The Black Bream Project

Revealing the secrets of black bream breeding behaviour off the Dorset coast



A report to the British Sub-Aqua Jubilee Trust, May 2016

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Summary

In 2015 I was awarded a BSA Jubilee Trust Grant for £1,110 toward a project studying the breeding behaviour of black bream along the Dorset coast using remote video and camera methods. Cameras were placed on the seabed in known nesting areas to record the behaviour of the fish throughout the nesting season. Attempts at improving upon still images with a digital SLR were also undertaken.

The project began in April 2015 and focused on a site close to Kimmeridge Bay in Dorset. The bream arrived in early April and our seabed cameras captured footage of huge shoals of fish and early nesting behaviour. By early May the first nests appeared and we were able to gain footage of males attracting females to inspect nests and even males fighting over nests. Eggs were soon laid and our footage revealed secrets of the male parental care of the nests including predator defence and nest cleaning behaviour. Additional footage was gained from sites in Swanage and Poole Bays which captured different aspects of behaviour associated with varying seabed typology and the additional, often predatory species present.

A period of stormy weather in mid-May destroyed many nests though a few persisted. At this point it seemed that the annual nesting period was over but subsequent dives in June captured a second spawning event with the eggs hatching in July. It was not known that a second spawning event might occur at the same site and this observation has been of great interest to many biologists.

The resulting video footage from the project so far is considered unique and reveals previously unseen footage of this species breeding within the UK. We attended the Institute of Fisheries Management Annual Conference in October 2015 in Plymouth and presented our work which received great interest from many scientists. Further talks on the project are planned for 2016 and 2017. The video files and images have been used subsequently by Natural England and the Southern and Sussex Inshore Fisheries Conservation Agencies at stakeholder meetings to present the findings and educate anglers, commercial fishermen and industries of the challenges the black bream face during their spawning season. The footage has received a huge amount of positive feedback from all types of stakeholder on its ability to demonstrate the reasons for management processes in place and to educate people as to the existence of this incredible seabed engineer. We have written an article and given images to Dorset Wildlife Trust who printed the story in the May 2016 edition of their magazine.

The stormy weather in May 2015 meant that fewer dives could be completed than planned. There are still behavioural insights and different images to capture so in March 2016 we began again. In 2016 we are using modified techniques to capture different and improved images and video of the bream once again and add more to our story of this charismatic species.

The project is not over. There are more videos to analyse, more stories to tell and more people to reach.

Introduction

Black Seabream (*Spondyliosoma cantharus*) is a prized sport and food fish which migrates inshore in spring to breed. The timing of the breeding migration is thought to be governed by temperature with the fish following the 9 °C isotherm eastward up the English Channel. They seek out areas where a thin layer of mobile gravel, sand or shells cover over a hard surface. The males are reported to use their tail to expose the rock surface below on to which the females lay their eggs, firmly sticking them to the rock surface. To date, observations of black bream breeding behaviour are from aquarium habitats and detailed field observations have not been made. The species is shy, often avoiding divers who rarely seen the fish, its presence often only indicated by the large nests encountered by divers on the seabed. The advent of small underwater HD video cameras means that many of these behaviours can now be recorded for subsequent analysis.

Black Bream are known to breed in areas off Kimmeridge Ledges in Dorset and at other sites in Hampshire, Sussex and possibly Cornwall and Wales (Figure 1). One such breeding area near Kimmeridge provides a concentrated area of bream nests across an area approximately 50-metres by 200-metres in 16m depth and adjacent to a bedrock reef wall some 4-5m high. The area consists of bedrock of covered by small pebbles of Kimmeridge shale, gravel and sand. Amongst the loose surface covering, the area contains scattered flat limestone rocks. For the majority of the year the upper surface of the rocks is level with the general seabed gravel and sedimentation such that it appears a predominantly flat seabed surface.



Figure 1: Probable and known spawning areas for black bream (red areas).

In April and early May the first sign of their arrival for divers is that the area takes the appearance of a lunar landscape, being covered extensively in craters excavated in the shingle to form the bream nests, each being typically 1 to 2 metres across. Most of the craters are formed around slabs of rock that are cleared by the bream to expose a clean, smooth surface. [see Photo 2]. The eggs are eventually laid on the top surface of the

cleared rock [see photos 5-7]. The craters are close together, in most cases they are best described as adjacent.

Black bream are shy fish and even for divers who are aware of their nests and where to find them direct encounters with the fish are rare as they retreat when divers near the nests. Occasionally bream will be seen hovering at the limit of visibility and if the diver is patient, the fish might, with caution, come closer. To our knowledge, no field observations exist of black bream breeding behaviour prior to this project. We used cameras placed near to and on the edge of bream nests to capture footage throughout the breeding period. The aim was to capture behaviours not previously recorded and use the footage to inform other divers and the wider public about the species and its breeding behaviour.

Methods

Preliminary observations of bream nesting behaviour were made in 2013 and 2014 and occasionally referred to here. The main results reported here were obtained in 2015 along with some early results from 2016.

The original intention was to focus the main study in Poole Bay in the Poole Rocks MCZ and at a site near to Kimmeridge, both in Dorset. A combination of poor weather conditions and boat availability meant few opportunities were available in Poole Bay and the study focused primarily on the Kimmeridge site where visibility and conditions were generally excellent throughout the season. Single visits were made to sites in Poole Bay and Tanvil Ledge in Swanage Bay.

During each day's survey activity divers entered the water and conducted a brief search of the vicinity to check for nest presence and extent, nest size and egg presence whilst making any other notes of site conditions and other species observed. Divers then deployed and activated up to three Go Pro cameras in the nesting area. When nests were present, the cameras were placed on the nest periphery to film the activity over and around the nest. When nests were not present, cameras were placed at random on the seabed to record any activity in the area. Once cameras were placed divers left the site and returned to the surface. Camera battery life was typically of three hours duration and divers remained off site during this time to avoid any potential disturbance to the site. Cameras were then retrieved later in the day and the footage downloaded.

Whenever possible, surveys were undertaken at least once a week whenever a suitable tide and weather window permitted.

Results and observations

Survey timeline

In general the work in 2015 was a great success. As a team we have recorded the entire cycle from fish arriving on site, through nest construction and egg-guarding until all eggs had hatched. We obtained footage of male:female interactions, males fighting over nesting areas and footage of males removing egg predators and other unwanted species from within the nest area. The data have confirmed some known behaviours from aquarium observations and revealed new behaviours not previously recorded. The video footage can be pieced together to narrate the breams' story and the images obtained in parallel to the footage capture detailed moments in the breams' daily lives. Table 1 below details the survey dates and significant observations throughout the breeding period.

Table 1: Survey dates and significant observations on 2015. All observations are from Kimmeridge unless otherwise stated. The images referenced are shown following the description of the main behaviours observed.

Date	Observation	Image reference			
	2015				
6 April	No bream present	n/a			
8 April	Large shoals of bream present swimming back and forth over the site. Occasional inspections of the seabed by male fish. Small nest excavations present.	Photo 1			
13 April	Large shoals of fish persisting. Male fish building nests and occasional visits to nest by females.	Photo 3			
15-16 April	Male fish established on nests with occasional fights over territory. Female nest inspections. No eggs laid.	Photo 4			
17 April	Male fish agitated at spider crabs passing though the nesting area. Active male displays to attract females with colour changes observed. Female interest in nests.	Photo 10			
24 April	Male fish established on nests. Female nest inspections continuing. No eggs laid.	Photo 4			
4 May	Eggs observed on nests. Males actively guarding nests.	Photo 7			
5-9 May	Force 9 storms destroy many nests.	n/a			
10 May	Observations demonstrate many nests close to reef wall were destroyed and eggs scoured from the seabed.	n/a			
16-17 May	Dives in Swanage Bay at Tanvil Ledge recorded male nest guarding in a different habitat and seabed substrate with more silt.	Photo 13			
23 May	Bream persisting at Kimmeridge with well-developed eggs on remaining nests.	Photo 12			
31 May	By the end of May all eggs at this site had hatched and the bream had gone. Any nest structures remaining were clearly not maintained and covered in thin layers of silt.	n/a			
7 June	Inspection of nesting site in deeper water near Kimmeridge. No eggs observed.	n/a			
8 June	Dives in Poole Bay over three known bream nest sites. Spawning complete at most sites but a few nests with unhatched eggs remained at one. Footage obtained of egg predation of an unguarded nest (male fish obviously disturbed by divers) by black gobies, pouting and even a juvenile bream.	Photo 14			
22 June	A surprise second spawning occurred at the Kimmeridge site. This was an event not recorded previously and has shed new light on the species' breeding behaviour.	n/a			
2 July	Increased temperatures meant eggs hatched within 10-12 days. No	n/a			

Date	Observation	Image reference		
	further spawning behaviour after this date.			
2016				
31 March	Water temperatures were higher than usual and reports of bream being caught as early as 21 March off the Isle of Wight. First dive to inspect site and test new camera equipment. Visibility too poor to assess for bream presence or not.	n/a		
13 April	Visibility still very poor. No footage obtained but some evidence of small excavations at Kimmeridge.	n/a		
28 April	Eggs observed on nests suggested spawning had occurred within the past few days. Many dog whelks observed feeding on eggs on 'silted nests'. Few adult fish observed which is confusing.	Photo 15		
4 May	Further efforts with new fixed cameras and video systems.	n/a		
5 May	Further efforts with new fixed cameras and video systems.	Photo 16		

Typical behaviour patterns

The main behavioural traits observed during 2015 are described below. There has been a typical pattern in the observed bream activity when the camera has been in place. Within 10-20 minutes of the diver moving away from the area, bream are seen to return. These bream may be seen initially as a shoal, but relatively quickly a single male bream returns to the nest and stays in the vicinity. Frequently other single bream approach and shoals might be observed to pass by, but the same bream remains constantly in the vicinity of the nest for the entire period, at least until the camera battery runs out.

Shoals

Early in the breeding period, the first activity recorded by the camera after the diver moves away is of a shoal of bream passing across the nest vicinity. When eggs are present on the nest, the first bream often seen is the resident male returning to their individual nests and re-establishing their territory. After the male has returned to guard and tend the nest, the occasional shoal might still be seen passing over or around the nest area. These appear to be female bream, being slightly smaller and lighter coloured than the guarding males but this is not completely clear from the current observations. These shoals of female bream have been observed to continue after the eggs have been laid and hence do not appear to be simply associated with the mating period. The male fish will occasionally make an effort to deter these larger shoals if they venture too close to a nest with eggs. [see Photo 1]

Proximity to nest

The male bream typically stays in close proximity to the nest frequently maintaining a position less than 10 cm from the eggs. He is observed to frequently swim across the eggs, "wafting" or "fanning" them with his tail. It is not clear whether this is to create a level of aeration or to keep the eggs clear of silt from the water, or both.

Frequency of cleaning eggs

Compared to activity observed on different site in 2013, the frequency of this activity was much higher in 2014 and might be owing to increased silt levels in the water or simply due to natural variation. However, these

observations were based only on individual fish. Analysis of the 2015 video data will provide a more detailed and quantitative answer.

Clearing debris from the nest

On one occasion a few pieces of shale and gravel were deliberately left on one end of the rock that formed the base of the nest, but away from the eggs in the centre. When the male bream returned this debris clearly caused significant consternation. He initially remained much higher above the nest (30 cm) and examined the stones. He continued to chase away other fish but constantly returned to look at the debris. After about 20 to 30 minutes he approached the shale, picked up the largest piece in his mouth and swam to the edge of the nest crater before dropping it. He then returned to clear the rest of the debris, either by physically lifting and moving, clearing the smaller pieces either by brushing them off with his body or by wafting with his tail. Once the debris was clear he returned to the normal behaviour of remaining close over the nest. The reason for this behaviour is uncertain but similar observations have been recorded of the male removing slow moving predators from the nest just as netted dog whelks. This removal of debris could be either a case of mistaken identity or to reduce the risk of the stones moving closer and causing damage to the eggs.

Colour change

The colouration of adult bream is reported to be silver, tinged with blue and may have broken golden longitudinal lines. Mature males are larger and they exhibit a humped shoulder, a concave forehead and during the breeding season may appear dark silver to black with an iridescent blue-grey band between the eyes.

The males have been observed to rapidly change colour from silver to black with vertical white bars. This colour change has been observed when deterring potential rival males from a nest area, when attracting females to a nest and when predators approach the nest. Females will also change to a black colour with horizontal white stripes when approaching a nest to inspect both it and the male fish.

Egg laying behaviour has not yet been recorded so any associated colour changes have not been observed.

Raised dorsal

Occasionally when other fish come too close they are chased away, at these times the male raises his dorsal fin, making himself appear larger than his normal size in what appears to be a sign of warning or aggression. The same behaviour is observed when a female approaches and rather than being chased away, is allowed to swim across and inspect the nest area [see Photos 3 and 4].

Predator defence

The level of defence against predators appears to be very site-dependent. At Kimmeridge the seabed consists of mobile gravels and the nesting area is devoid of much life, consequently the main predators appear to be hermit crabs, netted dog whelks and ballan wrasse. In contrast the nests in Poole Bay surround rocky reefs supporting a large amount of life and the bream have to defend regularly against goldsinny wrasse, tompot blennies, rock gobies, black gobies, pout and even juvenile bream. Often the male bream simply chased predators away from the nests but deterrence of larger fish like ballan wrasse involved direct physical contact and an element of fighting [see Photos 8 and 9].

Proximity of diver

Even with the diver beyond the limit of visibility but still in the vicinity, the activity of the bream is disturbed. The diver may be out of visible range but their presence in the vicinity is considered sufficient to stop the male fish returning to within proximity of the nest. During one dive where the diver remained in the water but was beyond the visible range of the nest, with the exception of one fish, the diver saw no sign of the bream during the dive. The presence of the diver was sufficient to stop the male returning to the nest however a shoal of bream appeared several times on the GoPro.

When there are no divers in the water, the presence of the boat and noise from the engine appears to have no direct effect on the bream. As soon as a diver returns to the water, in relative proximity to the nests, the bream activity changes and they move away.

Behaviour analysis and timeline

The videos are being analysed to provide a form of quantification to the results obtained. This was planned to be completed during winter 2015-16 but was delayed due to illness. A full quantitative analysis will take place following the collection of more data at the end of the 2016 season. Despite the delay in this project element it is a small part of the project, the main value of which has already been proven to exist in education and engagement and use in management decisions. Whilst the quantitative data to be collected from the video will be interesting, their usefulness will perhaps be less so than the information already obtained.

The behavioural observations to date have helped inform anglers who often release females and retain males that the practice could be detrimental to the nest/egg survival as predation is almost guaranteed to occur when the male fish is off the nest. There was also some deliberation as to whether or not the male fish guarded the nests all the time. Our videos demonstrate that it is highly likely the male fish do guard the eggs all the time as they return to the nests soon after divers leave the area and remain for the duration of every video. Furthermore, scientific literature suggests the breeding migration and behaviours are driven by temperature. Our records of the timing of the breeding cycle coupled with temperature readings from the site suggest this might not be the case and other influencing factors could be at play.

Aside from the individual behavioural observations, each of which demonstrates critical stages in the breeding cycle, the footage as a whole can be pieced together to tell the full story of black bream breeding behaviour. This itself will provide a unique educational insight into the life of a species that is otherwise seldom seen or considered by divers and the general public. Following collection of additional footage this year we plan to make a short film about the species summing up this love story beneath the waves!

Project images

Many of the images below are stills from the video sequences obtained but illustrate the main behaviours observed and the timeline of events over a spawning season.

All images by Matt Doggett and Martin Openshaw.



Photo 1: Late March Early April – black bream arrive on site in huge numbers.



Photo 2: Nest building begins in earnest. Nests can vary from being 2ft to over 6ft in length/diameter.



Photo 3: Males attempt to attract female fish.



Photo 4: Females inspect the nests (and perhaps the males) for suitability.



Photo 5: Spawning has yet to be caught on camera and the first signs we know it has occurred are from direct observations.



Photo 6: Some nests reach huge sizes and appear to contain multiple batches of eggs.



Photo 7: Oil globules are visible in newly laid eggs.



Photo 8: With males off the nest, predators like this ballan wrasse are quick to move in.



Photo 9: A male bream attacks the ballan wrasse to stop it feeding on its eggs. The males are so sensitive to predators they will even remove small snails.



Photo 10: The literature often suggests crustaceans are likely to be the main egg predators. To date we have only observed them passing through the nesting area before eggs are laid. Perhaps the male fish keep them away when eggs are present.



Photo 11: A male eyes the camera at the edge of the nest. Note the silvery coloration.



Photo 12: 30 seconds later the fish is dark black – perhaps as a warning sign to the two ballan wrasse in the background.



Photo 13: A male bream in Swanage Bay tends the eggs on a very soft and silty clay seabed.



Photo 14: Heavy predation of a nest in Poole Bay by black gobies and pout when a guarding male is disturbed.



Photo 15: Some video footage ends in disaster if a male fish takes a disliking to the camera!



Photo 15: A dog whelk feeding on newly laid eggs in April 2016.



Photo 16: A recent SLR image of a male guarding the nest from May 2016. There is still more to do.

Dissemination and feedback

The resulting video footage from the project is considered unique and reveals previously unseen footage of this species breeding within the UK. We attended the Institute of Fisheries Management Annual Conference in October 2015 in Plymouth and presented our work which received great interest from many academics and government / consultancy scientists. The work generated much interest with talk of changes to current management practices possibly being required in light of our findings.

We created a webpage on each of our personal websites to tell the story of black bream and open the project up to a wider audience. These links have been disseminated via Facebook and Twitter and received approximately 3,000 hits between February 2016 and April 2016 inclusive. The pages will be updated and enhanced following the 2016 breeding season. The BS-AJT is gratefully acknowledged for its support of the project on the project webpage.

http://www.mattdoggett.com/the-black-bream-project

http://www.stardis.co.uk/black bream project.html

The video files and images have already been used by Natural England and the Southern and Sussex Inshore Fisheries Conservation Agencies at stakeholder meetings to present the findings and educate anglers, commercial fishermen and industries of the challenges the black bream face during their spawning season. The footage has received a huge amount of positive feedback from all types of stakeholder on its ability to demonstrate the reasons for various management processes in place.

Feedback from anglers in particular has been very positive, particularly regarding the conservation benefits of our project. Comments from both direct messaging and as posted on angling forums include:

• "Just a note to say thank you for sharing the most enlightening and informative information on the Black Bream ever to be seen. I am a keen sea angler based in Brighton Marina and have been arguing the case against anglers releasing female bream, but retaining the males.

This video evidence will prove once and for all the importance of the male's role in their breeding cycle.

What exactly cane be done to ensure the wellbeing of our bream stocks is dependent on exactly this kind of educational information provided to all, by you and your team. A thank you from me and another for all the other Anglers that don't care... YET!"

• *"I have just seen the footage of The Black Bream Project, all I can say is that it was awesome. I have been a keen angler all my life and regularly compete in competitions, where bream are normally an important part of your catch (they are all returned). I was aware of the male's role in protecting the nest, but to see them in action was very informative...*

Really I am just emailing to say thanks for putting this out there, it would be nice if the powers that be would see this and act on trawling/netting in these areas during the breeding season (in the same way as they have at Kingmere I believe)."

• *"Hi Matt, may I say how interesting your article is. I'm very keen to promote conservation and encourage understanding. If my business can be of any assistance please get on touch."*

- "What a fantastic blog."
- *"Factual evidence is worth its weight in gold, add this information to the scientific studies taking place with the support of the SxIFCA, anglers and charter skippers fishing inside the Kingmere MCZ and you start to better understand the species, its life cycle and the natural and man-made threats to its survival and spawning habitat."*
- "The format is pretty unique and a powerful tool in helping the average person understand what is happening under the sea. I think if you could tell a story visually for every species/habitat, people would be a lot more receptive to protecting and preserving species for the future."
- *"I have always thought that the black bream would make a great subject for a TV wildlife special. Fascinating fish, thanks for posting!"*
- "Thanks for posting, a real eye opener having read and seen the video clips a few times I have a lot of respect for the bream even though I don't catch many but they put real effort into their breeding. Thanks for enlightening me."

We also plan to present the work next year to the Porcupine Marine Natural History Society (a gathering of amateur and professional enthusiasts) and perhaps elsewhere as well as giving other talks locally in Dorset and Hampshire to interested parties. At each talk the BS-AJT is and will be acknowledged for its support of the project.

We have written an article and given images to Dorset Wildlife Trust who printed the story in the May 2016 edition of their magazine (see overleaf). An article is also planned for the diving press to further disseminate our findings to a wider public audience and generate further interest among UK divers in a species that is perhaps a little different from the norm.

2016 Plans

We are continuing the work in 2016 to concentrate on trying to capture the actual moment of spawning as well as obtaining better quality still images. Martin has designed a bespoke camera housing, power and programming system with the plan to record activity over a 24-hour period and hopefully capture spawning behaviour. Matt has obtained technology to use SLR time-lapse photography underwater in the nesting area to obtain better still images. Both aims continue to need to be achieved remotely to avoid disturbance from divers. To date, the weather conditions have not been optimal and April only allowed us two opportunities to test equipment. Now in May we have been able to seize several opportunities and are visiting the site whenever conditions allow. Already we are improving the images obtained (see Photo 16).

We have also been invited out to photograph anglers on a boat by a local skipper to tell the story of the species' socio-economic value to the local recreational fishing industry.

The Black Bream Project - Matt Doggett & Martin & Sheilah Openshaw

Raising young to ensure the next generation is a success is rarely simple whatever species you are. For black bream (Spondyliosoma cantharus) a sea fish which frequents our shores every spring and summer, it can sometimes be a rather thankless task. Matt Doggett and Martin and Sheilah Openshaw spent many days last year uncovering the secrets of the breeding lives of bream.

Black bream

Each year, soon after Easter, the seabed at sites throughout Dorset is transformed by a little-known and rarely seen spectacle of nature when tens of thousands of black bream arrive to breed. Two clues announce their arrival; firstly the seabed is transformed into a moonscape of craters; and secondly, dozens of chartered and private fishing boats head to sea to catch the fish.

Despite this dense breeding aggregation, divers rarely encounter bream as they seem to temporarily scare them away when in the water. To gain an insight into the private lives of bream, we placed video cameras on the seabed in and around the nesting areas between Kimmeridge and Swanage.

Early in the season we were amazed to capture footage of huge shoals of bream as they arrived at their traditional nesting grounds. Male fish soon cleared large guantities of sand, gravel and small rocks (up to 70 kg per nest) to reach the bedrock underneath. Considerable effort then went into attracting a female and defending their nest against would-be home-wreckers, as other males tried to muscle in and claim the prime territory. Our footage bore witness to several fights between rival males.

With the warm, lengthening days, romance blossomed on the seabed. Once a female had chosen her mate she would glue her eggs to the bedrock where they were fertilised and guarded by the male until they hatched.



The male's job was by no means easy. With silt to clear and predators to ward off there was rarely a dull moment in a day. Our findings showed that when a male was off the nest even for just a brief moment, predators were quick to arrive and feast on the unguarded eggs.

As if this wasn't enough hard work, the storms in May 2015 tore through about half the nests at one of our study sites, scouring the eggs from the rock. But the stoic fish regrouped and the whole process began again, ending this time with a successful hatching in June.

Our work has been of much interest to fishery managers because the effects of removing a male fish from the nest, even for a short time, could spell disaster for the next generation.

A diver surveying a black bream nes

See page 3 for links to more online informatior



To see pictures and videos of the project, visit mattdoggett.com/theblack-bream-project

> Spawning male black bream guarding his nest

FISHING ADVICE

To give black bream a chance, source mature specimens over the length of 30cm outside of the vulnerable April-May spawning season. When angling, practise catch and release with barbless hooks. For more information, visit dorsetwildlifetrust.org.uk/ responsible-sea-angling

Financials

Given the disruption to the work by the unexpected May 2015 storms, budget remains within my grant award for a further six visits (approx. £460) to the nesting sites in 2016, three of which have already been undertaken. This work was planned to begin as soon as possible in March/April 2016 and is now underway. Given the success of the project to date I would kindly request that the remaining 2015 funds be allocated to the 2016 stage of the project.

The estimated costs in the grant application on the basis of conducting 15 days' diving were:

- Boat £50 per day
- Air fills £15 per day
- Travel £12 per day

The table below shows the dives in which I have participated, remaining planned dives to use the budget and the cost per dive. It should be noted that more than the remaining three dives are planned in 2016 weather permitting. Additional dives to those listed below have been undertaken by other team members but I was unable to participate due to work commitments (see Table 1).

Date	Activity	Cost
24/04/2015	Kimmeridge - inspect nests, photograph, video	£77.00
04/05/2015	Kimmeridge - try photos, inspect nest, set and retrieve videos	£77.00
10/05/2015	Kimmeridge - two dives, 3 cameras, trashed nests	£77.00
16/05/2015	Swanage bay - dives aborted due to canoe fishing competition	£77.00
17/05/2015	Swanage bay - Tanvil Ledge, video of two nests + M&S at Kimmeridge	£77.00
23/05/2015	Kimmeridge - filming nest guarding	£77.00
07/06/2015	Kimmeridge - drift over other bream nesting area	£77.00
08/06/2015	Poole Bay - inspection of three sites and start algae work	£77.00
02/07/2015	Kimmeridge - second spawning	£77.00
31/03/2016	Kimmeridge - initial survey and equipment test – all good	£77.00
28/04/2016	Kimmeridge - first time in since conditions improved – no fish on nests photographed	£77.00
04/05/2016	Kimmeridge - in again - 2 dives – camera failures	£77.00
05/05/2016	Kimmeridge - in again - 2 dives – SLR and Go Pro images obtained	£77.00
May-July 16	Additional planned dives	£77.00
May-July 16	Additional planned dives	£77.00
TOTAL		£1,155.00

Table 2: Summary of BSA-JT grant spend for project dives conducted by Matt Doggett as part of the Black Bream Project. Note: an error in my original application meant £1,110 was requested rather than £1,155.