

Wildlife Conservation
Bittern (*Botaurus stellaris*)

1.0 - Introduction

- Description of Organism and Study area

The Bittern family contains twelve species widely spread from Australia to the America's (Hollier-Larousse *et al*, 1974).

This report will focus on *Botaurus stellaris* the Eurasian or Greater Bittern (fig1). It is described as “a thickset heron with all-over bright, pale, buffy-brown plumage covered with dark streaks and bars. It flies on broad, rounded, bowed wings” (RSPB). Despite the species fairly wide range within Europe (below) this report will focus mainly on its status within the United Kingdom.

Fig 1 –Adult male
Botaurus Stellaris
Source - RSPB

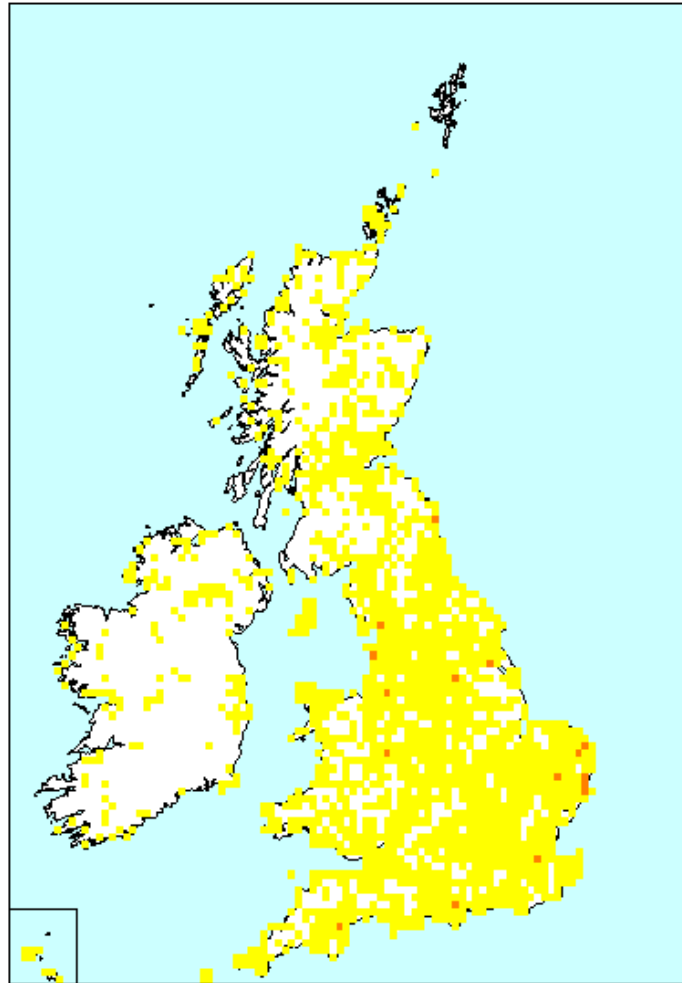


- Natural Distribution and UK Distribution

The natural distribution of this species is widespread through out Continental Europe ranging from Russia in the North to Turkey in the South. The numbers of individuals also varies greatly with an estimated 10,000 – 30,000 breeding pairs in Russia and just 1-5 in Portugal (Newbery *et al*, unknown). Within the UK *Botaurus stellaris* is widespread but restricted to certain areas presumably where habitats are most suitable (Fig 2). As fig 2 shows the distribution is across the country but restricted to a few sites in Dorset, Devon, Lancashire and Norfolk. According to the data from the Joint Nature Conservation Committee (JNCC), breeding populations of the Bittern are however confined to Norfolk and Lancashire.

Fig 2 – Distribution map of UK for *Botaurus Stellaris*, 2002.
Source – BTO

Yellow = No recorded sightings, Red = Species Recorded



- Basic Biology and Ecology

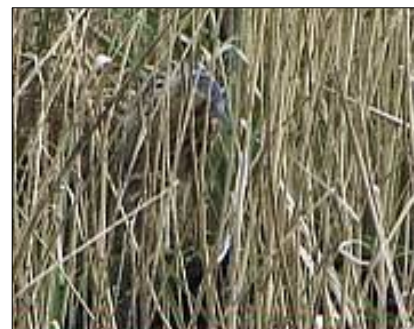
- Size, lifespan and Breeding

- The Eurasian Bittern grows to a maximum size of around 76cm (Flegg and Hosking, 1997) and can live for up to 10 years (RSPB). They are believed to be a polygamous (mate with more than one female) species and can be heard ‘booming’ during the mating season (Newbery *et al*, unknown). The characteristic ‘booming’ sound that the Bittern makes is caused by the exhaling of large quantities of air in sudden bursts, this call can be heard up to 3 miles away (Newbery *et al*, unknown). The female is responsible for the rearing of the chicks and lays on average 5-6 eggs which have an incubation period of 26 days (RSPB) and fledging period of 55 days.

Habitat and Feeding

The Bittern is a largely nocturnal species (Hollier-Larousse *et al*, 1974) which when threatened either runs into thick reeds or extends its neck vertically in line with its body to blend with the surrounding vegetation (Frohawk, 1957). Camouflage is its main defence and as can be seen in fig 3 they are almost invisible in the correct habitat. The Bittern is a habitat specialist

Fig 3 – Bittern camouflaged in reeds
Source - FVI



only utilising reedbeds made of primarily *Phragmites australis* (common reed) or other similar fen species (Newbery *et al*, unknown). Research into the adults has shown that they utilise large sections of wet reedbed with areas of open water. It was commonly believed that the species required sites over 20ha in size but recent findings indicate they can exist in reedbeds much smaller although they then become more dependent on surrounding habitats such as dykes, ditches and ponds. The conditions within the reedbed are extremely important and must be just right for Bitterns to breed there. The reedbed must be wet and at a constant water level throughout the year, they will not breed in dry reedbeds where food is not readily available or estuarine areas due to the high salt content. They are also dependent on reedbeds in the early stages of succession therefore move gradually to more suitable areas as they become available (Newbery *et al*, unknown). Food obviously has an important impact on the Bitterns chosen habitat, they are fairly eclectic eating predominantly fish but also amphibians, insects as well as small birds and mammals.

- Species History in the UK

The Bittern has long been exploited in the British Isles for either recreation (hunting) or as a food source with hunting parties in the early 19th century returning with up to thirty birds in a morning. Roast Bittern was also a common dish for fenland families earning them the nickname of ‘fenman’s turkey’ (RSPB). In 1886 the Bittern went extinct in the UK as a result of this persecution and the drainage of fenland for agriculture and development. The

first birds re-colonised around the marshlands of East Anglia in 1911, since then they have gradually spread across the country (Fisher, 1976).

- Protection Status in the UK

The Bitterns red data book status in the UK is red showing it is in serious need of protection (RSPB), it is currently protected in the UK by the Wildlife and Countryside Act of 1981. This act protects not only the bird but the eggs and nests as well, any person(s) found breaking this act can face fines of up to £5000 or a six month prison sentence (RSPB). Other international legislation/acts affecting the Bittern within the UK are listed below:

EU Birds Directive 97/49 (annex 1 species)

EU Birds Directive 91/244 (annex 1 species)

EU Birds Directive 85/411 (annex 1 species)

EU Birds Directive 79/409 (annex 1 species)

Bern Convention (annex 2 species)

AEWA (African-Eurasian Water bird Agreement) (annex 2 species)

- Conservation Status in the UK

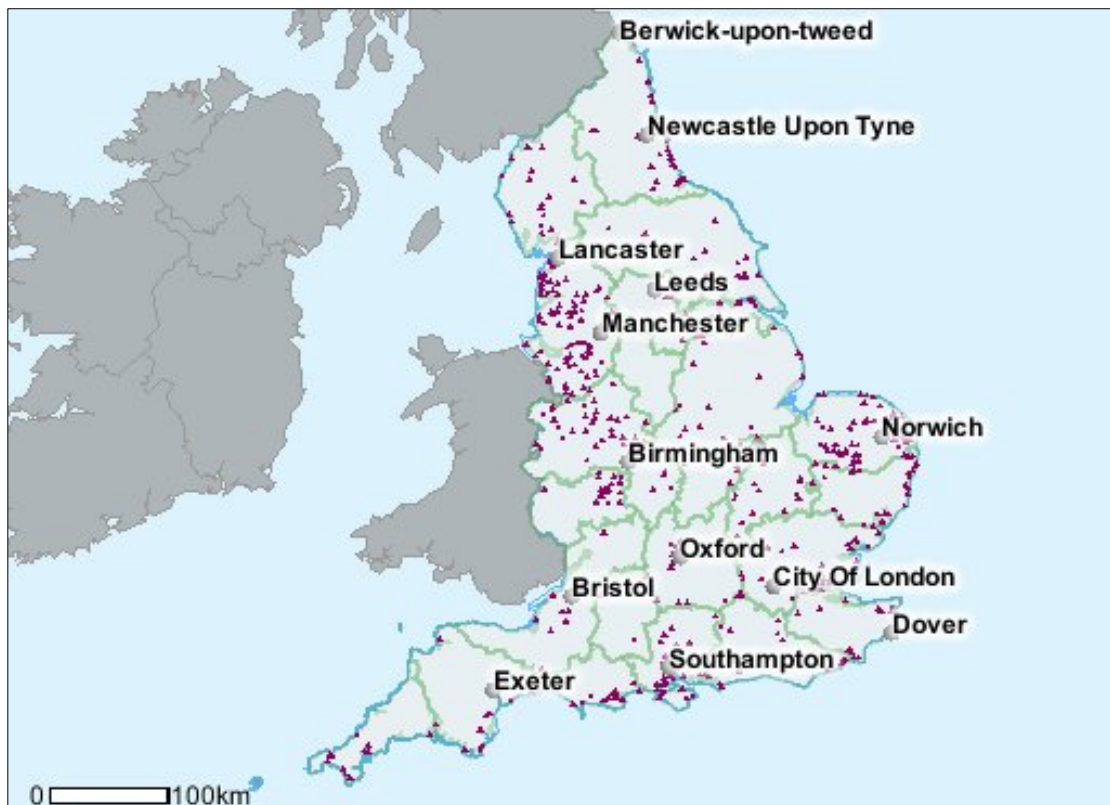
After its re-colonisation in 1911 Bittern numbers had gradually increased but in recent years a downwards trend in numbers has occurred. The conservation priorities differ depending on where in the UK you are but generally they focus on maintaining the condition of the existing reedbed habitats especially in the few areas the species breeds at. Since all the breeding sites in the UK are privately owned by charities the management and conservation is largely thanks to volunteers and donations. There are currently no programmes for increasing populations by ex-situ methods such as collecting eggs or artificial insemination.

2.0 - Description of UK habitat area

The climatic conditions in the UK make it an ideal habitat for the Bittern as the warm wet winters and relatively cool summers normally result in constant water levels compared to some continental countries. Due to many factors from recreation (e.g. boating in the Norfolk broads) to drainage for agriculture the available habitat for the

Bittern has reduced dramatically since its re-colonisation in 1911. Many wetlands in the UK have the potential to sustain the Bittern but most are not currently suitable for breeding populations. Fig 4 is a map of reedbed habitats within the UK indicating just how widespread they are. The main problem with the reedbed habitats shown on fig 4 are their generally advanced succession stages. Many of the UK wetlands once cut for thatching etc have now been left and become overgrown and semi terrestrial ecosystems totally unsuitable for the Bittern. Current policy is attempting to protect these areas from further damage by making them nature reserves (UKBAP1, 2002) but cost and inappropriate management may cause this to become more of a hindrance than initially expected.

Fig 4 – Reedbed habitats in the UK
Source – Nature on the map



3.0 - Threats

- Habitat Loss and Fragmentation

Habitat loss is possibly the single most threatening factor for the Bittern in the UK. Many of the natural reedbeds in areas such as Norfolk have been drained for agricultural use or for building and development. Out of an estimated 5000ha (900 sites) of reedbed in the UK only 50 sites are over 20ha and these

make a large contribution to the total area (UKBAP2, 2002). Fragmentation or the splitting of habitats and populations is a major problem in all ecological science. Although the effects of this problem have not been fully investigated it is believed that it can cause increased interbreeding, reduces population health and increases the chances of extinction. This problem has not been directly linked to the Bittern but with such small numbers as found in the UK it could potentially devastate whole populations

- Habitat Suitability

The early succession stage required for the Bittern to thrive limits the number of possible locations for it to live. Many of the UK reedbeds which are of suitable size are poorly managed and in advanced stages of succession. The general decline in the market for reeds in the last century has resulted in scrub encroachment and succession to woodland (Pullin, 2002). This is a huge problem (UKBAP2, 2002) which not only affects the habitat but also has a dramatic effect on the type and availability of food. Currently 85% of the British Bittern population are within habitats created and managed for early succession stages showing that this can have a great impact on them (RSPB). Excessive sedimentation found in some reedbeds can be extremely damaging, not only does this process reduce the water depth but also the sediments often contain pollutants (see below - Pollution, heavy metals and Water quality) which can affect the Bitterns (RSPB).

- Food Availability

The availability of suitable food is seen as a high priority by the EU Bittern action plan (Newbery *et al*, unknown). Although it is commonly believed that Bitterns will only occupy large reedbeds it has been found that with suitable food sources they will breed successfully in reedbeds as small as 15ha. At one site in Italy as many as 19 wintering Bitterns have been seen on one site due to its large quantities of small fish (Newbery *et al*, unknown). Open water must be available within the reedbed habitat, this contains the main populations of fish, especially eels that the Bitterns eat. The decline in suitable food has not been widely studied but it is believed to be linked with the pollution of the

water (see below - Pollution, heavy metals and Water quality) and succession (UKBAP1, 2002).

- Pollution, heavy metals and Water quality

Pollution is a complex issue and a problem for all wildlife and habitat conservationists, this is true for the Bittern. Eutrophication of water supplies can affect the quality of reeds and is believed to have resulted in reed die-back and problems of reed rehabilitation in some areas. Nitrates and phosphates have led to the degeneration of floating mats of reed in some sites in the UK (Newbery *et al*, unknown). The resulting anoxic (very low oxygen) sediments will not support food or reed re-colonisation. In past decades numerous chemicals such as organochlorine pesticides and mercury have been shown to accumulate within the birds themselves adversely affecting the populations (RSPB). The threat of these chemicals is now believed to have gone due to restricted use and new legislation. Toxins within the waters now that legislation restricts the use of chemicals may not directly affect the Bitterns but can affect the invertebrates and fish they eat (UKBAP2, 2002). The location of reedbeds in the UK could also bring problems with saline water intrusion. With many of the larger reedbeds located around the coastal areas and sea levels rising, flooding is a possible issue. The saline water brought into the reedbeds during a flood is not suitable for the Bitterns and also has an effect on the availability and suitability of the food.

- Weather

The Bittern is naturally a migratory bird moving from Russia and northern Europe to the Mediterranean during the winter months (Flegg and Hosking, 1997). In some countries such as the UK the populations are fairly stable with very little migration. During very severe winters such as in 1978-79 it has been known for the breeding populations to be reduced by 30-40% in parts of Europe (Newbery *et al*, unknown). This may not be a current problem in the UK with mild winters but with a reduction in available habitat and predicted colder winters it may add pressure to an already sensitive breeding population.

- Recreation

Wetlands across the world are coming under increasing pressure from the many different forms of recreation. Walkers, boating, photographers, birdwatchers etc all disturb the habitat in one form or another (Newbery *et al*, unknown). Although this problem is site specific one of the largest problems is boating, the wake created by the boats disturbs the reed fringes and the wildlife within them including the Bitterns and their food. Some areas suffer more with this problem than others and the possible good effects such as increased income and financial support should not be dismissed.

4.0 - Methods of conservation

- Legislation and Economic

One of the first ways of conserving the Bittern was to have it put officially into existing legislation, by doing this the government could formally prosecute any person breaking the law. As shown in section 1 the Bittern is now within numerous national and international legislation and treaties. The UK government has also started to include the Bittern into related legislation such as for water abstraction and gravel extraction (UKBAP1, 2002). The cost of conservation is a major problem especially for the smaller charities associated with Bittern conservation. The EU has set up a fund specifically for financial assistance for species or habitat conservation projects. This fund known as the LIFE fund is available to aid community projects for the conservation of some key species or habitats listed in EU legislation. Some conditions do apply for this fund such as all sites must be either Special Protection Areas or Sites of Community Importance (Europa) but within the UK some key Bittern areas fall within these categories. Funding can also come from other sources such as the Heritage Lottery Fund. This organisation provides funding for numerous projects such as the RSPB's Lakenheath Fen nature reserve where funding has been used to re-create an area of wet reedbed (RSPB). The Cooperative bank has become the official species sponsor of the Bittern and provides the RSPB with funding in the region of £10,000 per year towards its habitat restoration work (English Nature).

- Habitat Protection

The protection of the current Bittern habitat is a high priority for all conservation societies in the UK, before the numbers can be increased there must be a stable population. Much of the habitat protection comes in the form of creating SSSI (Sites of Special Scientific Interest), NNR (National Nature Reserves), SPA (Special Protection Areas), SAC (Special Areas of Conservation) or one of the many other possible protective statuses.

These generally control all activities on a site by the use of agreed legislation and annual inspections by governing bodies with the aim to increase the quality of the area for a particular species habitat or group. Important Bird Areas (IBAs) are now being set up to protect key habitat areas for threatened bird species (Bird Life International), this works in a similar way to the Ramsar sites which are concerned not with the species itself but the conservation of the habitat (wetlands/reedbeds). Five of the main Bittern breeding sites in the UK are now designated IBAs (Newbery *et al*, unknown):

- Leighton Moss (SSSI, IBA, Ramsar, SPA)
- North Norfolk Coast (SSSI, IBA, Ramsar, SAC)
- Upper Thurne Broads and Marshes (SSSI, IBA)
- Ant Broads and Marshes (IBA, NNR)
- Minsmere and Walberswick (SSSI, IBA, SPA, SAC, Ramsar)

- Habitat Management and Re-creation

The management of existing reedbed habitats is an important issue in conservation today. Protective status and economic aid can only help so much, if a habitat is poorly managed the Bittern will not use it. English Nature together with the RSPB are acting as advisory bodies for other conservationists aiming to manage reedbeds.

The management practices applied to reedbeds are usually similar to the following but some localised differences can be found (RSPB):

- Raising water levels and keeping them high all year
- Cutting, Mowing or Burning of reeds and litter
- Lower reedbed to allow flooding
- Water control structure

- Re-profiling, clearing or digging of dykes and ditches
- Linking reedbeds to allow fish movement etc:
- Introduction of fish
- Coppicing/scrub clearance
- Reed planting

Local authorities can play a key role in reaching management agreements with local landowners, the broads authority for example have recently introduced the ESA (Environmentally Sensitive Area) conservation plan. This agreement requires farmers to manage reedbeds and offers grants for restoration work, similar to the national ‘Countryside Stewardship Scheme’ (UKBAP2, 2002). Re-creation of the Bitterns natural reedbed habitat is perhaps the most commonly used method of conservation at the moment. This is especially important in areas such as the UK which do not possess the large natural habitats that some other countries still have. English Nature is currently undergoing a project to fund the re-creation of reedbed habitats. This reedbed ‘rehabilitation’ allows conservation bodies such as the RSPB or Wildlife Trust to purchase land to be specifically turned into reedbeds. This can be extremely successful and may become a long term solution to combat the habitat loss of other areas. The RSPB’s Lakenheath Fen nature reserve is an excellent example of how this can work if correctly implemented and managed (Fig 5).

Fig 5 - Lakenheath Fen nature reserve
Source - RSPB



- Research and Monitoring

The Bittern, a shy solitary bird is well known to conservationists but still poorly studied. The complex habitat, nesting and feeding requirements of this bird are still being fully investigated so obviously this will play a huge part in future management (UKBAP1, 2002). The RSPB are currently undergoing a long-term monitoring programme to not only assess species numbers but also gain a greater understanding of the habitat requirements (English Nature). When this information has been collected it can be implemented into localised management plans or the national species and habitat action plans for the benefit of all concerned.

5.0 - Evaluation of Methods of Conservation

- Legislation and Economic factors

With full legal protection in the UK there is little more that the government could do to protect the bird itself, this is part of the reason why current conservation programmes are focused on the habitat. The economic factors concerned with the protection of any species are extremely important. The cost of management, protection and general running of a habitat are high, as are the costs of promoting the Bittern itself. The European LIFE scheme is an excellent idea but restricted to only certain sites of importance already (Europa), this is a problem in the UK since many of the areas potentially good for Bitterns are not currently protected. The Heritage Lottery fund is another possible source of funding yet this is also severally restricted. Not only do projects need to raise 50% of the money themselves but selection is more subject to luck than actual scientific knowledge of Bittern habitat requirements in the UK. Sponsorship may help in the long-term by providing a countrywide scope rather than focusing on single sites, funding from companies such as the Cooperative may help but £10,000 per year will not go very far.

- Habitat Protection

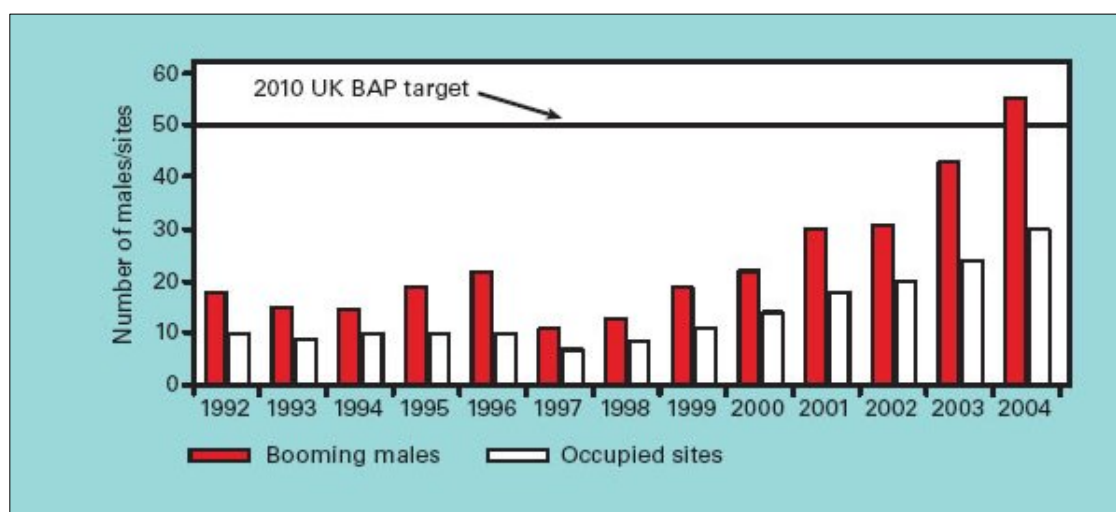
Many of the most important breeding areas for the Bittern have now been protected under one status or another yet still much of the UK's reedbed habitat is unprotected and generally declining in quality. The new IBA

designation will hopefully give greater protection to areas specifically known to be important for birdlife. The number of different protective status does tend to cause confusion when it comes to management, SSSI's for example have a legal protection to stop development etc. but little can be done to enforce long-term appropriate management (Thornton and Beckwith, 2004). Another problem sometimes found with simply protecting areas is the lack of experienced land management specialists. For the Bittern to utilise an area regular cutting has to be completed and certain aspects of the reedbed preserved. Some of the protective status may even have restrictions on machinery or processes allowed on a site, this can cause problems especially in non-reserve areas where an industry etc is being undertaken as well as habitat conservation. In review it is the protective status's lack of flexibility that can not only restrict habitat management but make it impracticable for many land owners to do.

- Habitat Management, Re-creation, Species and Biodiversity Action plans
Habitat management is a complex issue and to say whether it is working on a national scale even more complex. What can be said is that Bittern numbers have increased over the past decade and they appear to be establishing stable breeding colonies in several areas (fig 6).

Fig 6 – Graph showing numbers of Booming male Bitterns and occupied sites in the UK between 1992 and 2004

Source - RSPB



This increased stability does suggest that current management practices are working and that the reedbed re-creation schemes such as at Lakenheath Fen are working. A government action plan for the Bittern hoped to have 50 booming males by 2010, this target has been broken six years early (English Nature). In 1997 only 11 Bitterns were recorded in a national survey but over 55 at 30 different sites in 2004. One problem with assessing the success of the numerous Bittern conservation schemes is the relatively few years they have currently been running for. It is possible that the increase in Bitterns could be to do with a variety of factors from global warming to greater clutch sizes, not necessarily the new management practices. To fully assess the results of the management schemes they need to be studied over a greater timescale, research by Birdlife International does suggest however that the UK Bittern population is stable with a 16% increase between 1997 and 2001 (Birdlife International). Within the UK most of the management of the Bittern concentrates on one or two main species within the habitat, these normally are *Phragmites australis* a species of reed or the sedge *Cladium mariscus*. This appears good practice since it is the Bitterns main habitat but both Noble *et al* (2004) and Self (2005) believe that the future of Bittern conservation lies in the management of fish stocks not the reedbed habitat itself. Although both agree that the reedbed itself is an important part of management they demonstrate that within a country the size of the UK where accessible land for reedbeds is extremely limited an alternative to large habitat areas must be found. They believe that by increasing the food stocks of fish will allow the Bittern to survive in a much smaller areas. In studies with the RSPB Self (2005) has established that in many reserves especially those in coastal areas commercial fisheries and tidal sluices have restricted fish movement into the reedbeds. Rudd, Stickleback and Eels appear to be the main food source for the Bittern in the UK with Bittern breeding sites occurring in areas with greater stocks of these species. Noble *et al* (2004) believes that greater control of the fishing industry and the re-opening of the natural colonisation routes long exploited for their fish stocks may allow many of the reedbed fish stocks and Bittern numbers to increase. Tyler *Et al* (1998) has studied the relationship between the Bittern and its nesting habitat and found that the greatest cause of decreasing Bittern numbers is scrub encroachment.

Inappropriate management at certain sites has allowed hydroseral succession to occur and this is severely restricting the breeding habitat. Gilbert *et al* (2005) has established that the most suitable habitats for breeding Bitterns must have the following characteristics:

- Continuous blocks of reed around 2.8ha (no less than 100m at narrowest width and uninterrupted by any features i.e. ditches)
- Within 70m of open water
- Within 30m of a ditch
- Nest surrounded by at least 22cm of water when laid

It is the complexity of the Bitterns habitat and the special features it requires compared to other species that makes it such a difficult bird to manage for, this presumably is also why it is easy to manage incorrectly and cause declines in overall populations. This is why the national Biodiversity and Species Action plans (BAP/SAP) are being used, they should not however be over estimated. The complex nature of the bird mean that management plans should be done on a site by site basis using the BAP's and SAP's as a set of guidelines.

- Research and Monitoring

The research and long-term monitoring of a species as illusive as the Bittern can cause numerous problems in estimating population numbers and general health of the ecosystem. Recent advances in technology have allowed the RSPB to use spectrograms to differentiate between the booming of individual males, this should help to more accurately estimate the populations (Self, 2005). At present it is difficult to make any assessment on the success of the research and what impact it will have on the future of Bittern conservation, only with more data from a wider timescale can full conclusions be made.

6.0 - Suggestions for improved conservation

The future of Bittern conservation lies in more detailed studies of not only the bird itself but its complex nest, habitat and feeding requirements. This data can then be used to improve existing management plans so that the habitats are more suitable for the Bittern. Since all the current breeding areas in the UK are protected the conversion of the 'unused' reedbeds should be a priority. By increasing the possible area and

range for the Bittern more stable breeding populations may be established, this should also tackle numerous issues related to the fragmentation of habitat. The priority for reedbed recreation should be to join current reserves and create corridors for the movement of the species. Although the reedbed themselves are an important issue, with limited space it may prove more useful to greater control the food availability in the reserves. By increasing current numbers in specially designed and carefully managed reserves, it may be possible at a later date to relocate individuals to new suitable areas. The future of the Bittern in the UK lies in the funding that the numerous conservation organisations receive, without this no management can occur and research would cease. It would be advisable to any conservation body to initially try to increase its income through membership, government and donations before undertaking new projects which without funding could not be successfully managed.

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