

# **Executive Summary**

## **Introduction and Background**

The principal aim of the Study is to complete investigations into the impact of water company operations on the River Itchen candidate Special Area of Conservation (cSAC) required by the Secretary of State. The River Itchen system is also a riverine Site of Special Scientific Interest (SSSI), and the riverine habitat itself is an interest feature under the Habitat Regulations. If the investigations show serious impact, measures to ameliorate, or mitigate against them should subsequently be prepared for implementation. Allied to the investigations is the need to prepare best scientific information to enable competent authorities to make appropriate assessments under the Habitat Regulations.

## **Assessment Methods**

Site status assessments, over the Study's ecological and hydrological assessment period – 30 years from 1970 to 2000, were based on a combination of field surveys, expert opinion, DNA work (for southern damselfly and otters), laboratory analyses in relation to eco-toxicological assessments/water quality determinands, mathematical modelling and data analysis in a holistic manner. Assessments were carried out for the River Itchen system as a whole and for the key interest features, including those for which the cSAC/SSSI was designated. Assessment methods were based on best science and involved leading academics and consultants who are acknowledged experts in their fields both in the UK and internationally. Ecological models were used for salmon, trout and invertebrate assessments.

## **Discussion of Study Outcomes**

The site status is substantially affected by low river flow and high soluble phosphorus concentrations. The estimated public water supply abstraction deficit during warm dry summers is of the order of 45ML/d for a low flow target of 270ML/d, which is some 25% below the month of September naturalised flows. This deficit is equivalent to the water consumption of some 250,000 people in Hampshire and Isle of Wight. Any new planned development may worsen this situation if not promoted in a sustainable manner. The effects of abstractions during a dry year lead to conditions of about 35% below the September naturalised flow in the Candover Stream, the upper tributary of the Itchen to the north, and in the lower river south of Winchester. Downstream of the Otterbourne surface water abstraction intake, the public water supply abstraction impacts on the 7 kilometres of river channel to the Chickenhall sewage treatment works outfall. The Chickenhall sewage treatment works effluent discharge ensures that the Gaters Mill abstraction does not cause a fall in river flows to levels below 35% of the September naturalised flow. English Nature and the Environment Agency have agreed soluble phosphorus standards for the Itchen system. These standards are currently marginally exceeded in the River Arle, the upper tributary of the Itchen to the east, the middle Itchen to Easton, and significantly exceeded downstream of Easton, due to Harestock and Chickenhall sewage treatment works discharges.

For most of the cSAC interest features the historical status up to 2000 was thought to be favourable for the river as a whole. The one exception was the southern damselfly, which was poor due to the fragmented nature of suitable habitats and the population. In all cases the target status is favourable. In general, the current status of the interests is variable. Some interests are probably favourable (for example bullhead, brook lamprey) while others are unfavourable and maintained (for example otter) or part destroyed (for example crayfish).

Salmon is the most heavily impacted of the interest features with numbers being significantly reduced over the last decade. Concerns have been raised by fisheries interests, the Environment Agency and English Nature that current demands within existing licensed entitlements for water supply will not assist the recovery of the River Itchen salmon population. The early 1990s saw a sharp decline in salmon returning to the river. Factors thought

to be significant in the riverine habitat with respect to salmon movement and survival are siltation of the salmon redds, summer low flow with respect to habitat suitability and entry to the river and eutrophication effects.

The passage of salmon through the estuary, particularly landwards, is thought to be influenced by river flow and water quality. In the sea, drift net fishing is thought to have an impact. The *Ranunculus* community and invertebrate community have been shown to be impacted by the low flow period 1989 to 1992. The invertebrate community changed markedly in the dry years with some species showing a significant reduction in abundance. The flow impacts on invertebrates are usually short lived with recovery being rapid once higher flows return. However, the reduction in numbers could have an impact over several years for species higher up the food chain, for example salmon. The Otterbourne abstraction potentially impacts on about 70% of the river length currently available to salmon downstream of the weirs in Winchester.

Other influences, often specific to individual species, are usually unrelated to water company activities. Exceptions are the modest effects of sewage treatment works discharges on achieving River Ecosystem Class 1 for salmon in lower Itchen south of Eastleigh. The discharge from Portswood sewage treatment works to the upper Itchen estuary is thought to potentially impact migratory salmonids through high ammonia levels. For the determinands that occur in the General Quality Assessment, River Ecosystem Class 1 is achieved in the whole of the catchment, although this is marginal in the lower Itchen downstream of the Chickenhall outfall.

Factors responsible for the deterioration in site status for specific species are very variable and include low flows, obstructions to movement and sediment in spawning gravel (salmon), disease (crayfish), lack of safe access throughout the river and road deaths (otter), water quality, and water level issues and habitat discontinuity (southern damselfly).

## Conclusions

The scientific studies have shown that current management regime has significant effects on salmon, the *Ranunculus* community and invertebrates. Low flow periods associated with the contemporary abstraction and discharge regime suggest that all three interest features are probably capable of recovery, but the timescale varies from a few months to several years. Even the short term recovery of the invertebrates may prolong the timescale recovery of the salmon. Fish migration modelling outputs suggest that the salmon population of the River Itchen has had a long standing susceptibility to impacts associated with naturally-occurring dry years over the Study's 30 year assessment period.

On this basis, the Study concludes that the current abstraction and discharge regimes are implied to have a serious impact on these three interest features and the riverine habitat itself. Thus, in putting forward recommendations for an interim sustainable management strategy for future water management in the Itchen valley, consideration has been given to the Study's target flow proposals and also to the English Nature's recommended flow criteria for the riverine SSSI and cSAC. The current levels of soluble phosphorous are too high for favourable site status. Of the flow and water quality constraints, the latter seem to be more easily addressed. The overall pressure on water resources in South East England makes the flow issue very much more difficult.

In the longer term, the current best (far from perfect) estimates of future water demand indicate an additional demand of some 47MI/d for the 2050s. In addition, climate change estimates suggest a reduction of around 46 MI/d from the 1 in 30 critical 'dry year' September naturalised flows.

In summary, the combined impacts assessed as part of the Study is serious, environmental improvement is achievable, at a cost, but detailed options appraisals are needed.