

## TIDES Explorer Kit assembly instructions and costs

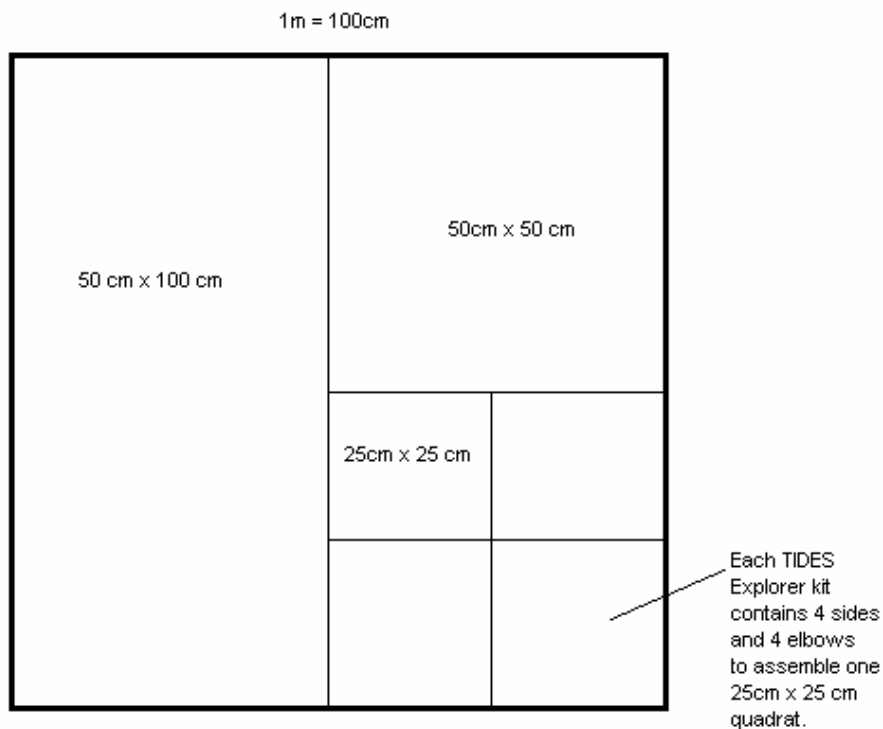


The TIDES Explorer Kits are intended to be a low cost, durable, and versatile set of tools that students will use with the activities in this curriculum. Each basic kit can be assembled for under \$10.00 and some of the items such as the clear plastic sample jars may be salvaged from containers that are typically discarded such as vitamin bottles. Notes below describe the rationale for each item and help to define the overall approach to the TIDES Explorer Kits. The basic kit items are intended to reduce the kits to a simple configuration that is easy to account for at the end of the field study. All additional items should be easy to fit into the kit and limited to reduce potential loss.

**Hand trowel** – Because these trowels will be used in and near salt water, we recommend sturdy plastic rather than metal tools. The trowel should fit easily inside the kit box.

**Kit box** – The kit box is the container that will hold all of the tools and also serve as a small field aquarium for observing organisms underwater. Most of the animals students will encounter are best observed by placing them in the kit box partially filled with water. Since the kit box will carry all of the tools, a snap on lid is an important feature. The lid should not be hinged, if possible, since this provides a point for breakage. Plastic tubs of many sizes and shapes are widely available at most discount department stores. The size should be approximately 3.5 liters or 10cm x 30cm. This will accommodate all of the items listed below and still allow room for a few additions.

**Quadrat - pvc quadrat sides and pvc 90° elbows** – The quadrats are simple, four sided markers that define a specific area where sampling will be conducted. In this case, a sixteenth of a square meter is used to facilitate collecting data quickly and allowing the students to observe several locations along the transect. Quadrats can be made from many types of materials, but the low cost, durability, and wide availability make ½” pvc pipe and connectors a good choice. Cutting the pvc to length needs to be done with care to account for the length at the end that will be pressed into the elbow fitting. The final quadrat should measure 25cm x 25cm on the inside.



A 25cm x 25 cm quadrat is the equivalent of .0625 m<sup>2</sup>.

**plastic sample jars and lids** – These jars should be small, made of clear plastic and the lids should screw on. Children’s vitamins often come in suitable containers. Labels need to be removed to allow for full visibility. One container will be used for sediment samples and the other will be used for viewing of small organisms in water.

Approximate costs for basic kits

Item	quantity	approximate cost (each)	sub-total	detail
trowel	1	\$1.99	\$1.99	sturdy plastic
kit box	1	\$1.79	\$1.79	snap on lid, ~ volume 1 quart
pvc quadrat sides	4	\$.27	\$1.08	from 10' length ½ “ pvc pipe, 4 sections
pvc 90° elbows	4	\$.29	\$1.16	
plastic sample jars and lids	2	\$.39	\$.78	
<b>TOTAL</b>			<b>\$6.80</b>	

## **Additional items**

The addition of items in the TIDES Explorer Kits can be helpful, however, too many items can sometimes confuse students and complicate their achievement of the particular objective identified for the specific activity. Customizing the kits to a particular activity is a better approach than creating clutter by putting extra, unused items into the kit. Balance should be sought in providing enough tools for the student to freely investigate and equipping them with the exactly the tools they will need to meet the minimum requirements for the study. While the basic kits are not susceptible to corrosion, proper care and maintenance of the kits will extend the life of all items. At a minimum, all items should be rinsed with fresh water since salt can damage most types of metal and a combination of fine sediment and salt will make any fittings difficult to pull apart.

The following suggestions are a starting point. Please forward any additional ideas for items and investigations to the South Slough NERR staff.

**Armored thermometer** – The students may want to collect immediate temperature data for sediment at the surface, below the surface, in pools, and in the near shore water. Often these temperatures vary widely and help to illustrate the incredible range of conditions most estuary life forms encounter.

**Clear plastic metric ruler or tape measure** – A simple, clear and flexible metric ruler can be made by photocopying a metric ruler onto a sheet of clear transparency film. The advantage of flexible rulers is that they can conform to rounded surfaces such as the back of a crab carapace. Collection of size information can be used to show variability of size within a single population and age class. For example, collecting and measuring crab molts and then plotting the data, students will observe size diversity in the natural world. The clear ruler may be taped to the lid of the kit with clear packing tape to secure it and prevent loss.

**Plastic tweezers** – Tweezers should be provided only to students that are mature enough to use them with care. The potential to destroy small, fragile organisms increases when tweezers are used improperly. However, if used with care, the tweezers will aid in moving small animals and parts of plants between the environment and observation containers. They are also useful for holding a specimen while observing with a magnifying lenses.

**Plastic magnifying lens in protective case** – The advantages of plastic magnifying lenses are the low cost, light weight, and durability. However, they scratch easily, particularly in the tidal environment where sand and mud are likely to come into contact with the lenses. If students are careful, glass hand lenses with a protective cover and a polishing cloth are preferable for close observation of specimens. Many hand magnifiers come with a close up lens embedded in the larger lens.

**Small aquarium fish net** – Caution is also required when providing students with fish nets. Unless used very carefully, the netting is easy to damage and the net frame may injure the specimens. However, if used with care, a small net is useful for collecting small, fast moving organisms and will usually be a safer method of collection than using a bare hand.

**Simplified, laminated field guide sheets** – The possibilities for developing classroom sets of simplified, laminated field guides are many. Published material that does not prohibit reproduction may be copied, laminated and ring bound. If this approach is taken, limiting the number of organisms to a selection of the most common is valuable. However, remind students that they are likely to find organisms that are not included in these simplified field guides.

Another approach is to ask the students to photograph and correctly identify specimens from a particular habitat in order to develop their own classroom field guides. If scientific illustration is important to the teacher, students may be tasked with making simple line drawings and coloring them as a part of the project. Whether copying from existing sources or producing field guides from student work, care should be taken to credit any sources or contributors.

Finally, field guides can be a useful tool with a few caveats. Always remember that field guides are simplified material to assist with identification and provide a limited natural history of the organisms. Most field guides necessarily reduce the number of organisms depicted to a subset of the most common creatures and plants. The possibility of misidentification is often increased as students spend more time observing the illustrations and pictures than they do looking carefully at the specimen. There is also a tendency to want to “make” a particular specimen into something in the field guide. This tendency should be resisted in favor of careful notation of individual characteristics of the specimen for later consideration using a variety of identification resources.