4 Transitional and coastal water monitoring

In 2011 we completed our routine transitional and coastal (TrAC) fish surveys in Southampton water and the Adur estuary, which allows each estuary's' ecological status to be classified for the Water Framework Directive.

Note that our sampling techniques are selective for small fish, so our catch is almost entirely composed of juveniles and small species.

4.1 Southampton Water

The Southampton Water TrAC programme in 2011 included the routine beach seine and beam trawl surveys at five sites and beach seine only samples at two sites (sites where the ground is too rough for trawling). In addition, a fyke net survey was carried out in autumn near to Fawley power station - the addition of a third sampling technique will increase the confidence level of the WFD classification. The 2011 classification for Southampton Water for fish was "High", but with a confidence level of "Uncertain" (because two, rather than three sampling methods had been employed to date).

Figure SW1 shows the total number of each species caught in spring and autumn 2011 in Southampton Water- note that where there appears to be no column for a species, very few individuals were caught.

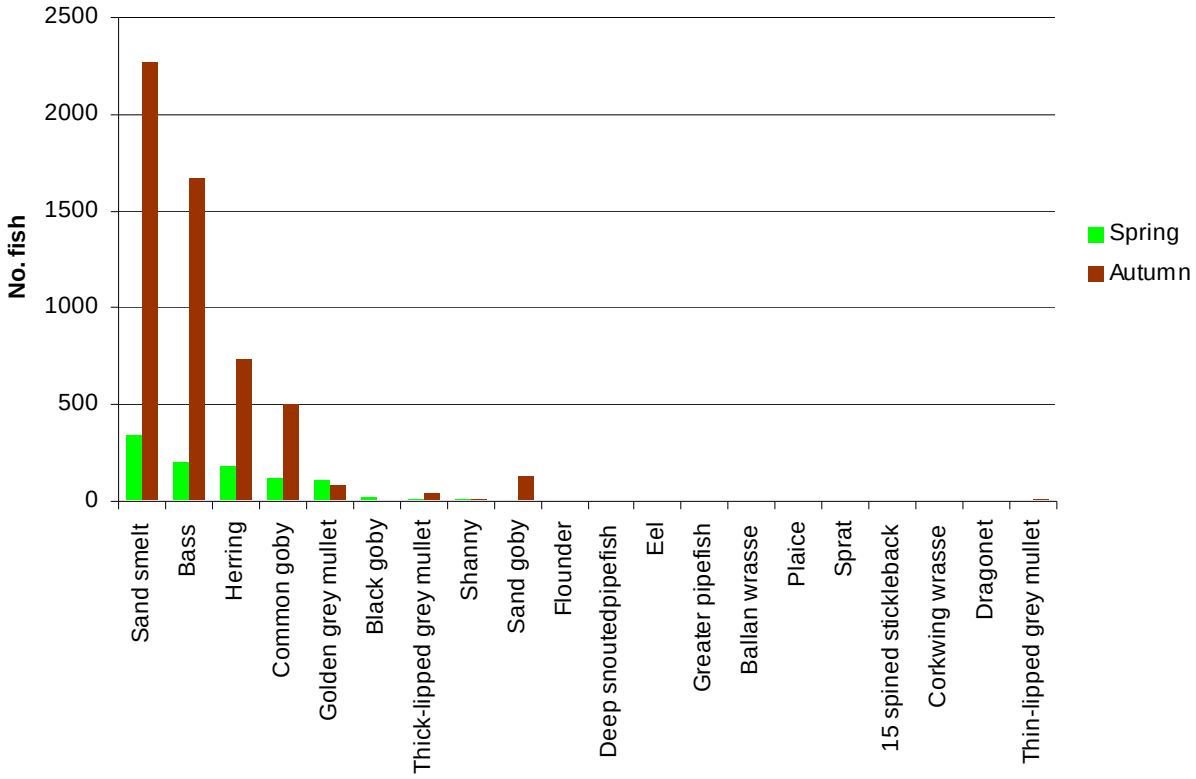

Figure SW1: Spring and autumn catches, Southampton Water, 2011

Figure SW2 compares the 2011 total spring and autumn catches with those in the previous four years:

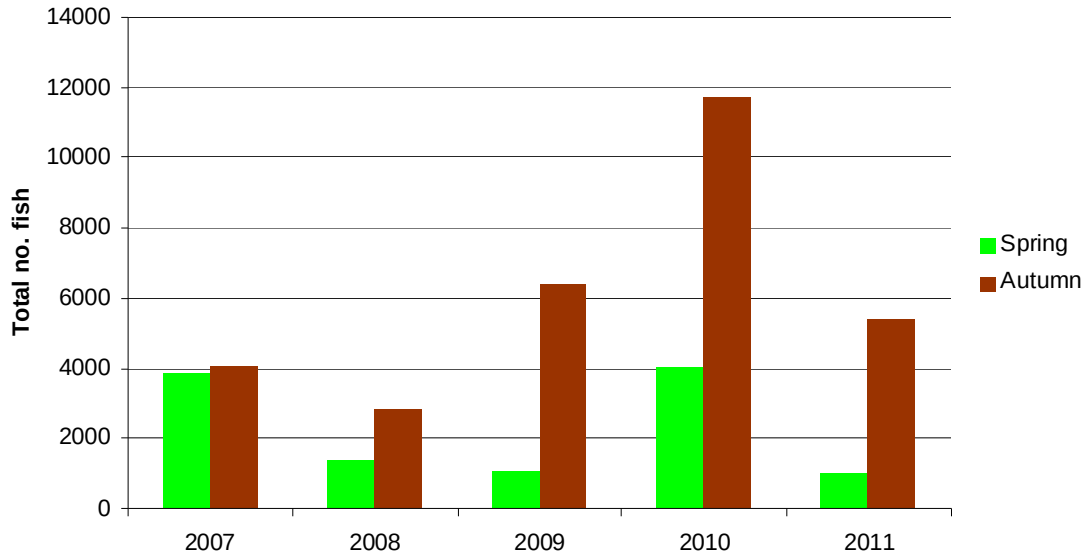

Figure SW2: Total number of fish caught Southampton water, 2007-2012

Figure SW3 illustrates the close correlation between mean winter sea temperature recorded at Hayling Island buoy and the total number of bass caught at the five Southampton Water spring TrAC surveys that have been sampled routinely since 2007.

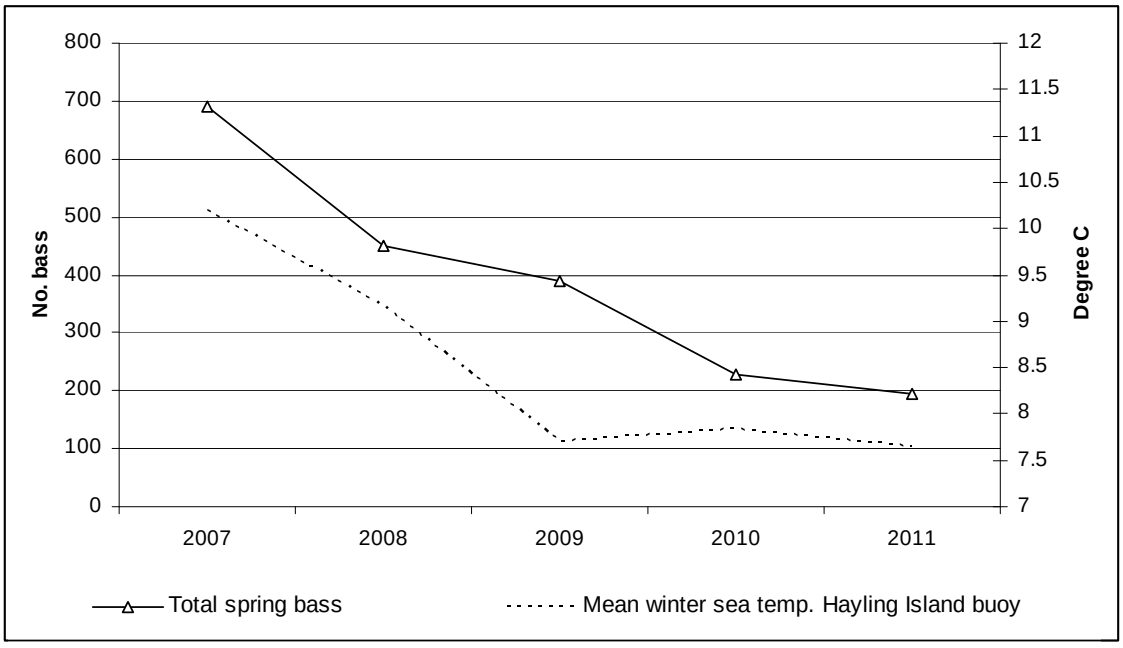

Figure SW3: Total bass caught in spring surveys in relation to mean winter sea temperature at Hayling Island buoy (Correlation = 0.92)

Figure SW4 shows the correlation between mean summer sea temperature recorded at Hayling Island buoy and the total number of bass caught at the five autumn TrAC survey sites that have been sampled routinely since 2007.

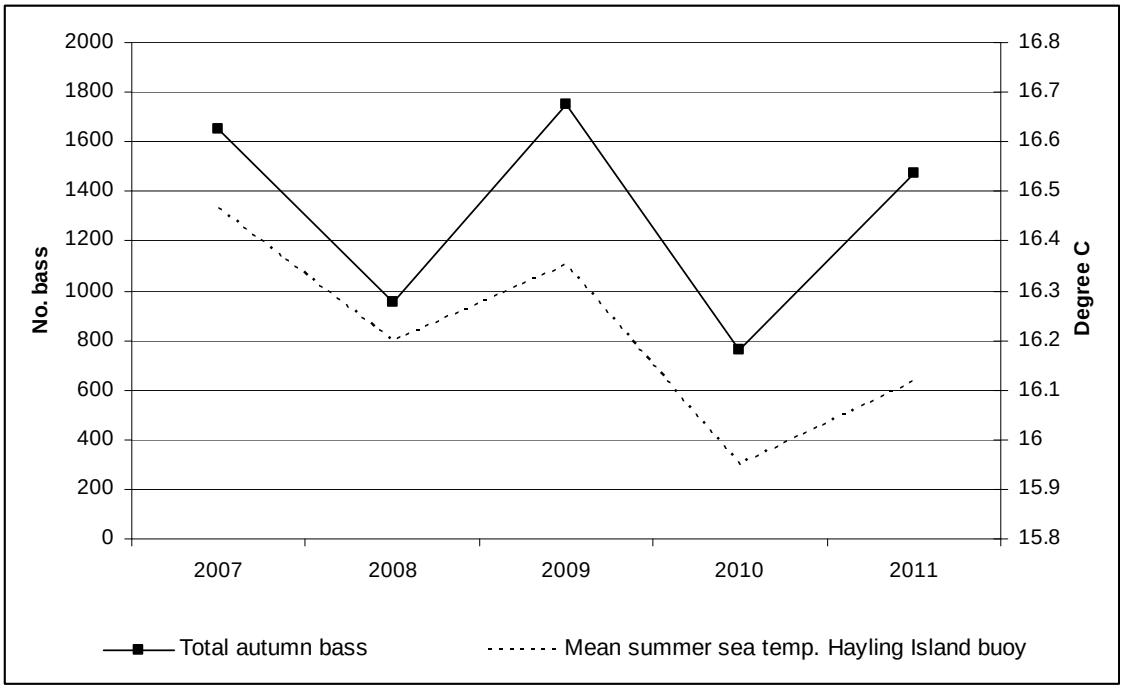

Figure SW4: Total bass caught in autumn surveys in relation to mean summer sea temperature at Hayling Island buoy (Correlation = 0.8)

Southampton Water TrAC discussion:

In 2011 we caught a total of 20 species in Southampton Water, which was an increase from 19 caught in 2010. The additional species was a dragonet, *Callionymus lyra*, caught at Calshot in autumn. The total number of fish caught in spring was greatly reduced from last year and was the lowest recorded over our five year sampling period. This was almost certainly linked to the relatively harsh winter of 2010/11, which resulted in an unusually low mean winter water temperature in the Solent in 2010/11(Chart SW3). However, the total autumn catch was approximately average for the five year sampling period and Figure SW4 sows that the bass catch was relatively high.

A further year's sampling and access to a local sea surface temperature dataset allow us to make further analysis of the apparent link between juvenile bass catches and water temperatures that was discussed in last year's report. Sea surface temperatures were taken from the Hayling Island buoy and there was found to be a strong positive correlation (0.92) between the mean winter temperature (November to April inclusive) and the total number of bass caught at the five Southampton Water survey sites that have been sampled routinely since 2007. The number of bass caught at the same five sites in autumn was found to be strongly positively correlated (0.8) with the mean summer sea surface temperature (May to October inclusive) at the Hayling Island buoy.

Last year's report identified that our spring bass catches are typically dominated by juvenile fish born in the previous summer that have over wintered in inshore waters. The correlation described by figure SW3 indicates that mild winters result in more of these fish surviving into their second summer. Autumn catches are typically dominated

by young of the year bass, which drift into inshore waters in early summer (after our spring surveys) and figure SW4 shows that there is a tendency for their abundance to be increased by warm summers.

Both these observations suggest that unusually cold winters and cool summers probably reduce the numbers of bass being recruited to local commercial and recreational fisheries in subsequent years.

Grey mullet from the Hamble estuary

Deep-snouted pipefish, also from the Hamble estuary

Adur estuary

In 2011 our three routine sample sites were monitored on the river Adur, all of which were subject to seine net and beam trawl methods. Figure Adur 1 shows the total number of each species caught in spring and autumn:

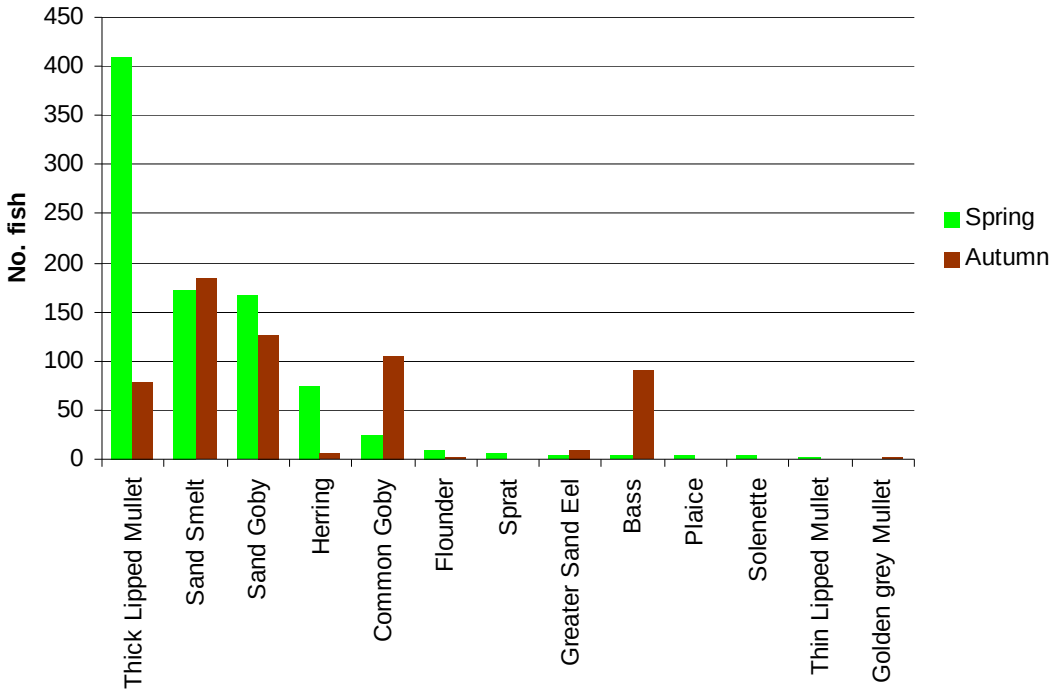

Figure Adur 1: Total catch per species, all Adur sites combined, 2011

Figure Adur 2 compares the total catch in spring and autumn in each survey year at the Ladywell site, which has been surveyed consistently since 2005:

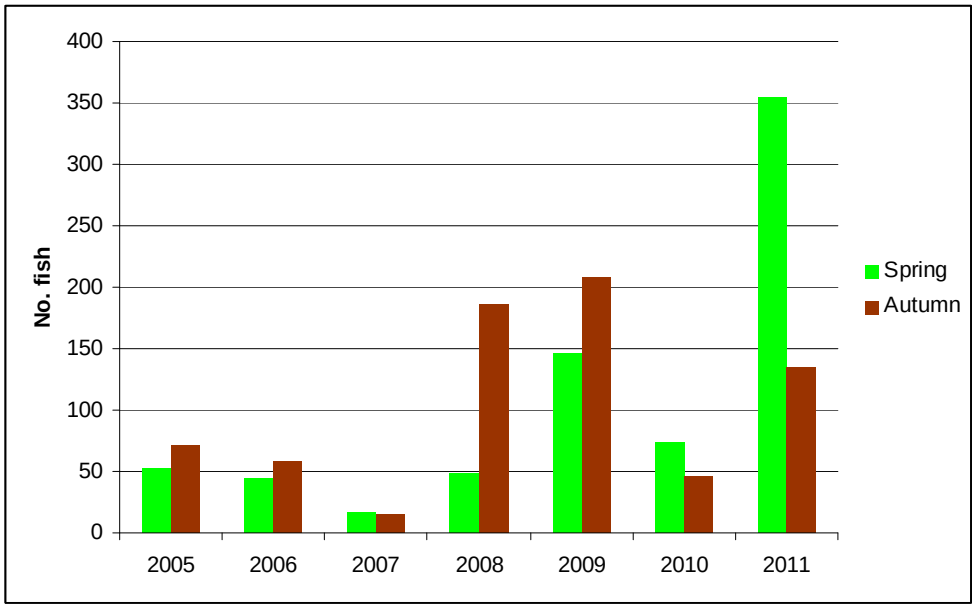

Figure Adur 2: Total catch at Ladywell, 2005-2011

Figure Adur 3 shows the apparent relationship between the total number of mullet caught each spring at Ladywell and the mean winter air temperature, based on Central England Temperature Hadley.

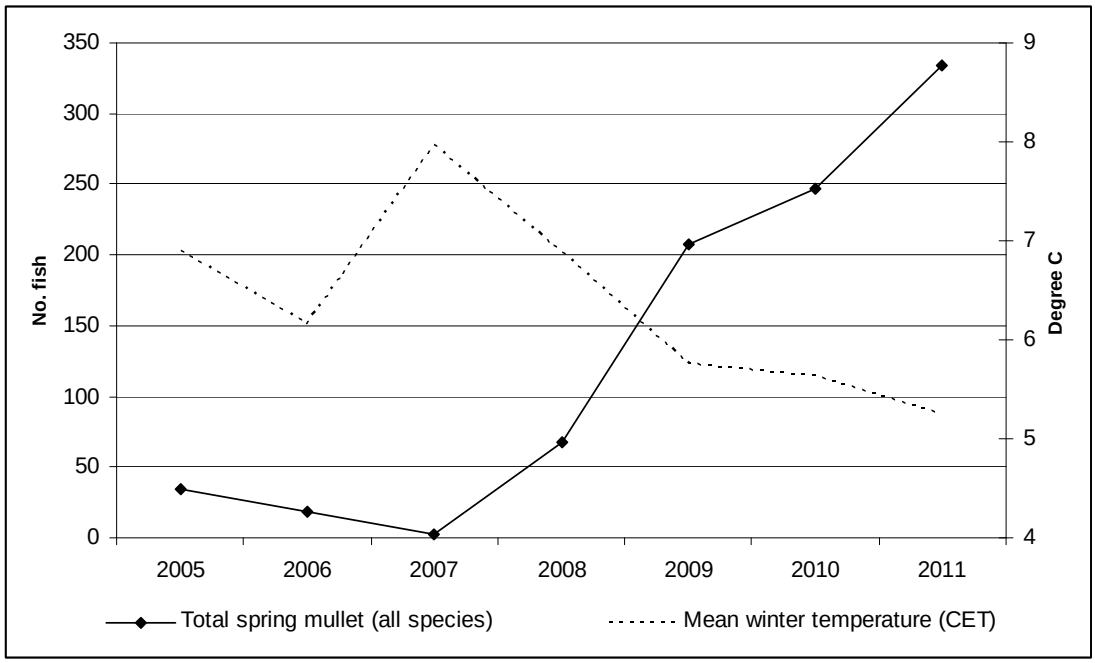

Figure Adur 3: Total mullet catch at Ladywell in spring and mean winter air temperature (CET) (Correlation: -0.84)

Figure Adur 4 shows the total number of bass caught at Ladywell each autumn and the mean summer flow at Sakeham gauging station, located close to the Adur's tidal limit.

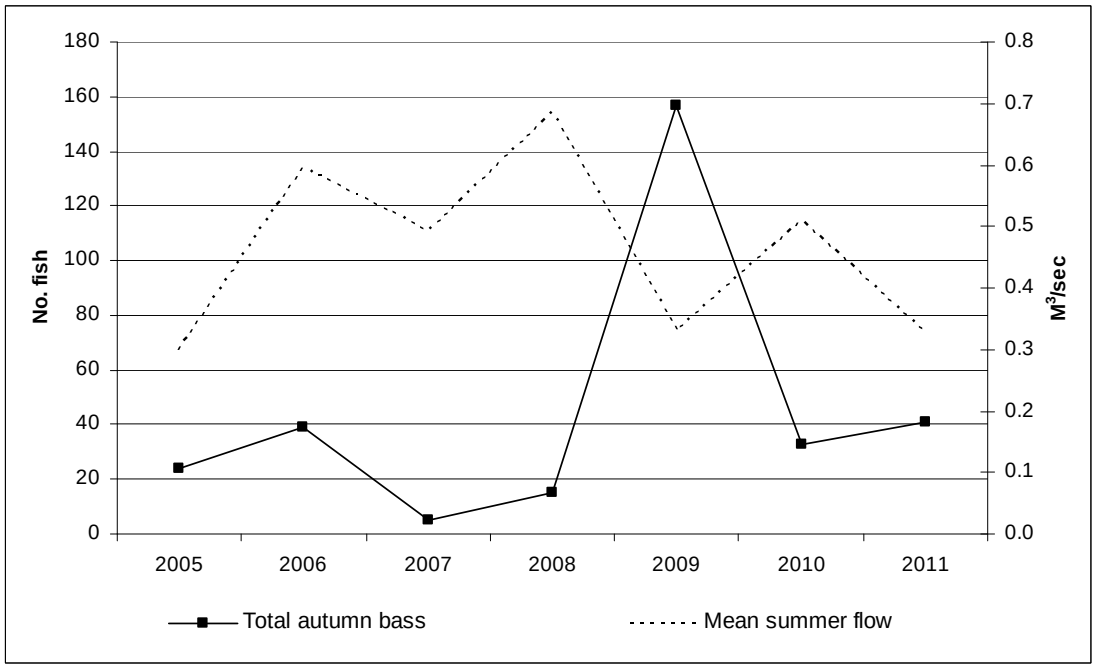

Figure Adur 4: Total bass at Ladywell in autumn and mean summer flow (Correlation: -0.44)

Adur estuary TrAC discussion:

In 2011 we caught 13 species of fish in our Adur estuarine survey, two more than were captured in 2010. Chart Adur 1 shows that the most abundant species where thick lipped grey mullet, sand smelt and sand goby. However, the three survey sites range from adjacent to the open sea at Kingston Beach, to narrow river channel at Ladywell, with the Old Tollbridge between the two. As a result, salinity, temperature, flow and substrate conditions vary considerably, leading to different fish communities at each site. For example, the Kingston Beach catch is generally dominated by sand smelt, whereas at Ladywell, thick lipped mullet is the dominant species.

Of the three sites, only Ladywell has been sampled annually for long enough to indicate any trends. Figure Adur 2 shows the total number of fish caught in spring and autumn at Ladywell annually since 2005 and indicates that the spring 2011 catch was the highest for the whole period, whilst the autumn catch was only exceeded by the 2008 and 2009 autumn catches.

Because of the major physical differences between the three Adur sites, it is likely that the fish communities at each are affected differently by the flow and temperature. For example, fish at Kingston Beach are more likely to be affected by sea temperature than any other variable whilst those at Ladywell are more likely to be affected by river temperature and flow.

Figure Adur 3 shows that the numbers of mullet (all three species combined) caught in spring have increased annually since 2007. The environmental variable that this appears to be linked to is mean sea surface temperature (recorded at Hayling Island buoy): in general, the colder the sea in winter, the more mullet are caught at Ladywell in spring. The most likely reason for this relationship is that the difference between river and sea temperatures at the time of the spring surveys (June) is likely to be greatest following an unusually cold winter - the relatively warmer river temperature may attract juvenile mullet farther upstream.

Thin-lipped grey mullet from the Adur estuary at Ladywell.

5 Looking forward

At the time of writing, the 2012 Solent & South Downs fish monitoring programme has already commenced and a significant number of WFD surveys have been completed in various catchments. However, the abrupt end to drought conditions in April led to many surveys being postponed until river levels drop.

The key fisheries monitoring components for 2012 are as follows:

Cuckmere & Adur Principal Coarse Fisheries: 5 sites each, monitored triennially.

Western Rother Principal Coarse Fishery (national index river): 5 sites monitored annually.

Wallington & Hamble Principal Coarse Fisheries: 2 sites each, monitored triennially

Ouse, Meon, Upper Itchen, Lymington & Beaulieu Principal Brown Trout Fisheries temporal monitoring: 2 sites each monitored annually.

Test Salmon Action Plan Fishery: 6 sites monitored biennially

General Coarse Fishery monitoring: approximately 12 sites across various catchments, monitored 6 yearly

The key Water Framework Directive fish monitoring programme components for 2012 are as follows:

TrAC WFD monitoring: 9 sites in Southampton Water; 4 sites in the Adur estuary, all sampled once in spring and again in autumn.

WFD Key Performance Indicator investigations surveys: large number of surveys across various catchments to investigate waterbodies failing for fish, and which have KPI's set for them (KPI's are self-imposed work deadlines or standards).

WFD new fisheries monitoring sites: a large number of new sites across various catchments that are needed to provide more accurate fish classifications for certain waterbodies.

List of abbreviations

KPI: Key Performance Indicator

SAP: Salmon Action Plan

SSD: Solent and South Downs (Environment Agency administrative area)

TrAC: Transitional and Coastal

WFD: Water Framework Directive

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