Introduction of rudd *Scardinius erythropthalmus* as food for bitterns *Botaurus stellaris* at Titchwell Marsh RSPB reserve, Norfolk, England

Gurney M.
Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire SG19 2DL, UK

SUMMARY

Rudd *Scardinius erythropthalmus* introduced to a wetland nature reserve in eastern England as a potential food source for bitterns *Botaurus stellaris*, successfully became established within 3 years of release.

BACKGROUND

Bitterns *Botaurus stellaris* are a high conservation priority in the UK, where they are largely restricted to areas of scrub-free, wet *Phragmites australis* reedbed containing significant areas of open water (Tyler *et al*. 1998, Gilbert *et al*. 2005a & b). Having reached a peak of about 80 booming males in the 1950s, the species started to decline shortly after. Despite a slow recovery during the 1990s, the population reached a low point of only 11 booming males in 1997. Since then, numbers have steadily increased and there are currently about 50 pairs in England.

In the UK, breeding bitterns feed mainly on two native fish species, rudd *Scardinius erythropthalmus* and eel *Anguilla anguilla* (Gilbert *et al*. 2003). Rudd is a species of lowland freshwater rivers and lakes. It has suffered its own population declines because of habitat degradation and competition from, and predation by, introduced species. It is considered particularly sensitive to disturbance of spawning habitat and refuges. Within reedbed habitats, rudd are thought to require interconnected open water bodies with emergent and marginal vegetation, and a range of depth profiles including water up to 2 m deep to allow survival in hotter periods of the summer.

Titchwell Marsh RSPB reserve in eastern England, like a number of other wetland sites in the UK, has recently been managed to benefit bitterns through a combination of excavating parts of established reedbeds to raise water levels and create areas of open water, and the introduction of fish as a food resource. This has created more pools with reedy edges where bitterns can feed (Self 2005). Prior to this habitat enhancement, bitterns last bred successfully at Titchwell Marsh in 1989, although a male was booming at the site in 1991. However, like some other isolated reedbeds, Titchwell lacked a suitable bittern food supply and had no rudd. In the study described here, rudd were introduced to part of the reserve and the outcome of the introduction was assessed.

ACTION

Study site: Rudd were introduced as food for bitterns at Titchwell Marsh RSPB reserve, Norfolk, eastern England. The project was funded by the EU Life Fund. The reserve comprises a number of man-made scrapes, an area of reedbed, and patches of wet woodland

Rudd release: A total of 500 mature rudd (average length 15 cm) from a commercial fishery in Suffolk (eastern England) were introduced into the freshwater reedbed (an 18 ha area of *Phragmites* swamp with approximately 1 ha of open water) on 15 April 2000.

The fish were transported in glass tanks and each one was checked to ensure good health (and that it was indeed a rudd) before being released. The fish were released slightly later than planned because of delays in obtaining the stock. Early spring was chosen because the water is cooler at this time of year and thus has more oxygen available, and the fish would also have a few weeks to acclimatise before the onset of the spawning season. Permission for the release was obtained from the Environment Agency (a FR1 consent) and English Nature (because the area is a Site of Special Scientific Interest). There were few other fish present in the reedbed (a man-made site), so no problems were expected through interactions with species already present.

CONSEQUENCES

The rudd successfully spawned in late April–May 2000 and produced fry, which were seen in a number of pools and open channels in the reedbed. Initial successful establishment of adult fish and survival of fry was established through electro-fishing surveys conducted in September 2000. Further electro-fishing surveys in 2003 revealed that the rudd had become widespread in pools throughout the reedbed, with an estimate of at least 1,150 fish/ha and a biomass of 15.75 kg/ha. These figures were derived from an electro-fished transect of 959 m, extrapolated over the area of open water in the reedbed, assuming an effective sampling range of 2 m width along the transect. These results, along with the habitat management, are considered to indicate close to ideal foraging conditions for bitterns.

Conclusions: Rudd have established and spread throughout the pools and channels in the reedbed at Titchwell Marsh. Importantly, the objective of enticing bitterns back to breed appears to have been achieved, with at least one pair breeding in both 2004 and 2005.

Experience gained from this and three other RSPB reserves, suggests that fish introduction can be an effective way of initiating a fish population if habitat conditions are right, but that stocking areas is expensive and also likely to benefit birds other than bittern. Species such as cormorant *Phalacrocorax carbo*, which are highly mobile and not so selective in feeding habitat, can rapidly move in and take advantage of the high density of fish created by stocking a general area. Bitterns on the other hand, will feed only at reed edges and so must wait for the fish population to build up and disperse throughout that habitat. The best approach is probably to introduce enough fish in order to try and establish a breeding population, and maintain or enhance the water quality and habitat so that the fish population can increase and sustain itself overtime.

REFERENCES

Gilbert G., Tyler G. & Smith K.W. (2003). Nestling diet and fish preference of bitterns *Botaurus stellaris* in Britain. *Ardea*, **91**, 35-44.

Gilbert G., Tyler G.A., Dunn C.J & Smith K.W. (2005a). Nesting habitat selection by bitterns *Botaurus stellaris* in Britain and the implications for wetland management. *Biological Conservation*, **124**, 547-553.

Gilbert G., Tyler G. & Smith K.W. (2005b). Behaviour, home-range size and habitat use by male great bittern *Botaurus stellaris* in Britain. *Ibis*, **147**, 533-543.

Self M. (2005). A review of management for fish and bitterns, *Botaurus stellaris*, in wetland reserves. *Fisheries Management and Ecology*, **12**, 387-394.

Tyler G.A., Smith K.W & Burges D.J. (1998). Reedbed management and breeding bitterns *Botaurus stellaris* in the UK. *Biological Conservation*, **86**, 257-266.