



BRUVS

BAITED REMOTE UNDERWATER VIDEO SYSTEMS

GRADES 3-5

BRUVS ARE A VALUABLE TOOL FOR DETERMINING WHICH SPECIES LIVE IN OR VISIT AN AREA, HOW ABUNDANT THAT SPECIES IS, AND HOW DIFFERENT SPECIES USE A HABITAT (FEEDING, NURSERY AREAS, ETC).

At the end of this lesson plan...

- Students will have an understanding of the different components of BRUVS and how scientists study the underwater world.
- Design & construct 3D scaled models of BRUVS to help scientists collect data on the distribution of sharks & other organisms in an ecosystem.
- Analyze and Interpret data on the patterns of distribution of organisms in a sandy bottom ecosystem.

LESSON PLAN

Learning Target:

- Students will have an understanding of the different components of BRUVS and how scientists study the underwater world.
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Link to Standards:

- NGSS
 - DCI- LS2.A, LS2.C, LS4.D, ETS1.A, ETS1.B, ETS1.C
 - SEPs- Analyze & Interpret Data, Asking Questions & Defining Problems, Developing & Using Models
 - CCCs- Structure & Function, Patterns, Scale, Proportion & Quantity
- Common Core- Math.content.6.SP.B.5, Math.Content.7.SP.A.1
- Ocean Literacy- P5B, P7A, P7B, P7C

Vocabulary:

BRUV, nondestructive sampling, habitat, species

Interdisciplinary Connection:

This lesson helps students build skills in engineering and technology because it requires student to brainstorm and construct a model baited remote underwater video rig.

Essential Questions:

What would scientists use BRUVS to study? What are the different parts of BRUVS? What do you need to think about when designing BRUVS?

LESSON PLAN

Introduction:

The teacher introduced the lesson by discussing different research methods for studying marine organisms (or participating in a Sharks4Kids lesson with a shark research focus).

- Prior to showing students photos of what BRUVS are/ looks like, show a video from the Sharks4Kids website. Ask students to make a Notice/Wonder T-Chart in their notebook or on a piece of paper. This should take 5-10 minutes total.
- Have a quick partner/whole class share out and then discuss
 - How was this footage obtained?
 - Why is this kind of data helpful to scientists?

I Notice

Record anything you notice as you watch the clip

I Wonder

Record any questions you have while watching the clip.

LESSON PLAN

Part 1: Design your own BRUVS

Baited remote underwater video systems are a nondestructive sampling method to study a number of different things. The two essential components that make up a BRUV rig are a camera to record underwater footage and bait. Most BRUVS are made of PVC or metal frames and many have a float for ease of locating and retrieval. Some also have weights to make sure it sits still on the ocean floor.

After introducing what BRUVS are made of and how they can be used, ask students to design their ideal BRUVS with an unlimited budget (H1). Invite students to design their BRUVS with a group prior to them seeing BRUVS design images (H2).

Material Suggestions:

- Popsicle sticks/ BBQ Skewers/ Toothpicks
- Hot Glue & Hot glue gun/ Tape/ Styrofoam balls
- Cork/ Kitchen Sponge
- String
- Pompoms
- Scissors

Print-Out Suggestions:

- Design your own BRUV worksheet

Follow up questions: What type of habitat are you exploring?, what are the different parts of your BRUVS?, What marine life do you expect to see with your BRUVS?

Have students present their first BRUVS designs. After seeing other's models and the photo of modeled BRUVS designs, student's can use the inspiration in the next activity.

LESSON PLAN

Part 2: Build 3D model BRUVS (H3)

Have students work in groups to design BRUVS given material constraints. Each group can get a supply of materials including- 15- 20 popsicle sticks or toothpicks, 2 pieces of string, 8 pompoms of different colors, a hot glue gun or tape, and a cork or sponge.

Each group uses the given materials to construct 3D Model BRUVS. Students can follow the given instructions for building their BRUVS models. Take turns testing the buoyancy of the BRUVS for an added activity.

Follow up questions: Does your BRUVS sink to the bottom? If it doesn't, what can you add to act as weights? Does your float stay at the surface? What could you use instead to act as a different float? If you were to make another BRUVS, how would you change your design?

Part 3: Guess that species! (H4)

Watch the four associated videos as a group. After each video, students guess which shark species can be seen in the video.

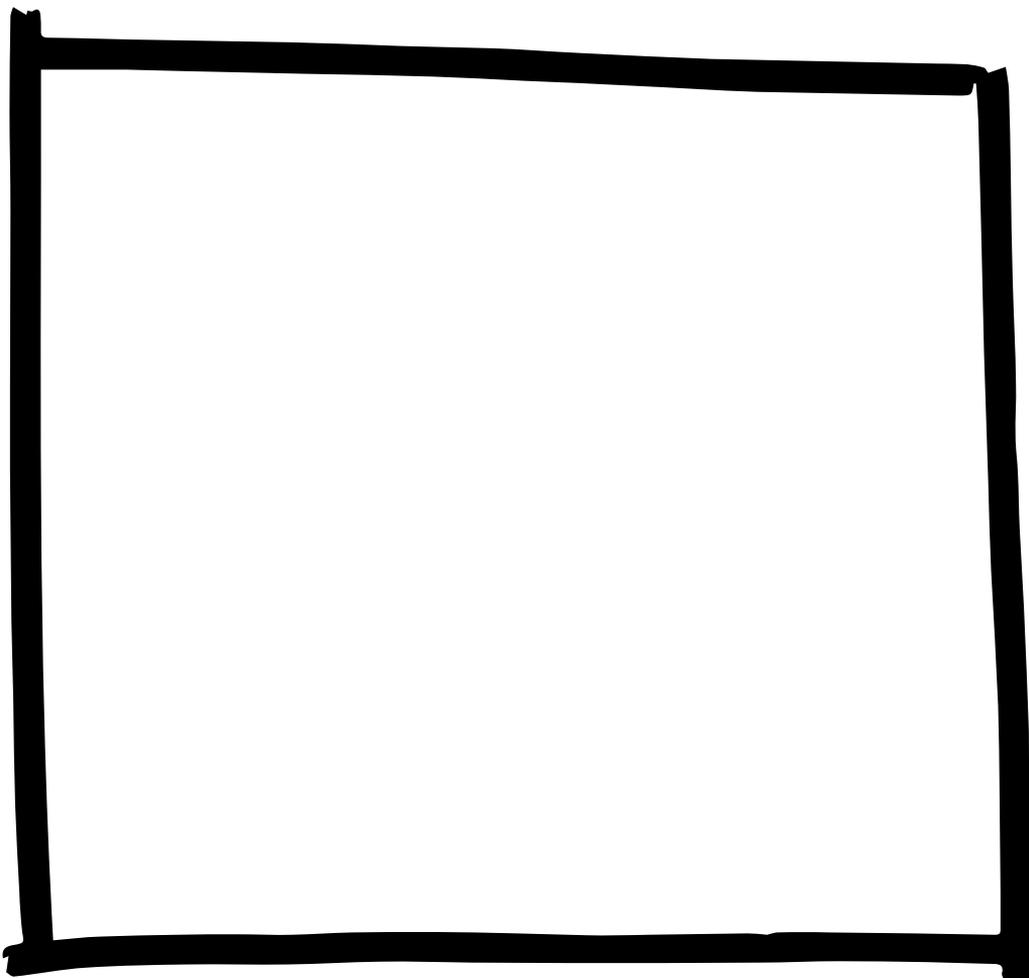
Optional: Use the species ID guide (H5) as a reference.

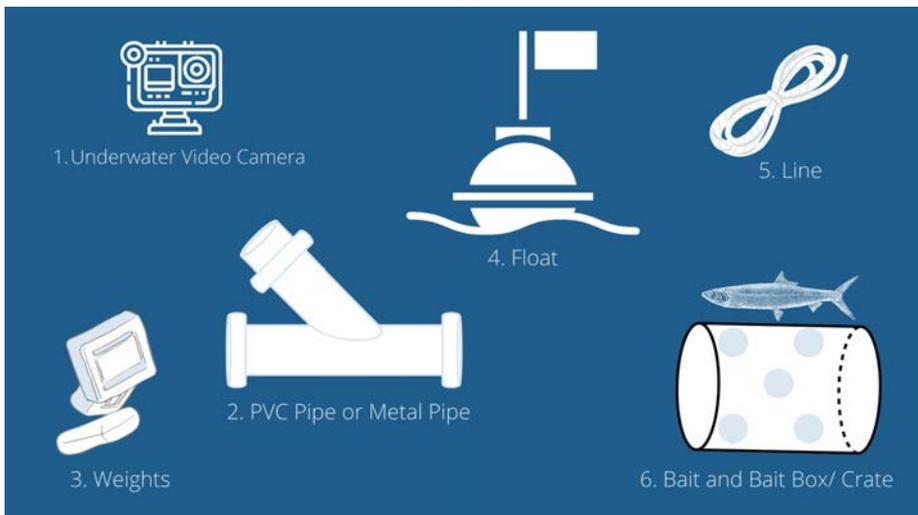
DESIGN YOUR OWN BRUVS!

What type of habitat are you exploring?

What are the different parts of your BRUVS?

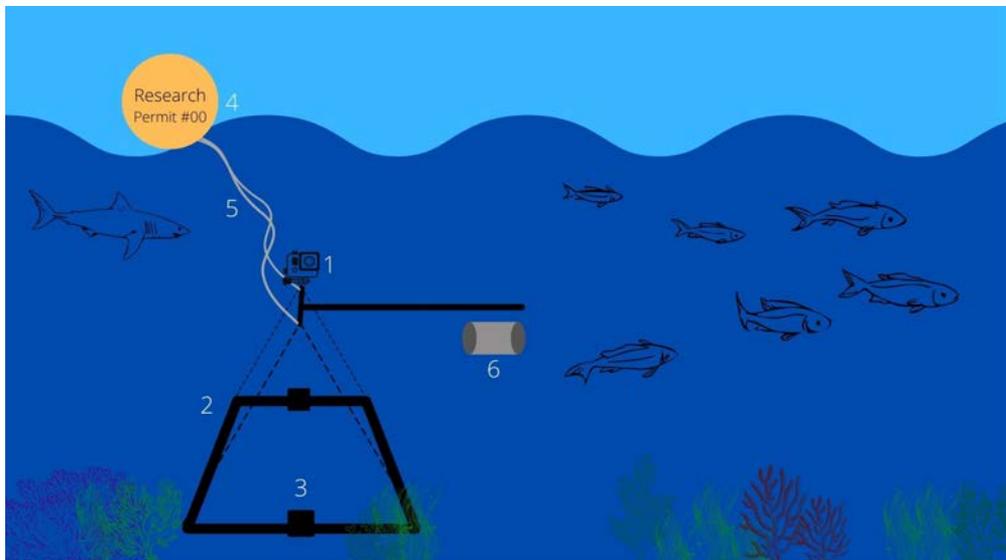
What marine life do you expect to see with your BRUVS?





A BRUVS unit is made of...

1. Camera to observe and record animal species and underwater activity
2. Base frame of PVC, stainless steel or rhubarb pipes
3. Weights to keep it from floating up
4. Float to identify it in the water
5. Line to attach the float to the unit
6. Bait box or crate with bait to attract animals to camera



BUILD A 3D MODEL OF YOUR BRUVS USING HOUSEHOLD ITEMS

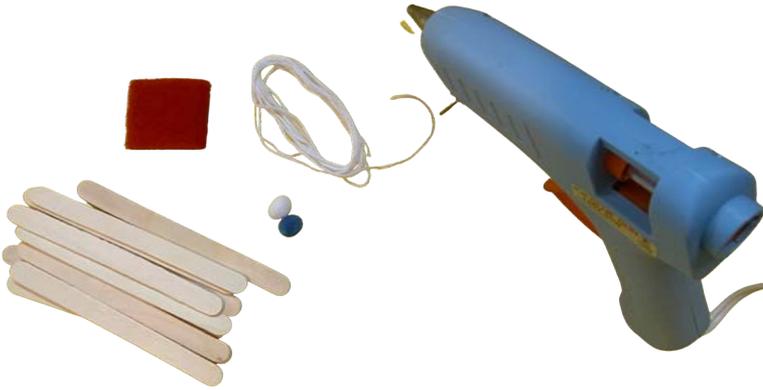
Important components of your BRUVS:

- Frame
- Camera
- Bait
- Float

Material Suggestions:

- Popsicle sticks
- Toothpicks
- Hot Glue
- Tape
- Cork
- Kitchen Sponge
- String
- Pompoms

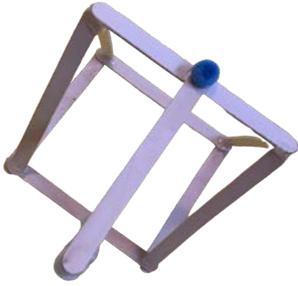
1. Collect necessary materials.



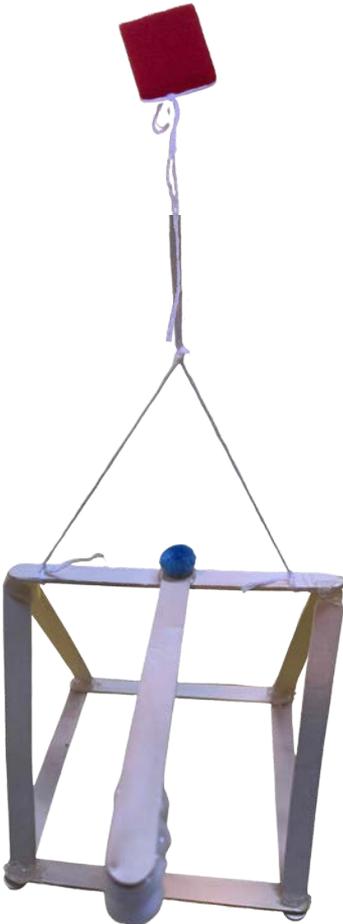
2. Construct frame and main structure of your BRUV



3. Add pompoms or other material to represent where your camera(s) and bait are located



4. Attach a float to the BRUV structure with a string



TEST IT OUT!

Fill a Tupperware with water deep enough for your BRUVS.

- Does your BRUVS sink to the bottom? If it doesn't, what can you add to make it sink?
- Does your float stay at the surface? What could you use to make it float so you can later find the BRUVS?
- If you were to make another BRUVS, how would you change your design?
- If you were a scientist with an unlimited budget, what else would you add to your BRUVS?

Guess the species!

Can you guess which species of shark can be seen in the video?

Video 1: _____

Video 2: _____

Video 3: _____

Video 4: _____

Species ID Guide



Lemon Shark



Nurse Shark



Great Hammerhead Shark



Caribbean Reef Shark