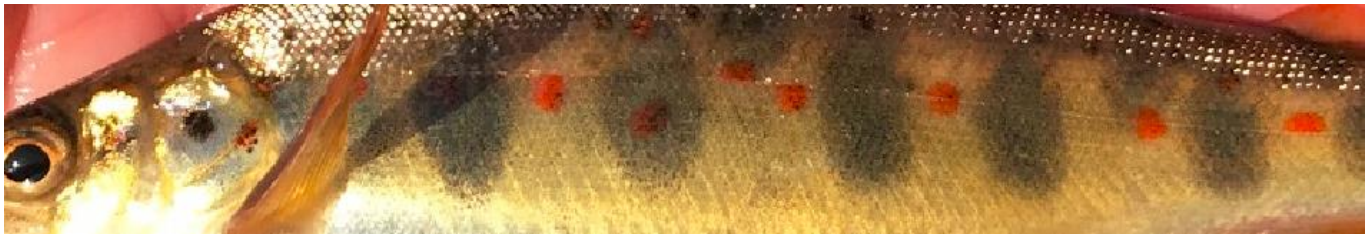
SSD Annual Fish Monitoring Report, 2020

Results of all fish monitoring carried out in 2020.



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Author: Dom Longley

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Foreword

This report provides details and results of all Environment Agency fish monitoring carried in Solent and South Downs Area in 2020. Coronavirus restrictions throughout summer 2020 meant that fish monitoring activities could only be undertaken working singly or in pairs with strict social distancing measures in place – fortunately and in contrast with many other EA areas, this allowed a substantial proportion of our scheduled programme to be completed but it meant that our fish monitoring activities were restricted to the Test and Itchen catchments.

Our annual programme of Test and Itchen salmon parr, trout and lamprey surveys was completed in full, yielding valuable results on those and other species. Our salmon counters were maintained and operated throughout the 2020 run, which proved to be exceptional on both rivers. Winter salmon redd mapping was also completed in full.

Coronavirus restrictions on field working remain in place for the 2021 survey season, meaning that fish population surveys by electric fishing may only be carried out in small teams, using a single anode: this precludes several general coarse fish and eel surveys and may also affect the estuarine fish surveys scheduled for autumn. However, all of the elements completed in 2020 will be repeated, as well as a large number of varied Water Framework Directive and project related general fish population surveys across the Area.

Acknowledgements

None of the fish monitoring detailed in this report would be possible without the generous support of landowners, River Keepers, angling clubs and societies.

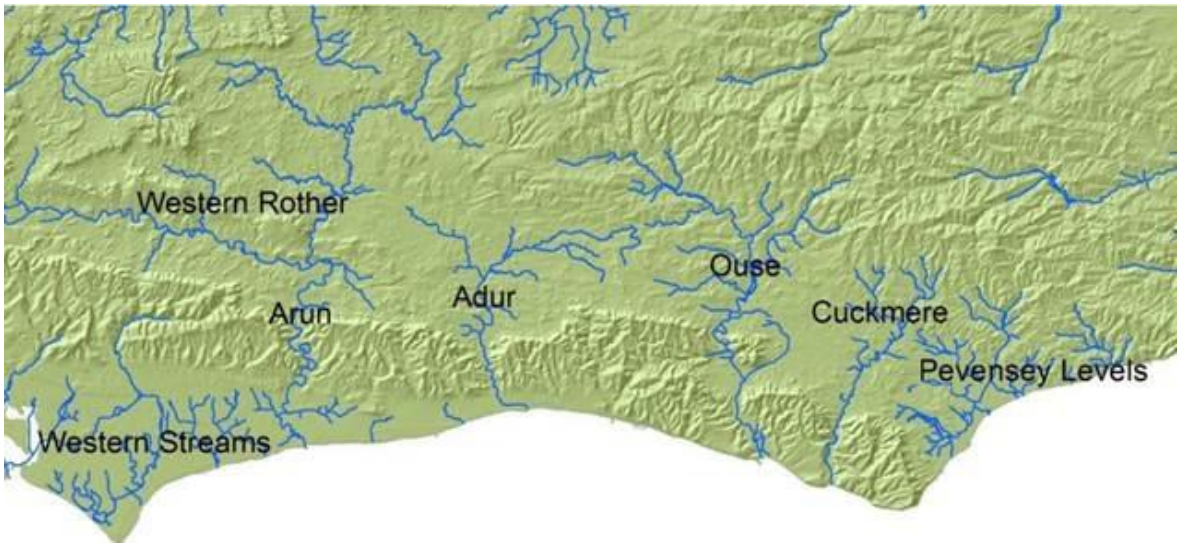
Narrow channels between tresses of Ranunculus, providing exceptional salmon parr habitat at Tanyards on the Broadlands Estate.

Executive summary

- Routine annual salmon parr surveys on the Test and Itchen indicated relatively low abundance in general.
- Wild brown trout abundance was generally slightly decreased but with some notably high catches at certain sites.
- Eel abundance remained poor, but with increases at some sites.
- Brook lamprey sampling showed widespread distribution and relatively high abundance but no juvenile sea lamprey were recorded.
- The 2020 salmon runs on the Test and Itchen were exceptionally large: the Returning Stock Estimate for the Test was the largest in 30 years of counting; the Itchen estimate was the sixth-largest in 30 years. We discuss evidence of potential links between salmon migratory success in inshore waters and the beneficial impacts of the first coronavirus lockdown on the marine environment.
- Salmon redd mapping in winter 2020/21 recorded exceptional numbers of salmon redds, with evidence of spawning relatively far upstream on both the Test and Itchen.

River catchments of Solent and South Downs

South Downs:



Solent:

1. Temperature and rainfall in 2020

Climatic conditions have a major influence on fish populations in both freshwater and marine environments. Rainfall influences flow, which is closely linked to physical habitat, migration and juvenile survival; temperature affects water quality, growth and spawning success. In this section, we're particularly interested in comparing temperature and rainfall patterns in 2020 with long-term average conditions, as well as looking at trends with regards to short periods of intense heat.

Please note: *Water situation information (including rainfall, soil moisture deficit, river flows, groundwater levels and reservoir levels) for your local area are produced on a monthly basis and can be found, here.*

- Figures TR1 and TR2 give monthly average temperature and rainfall values, respectively, compared with long-term averages and previous maximum and minimum values (blue shaded range). This format highlights any months where unusually high or low values occurred.
- Whereas the first two figures deal with monthly averages, Figure TR3 focuses on the single, highest daily average temperatures recorded each year, i.e. it represents the most significant heatwaves each year. Daily average values are for the whole 24 hour period, so are particularly influenced by unusually high night time temperatures.

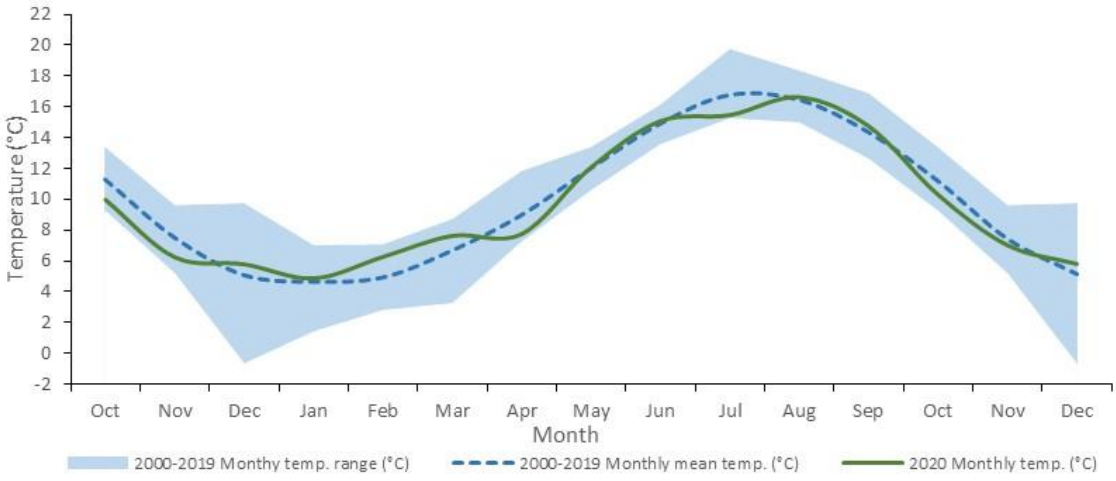


Figure TR1: 2020 mean monthly temperatures compared with long-term data

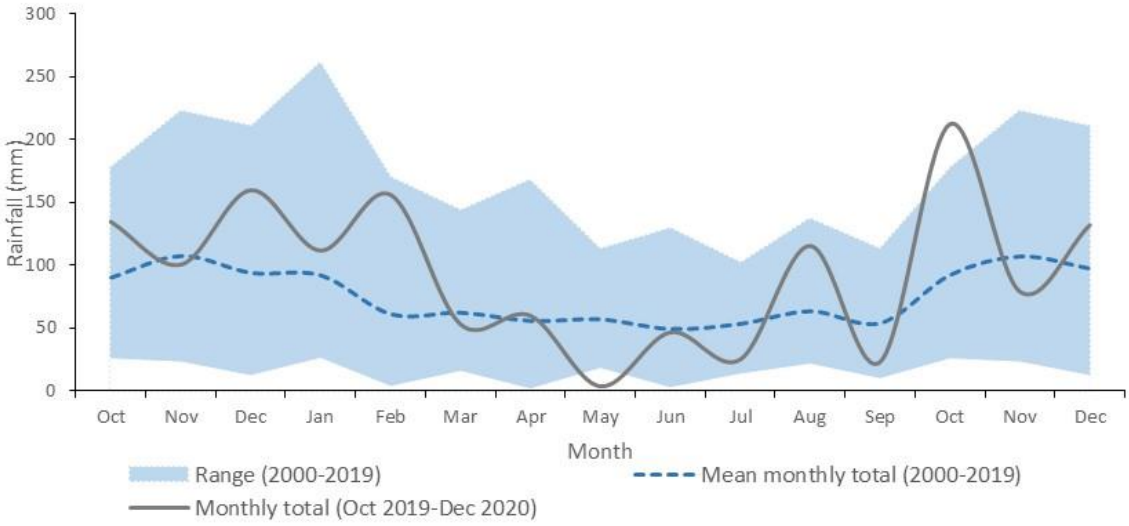


Figure TR2: 2020 mean monthly rainfall compared with long-term data

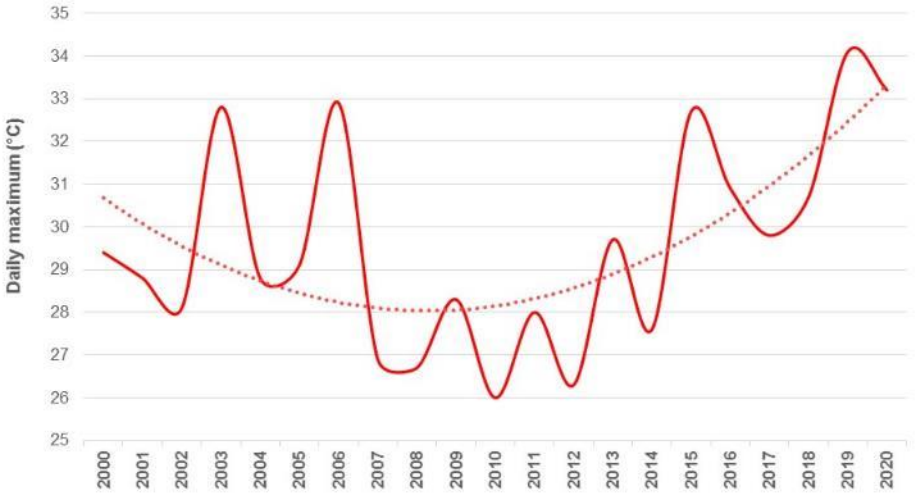


Figure TR3: Annual maximum daily average temperatures

Discussion:

- Figure TR1 indicates that 2020 was a relatively normal year in terms of monthly average temperatures: no values were outside of the 2000-2019 range, although October and November 2019 and April and July 2020 were close to the minimum temperatures averages recorded for those months. No monthly average was notably high.
- By contrast, Figure TR2 shows a great deal more variation in rainfall in 2020, with notably high monthly averages in December 2019 and February, August and October 2020: October 2020 rainfall exceeded the previous maximum for the 2000-2019 dataset. Rainfall in May 2020 was lower than the previous minimum for the month.
- Figure TR3 shows that the maximum daily average temperature in 2020 (33.2c, 31st July) was the second highest in the long term dataset, with an increasing trend in maximum daily average temperature evident since around 2010. Brief periods of

intense heat have the potential to impact fish populations as much as prevailing temperatures over longer periods of time. This is particularly true for salmonids, where water temperature approaches lethal limits or causes water quality parameters, especially night-time dissolved oxygen, to do so.

Lack of bankside shade can have a substantial effect on peak water temperatures, particularly during heatwaves. It's often remarked that some reaches were similarly devoid of trees decades ago when salmonid populations were more prolific – unfortunately, present-day climatic patterns are no longer similar to those times.

2. Test and Itchen drought monitoring fish surveys

2020 was the third year of our ten-year programme of annual, Water Company funded fish population surveys on the Test and Itchen, aimed particularly at juvenile salmonids. The 2020 programme comprised 22 surveys on the Test and 11 on the Itchen, distributed throughout the spawning range of salmon; lower reaches to Wherwell on the Test and lower reaches to Winchester on the Itchen. The technique used is 5-minute Catch Per Unit Effort (CPUE) fishing through good quality parr habitat, using a battery powered backpack electric fishing unit operated by a two-person team.
At each site, a juvenile lamprey survey, using a 1 metre square quadrat, is also undertaken.
The programme also includes a number of trout-specific surveys (which also yield other interesting species), involving a single-run with backpack electric fishing gear and fishing the full channel width of several small tributaries. In the Test catchment, this part of the programme includes two sites each on the River Blackwater, Cadnam River and Tadburn Lake, as well as a single survey on Romsey Canal. Ordinarily, we would conduct a similar survey on the Itchen at Woodmill breach channel, but this could not be completed in 2020, due to Covid restrictions.

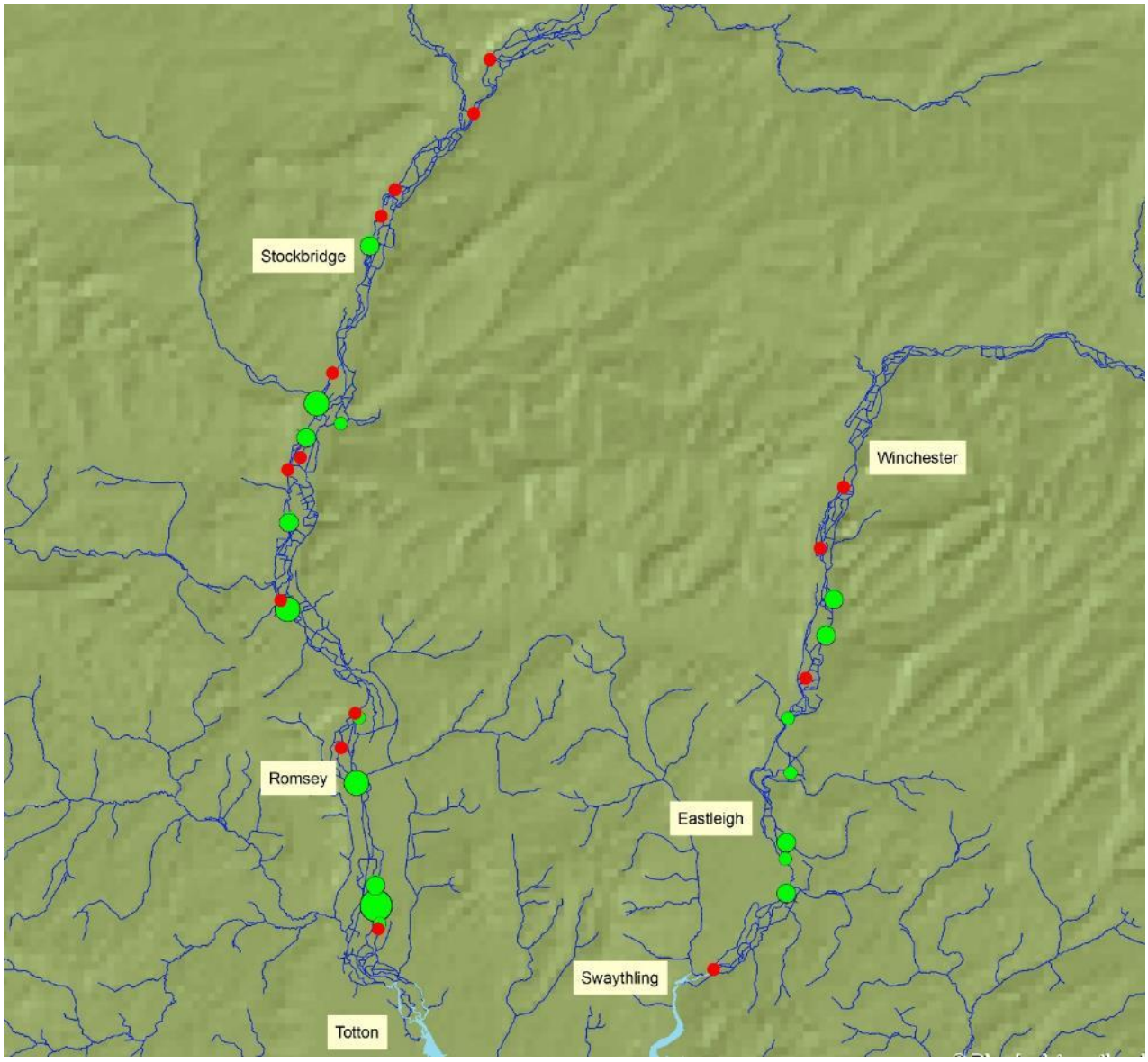
Salmon parr (left) and juvenile lamprey (right) surveys in progress

Results:

2.1. Catch Per Unit Effort survey results:

Map DM1 shows the locations of all salmon parr surveys carried out in 2020, with the markers sized proportionally to the number of parr caught - red markers indicate no salmon parr caught.

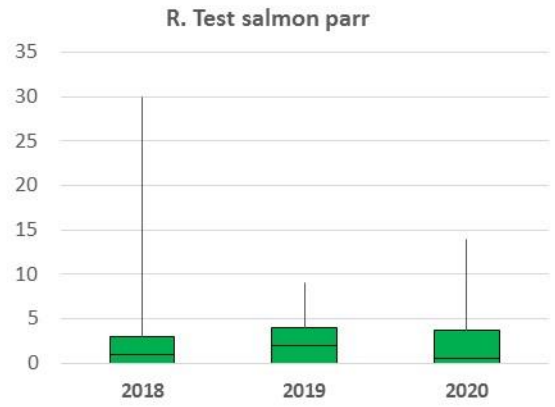
Map DM1: 2020 salmon parr survey locations & catches.

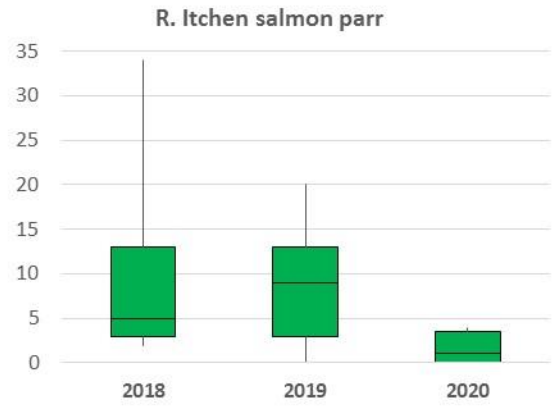


Figures DM 1 and 2, below provide summary results to date in the form of boxplots, for salmon parr. Although slightly challenging to interpret, boxplots convey a great deal of information in a small amount of space:

- Upper and lower error bars indicate the maximum and minimum catches at individual survey sites – the maximum catch sites in each year are named below each chart.
- Upper box edges indicate 3rd quartiles; lower edges indicate 1st quartiles.

- Horizontal lines within each box indicate median values (these are sometimes not visible, if the median coincides with the 1st quartile).





2018	Bossington
2019	Little River, Conegar
2020	Moorcourt

2018	Highbridge
2019	Bishopstoke
2020	Bishopstoke, Shawford & Lower Itchen

Figures DM1 and 2: Salmon parr catch boxplots

Comparison with existing salmon parr data:

Many of the survey sites included in the current drought monitoring programme on the Test have been sampled for salmon parr, using the same methods, previously, as part of our Salmon Action Plan (SAP) monitoring. Figure DM3 compares the total catches of salmon parr each year for the five most frequently sampled sites included in both the SAP and Drought Monitoring programmes (SAP sites on the Itchen are sampled using full-channel width fishing, so, unlike on the Test, the results are not comparable with the more recent drought monitoring surveys).

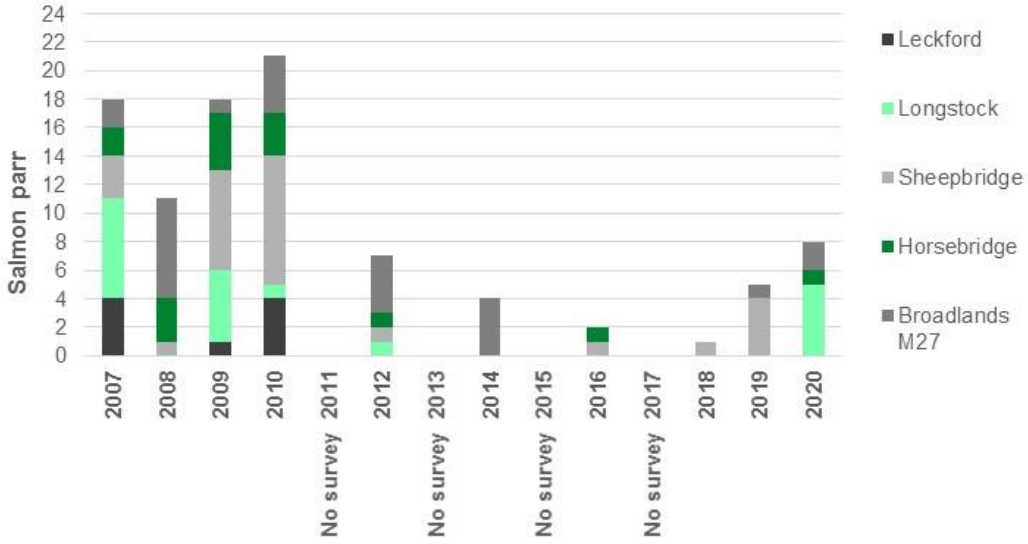


Figure DM3: Long-term data for five salmon parr sites

The SAP programme involves sampling a much larger number of sites once every six years: all of these sites used the same five-minute CPUE sampling method and fifteen of them on the Test are now included in the Drought Monitoring programme. Figure DM4 compares the total numbers of salmon parr caught at these fifteen sites during the six-yearly sampling (2010 & 2016), with those caught at the same sites in the past three years of Drought Monitoring.

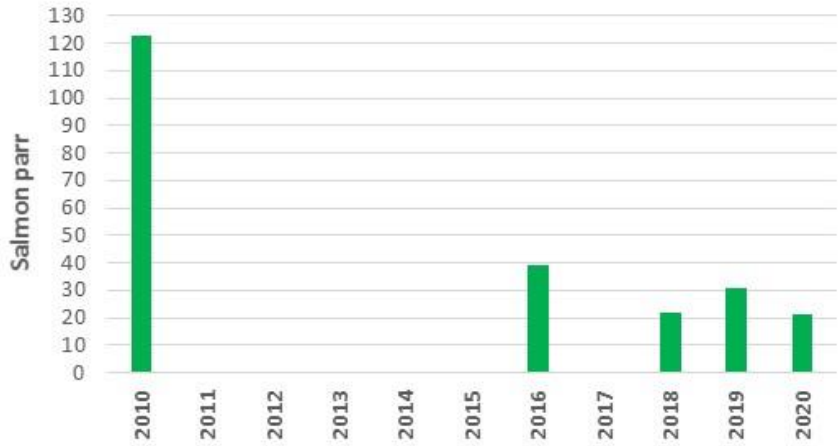
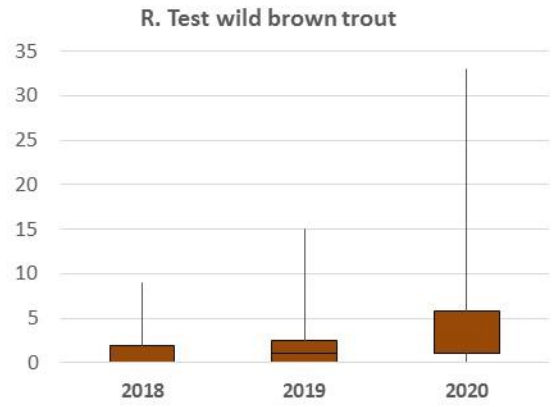
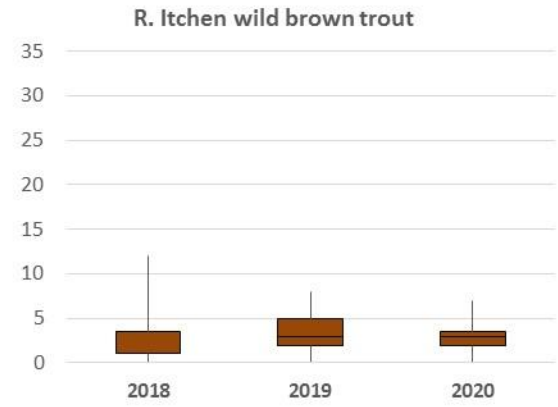


Figure DM4: Long-term data for fifteen salmon parr sites

Figures DM5 – DM10 consists of three pairs of boxplots comparing data for wild brown trout, eel and brook lamprey, respectively (brook lamprey data are derived from specific lamprey sampling in 1 metre^2 quadrats).

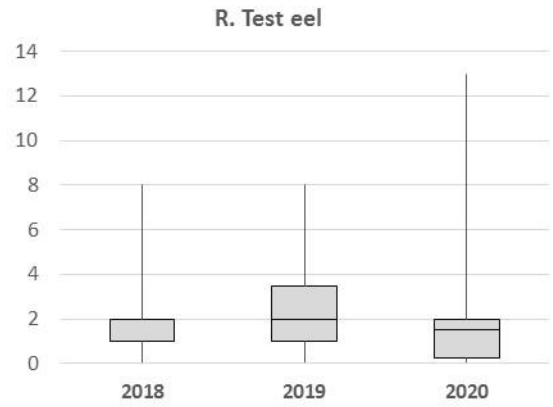


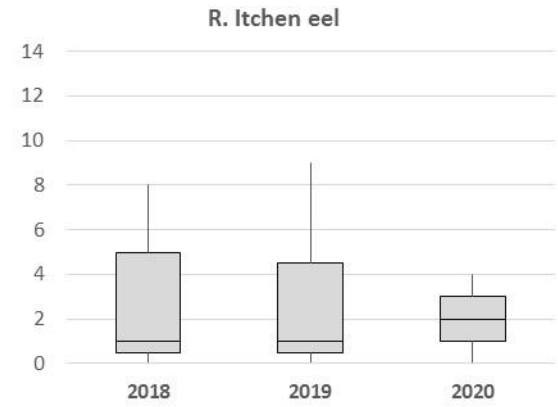


2018	Horsebridge & Freelands
2019	Mayfly Inn
2020	Horsebridge

2018	Winchester
2019	Bishopstoke
2020	Highbridge

Figures DM 5 and 6: Wild brown trout catch boxplots

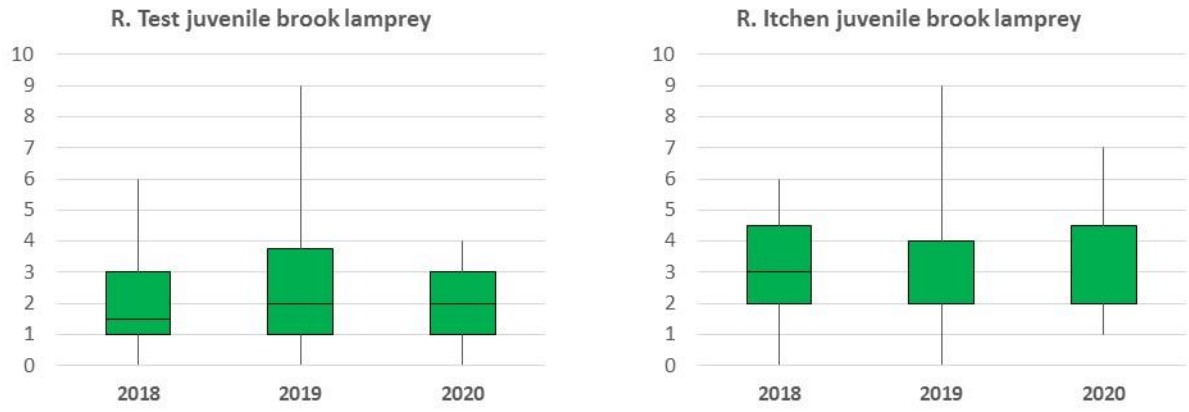




2018	Grayling island
2019	Broadlands
2020	Broadlands

2018	Bishopstoke
2019	Bishopstoke
2020	Highbridge & Bishopstoke

Figures DM7 and 8: Eel catch boxplots



Figures DM9 and 10: Brook lamprey catch boxplots

2.2. Single run survey results

Figure DM11 shows the numbers of each species caught per 100m^2, except for minor species (minnow, stickleback, bullhead, stone loach & lamprey) which are excluded for clarity.

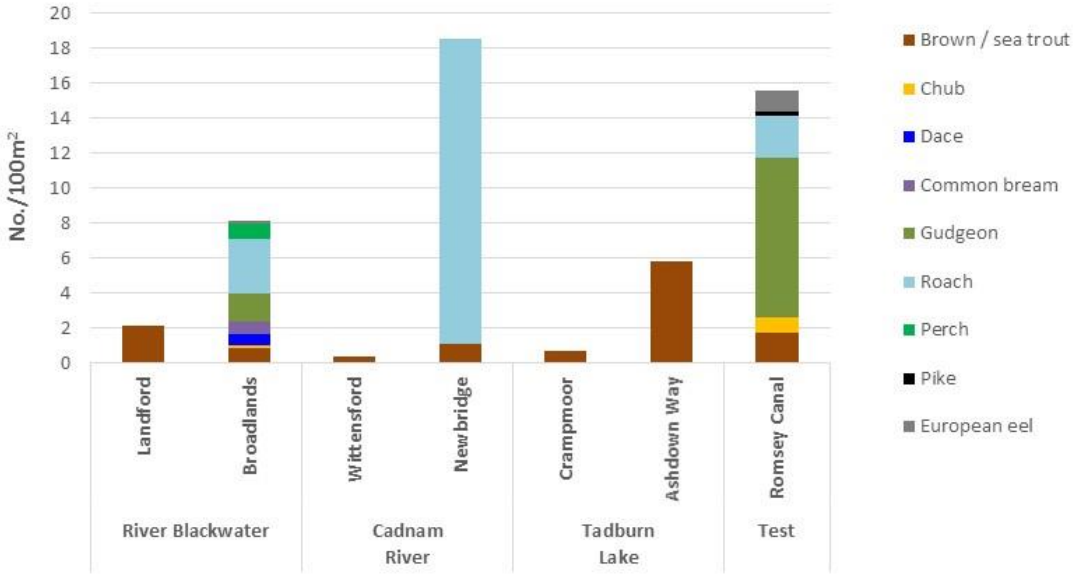


Figure DM11: Single run survey catches

Figures DM 12 and 13 compare numbers of brown trout and eel, respectively, caught in single run surveys at each site annually:

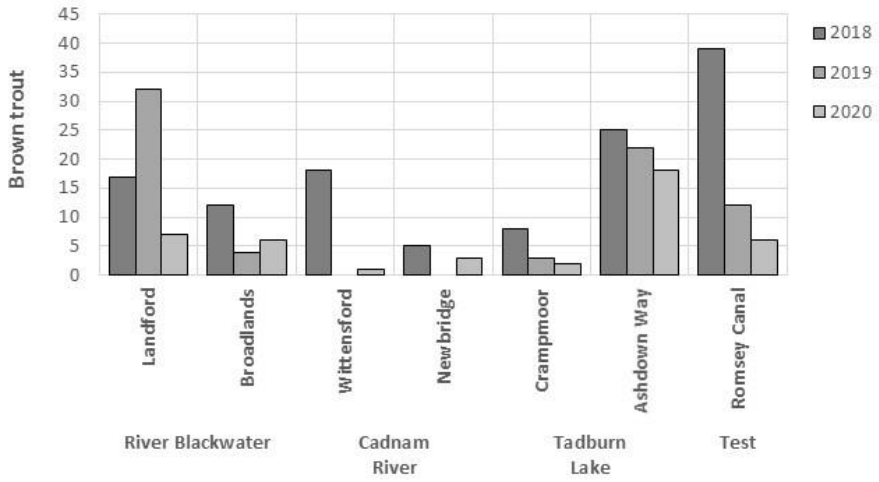


Figure DM12: Time-series single-run brown trout catches

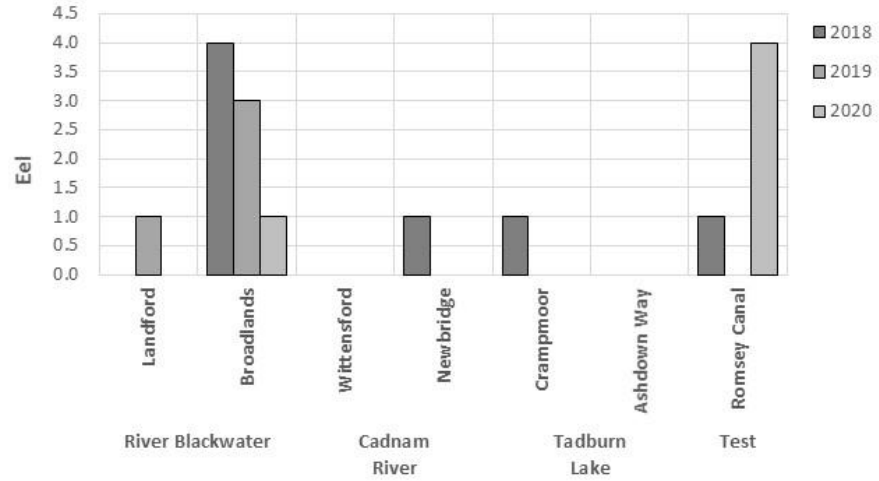


Figure DM13: Time-series single-run eel catches

Discussion:

- Catch Per Unit Effort surveys carried out in 2020 indicated low salmon parr abundance, as indicated in Map DM 1, figures DM 1 and 2. Figures DM 3 and 4 suggest that salmon parr abundance recorded in all three years of the Drought Monitoring programme (2018-2020) has been low relative to historic records. This is also reflected in the proportions of sites where none were caught: on the Test, the proportion of sites where this was the case was 39% in both 2018 and 2019 but 50% in 2020. On the Itchen, the proportion was 0% in 2018, 18% in 2019 and 36% in 2020.
- Figure DM5 and 6 suggest that wild brown trout numbers recorded in CPUE surveys (predominantly juveniles) were slightly improved on the Test but remained low on the Itchen. A notable maximum catch was made on the Test at Horsebridge, where well-executed habitat works over several years have created excellent conditions for parr in terms of water depth, velocity and *Ranunculus* growth. These results need to be considered in context: the CPUE surveys are located primarily on fairly wide main river

reaches, so results do not reflect wild brown trout abundance in the tributary and headwater reaches where they are typically at their highest.

- Figures DM7 and 8 indicate relatively poor eel abundance, with the exception of the farthest downstream site on the Test, on the Broadlands Estate, a short distance upstream of the M27 motorway, where 13 eels were caught. This catch included both small “bootlace” eels early in the freshwater phase of their lives and large silver eels, about to migrate back to sea.
- Brook lamprey quadrat survey results suggest that abundance and distribution are relatively stable on both the Test and Itchen and this is reflected in figures DM 9 and 10. The very low numbers of juvenile sea lamprey in the dataset and their absence from 2020 catches is cause for concern. In general, we have very little information on this enigmatic species but the two other measures of abundance we have, fish counter records and early summer spawning observations, suggest that numbers of returning adults have been very low for the past three years.
- Figure DM 11 highlights the diverse fish communities of the Broadlands and Romsey Canal single-run survey sites, as wells as the dominance of brown trout on the Tadburn Lake and the upper reaches of both the Blackwater (Landford) and the Cadnam River (Newbridge). Figures DM 12 and 13 compare catches of brown trout and eel at each site over the past three years and indicate that, in general, abundance of both has reduced. These surveys highlighted some problems with invasive, introduced non-native species, with American signal crayfish recorded at Landford and two topmouth gudgeon at Romsey Canal.

Clockwise from right:

Two topmouth gudgeon (invasive non-natives) from Romsey Canal.

Juvenile (top) and adult brook lamprey from Landford.

A perfectly formed juvenile wild brown trout.

Some Test tributaries are a stark to contrast to the classic chalkstream: this is the upper Cadnam River – always turbid and where flow is extremely variable.

CPUE survey at Bishopstoke on the Itchen.

A pair of salmon parr from the Test at Broadlands.

A beautiful day on the Itchen.

3. Salmon counters

3.1. 2020 Returning Stock Estimates

The Test and Itchen fish counters have been in operation since 1990 and they operated well throughout 2020. Numbers of salmon and sea trout recorded migrating upstream at the Test and Itchen fish counters in 2020 were exceptional. The Returning Stock Estimate (RSE) for the Test was far greater than the previous largest value: for 2020, we estimate that approximately 2,947 salmon ascended the Test. The second highest RSE was 2,007 salmon, in 2015. The five-year average RSE for the Test (2015-19) is 1,396. The preliminary Test RSE is therefore approximately 147% of the highest previous RSE and 211% of the five-year average. Note that the RSE is greater than the raw number of upstream counts because it is adjusted to account for salmon using non-counted routes. Conversely, the number of salmon that survive to spawn ("Spawning Escapement") is smaller than the RSE due to in-river mortality between being counted and the winter spawning period; this is typically around 15%.

2020 was also an exceptional year for salmon on the Itchen: our preliminary Returning Stock Estimate is 719, the sixth-highest recorded. The maximum recorded RSE was 903 in 2015 and the five-year average is 547. The preliminary Itchen RSE is therefore approximately 80% of the highest ever recorded and 130% of the five-year average.

Numbers of returning sea trout on both rivers were similarly remarkable: we estimate that the number of upstream sea trout counts on the Test was 1,341, which is 262% of the previous highest record, within the past five years and 342% of the five year average. For the Itchen, we estimate the number of upstream sea trout counts to be 628, which is 114% of the previous highest value within the past five years and 144% of the five year average.

Salmon migrating upstream in summer 2020 at Nursling Mill on the Test (left) and Gaters Mill on the Itchen (Right). The red glare in the left hand photo is from infrared nightlights.

3.2. Test and Itchen salmon population targets

Principal Salmon Rivers, including the Test and Itchen, have two salmon population targets set for them; firstly, a basic level below which the population is considered to be at risk – this is known as the Conservation Limit, and, secondly, a higher target that represents a sustainable level for the population with a degree of inherent resilience – this is known as he Management Target. Both targets are expressed in terms of numbers of eggs required to be deposited by spawning adults each year. We estimate the annual numbers of deposited eggs on the basis of our Returning Stock Estimates and estimated Spawning Escapement values.

Figures SC1 and 2 show annual compliance, for the Test and Itchen respectively, with each river's Conservation Limit and Management Target since counting commenced in 1990. Compliance is expressed as a percentage.

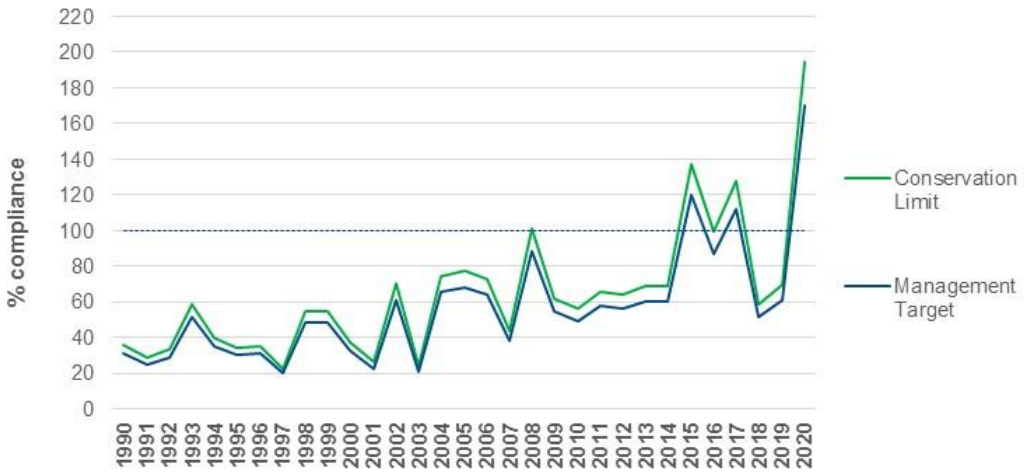


Figure SC1: River Test salmon population target compliance

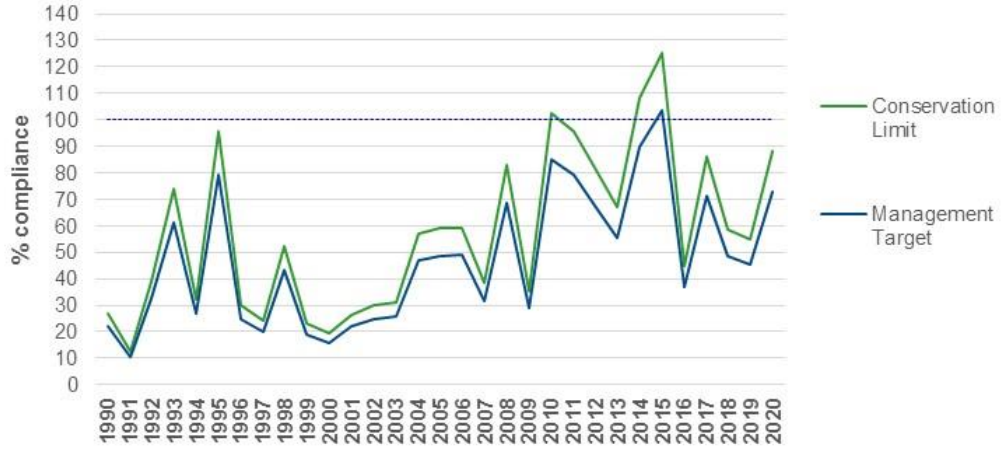
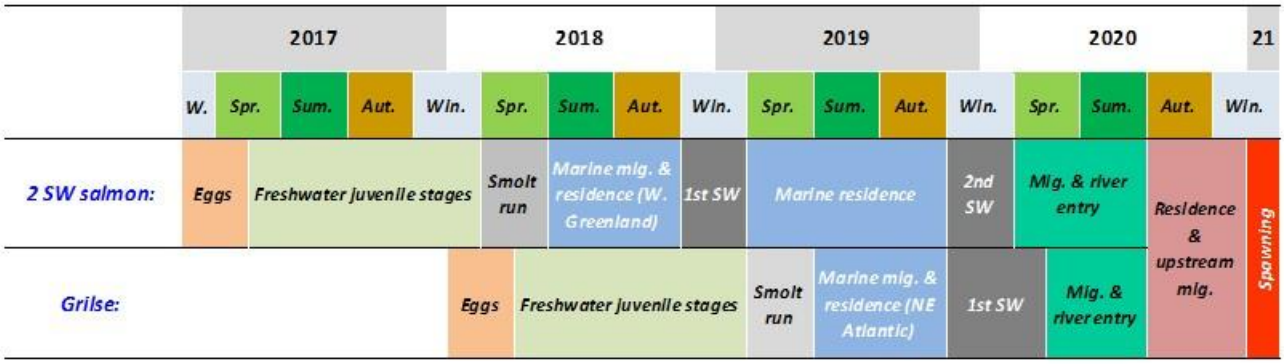


Figure SC2: River Itchen salmon population target compliance

3.3. Typical chalkstream salmon lifecycle timeline

Here we consider the life stages and journeys of those salmon that returned to the southern English chalkstreams in 2020: figure SC3 below provides generalised timelines showing the key life stages of typical 2-sea winter salmon and grilse (1-sea winter salmon).

Figure SC3: Generalised timeline of grilse and 2-sea winter chalkstream salmon.



3.4. Did the 2020 spring lockdown contribute to the Test & Itchen's bumper salmon year?

On 16th March, 2020 the Prime Minister announced that *"Now is the time for everyone to stop non-essential contact and travel"* and on 26th March, the first national lockdown came into force. Plans for easing lockdown were announced on 10th May; phased reopening of schools in England began on 1st June and non-essential shops reopened on 15th June.

This unprecedented period of restricted human activity had a profound effect on the marine environment: recreational boating and watersports ceased entirely; the cruise ship industry ground to a halt; commercial fishing, freight transport and ferry operations were severely restricted. The following three figures illustrate the extent to which the lockdown curtailed normal commercial activity in UK waters.

Figure SC4 is based on Marine Management Organisation's monthly UK sea fisheries statistics and shows the percentage reduction in total UK commercial fish landings and total number of commercial fishing vessel trips undertaken in the March to June period in 2020 when compared with the same period in 2019. These data represent vessels of all sizes, for demersal, pelagic and shell fisheries in England, Scotland, Northern Ireland and Wales.

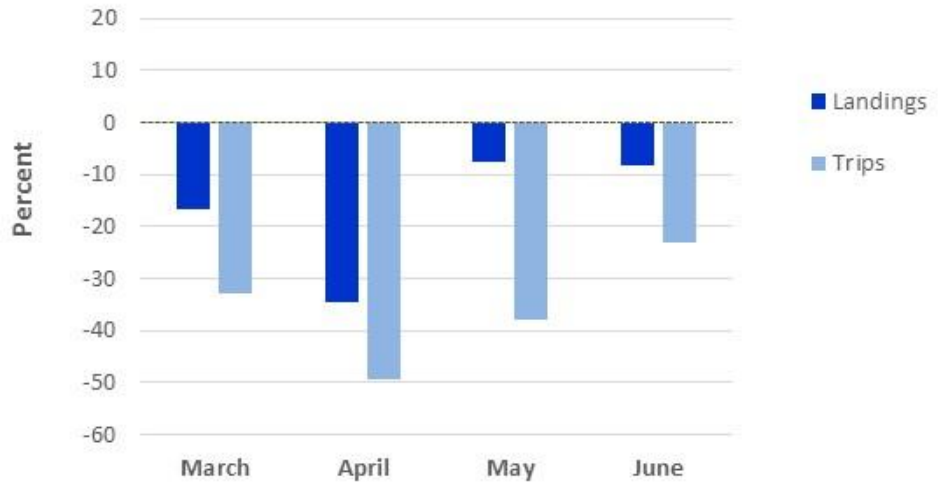


Figure SC4: Percentage difference in sea fish landings and trips between 2019 and 2020.

Figure SC5 is taken from the Department for Transport Port Freight Quarterly Statistics report: April to June 2020. It gives quarterly results from 2015 for both total UK port freight tonnage and numbers of units for unitised traffic (lift-off / lift-on & roll-on / roll-off units).

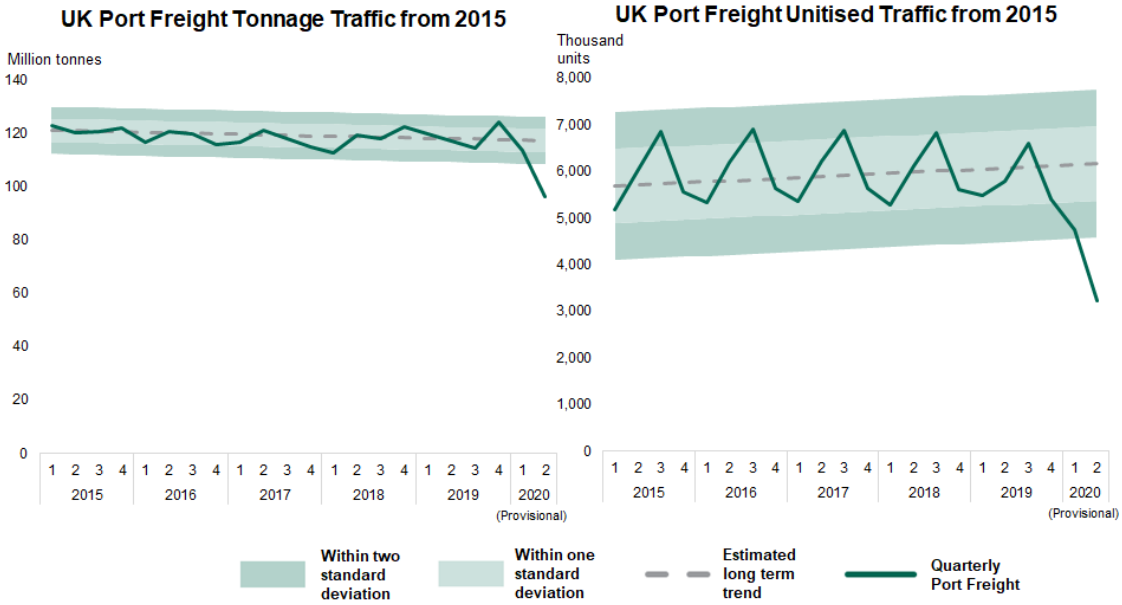


Figure SC5: Quarterly UK Port freight traffic, 2015-2020

Figure SC6 is taken from the Department for Transport's "Statistical Release", titled: "Sea Passenger Statistics 2020: Short Sea Routes".

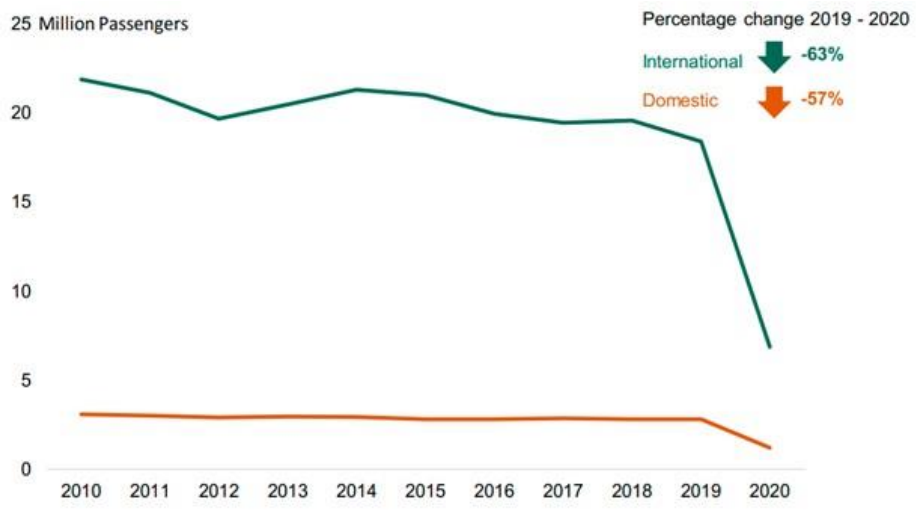


Figure SC6: UK international and domestic ferry passengers, 2010-2020.

The three figures above demonstrate the significant reduction in shipping activity and commercial fishing effort in UK coastal waters in spring 2020. This is likely to have resulted in improved conditions for a variety of marine species and, internationally, there have been many reports of such an effect, particularly with regard to water quality (including, famously, the unprecedented clarity of the Venice canals) and underwater noise. International monitoring on the latter has produced compelling data, leading marine acoustic scientists to declare 2020 *"The year of the quiet ocean",* as reported by the Guardian on 17th April, 2021. The article emphasises that the impacts of the reduction in anthropogenic marine noise were most evident in coastal areas and shipping lanes.

So did the unique conditions in UK coastal waters in spring 2020 benefit the Test and Itchen's Atlantic salmon and sea trout populations and contribute to the remarkable abundance of both species recorded at our counters? If they did, what were the mechanisms?

The timing of the lockdown may have been important: the March to June period is when a large proportion of returning adult migratory salmonids enter their natal estuaries, with a large proportion of these resting within the lower river, between the head of tide and the counters, which are around a mile upstream (the major runs recorded by the counters in autumn are thought to be a mix of multi sea winter fish and grilse that have been resident in the lower river for some weeks).

The migratory routes of Test and Itchen salmon returning from their winter feeding grounds take them through areas of both intense commercial fishing activity (the entire UK western seaboard and English channel), as well as intense shipping and industrial activity in inshore waters. This suggests that accidental by-catch (in a range of different fishing gears) and noise disturbance should be considered as potential constraints on salmon

migratory success that were significantly eased during the spring 2020 lockdown – it's important to recognise that, while noise disturbance of migratory salmonids in estuarine waters is highly unlikely to be directly lethal, it does have the potential to prevent affected fish from entering the river and succeeding in their spawning migration.

Sea trout migrate far less distance than salmon, typically feeding at sea within 100 miles of their natal rivers. Therefore, the success of this species in 2020 suggests that some form or forms of constraint were eased within this limited range. It's worth considering that, under normal circumstances, the port of Southampton is the UK's busiest vehicle handling port; it is the second largest container terminal in the UK and it handles around 2 million cruise and ferry passengers annually. It is also home to the UK's largest oil refinery. The Solent is a major shipping lane for passenger, freight and military vessels and experiences very high levels of recreational boat traffic. In the spring and early summer of *"The year of the quiet ocean"*, it's likely that the Solent and Southampton Water experienced a dramatic reduction in underwater noise and suspension of sediment by large vessel movements, compared with any other year in recent decades.

A crucial indicator will be whether or not salmon and sea trout abundance of this magnitude occurs again in the next few years, presuming that estuarine and marine conditions remain back to normal levels of disturbance. We will continue to monitor in order to better understand the extent to which the 2020 salmon and sea trout runs were outliers; this, in turn, will indicate the significance of the factors affected by the lockdown as pressures on populations of these fish.

3.5. New counter for the River Test

In late 2020 we constructed an entirely new salmon counter on the Little River Test, a previously un-counted branch of the lower Test, parallel with the existing counter at Nursling on the Great Test. The new counter is already fully functional and has indicated that the Little River is surprisingly busy as a migratory route for smaller sea trout and that the resident brown trout appear to roam up and downstream with remarkable regularity. Several salmon have been recorded; the first of these to be photographed is shown below.

The new salmon counter at Conegar on the Little River Test & the first salmon photographed.

4. Salmon redd mapping

Introduction

Winter 2020/21 was the third year of planned, consistent redd mapping on the Test and Itchen. The project was set up in 2018 as one of the several fish monitoring components of the Water Company-funded Test and Itchen Drought Monitoring Programme. The aim is to record the locations of salmon redds each year in order to better understand the relationships between redd distribution and environmental conditions, especially flow. This is to provide a baseline to assess potential impacts of drought years.

The numbers and distribution of salmon redds in this survey period are of particular interest because the 2020 salmon runs on both rivers were unusually large.

Methods

Redd mapping on the Test and Itchen is carried out during February so that spawning is largely completed and redds are as recent and prominent as possible. Survey days are carefully planned around the weather to take advantage of the lowest possible turbidity. Surveys are carried out on foot, using polarising glasses and the surveyor is often accompanied by the Keeper, who is invariably able to offer valuable guidance and information on spawning observations over the previous few weeks.

This year, we recorded all redd locations using the "What3Words" app, which has useful data storage and management features. Hard copy, back-up records are also made in the field, using pencil and paper.

On both rivers, we aim to survey as much of the river as possible between specific downstream and upstream points; on the Test, this is the M27 motorway bridge upstream to the Mayfly Inn, Fullerton, and on the Itchen it is from Mansbridge upstream as far as

Durngate Hatches, Winchester. Within these two reaches, only river sections that provide areas of suitable spawning habitat are surveyed. On some reaches where numbers of redds tend to be relatively low, we may consult the Keeper rather than survey ourselves. There is inevitably a small amount of variation in the survey extent in different years, as a result of access being available or unavailable, or due to adverse flow conditions.

This year, the total channel length surveyed was 54km on the Test and 38.2km on the Itchen. Salmon redds were reported at Wherwell and Longparish on the Test, upstream of the programmed redd mapping reach, but formal surveying could not be extended beyond the regular boundary at the Mayfly Inn. However, following reports of redds upstream of Winchester, the surveyor was able to extend this year's coverage to Easton Bridge, slightly farther upstream of the programmed limit at Durngate. The confirmation of salmon redds in this reach is unusual, despite the presence of a fish pass at Durngate.

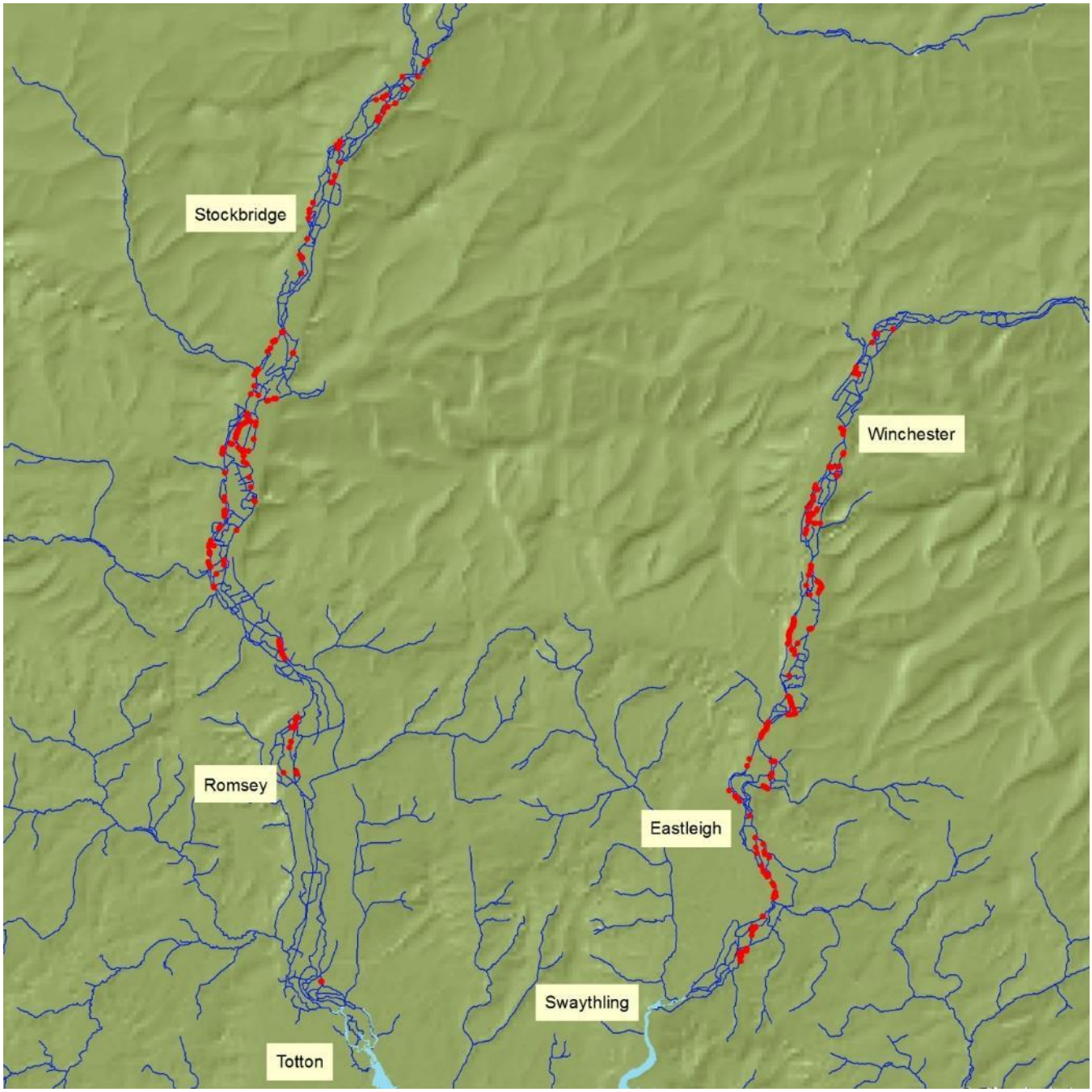
Spawning is the end of the line for most salmon: this vividly coloured cock fish was found close to redds at Kimbridge. Unusually it hadn't yet been damaged by predators or scavengers.

Even before spawning, in-river mortality is considerable: having entered freshwater it's estimated that 9% of salmon die before reproducing.

Results

Map RM1 shows the salmon redds located in February 2021 on both rivers. The omission of detail from the map is deliberate and avoids providing the specific locations of prime spawning areas.

Map RM1: Test & Itchen salmon redd locations winter 2020/2021



Tables RM1 and 2 give summary statistics on redd counting over the past three years on the Test and Itchen respectively - please note:

Length: *length of channel surveyed (Km)*

RSE: *Returning Stock Estimate; estimated size of the salmon run, based on counter data*

u/s NTL: *average distance of redds upstream of the Normal Tidal Limit (Km)*

Flow: *maximum flow recorded from 1st November to 31st January (cumecs / m^3/sec.)*

Table RM1:

Test	Length	Redds	RSE	Redds/Km	u/s NTL	Flow
2018/19	51.4	69	683	1.3	9.3	15.1
2019/20	52.2	39	984	0.7	13.8	31.1
2020/21	54	261	2,947	4.8	15	27.2

Table RM2:

Itchen	Length	Redds	RSE	Redds/Km	u/s NTL	Flow
2018/19	32.1	100	355	3.1	6.79	4.64
2019/20	32.1	27	475	0.8	6.39	9.64
2020/21	38.2	244	717	6.4	8.33	8.87

Discussion

Redd mapping in February 2021 was completed successfully, in conditions of good visibility during breaks in the wet weather. Access availability and support from Keepers and landowners was exceptionally good. Numbers of redds mapped and observations on spawning provided by Keepers and anglers indicate very good spawning seasons on both rivers, commensurate with numbers of salmon recorded at the counters in 2020. This does not guarantee high parr abundance in summer 2021 nor a subsequent strong smolt run in spring 2022, but it greatly increases the chances of these outcomes.

The data in tables 1 and 2 reflect the obvious relationship between returning stock estimates and redds observed per kilometre, but also between average distance from the NTL and winter peak flow. However, the relationship between salmon migration and flow patterns throughout the year is complex and requires quite in-depth analysis. Also, the data suggest that the effectiveness of redd mapping in winter 2019/20 was probably constrained by the very high flows and turbid conditions. More importantly, there are currently only three data points with which to assess these potential relationships; a clearer picture will develop as subsequent data is added.

5. Looking ahead

Despite continued Coronavirus restrictions on fieldwork, we will deliver a great deal more essential fish monitoring in summer 2021, including:

- The water-company funded drought monitoring elements covered in this report.
- EA's own National Drought Monitoring Network surveys (Itchen & Ouse).
- A range of Water Framework Directive investigation surveys on the Isle of Wight, Monks Brook, Test and several other catchments.
- A range of surveys in support of specific EA fisheries and river habitat improvement projects in Sussex and Hampshire.
- Southampton Water estuarine fish surveys (if Covid related restrictions on boatwork are lifted before the autumn survey period).
- Coarse fish surveys on the Wallington.
- Wild brown trout surveys on the Meon, Lymington and Beaulieu.

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