for during the course of the quarantine period to ensure that the released animals are free of them.
23. The question of disease-free animals being infected after release to the wild obviously poses a question of whether their presence enhances transmission of disease above that usually encountered. For this reason, SNH has secured the partnership of the Public Health Department of Argyll and Bute Council, who are now conducting regular monitoring of the Knapdale area as part of the regime of public health control. Sampling has begun prior to the release of beavers in order to obtain baseline data for comparison. Additional pathogens may be tested for within this programme.

Post-project assessment – criteria for success/failure

24. Following completion of the field period (five years), information will be collated, both on the scientific and socio-economic implications of the trial, and presented for consideration by the Management and Project Groups. This information, and the views of the Groups, will subsequently be presented to the Board for consideration on whether the trial has been successful or demonstrated limitations. SNH would then make a recommendation to the

Scottish Executive to agree the way forward. The following draft criteria are currently being considered.

25. *Draft criteria for success:*

- (i) Survival of introduced animals is similar to successful re-introduction programmes elsewhere in Europe at similar period of population establishment.
- (ii) A stable or increasing core population is achieved within the limits of the study site.
- (iii) Beaver re-introduction is integrated with habitat management/restoration.
- (iv) The area does not suffer significant economic loss as a result of beaver activities.

26. *Draft criteria for failure:*

- (i) Mortality levels preclude establishment of a population.
- (ii) Significant and unsustainable damage is incurred by the ecosystem within the study site.
- (iii) The area suffer significant economic loss as a result of beaver activities
- (iv) Costs of project/damage/management significantly exceed expectations

Post-project Options

27. The purpose of the trial is to determine the behaviour of beavers in the contemporary Scottish environment. Consequently, there are several possible outcomes beyond the trial:

- Option (i) The trial is a success and a full re-introduction of beavers to Scotland is recommended: Beavers to be allowed to naturally colonise out of Knapdale.
- Option (ii) The trial is a success and a full re-introduction of beavers to Scotland is recommended: One or more new populations to be established throughout Scotland.
- Option (iii) The trial is a success but it is concluded that additional information is required before a decision can be made as to whether to proceed with a full re-introduction. Maintain only the population within Knapdale.
- Option (iv) The trial is a success but it is concluded that additional information is required on the effects of beaver presence on salmon rivers before a decision can be made as to whether to proceed with a full re-introduction. Set up a new trial site

- Option (v) The trial is a success but continuation of the Knapdale population opposed: Beavers translocated from Knapdale to a new Scottish site(s).
- Option (vi) The trial demonstrated insurmountable problems and/or levels of damage and is deemed a failure. Under these circumstances, implementation of the exit strategy would be recommended.

Combinations of some of the above options are also possible.

SNH REPORTS RELATING TO THE TRIAL REINTRODUCTION OF EUROPEAN BEAVER TO KNAPDALE

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Conroy J. and Kitchener A. 1996. The Eurasian beaver (*Castor fiber*) in Scotland: a review of the literature and historical evidence. Scottish Natural Heritage Review 49.

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SUMMARISED BUDGET

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Project Total
Capture, quarantine & release	43553	2825						46378
Tracking/ site personnel	41518	56171	42410	45629	50090	54800	49095	339713
Research & Monitoring	26250	15750	12600	15750	12600	28350	3150	114450
Publicity	0	6300	2100	0	0	2100	0	10500
*Other costs	2475	2650	2900	2675	2925	2750	7482	23857
TOTAL CASH COSTS	113796	83696	60010	64054	65615	88000	59727	534897

Note on timetable:

Year 1: Pre-release site monitoring, animal capture, quarantine.

Year 2-6: Animals released, five-year field trial.

Year 7: Post-trial assessment of results.

*'Other costs' includes an element for possible compensation payments, the exit strategy and general project management costs