Operations Manual for Assembly and Deployment of Seabed Baited Remote Underwater Video Systems

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DISTRIBUTION

Electronic copies are held on the Blue Abacus cloud drive with access provided to this document, and all supporting materials to collaborating groups.

Cover photo: Lincoln Hood deploying a mid-water BRUVS. Photo courtesy Andrew McGregor, Seabird Films.

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1. General Introduction:

Seabed Baited Remote Underwater Video Systems (BRUVS) are a standardised sampling tool that allows users to document the status of their benthic (demersal) wildlife. This wildlife includes the fishes, sharks, and reptiles that are associated with seabed habitats. The video samples generated by BRUVS document the diversity, abundance and length of all observed individual animals. Weight can be calculated from length data, and the video samples can be used to explore animal behaviour. See Appendix 1 for a list of references that use seabed BRUVS.

This document provides information on the Blue Abacus seabed BRUVS and complements the Blue Abacus Training Videos ©2021. We note that as we continue to refine our rigs to maximise outcomes and improve ease of use, some configurations may differ from the training videos and these refinements described in this document and additional video provided where helpful.

See Appendix 2 for the list of training videos and supporting materials.

1.1 Components of the Blue Abacus seabed BRUVS

The Rig: The Blue Abacus seabed BRUVS (hence BRUVS) are a light-weight, robust carbon fibre rig comprised of 4 pieces (Fig. 1):

> (1) camera base bar (102 cm) in which two small action cameras are secured in a fixed stereo position;
>
> (2) inner bait arm (96 cm) (smaller diameter) which inserts into base bar and vertical arm locking system into place;
>
> (3) outer bait arm (96 cm) (larger diameter) which slides over part of the inner bait arm and supports the PVC bait canister; and
>
> (3) vertical arm (40 cm) that connects the rig to the (i) drop line that extends to the surface floats and (ii) the weights that maintain the rig's vertical position in the water column.

The bait arms and vertical arm are stored in their own neoprene sleeve within the base bar when shipped.

The Camera Base Bar is where the two small action cameras sit in their underwater housings. The housings are set in fixed mounts within the base bar. The two mounts are separated by 80 cm, consistent with previous designs used by the Marine Futures Lab. This distance provides a balance between maximising the field of view and generating accurate length measurements. The camera mounts are heavily moulded, and eliminate movement of the housings that would otherwise require repeated calibration following shipment and surveys.

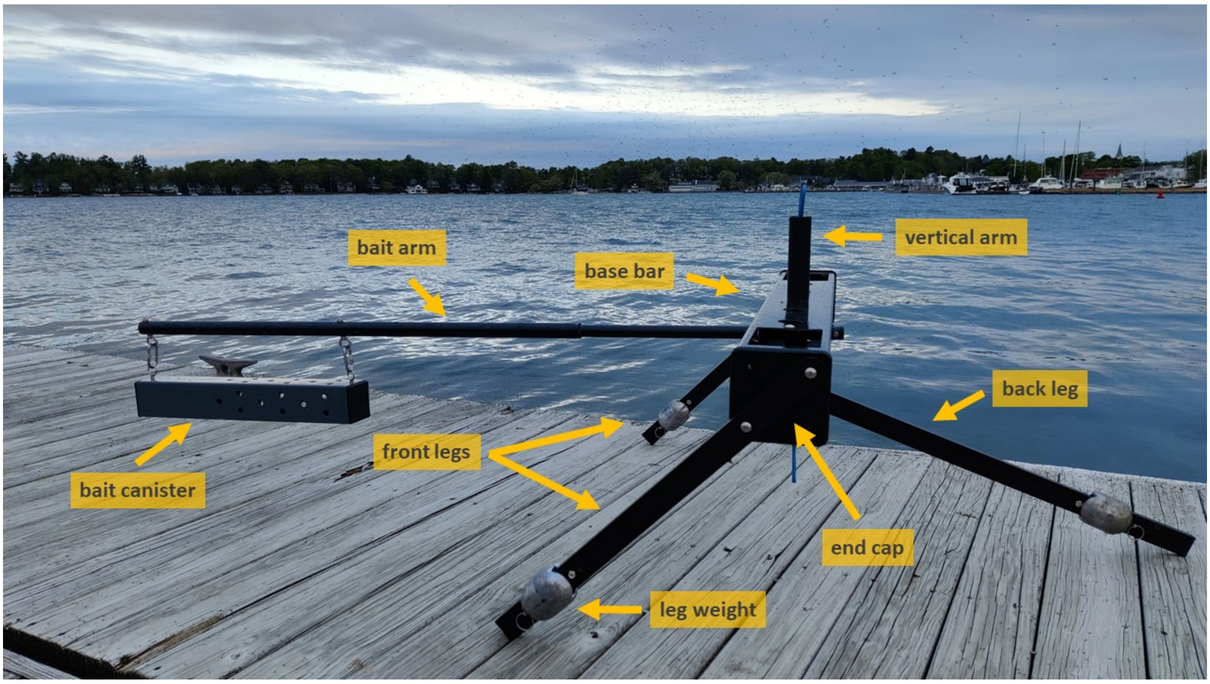

Figure 1: Assembled seabed BRUVS with labelled components

The Horizontal Bait Arm intersects with the vertical arm locking both into place with the base bar of the rig. The bait canister is suspended from the bait arm via two safety nut spring hooks.

The Vertical Arm intersects the camera base bar and the bait arm. On the top end, there is a loop of Spectra line for connecting the vertical arm to a downline that links the rig to the surface rigging. On the bottom end, there is a second Spectra loop to which the provided mid-water weight bar or any other weight can be attached.

The Weight Bar is a 32 cm piece of Delrin plastic on which three 1.5 kg lead weights are secured. A double action safety clip is luggage tagged into a Spectra line that has been secured to the weight bar. This clip can easily be attached to the bottom Spectra loop of the vertical arm to weight the mid-water rig. The weight bar design maintains the rig's horizontal position in the water and reduces bouncing and swinging.

The Legs and their weights consist of two legs of equal length and one longer leg. The two equal legs are attached to the base bar whilst the longer leg is slotted through the vertical arm. Each leg has a 1.5 kg lead weight into which the leg is inserted.

The surface line connects a seabed BRUVS to its surface floats. The surface line connects the upper Spectra loop and the buoy leash and its length depends on the maximum depth in which you are working.

The Buoy Leash secures the two or three surface floats to the downline.

1.2 Assembly

Please watch the BRUVS Assembly Video ("Training Video – Chapter 1 – Assembly 2021). This section highlights key points for you to consider as you assemble your seabed BRUVS.

The Rig Case comes with the BRUVS in their protective neoprene sleeves, bait canisters, downlines and sub-surface floats. You will not need the downlines or sub-surface floats for use on the seabed.

Prior to the first survey, we recommend that you find a working area and assemble all rigs, thus familiarising yourself with how they fit together. In addition to building the rigs themselves, we suggest assembling the rigs and the line and floats. This will familiarise you with the connections to be made at sea during deployment.

To assemble the rig, see Appendix 3 for schematic of seabed BRUVS assembly. Remove one end cap and the components of the BRUVS. Replace the end cap. We recommend using a Number 3 Philips Head screwdriver for removing and replacing the end cap screws. Using a drill or power screwdriver is not recommended.

KEY POINTS FOR RIG ASSEMBLY

End caps are specific to each rig. When you remove the two arms from the base bar, immediately replace the end cap.

Use the split ring pliers if your fingernails are feeling abused.

Test all connections. Make sure that all attachments are secure i.e. that all double action clips are fully closed.

If you need weight in addition to the 5 kg that are distributed across the three legs, attach the additional weight to the lower spectra loop on the vertical arm.

Ensure that your surface line is long enough to provide sufficient scope to minimise drag. We recommend between 2 and 3 x the maximum depth at which you are working. So in 20 m, you would use 40-60 m of line.

Leave assembled equipment in secure area / vehicle.

Connect the two pieces of the bait arm by removing the clevis pin and split ring, connect the two pieces, insert the clevis pin and secure with the split ring. Due to the tight tolerances and small variances in manufacture, not all inner bait arms and outer bait arms are necessarily interchangeable. We have marked them so they can be identified should your gear become mixed together. You will also notice the two eyebolts to which you will secure the bait canister in the field.

Insert the short vertical arm through the base bar, aligning its central hole with the hole in the back of the base bar through which the inner bait arm will be inserted. Make sure the lower slot is facing the back of the base bar.

Remove the end-most clevis pin and split ring from the end of the bait arm. Thread the bait arm through the front of the base bar, through the vertical arm and anchor it by replacing the clevis pin and split ring.

Each seabed rig will use three legs in the assembly. The two shorter legs will be attached to the end caps and the longer central leg will slot into the vertical arm.

To attach the legs (Fig. 2):

- Remove one of the end caps from the base bar and attach one of the two shorter legs using the supplied nut and bolt so that the leg extends forward. Replace the end cap. Repeat this step for the second end cap. Note: we recommend only removing one end cap at a time.
- Slide the longer leg into the vertical arm slot and fix in place with a clevis pin. Due to slight variance in manufacture and tight tolerances inserting the pin may take a moment. If the pin does not want to go though, remove the leg and turn it 180 degrees before re-inserting it in the base bar. This may solve any alignment issues if present. Add a split ring to the clevis pin to keep it in place.
- Once all three legs are attached to the basebar, attach seabed leg weights by sliding the weight onto the leg and inserting a supplied detent pin.

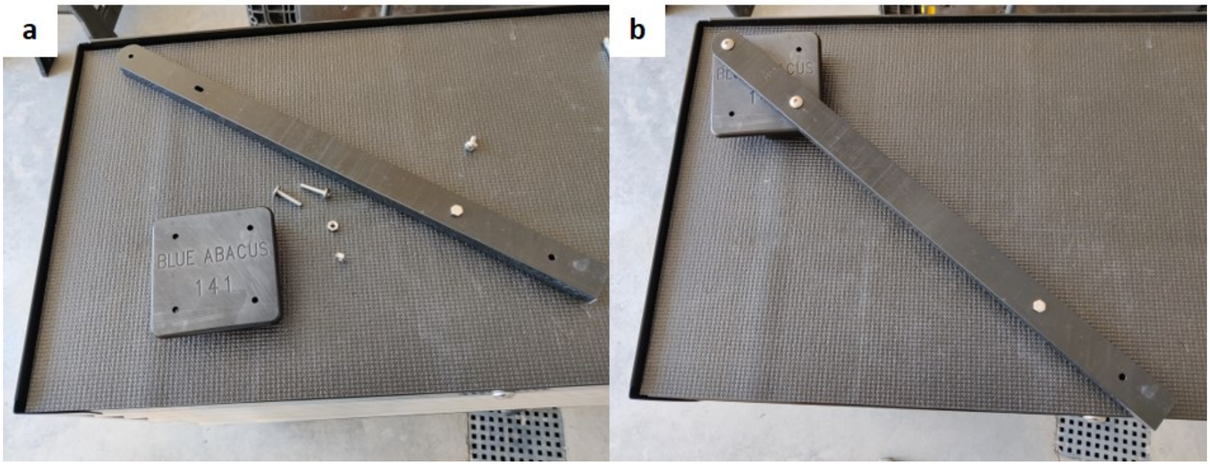

Figure 2: Attachment of forward legs onto end caps

Attach the surface line that leads to the buoys to the top Spectra Loop on the vertical arm. Remember that the surface line should have appropriate scope so as to allow for slack between buoys and seabed rig.

To prepare for the field, we suggest that you leave the rigs assembled but remove the weight bar, bait canister and downlines for mobilisation to the vessel. In this form, the rigs are easily transported as they pack together neatly.

At this point, we also encourage you to neatly coil your surface lines into gorilla tubs. We recommend that you slip the first loop of the line through a tub handle and wrap it so it is secure (this keeps it from getting lost in the tub), then coil and similarly, slip the end loop through the opposite handle. Poorly coiled rope can lead to entanglement during deployment.

2. Pre-survey preparation – seabed BRUVS

The following provides a description of pre-survey preparation and includes preparation that (1) should occur well in advance and (2) immediately prior to the survey.

KEY POINTS FOR PRE-SURVEY PREPARATION, MOBILISATION AND DEMOBILISATION

Advance Preparation should be completed early to ensure, e.g. that gear can be replaced, if needed

Day-before Preparation will depend on individual circumstances and the vessel in terms of the amount of equipment, bait etc. can be mobilised to the vessel prior to survey commencement

For demobilisation, rinse and dry equipment carefully

Ensure a final inventory is completed at the end of the survey

Preparation will be easier if post-survey demobilisation -down from previous survey

2.1 Advance preparation

1. Ensure permits and ethics approvals have been acquired, if needed.

2. Source bait. Bait should be an oily bloody fish such as small sardines/pilchards (*Sardinops* spp.). Small tunas (e.g. kawakawa *Euthynnus affinis*) can also be used. We encourage you to source "offcuts" from fish processing facilities.

   Plan for 0.8-1 kg of bait per sample. Thus if a survey involves 100 deployments, you will require 100 kg of bait. Bait should be stored in a freezer. During the survey, you will thawing the frozen bait the night before each day of sampling. Consideration can be given to whether you want to, in advance, create bait "logs" that can slide into bait canisters, separate bait into 'daily amounts' (10-15 kg) or leave as is and deal with on the night before each sampling day. Note that bait logs cannot defrost in bait canisters as there are not enough bait canisters to cover daily sampling effort.

3. Obtain hard drives for downloading video and making duplicate copies. You should assume that you need approximately 16 TB of hard drive storage per 100 x 2 hour samples thus 32 TB in total to allow duplication. Consider keeping 2 additional hard drives of comparable size as spares.

4. Confirm survey plan including
   a. Short description of goals for survey
   b. Determine number of samples to be collected
   c. Sampling strategy to determine locations of where seabed BRUVS are deployed (random, stratified, etc.)
   d. GPS coordinates for priority sampling sites, including 20% additional priority 2 sites

    e. Check travel times and determine a draft daily route plan and priority sampling. Note that daily sampling plans may vary with weather

5. Decide on nomenclature for your sampling. This is the naming convention that you will use to identify each sample obtained during the survey. We recommend a naming convention that is unique to each survey and that refers to the survey location and year. By way of example, for our 2019 survey of Gracetown (***GCT***), Western Australia, our individual samples (deployment of 1 BRUVS) were labelled as ***GCT19_001***, allowing for up to 999 individual samples per survey. The use of three number positions for sample id ensures (1) clarity that one is referring to a sample, analogous to the nomenclature for seabed BRUVS and (2) allows samples to sort numerically. If more than one survey is completed per year, we recommend adding the numerical month to the year, i.e. ***GCT1903_001***. This naming will be used on: (1) field sheets and metadata (Table 1); and (2) hard drives folders to which individual camera videos are transferred (Fig. 3).

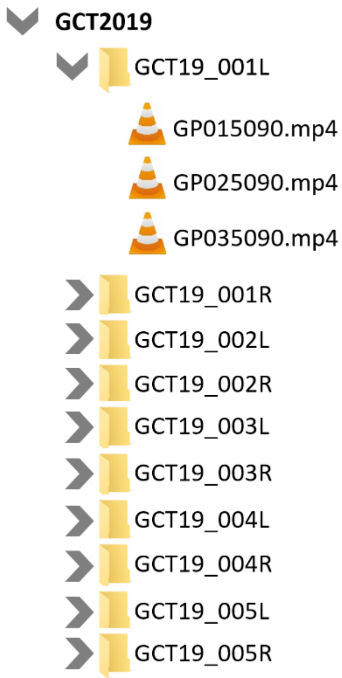

Figure 3: File structure of folders for each GoPro sample, for right "R" and left "L" cameras.

6. Print field sheets on waterproof paper. The number of sheets should reflect the expected amount of samples with one row per sample and several spare sheets. An electronic excel file (Seabed BRUVS_FieldSheet.xlsx) has also been provided for printing, in both A4 and Letter size formats.

7. Inspect electronic equipment
    a. Confirm settings for each camera
    b. Pre-charge cameras and batteries and ensure that charge is being held
    c. Check field laptop to ensure functionality
    d. Charge transmitter and ensure telemetry gear is functioning
    e. Check batteries for GPS and ensure

Table 1: List of variables, their abbreviations, format and examples for the daily field sheet and Excel metadata sheet. In addition to these variables, the metadata should include columns for who entered the meta data (initials), whether the sample is useable (Y/N) and if not, why (tip, camera issues, ran aground) and any comments.

	Variables	Abbrev.	Format	Example
1	Sample number	Sample	-	GCT1903_001
2	Date	Date	DD/MM/YY	21/03/19
3	Rig number	Rig	-	105
4	Left camera number	Cam-L	-	6
5	Right camera number	Cam-R	-	3
6	Latitude In	Lat-IN	5 decimal degrees	-34.10650
7	Longitude In	Long-IN	5 decimal degrees	114.74237
8	Time Deployed	Time-IN	HH-MM	9:07
9	Time Recovered	Time-OUT	HH-MM	11:21

Table 2: Standard settings for GoPro 9 cameras.

Category	*Setting Name*	*Setting*
Mode	Setting Name	Water
Video Mode	Resolution	1080
	FPS	30
	FOV	Linear
	Hypersmooth	Off
Settings Panel 1	Has no name	
(swipe down)	Voice Off	Off
	Beep Volume	Off
Settings Panel 2	*Connection*	
(swipe right)	Wireless Off	Off
	USB	MTP
Settings Panel 2	*Preferences*	
(swipe right)		
General	Date	YY/MM/DD
Displays	Screen Saver	1 min
	Brightness	10
Regional	GPS	Off

8. Inventory all equipment against the equipment list (Appendix 4).
    a. Ensure all core equipment is in working order
    b. Replace consumables as needed.

2.2 Mobilisation (Day-before preparation)

1. Assemble rigs (see Section 1)
2. Inflate Buoys
   - ✔ Remove plugs with a screwdriver
   - ✔ Inflate with compressor or a SCUBA cylinder as a back up
3. Coil surface lines into gorilla tubs to ensure they are tidy and that the ends are in place, ready for deployment
4. Place cameras and camera batteries on charge
5. Upload all sampling coordinates to hand-held GPS and vessel GPS (if available)
6. Store all bait
   - ✔ For the first survey day, remove bait for the following day
   - ✔ Place in plastic bucket to thaw (somewhere out of the way)

Table 3: List and number of items required on vessel for deployment and recovery.

	Items required on vessel	Number
1	Cameras including with SD cards	10
2	Spare cameras	2
3	Spare batteries	2
4	Bait cans	10
5	Eskie / cooler for bait	1
6	Rigs - assembled	5
7	Surface lines	5
8	Surface buoys sets and leashes	5
9	GPS	2
10	Magnetic drawing board (aka magnadoodle)	1
11	Clipboard with waterproof printed datasheets and pencil	2
12	Spares box including AA batteries, pencils fasteners	1
13	Toolbox	1
14	Gloves 1 set per person	2
15	Dry rags / towels	lots

2.3 Demobilisation

1. Wash down all kit with fresh water, excluding, of course, the electronics that are not waterproof
2. Scrub down and soak bait canisters and other bait-associated paraphernalia in bleach to clean
3. Allow all kit to dry
4. Break down rigs
5. Pack rig crossbars, uprights and bait bars in their case, reversing the description in Section 1
6. Deflate buoys if necessary
7. Update numbers on inventory so that restocking can be completed and to support next survey.

3. Data management and daily preparation during surveys

BRUVS generate a significant amount of data on a daily basis and efficient rolling out of the following days sampling requires preparation at the end of each completed day. See Training Video Chapter 4-Data Management.MP4.

3.1 Data management

1. Creating metadata: Information from the daily field sheets must be recorded in the electronic metadata sheet following daily sampling (Appendix 5 and Excel datafile: Sedabed Meta.xlsx). The data should be cross-checked by a 2nd party to ensure accurate entry. GPS coordinates are the most problematic and should be carefully checked for accuracy to 5 decimal points, i.e. Longitude: -14.67292 and Latitude: -7.93593. Consider taking photos of each field data sheet to preserve the field data sheet.

2. Downloading imagery and creating the daily backup: The goal here is to transfer the video imagery from the SD cards of each of the 10 GoPros that were used for the day's sampling. The steps are as follows:
    a. Create a folder on the external hard drive that refers to the sample ID and whether it comes from the left or right camera, GCT1903_001L and GCT1903_001R (Fig. 2).
    b. Access the SD card either by (1) directly connecting the GoPro to the computer via the data cable or (2) removing the SD card from the GoPro and inserting it into a SD card reader.
    c. In File Explorer, open and copy the files to the associated folder (i.e. the files from the left camera for sample GCT1903_001 should be copied to folder GCT1903_001L).
    d. Once the multiple files have been down loaded, check on the external hard drive that all video files have successfully transferred. Click on a few to test.
    e. As the same SD card will have been used for two samples per day, check the field sheet to determine which samples shared the same SD card. Create the folder for the 2nd sample as, for instance, GCT1903_006L and GCT1903_006R, which would be the first sample of the second string after sample 1. You can do this by looking for a video clip in the middle of the folder that has surface imagery. It and the following video clips belong in the second folder.

DATA MANAGEMENT AND DAILY PREPARATION

Organisation is critical to ensure that all samples are accounted for and that vessel time is maximised.

Be meticulous in entering metadata and transferring the imagery to the hard drives

Make sure you have everything prepped for the next day's sampling. Nothing worse than being caught short

These are guidelines only. Find the rhythm that works for your team.

f. Delete all files from the memory card so it is "clean" for the following day. Put camera on charge, having replaced the SD card if a card reader was used.
g. Repeat until the videos from all samples have been copied to their appropriate folders, all SD cards have been cleaned and all cameras are on charge.
h. Copy all folders from the day to the duplicate hard drive. If you deployed 2 sets of 5 cameras, you have 10 samples, each with a Left and Right camera set of files, equating to 20 folders.
i. Any challenges with SD cards, cameras or batteries should be recorded and spares used the following day.

3.2 Daily preparation

1. Ensure that all needed equipment for the next day's sampling is organised and stowed for the next day
2. Remove appropriate amount of bait from the freezer and defrost in container for use the next day
3. Ensure that all cameras and needed batteries are being charged
4. Check battery levels for GPS and that the transmitter is in good order.

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4. Deployment of seabed BRUVS

The deployment of seabed BRUVS will depend on the vessel and teams will find their own rhythm. However, there are three main sets of tasks allocated to two individuals responsible for deployment and the vessel skipper. See Training Video – Chapter 3 Seabed BRUVS.

Team member 1: Physical deployment

This individual works primarily with the rigs, surface lines and floats and will be positioned on either the stern of the vessel or the side, depending from where rigs are deployed. They will be responsible for:

- ✔ Positioning each individual rig for deployment
- ✔ Ensuring all connections to rigs, surface lines, surface buoys are in place and secure and that there are no entanglements
- ✔ Placing cameras in the housings and ensuring they are recording
- ✔ Placing magnadoodle in front of each camera and in the shared field of view to link video to sample id.
- ✔ Completing slow vertical clap to synchronise cameras
- ✔ Attaching bait canister
- ✔ Physically deploying each BRUVS and playing out the long line.
- ✔ Communicating verbally with skipper on speed of deploying surface line and to indicate when the rig has landed on the seabed and the deployment is complete.

DEPLOYMENT

Ensure equipment is arranged to make deployment safe and easy with no rope / float entanglements

Ensure metadata records are clear

Mind the bait so you don't end up with a stinky boat

Ensure all connections between BRUVS and floats / longlines are secure so you avoid donating a BRUVS to Davy Jones' Locker

Maintain clear verbal communication between team and skipper as to boat movements during deployment and recovery

Team member 2: Metadata and support

This individual works primarily to ensure metadata is appropriately recorded and provide the cameras, ready to go. For each rig deployed on a string, they will:

- ✔ Record date and sample number on the magnadoodle and pass to Team Member 1 and enter these on field data sheet
- ✔ Record camera numbers on field data sheet for Left and Right cameras
- ✔ Turn on cameras, ensure recording on (confirm settings) and pass to Team Member 1 for placement in housings
- ✔ On deployment of each rig, record latitude-in and longitude-in to 5 decimal points, using GPS and time-in (HH:MM) into field data sheet.

Vessel skipper:

The skipper's responsibilities are to drive the vessel in a way that supports deployment (generally downwind and into the current). This will depend on vessel, deployment position (from the stern, side), sea state and wind. During the deployment of each single seabed BRUVS, the vessel needs to remain as close to on-station as possible whilst an individual BRUVS is being prepared and until it is deployed. Once the rig is in the water, the vessel should maintain position as the surface line is fed out and the buoys deployed. The skipper can also assist but added backup points on his GPS position at points of deployment. On completion of the deployment, the skipper moves the vessel to the next sampling point; these should be at least 200 m distant. Soak time is one hour .

5. Recovery of seabed BRUVS

The recovery of seabed BRUVS will depend on the vessel, and teams will find their own rhythm. However, there are three main sets of tasks allocated to two individuals responsible for recovery and the vessel skipper. See Training Video Chapter 3-Seabed BRUVS.MP4.

- ✔ The vessel skipper comes alongside the first seabed BRUVS to be recovered while Team Member 2 logs time-out in the field data sheet.
- ✔ Team Member 1 recovers the BRUVS with boat hook and Team Member 2 places it out of the way while Team Member 1 begins to haul the surface line.
- ✔ Team Member 2 unclips the double action shackle on the top of the surface line, to remove the buoy leash and the leading eye loop of the long line.
- ✔ Team Member 2 slips the lead eye loop through the handle of the gorilla tub to anchor it and begins neatly coiling line into the gorilla tub (or as suits their particular coiling methods) as Team Member 1 hauls line.

RECOVERY

Haul line fast enough to ensure it does not get tangled in the prop

Coil line neatly given tangled line will cause difficulties in deploying the line for the next string

Ensure dry hands and sheltered conditions when exchanging batteries

On recovery of all BRUVS (unless the BRUVS are to be redeployed for another set):

- ✔ Bait cans are removed, emptied overboard and placed in cooler.
- ✔ Camera batteries are replaced if another string is to be deployed
- ✔ Ensure rigs are neatly stacked to facilitate next deployment

Appendix 1: Selected references

PDFs of these references can be found in the folder: “Manual Selected References”

Seabed BRUVS

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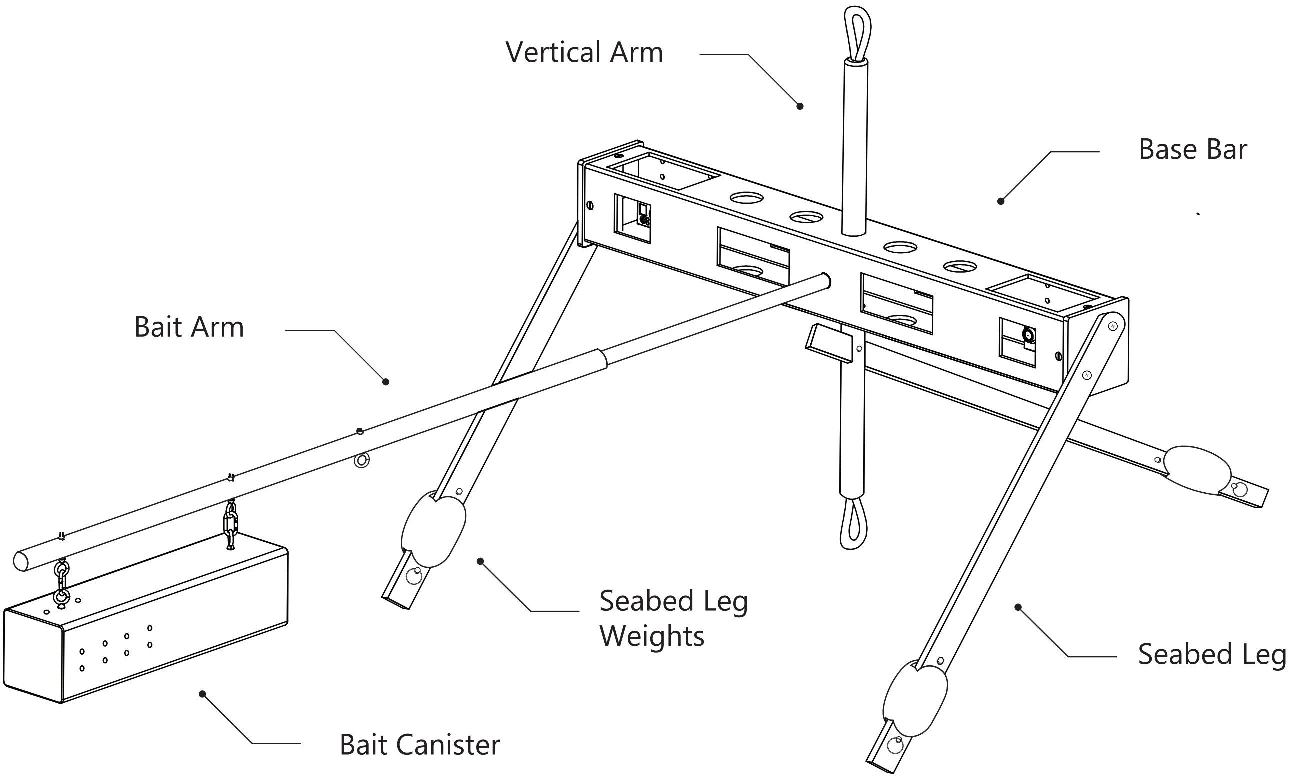
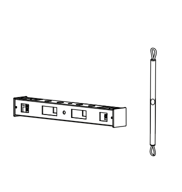
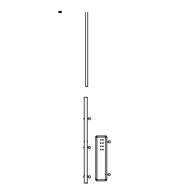
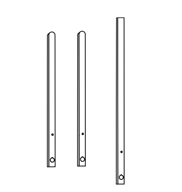
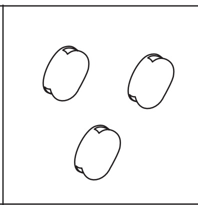
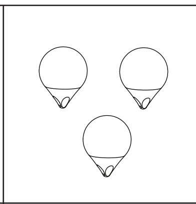
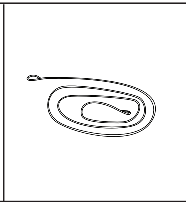
Appendix 2: List of training videos and support materials

1. Training Video-Chapter 1-Assembly.MP4
2. Training Video-Chapter 2-Mid-Water BRUVS.MP4
3. Training Video-Chapter 3-Seabed BRUVS.MP4
4. Training Video-Chapter 4-Data Management.MP4
5. Supp BA Training Video – weight bar.MP4
6. Supp BA Training Video – buoy leash.MP4
7. Electronic copy of inventory – BRUVS Inventory.xlsx
8. Electronic copy of Mid-Water metadata entry sheet – Mid-water BRUVS Meta.xlsx
9. Electronic copy of Seabed metadata entry sheet – Seabed BRUVS Meta.xlsx
10. Mid-water BRUVS field sheets for printing (A4 and letter) Mid-water BRUVS field sheets.xlsx
11. Seabed BRUVS field sheets for printing (A4 and letter) Seabed BRUVS field sheets.xlsx

SEABED BRUVS
ASSEMBLY INSTRUCTIONS



Parts Required

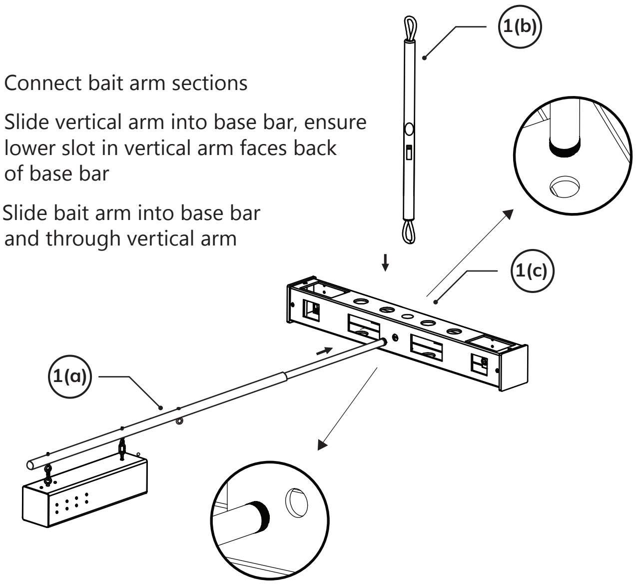
					
Vertical Arm & Base Bar	Bait Arm & Bait Canister	Seabed Legs	Weights	Buoy Cluster	Surface Line (Length varies)

Assembly Step 1

1(a) Connect bait arm sections

1(b) Slide vertical arm into base bar, ensure lower slot in vertical arm faces back of base bar

1(c) Slide bait arm into base bar and through vertical arm

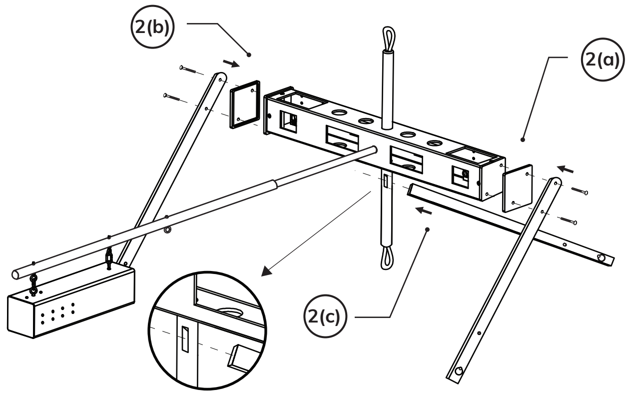


Assembly Step 2

2(a) Remove end cap, attach forward leg, replace end cap

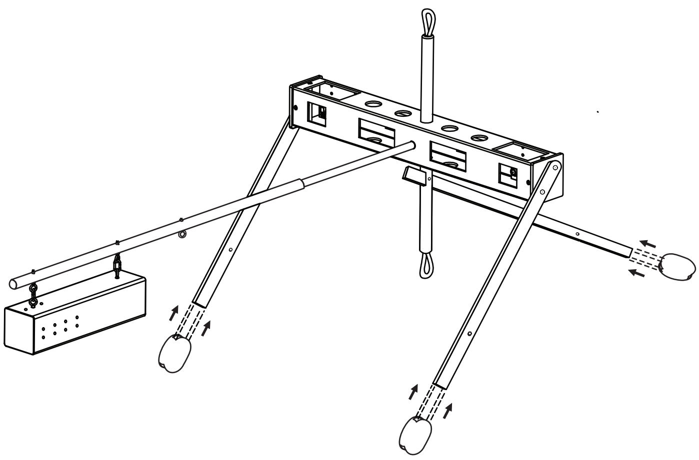
2(b) Repeat for other end cap

2(c) Slide centre leg into slot in lower vertical arm



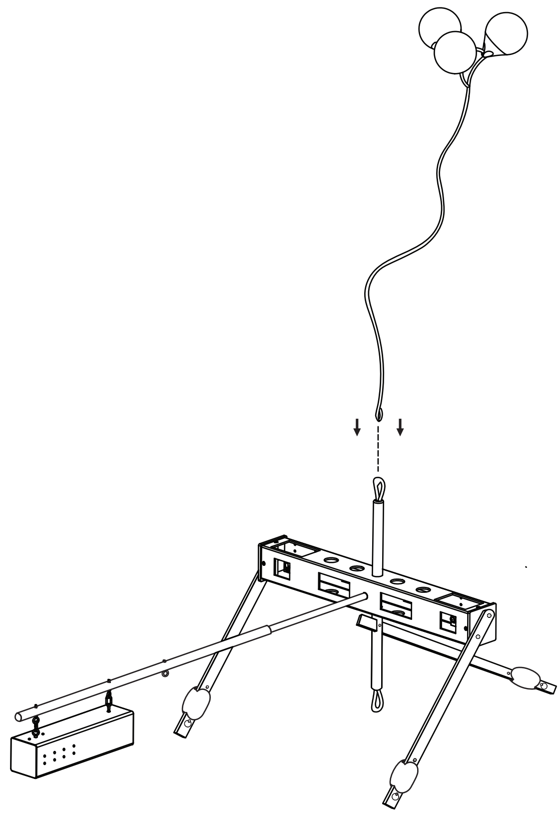
Assembly Step 3

3 Fix weights to Seabed Legs



Assembly Step 4

4 Attach Surface Line and Buoy Cluster to Vertical Arm



Appendix 4: Inventory of BRUVS equipement

Item	Number
Rotomolded Shipping Case	1
Carbon Fibre BRUVS	6
Downlines	6
Bait Cans	10
Pallet Container	1
A1 Buoys	15
Air Compressor	1
Buoy Leashes	6
Clipboard w/ Waterproof Paper	1
Cooler Bag	1
Dry Bag	1
F1 Stabilization Buoys	6
Flag Buoy	1
Gorilla Tubs	4
Gutter Brush	1
Lead Weights	18
Delrin Legs for Demersal BRUVS Conversion	18
Longlines	4
Magnadoodles	2
Power Strips	3
Extension Cord	1
Zip Ties	1
External Hard Drive Pelican Case	1
5 TB Western Digital Hard Drives	8
Go Pro Pelican Case	1
128GB Micro SD Cards	30
Dual Battery Chargers	6
Go Pro Cameras	14
SD Card Holders	2
Spare Batteries	12
Laptop Case	1
15.6" Lenovo Ideapad Slim Laptop	1
Telemetry Case	1
Transmitter	1
Antenna	1
Receiver	1
Garmin Handheld GPS	2
Tool Box with Hand Tools	1
Adjustable Wrench	2
Screwdriver	4
Splicing Fid	1
Wirecutter	1
Nutdriver	1
Multitool	1
7/16" Wrench	1
Measuring Tape	1
Seizing Wire	1
Split Ring Pliers	2

Item	Number
Needle Nose Pliers	1
Utility Stanley Knife	1
Spare Hero 9 Supersuits	2
Spare Fasteners (Variety of Pins, Rings, Bolts, Nuts, etc.)	1
¼"-20 ⅝" Truss Head Screws - Basebar End Caps	6
¼" - ¾" Detent Pins - Demersal Leg Weights	3
¼" - 1⅝" Clevis Pins - Bait Arm / Forward Demersal Leg	6
¼" - 1" Eyebolts - Weight Bar	2
5/16" - 3¼" Clevis Pins - Bait Can End Caps	2
¼" Safety Nut Spring Hooks - Bait Can	2
¼"-20 1¼" Truss Head Screw & Nut - Rear Demersal Legs	4
Split Rings	10
Demersal Conversion Fasteners	1
¼" - ¾" Detent Pins - Demersal Leg Weights	18
¼"-20 1¼" Truss Head Screw & Nut - Rear Demersal Legs	24
¼" - 1⅝" Clevis Pin - Forward Demersal Leg	6

Appendix 5: Example of metadata. See Seabed BRUVS Meta.xlsx for electronic copy

Sample	Date	Rig	Cam-L	Cam-R	Lat-IN	Long-IN	Time-IN	Time-OUT	Who?	Tip?	Comments
GCT1903_001	*21/03/2019*	*105*	*6*	*3*	*-34.10650*	*114.74237*	*9:07*	*11:21*			