



Building the Brooklyn Oyster Dory

A Construction Manual and Teaching Guide





Our Mission

To restore oyster reefs to New York Harbor through public education initiatives

Our Vision

A future in which New York Harbor is the center of a rich, diverse, and abundant estuary. The communities that surround this complex ecosystem have helped construct it, and in return benefit from it, with endless opportunities for work, education, and recreation. The harbor is a world-class public space, well used and well cared for—our Commons.

Why Oysters?

Oysters play a key role in attracting life. They earn their nickname as “ecosystem engineers” because we see biodiversity levels increase dramatically surrounding oyster reefs.

Oysters have a remarkable ability to filter nitrogen pollution from water as they eat. This is a heroic feat, because excessive nitrogen triggers algal blooms that deplete the water of oxygen and create “dead zones.”

Oyster reefs can help to protect New York City from storm damage—softening the blow of large waves, reducing flooding, and preventing erosion.

Restoring oysters and reefs will, over time, restore the local marine ecosystem’s natural mechanisms for maintaining itself, resulting in cleaner water and greater biodiversity.

How We Do It

The hands-on science of reef construction and monitoring is executed through community oyster reefs, in-school restoration-based STEM learning opportunities (including the Brooklyn Oyster Dory project), volunteer programs, community science and research, and restaurant shell collection. New York Harbor School, a maritime high-school located on Governors Island, is the flagship school of the Billion Oyster Project, and its students contribute to Billion Oyster Project as part of their Career and Technical Education (CTE) experience—growing oysters, designing and building oyster reef structures, diving to monitor reefs, building and operating boats, performing marine biology research, and more.

The Brooklyn Oyster Dory Program



The Brooklyn Oyster Dory program is a collaborative afterschool program designed for middle-school students in the New York City public school system. Over the course of 12 weeks, assisted by adult instructors and high school interns from the New York Harbor School, students build and launch a 14-foot wooden dory, a traditional workboat that was once a common sight in New York Harbor.

In addition to learning basic woodworking and team-building skills, the middle-schoolers gain an introduction to harbor and estuary geography, history, and ecology, and to contemporary policy and planning issues.

Once launched, the dories are used as support vessels and learning platforms for the Billion Oyster Project's community oyster reefs and for community boating programs in the city's waterfront parks.

Beyond connecting middle school students to their urban waterways, major goals of the program include laying the groundwork for a network of maritime-themed public schools and promoting social resiliency and ecological understanding in the city's underserved neighborhoods.

Acknowledgments



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Persak & Wurmfeld (naval architects)

Gowanus Dredgers Canoe Club
(sponsors of community boating)

NYC Department of Parks and Recreation (access to the water at Bush Terminal Park)

Urban Assembly New York Harbor School (high school interns)

The student builders of Sunset Park and their families

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Section One



Program Overview



Program Overview

With its flat bottom, simple planking, and plywood-epoxy construction, the Brooklyn Oyster Dory is a relatively ‘easy’ boat to build. Nevertheless, it can be a challenge for young, first-time woodworkers to complete one in the space of 12 weeks, and no less a challenge for instructors to organize productive work sessions, lively discussions and exciting field trips. Hence this guide.

Why build a dory? Aside from their simplicity, they are practical, versatile vessels whose traditional lines evoke the harbor’s rich maritime history. They make great, seaworthy workboats that are fun to row--and someday, we hope, sail. You can put several hundred pounds of gear in them, or a family of four. They slide in and out of the water easily, and they can be stacked and stored in small spaces--important in a crowded city.

The first two Brooklyn Oyster Dories were built as afterschool projects in Sunset Park, with the larger aim being to interest local students in the life of the harbor and in STEM and maritime education possibilities. Not far away is a new waterfront park--Bush Terminal Park--with a protected lagoon. The Billion Oyster Project had already begun a small oyster-restoration effort there--a “community reef” whose development neighborhood schools and volunteers helped monitor. We envisioned the dories as a fleet we could use to maintain the reef, but also make available to residents of Sunset Park for recreational rowing.

We started both builds in late winter/early spring, aiming for an early summer launch, and relied on a local educational nonprofit, Sunset Spark, to recruit two dozen interested students from local middle schools. Since we couldn’t accommodate that many builders at each session, we split the group in two and ran two sessions each week, one on Monday afternoon and the other on Friday. Even so, we would not have been able to finish the dories by June without organizing special weekend ‘community build days,’ when families, friends, and even a few passersby dropped by and joined in the work.

Sunset Spark helped organize our snacktime discussions and activities. Brooklyn Boatworks, a nonprofit that builds boats in public elementary and middle schools, provided experienced instructors and much-needed curricular know-how. One of Boatworks’ founders, Carl Persak, a naval architect, drew up the plans for the dory. Industry City, a manufacturing center and tech hub based in an historic cluster of waterfront warehouses, offered us rent-free space on the ground floor of one of their

buildings. And the Gowanus Dredgers canoe club provided canoes and, most importantly, on-water insurance coverage for the launch and subsequent community boating events.

Every build is different, of course. Depending on your location and circumstances, you may have to make significant changes to the format and timeline outlined here. That said, there is one constant: forming strong partnerships will be key to your success.

For further information on any aspect of the Brooklyn Oyster Dory program, please contact Rob Buchanan at the Billion Oyster Project: rbuchanan@nyharbor.org

Section Two



Before You Build



Before You Build

Funding

What does it cost to build a Brooklyn Oyster Dory? The materials themselves aren't much: about \$1000 in lumber, plywood, epoxy, and other supplies, and perhaps another \$1000 for the tools you'll need-- unless of course you have those already. Ideally, you'll be able to find a build space that's free or low-cost (see below for more on that).

That leaves staffing as the major expense. You'll need experienced instructors as well as community partners, schoolteachers, or others who can assist with the build, help lead breaktime discussions, and see that the builders get home safely at the end of the day. We estimate that about 350 hours of adult supervision went into each build, including planning and post-project reporting, with another 60 hours for the high school interns.

It may be that you can find qualified volunteers to fill some or all of those roles, but if not you'll need to raise the money. We did so via a grant from two private foundations focused on youth and innovative education, but given the evident interest in the program from elected officials, school administrators, contractors, fabricators, etc., there are many other potential funding sources.

Build Space

Our partners at Brooklyn Boatworks build a lot of smaller boats (Optimist prams) inside schools, where space is at a premium. Between work sessions they typically have to pack everything up, including the boat, and find a closet or other safe place to store it.

In planning the dory project, we imagined something more like a dedicated shop: a room 30 feet long and 20 feet wide, with good lighting and ventilation and big windows that would allow people passing by to see what was going on inside. Amazingly enough, that's exactly what we got the first time we ran the program: a vacant storefront on the ground floor of one of Industry City's converted warehouses. Between sessions we were able to leave everything in place, and people walking past were able to look in and track our progress over the course of the build.

A few months after we finished the first boat, Industry City found a tenant for the space and for a while we thought we'd have to build version 2.0 of the Brooklyn Oyster Dory somewhere else. But there was one other possibility at Industry City: a 20-foot container that had been modified to serve as a food

stand and positioned between an interior hallway and the building's courtyard. The container was too small to build the dory inside it, but the hallway was wide enough for us to set up work tables and the opening cut in the side of the container was long enough for us to move the boat in and out at night (we built plywood shutters to close up the container between sessions). Because we were in the hallway lots of people stopped to watch and ask questions, but the students didn't seem to mind--on the contrary. At times it felt like street theater, with our troupe of builders as the proud performers.

All this is to say that it's important to be flexible when hunting for a build site, and that what at first may seem like a drawback (eg, no walls and lots of distractions) might turn out to be an unexpected bonus.

Timing

On the two dory projects we've undertaken so far, we began construction in the middle of the winter, with the aim of launching the boat before the end of the school year. It doesn't have to work that way, of course--the Brooklyn Oyster Dory program could be run as a year-long course, with the same group of students meeting one day a week. But if you're working in a borrowed space, as we were, then a one-semester build with an early summer launch probably makes sense.

Some things to keep in mind as you plan your build schedule:

- During the two school vacations, one in February and the other in April, students and instructors may be traveling and you may not be able to meet
- Families often have lots of obligations on Saturday, while for others Sunday is a big conflict, so consider alternating your family/community days between the two, or running something after work on a weekday
- After Memorial Day everyone gets busy, especially with scholastic obligations (eg, Regents' exams)

Materials and Supplies, Tools, and Plans

As mentioned in the preceding section, the Brooklyn Oyster Dory can be built for about \$1000 in materials and supplies, with about \$1000 worth of tools. **Complete lists of both can be found in Section 9, "Additional Resources,"** but the two main things you'll need to obtain are:

- High-grade marine plywood (preferably okoume) and high-grade lumber for the rails (preferably mahogany), neither of which can be sourced at the local lumber store
- Sufficient numbers of good-quality hand tools (chiefly saws, planes, rasps, and screwdrivers) to allow for several student teams to work simultaneously

Some other things you'll probably also want, not included on the supplies list:

- Two good work tables, which can be built quickly from plywood and 2-by-4s
- Some kind of seating arrangement for the mid-session snack and discussion. This can be a rug on which everyone gathers, or some simple benches that double as sawhorses (a good project to tackle in week two, when you're building the strongback).
- A whiteboard or bulletin board on which you can post the daily lineup, captain of the day, safety reminders, etc.

Finally, if you want to build the genuine article, you'll need to obtain the plans for the Brooklyn Oyster Dory from their owner, Brooklyn Boatworks. There are many other dory plans available, of course, and a lot of them 'open source'--check out John Gardner's "The Dory Book" for some great examples. But because the BOD's simplified design is specifically intended for middle school builders, and because the plans include full-size patterns for each part, we highly recommend them.

Section Three



Safety Considerations



Safety Considerations

Because the Brooklyn Oyster Dory is designed for young, first-time builders, safety is a paramount concern. We've given a lot of thought to safe tools, materials and practices, but of course no system is foolproof. It's important to offer frequent safety demonstrations and reminders to students, stay alert, talk over incidents and close calls with the whole team, and amend procedures accordingly.

A particularly effective approach to shop safety introduced by our partners at Boatworks is to work with students to create a 'community agreement' governing behavior--something they themselves help draft and then sign on to.

Start by having a discussion with students: *What is safety? Why does it matter? Has anyone been injured before? What did it feel like and how long did it take to heal/feel better?* Ask students to identify possibly safety hazards and analyze different tools - *how might they be dangerous? How can we avoid those dangers? Would it be helpful to create a community agreement? What would its main points be and what should the consequences be if students ignore them?* Use a white board to write down suggestions for the agreement, and if necessary steer the conversation to include the following:

- Wearing proper protective equipment
- Respecting the tools
- Respecting other builders
- Not distracting other builders
- Not throwing, tossing or running with tools or epoxy

Another, more traditional approach is to draw up a simple set of safety guidelines and ask students and parents to review and sign (see Section 9 ("Other Resources") for an example. Three basic points are:

- The builder understands that working with wood, powerful adhesives, sharp tools and power tools can be hazardous
- The builder agrees to pay attention to the instructor when safety is being discussed, and to follow his or her instructions carefully
- The builder agrees that, if he or she is confused, uncertain, concerned about safety, or not sure of the next step, he or she will stop and ask an instructor or intern for help

Beyond that, a few general observations and precautions:

- Lots of supervision helps. We always had at least two adult instructors for each build session, plus the Harbor School interns.
- Keep work periods short, with defined goals. We generally aimed for a snack break and discussion or activity after 45 minutes to an hour of working on the boat
- Stick to hand tools. Of course, some hand tools--saws, chisels, planes--are sharp, and others can cause injury if misused. Every time a new tool is introduced, proper use and potential mishaps should be fully discussed.

We made two exceptions to the hand-tools-only rule: the drill or screw gun, which students who had mastered the use of the manual screwdriver were sometimes allowed to use under direct supervision, and the sabre saw or jigsaw, to be used exclusively by instructors or interns and, when possible, framed as a demonstration of a power tool that advanced builders can use to speed the construction process.

Epoxy is another 'tool' that requires special attention. It's a powerful, two-part adhesive that, while not toxic, nevertheless needs to be handled with care (gloves are mandatory, work aprons and protective eyewear recommended). Epoxy pumps can be difficult to operate, and they sometimes spatter, so on our builds the rule was that instructors or interns pumped the resin and hardener into cups before handing them over to students for mixing. Another rule: because partially-cured epoxy dust can be an irritant, students do very little hand-sanding on the boat, and none with power sanders.

More information on epoxy safety can be found here: <https://www.westsystem.com/safety/>

Section Four



Structuring Daily Sessions



Structuring Daily Sessions

Our afterschool sessions in Sunset Park typically started around 3:30 and ended around 5:45. That kind of time allows us to get real work to get done on the dory, but it can also be a long time for middle schoolers to stay alert and focused. Your situation will likely be different, and dependent on the personalities and abilities of your builders, but the format that we developed, outlined below, made for productive sessions and seemed to keep students engaged.

Circle Up

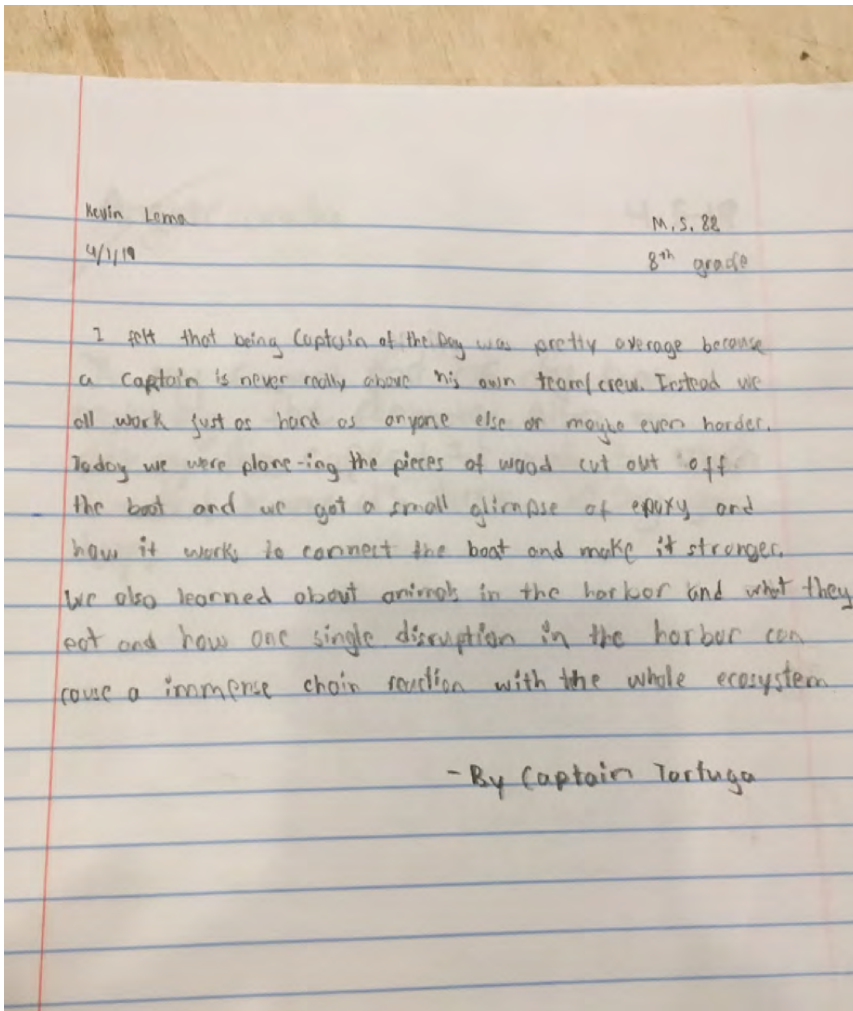
To begin each class, instructors form a circle or gather around a work table with the builders – “The Circle-Up”. This can be an important way to provide consistency, set the tone for the class, and build student trust. Components can include:

1. Cell phones: If necessary, students are instructed to turn their cell phones off, or put them in a receptacle and retrieve them at the end of class
2. Conversation: Instructor engages students by inquiring about their day/week--“Rate your day on a scale of 1 to 10”
3. Captain of the Day: The Captain is selected by drawing a name out of a captain’s hat, which he or she then dons for the day. The Captain is the class facilitator, helping peers and the instructor and making decisions when needed. He or she may also be given a camera and act as class photographer for the day, documenting each step in the construction of the dory.
4. Warm-up: The Captain leads a group stretch session, focusing on hands, arms and shoulders.
5. Plan for the Day: Review previous sessions and progress made, outline goals for the day (the white board can be useful for this), introduce any new tools/concepts, delegate tasks to specific students or teams

Snacks and Discussions

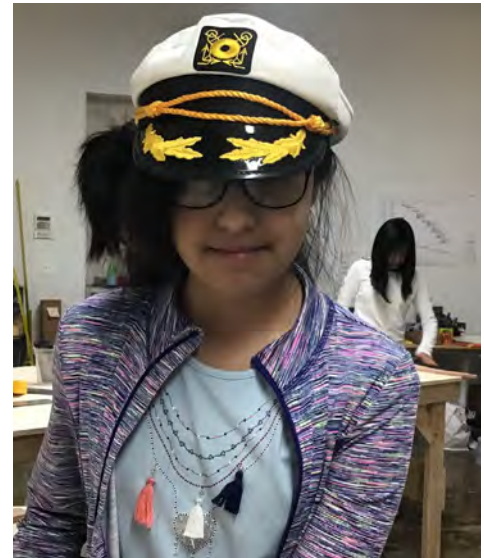
After our first work session, which typically runs from about 3:45 to 4:30, we stop and gather for a snack and a short, themed discussion or activity. It’s important to sit, either on benches or the floor, and to pass around food (mainly fresh fruit and raw vegetables, hummus, and--most popular of all--guacamole) and a jug of water. After a few minutes eating and chatting, an instructor introduces the topic of discussion. Most of the time it helps to have a series of visual prompts – maps and charts, graphs, photos, etc. (for details on the discussions we piloted, see Section 6, “Suggested Discussions, Activities and Field Trips”). As with the Circle Up, the goal is to involve all students. Often that happens

naturally, but if not instructors can work their way around the circle, calling on students in turn.



Captain's Reflection

About 10 minutes before the Circle Down, the Captain steps aside and reflects on the day's activities in the form of a blog entry, highlighting the builders' experiences that day.



Circle Down

At the end of class, immediately prior to dismissal, instructors form another circle with students – “The Circle Down”—that provides formal closure to the session. Components may include:

- Review: prompt students to review progress made and concepts and techniques learned that day
- Reflect: ask students how they felt about the day's class
- Look ahead: Preview the following week's class and briefly introduce any new steps, concepts, tools, etc.

Section Five



Week by Week build schedule



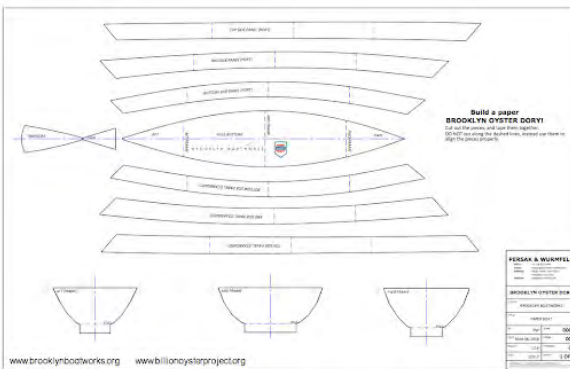
Week One

Building a paper model

The first session of the Brooklyn Oyster Dory build is largely given over to introductions: of students, interns, instructors, and the project itself. During the ‘circle up’ described in the preceding section, instructors typically ask students about their schools, their families, and their prior experience with building and with boats.



A popular additional activity is an assignment to each student to draw a small self-portrait or ‘name card’ that can be posted on the walls of the build space. Colored sharpies and large index cards or half-sheets of paper or cardstock work well for this.

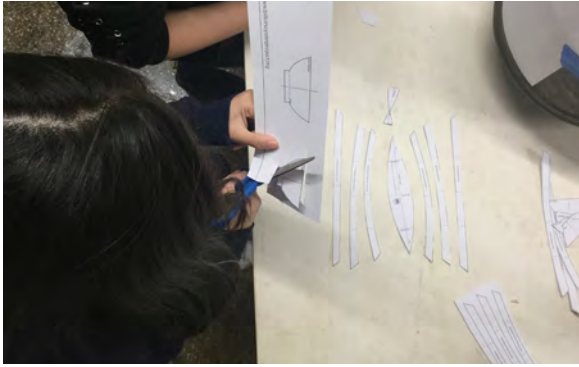


The dory cutout is best printed on heavy 11x14 paper or light cardstock. Instructors should provide each student with a pair of scissors and a roll of scotch tape.

****A full PDF of the cutout can be found in Section 9, “Additional Resources****



Safety tip: Before handing out scissors, show to hold and pass scissors (handle end first) and discuss the importance of not running with them, throwing them, or stabbing with them, even in jest.



Explain that the steps involved in making the model are essentially the same as those involved in making the boat: first you cut out the bottom (the ‘backbone’ of the boat), then you attach the frames (the ‘ribs’), and finally you add the planks (the ‘skin’).



It typically takes middle-schoolers 30-45 minutes to assemble the paper dories. Once they’re complete, encourage students to name them, decorate them with sharpies or colored tape and give them names.



Construction tip: tape the three planks for each side (port and starboard) together in the middle of the planks and attach them to the middle of the dory bottom before trying to tape the tips of the planks together at the bow and stern.



After the break, a second activity is to launch the model boats—typically in a tub or basin—and then evaluate their seaworthiness and cargo capacity. This can be framed as a competition: whose boat can hold the most pennies or (our preference) oyster shells before it capsizes and sinks to the bottom? That the dories can support a surprising amount of ‘cargo’ is usually one of the takeaways for students, and a good way for them to develop confidence in the larger vessel whose construction they are about to begin.

Week Two

Building the strongback

Students are introduced to some basic woodworking tools, including measuring sticks, tape measures, and squares; clamps and saws; and screwdrivers. After a brief design discussion, they use the tools to construct a strongback, the rudimentary stand on which the dory will be built.



The 'Big Inch' is a good way to start a discussion of measuring. Using a sheet of graph paper, sketch out an oversized inch, then divide it in half (two half inches), divide each half again (four quarter inches), and then divide each quarter (eight eighths). Then ask students to assign values to each mark. The $\frac{1}{2}$ " mark, for example, would be one half but also two fourths and four eighths.

As an exercise, and with the Big Inch in front of them, you can ask students to add a few lengths together: $\frac{3}{8} + \frac{1}{2}$, for example, or $5\frac{1}{2} + 1\frac{1}{4}$.

Another exercise is to have students practice taking measurements from the plans for the dory—the length and width of the bottom of the boat, for example, or the width of the bottom at the three frames. This can (at this or a later session) lead to a discussion of scale, and how to draw full-size boat parts from the plans. If, for example, the scale of your drawing is $1" = 1'$, then a piece measuring $1 - \frac{1}{2}"$ long on the plans will be 18 inches long on the boat.

Next, do a quick sketch of the strongback you want to build. There are many good ways to support the dory while it's under construction—two or three light sawhorses, for example, would probably work fine. But a simple structure that students can complete in less than an hour consists of a 1x6" or 1x8" pine board 'box' that's 10 to 12 feet long and about 24 inches wide. There should be an extra crosspiece in the middle, to support the middle of the dory bottom, and six short legs (18-24") made of 2x4s.

Strongback construction:

Step One: Ask the students to make a cut list (in this case, three pine cross pieces and six legs), show them how to use the square, and then ask them to measure and mark the cuts using sharpies.

Step Two: Introduce students to the Japanese pull saw. *Why might you call it a “pull” saw?* Brainstorm. Explain that the cut is made on the pull, not the push.



Safety tip: Students should wear safety glasses (or their own glasses) when sawing. Gloves--or at least a glove on the non-sawing hand--are recommended for inexperienced sawyers.



Step Three: Introduce the bar clamp and demonstrate sawing with and without clamping. *Why is it important to keep the wood stable while cutting? What is the best angle to cut at?*



Safety tip: it is easier to adjust a bar clamp if the handle is facing up, but the projecting bar can be a hazard; best to set clamps handle-down.

Step Four: Be sure students learn to cut on the outside edge of the line. Explain that builders can always remove more wood by planing or sanding, but cannot add it back if they cut inside the line. Emphasize the importance of double-checking measurements and of focusing while sawing, as a poorly cut piece will need to be redone and consequently slow down the build.



Construction tip: clamp a block of wood along the cut line to keep saw straight



Step Five: Have the students to temporarily clamp the pieces of the strongback together with bar clamps.

Step Six: Demonstrate the use of the power drill by drilling pilot holes for the decking screws that will hold the strongback together. Use a countersink bit or, if using a regular bit, be careful not to drill too deeply into the underlying piece of lumber--you want the screws to go in easily, but also obtain maximum grip.

Step Seven: Demonstrate the use of a ratcheting screwdriver, have students discuss the proper length of screw and the right tip use, and then have them screw the strongback together.



If there is extra time, or if you need additional tasks to keep all your builders occupied, you can designate a team or teams to design and build other items your shop may need: simple work tables, benches, storage shelves, sawhorses, etc.

Week Three

Lofting and cutting the dory bottom and the frame supports

The goal this week is to lay out the biggest part of the dory--the bottom--then cut it out and shape it. Students will also cut and shape the central butt block--the piece that holds the two halves of the bottom together--and the frame supports. The first challenge is to transfer the curved shape of the bottom from the plans to the flat sheets of plywood from which it will be cut--a process called lofting. The second challenge is to saw and plane that 12 mm (½”) marine plywood, which is considerably stronger and tougher than the soft pine used to build the strongback.

Dory bottom construction:



Step One: Students cut out the mylar pattern for the dory bottom with scissors, stretch it across two sheets of plywood placed end to end, and tape it in place with painter's tape. Take care to ensure that the location of the central frame indicated in the plans is offset three inches from the line where the two sheets of plywood butt together--that way one edge of the butt block (which is six inches wide) can serve as the first

layer of the frame support while the butt block itself is symmetrically positioned atop the two pieces of the bottom.

Step Two: Once the mylar pattern is taped in place students use push pins spaced a hand's-width apart to mark the dory bottom edges and centerline.



Step Three: Remove the pattern while carefully circling each pushpin hole in pencil, then hammer finish nails into the pushpin holes.



Safety tip: students should hold nails between thumb and finger and up against the board they are nailing into, then gently tap to get the nail to settle into the wood. Don't let students hammer nails that other students or instructors are holding (as pictured above!)



Step Four: Bend a batten--a long, flexible piece of trim--around the nails and trace the curve using a sharpie. Note that there are two lines on each edge, one for the inside of the boat bottom and one for the outside.



Step Five: Repeat the mylar, pushpin, nail and batten process on the other side of the centerline so that both halves of the bottom are marked.

Step Six: Pull the two sheets of plywood apart and designate two sawing teams, one for each sheet. The pieces will need to be reclamped frequently so that the cut line is close to the edge of the table and well supported. Sawyers should take care to stay close to but outside the outermost sharpie line; if the saw wanders across the line they should stop, back up, and start a new cut line.



Step Seven: Once the bottom pieces are cut out, students can clamp them to the work tables vertically and plane off the excess material, right down to the outermost sharpie line.



Step Eight: At that point the piece can be clamped flat so that the bevel--the angle between the outside and inside lines--can be planed.



Construction tip: Planes work best if they're held with two hands and positioned at a slight angle to the surface being planed, so that the blade passes over the wood 'on the bias' rather than straight ahead.



Step Nine: The finished bevel should be evenly angled so that the different bands or layers of plywood are the same width.



Step Ten: Since only one or two students can be sawing the dory bottom halves at a given time, others should be laying out and sawing the central butt block and the frame supports. The three upward facing edges of the frame supports that will not be attached to the frames should be rounded with rasps and sandpaper, 60 grit to start and 150 grit to finish.



Construction tip: a good strategy for getting the most out of your sandpaper is to have students fold sheets in half and tear them along the crease, then fold each half sheet in half again, and again tear along the crease. Fold the resulting quarter-sheets in thirds, like business letters, to form sturdy three-faced sanding pads.

Week Four

Assembling the dory bottom; making frames and the stern knee

After learning to mix epoxy adhesive, students join the two halves of the dory bottom by means of the butt block, a rectangular plate that reinforces the joint between the sections and doubles as a support for the middle frame. They then install the supports for the bow and stern frames and begin sawing out the frames and the stern knee.

Dory bottom assembly:



Step One: Find the distance of the bow and stern frames from the center of the boat and mark the locations on the dory bottom, using a square to draw a perpendicular line. Make sure that your frame supports (including the central butt block) are a little shorter than the width of the dory bottom, so that water won't get trapped in the ends of the boat. Trace the outline of all the frame supports so that you know where to apply the epoxy adhesive.

Step Two: Before beginning the epoxy session have students don aprons and latex or nitrile gloves. Explain the two-part nature of epoxy--it's a resin that's mixed with a hardener, or catalyst, that causes the mixture to gel and solidify. Mix a demonstration batch in a small cup and use a tongue depressor to stir it 30 times in one direction, 30 times in the opposite direction, and another 30 times in the original direction.



Safety tip: because epoxy pumps take a lot of strength and can sometimes spatter (and also because getting the right ratio of resin to hardener is critical if the epoxy is to cure), we strongly recommend that an instructor or intern do all of the pumping, then hand the cups to the students for stirring, thickening and application.

Step Three: Use a chip brush (a disposable brush) to apply a thin coat of liquid epoxy to the surfaces that are being glued. Point out that, as with paint, one should clear the brush of excess liquid before applying it. In other words, no dripping! Students can then ‘paint’ the edges of the dory bottom that will butt together, the places where the butt block and the frame supports will land, and the underside of the butt block and frames supports themselves.



Step Four: The next step is mixing wood flour--fine sawdust--into the liquid epoxy to make a thickened paste that will fill any gaps in the joints that are being glued. Using a dry tongue depressor, students spoon small amounts of wood flour into their cups and then, using their own tongue depressor, mix it with the liquid epoxy until it reaches the consistency of creamy peanut butter and no longer drips.



Step Five: The thickened epoxy or ‘peanut butter’ should be spread on all the painted surfaces, including the end grain of the two bottom pieces. Don’t worry about making the layer perfectly smooth--the excess epoxy will distribute itself evenly once the two halves of the joint are clamped or screwed together.

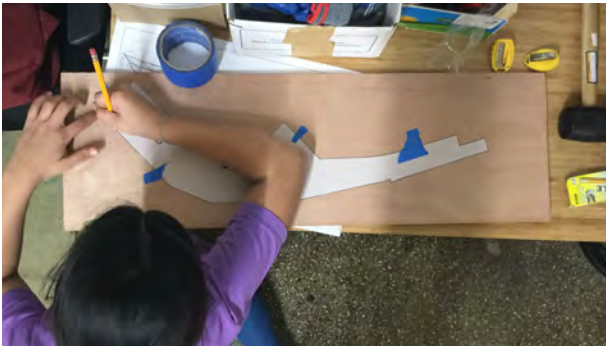


Step Six: Bar clamps are often the easiest way to hold a glue joint in place while the epoxy sets, but in places where clamps won’t reach, or where you want to eliminate the possibility of a piece slipping out of position, drywall screws work well (the screws can be backed out later, and the holes filled with epoxy). If you’re going to use screws, pre-drill a few pilot holes in the butt block and the frame supports and then have students use a ratcheting screwdriver to put the screws in, tightening them slowly until there’s just a bit of ‘squeeze out’ at the edges of the joint.



Construction tip: Once students are comfortable with the ratcheting screwdriver, you may want to let them use a screw gun. Set the clutch at a lower level so that there's no chance of 'stripping' or driving the screw too deep. Once the screw is set encourage students to keep both hands on the tool.

Cutting out the frames and the stern knee:



Step One: Students cut out the frame and stern knee patterns from the mylar sheets with scissors, tape them to a piece of plywood (taking care not to waste sections that may be useful for other pieces), trace them, and then begin sawing them out. Because these pieces are made of ½" plywood and because they contain sharp, concave curves, this can be a long process. Whenever possible, encourage students to

lay the pieces out so as to take advantage of the straight 'factory edge' of the plywood and minimize labor.

Step Two: You can also precut sheets of plywood into smaller segments with a jigsaw before the session starts, so that students can work on several pieces at once, rather than waiting for one student to finish cutting a piece out of an entire sheet.



Construction tip: One way to avoid the difficult sawing required to make the frames is to find a professional woodworking shop with a CNC (computer numeric control) router and ask them to cut the frames for you as a part of a class field trip. Many carpenters and craftspeople are eager to show young people what they do and how their shops work, so don't be afraid to ask!



Step Three: Once the frames are cut out, students should round the inside edges--that is, the parts of the piece that will NOT be glued to the dory bottom or the planks--with rasps and sandpaper.

Step Four: To make the stern knee, saw two pieces of plywood from the knee pattern and epoxy them together to form a 1-inch-thick piece. In lieu of clamps they can be screwed directly to the tabletop, provided you put down a scrap of plastic to prevent the bottom piece from sticking. After the epoxy has set, students can round the inside edge of the knee--the part of the piece that won't be glued to the bottom or the transom--with a rasp and sandpaper.

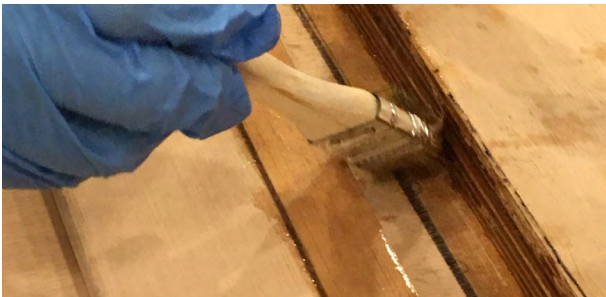
Week Five

Attaching the frames and the stern knee; making the transom

Attaching the frames:



Step One: Dry fit the frames against the frame supports. Be sure the centerline marks on the frames line up with the centerline on the dory bottom. Use a sharpie to trace the 'glue lines'-the outlines of the areas where epoxy will be applied.



Step Two: Apply epoxy 'paint' to all of the areas on the dory bottom, frame supports and frames that will be in contact.



Step Three: Apply a generous layer of 'peanut butter' to all painted surfaces.



Step Four: Swing the frames up into vertical position (check with a level) and secure with clamps or screws.



Step Five: Use the end of a tongue depressor to form robust fillets (rounded interior corners) from the epoxy that squeezes out of the joints during clamping. Harvest any excess epoxy to use on the other frames or to fill holes.

Attaching the stern knee:

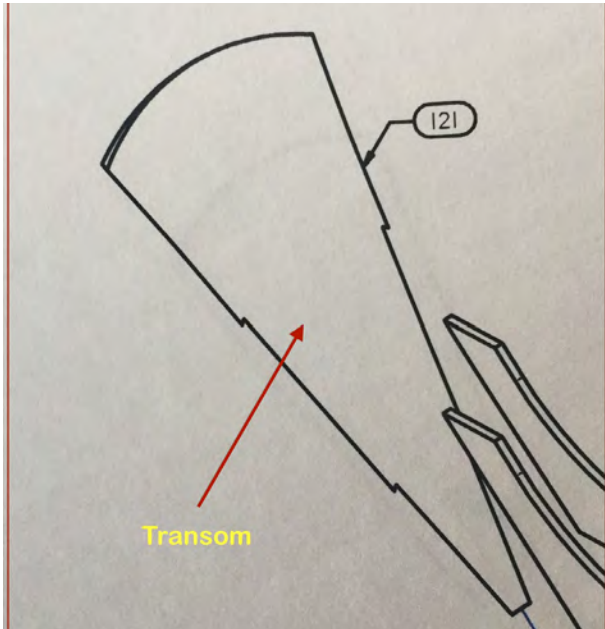


Step One: Dry-fit the stern knee to the back end of the dory bottom by drilling two pilot holes on the dory bottom centerline and securing it with two drywall screws. The knee should sit an inch or so forward of the tip, at the spot where its width (1 inch) matches the width of the dory bottom. Use a sharpie to trace the glue lines.



Step Two: Paint and peanut butter inside the glue lines and 'clamp' the knee in place with the two screws, then add robust fillets on either side of the knee where it attaches to the dory bottom. Be careful not to put a fillet at the back of the stern knee, since that is where the transom will be mounted.

Making the transom:



Step One: The basic transom shape can be sawed out quickly, but the bevels are tricky to shape with a plane because the plane can't reach all the way into the notches where the planks will fit.



Step Two: A chisel and hammer or mallet will be necessary to reach and remove the wood in corners. Pull saws and rasps can also be helpful here.



Safety tip: chisels are sharp and mallets or hammers can provide a lot of force; to avoid any accidents make sure that students position themselves and their tools so that they are working away from, rather than towards, their own bodies.

Week Six

Attaching the transom; making and installing the seat supports

These are the last parts of the dory's 'skeleton'; once they're in place the boat will be ready for its 'skin' (the planks).

Attaching the transom:

Step One: As with the stern knee, drill two pilot holes on the centerline of the transom. Set the transom on the 'shelf' formed by the tip of the dory bottom and set one of the screws into the stern knee. Check carefully to be sure the transom is aligned vertically before setting the second screw. Trace the outline of the knee on the transom.

Step Two: Remove the transom, paint and peanut butter inside the glue lines and at the base of the transom where it sits atop the dory bottom, and then remount the transom, making sure to form robust fillets on either side of the knee.



Construction tip: If needed, a small wedge placed on one side or the other of the knee can be used to adjust the angle of the transom vis-a-vis the centerline of the dory.

Making and installing the seat supports:

Step One: Thwart supports run from one side to the other of the middle and bow frames at the thwart height indicated in the plans. The supports can be made from any plywood or pine stock that's $\frac{1}{2}$ " to $\frac{3}{4}$ " thick and 1 to 1- $\frac{1}{2}$ " wide. After measuring and marking the proper heights on the frames, saw the supports so that they flush with the ends of the frames.

Step Two: Glue them into the boat, one on each side of each frame, using screws or clamps to hold them in place while the epoxy cures.

Week Seven

Making and hanging the garboard plank

Getting the first plank on is a big step--the airy frame of the dory finally starts to look like a boat. Because planking requires a lot of repetitive tasks, especially mixing and spreading epoxy 'paint' and peanut butter, it's a great opportunity to get the whole team working together.



Step One: Cut out the mylar plank patterns with scissors and lay them out across two sheets of ¼" plywood set end to end. Before marking and cutting out the plank sections with the saw, take care that the joint between the two sections will not line up over the middle frame when the plank is mounted on the boat--it should be aft of that by at least 4 inches, to allow for the placement of the butt block.



Construction tip: When tracing the mylars, leave an extra inch at the bottom of the plank and an extra inch at the aft end of the aft section--that material can always be removed later.



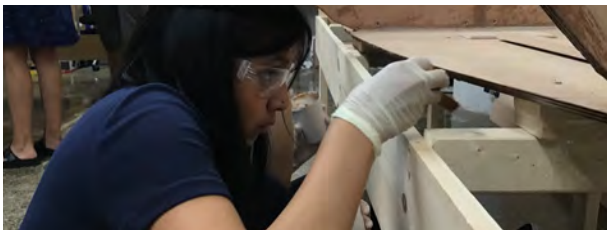
comes in contact with the dory bottom and the frames.

Step Two: Dry-fit the sections of the plank to the boat to make sure they align with the notches in the frame and in the transom. If they sit too high to snap into the frame notches, you can mark the overlaps with a sharpie and then use a batten to draw a new cut line that will allow the plank to sit where it belongs. You should also use a sharpie to mark the glue lines--all the places the plank

Step Three: Use a rasp and sandpaper to round the top inside edge of each plank section-- once the dory is finished, this will allow water to run down into the bottom of the boat without getting trapped by plank overlaps.



Step Four: Paint and peanut butter inside the glue lines on the plank sections .



Step Five: Paint and peanut butter the beveled edge of the dory bottom and the ends of the frames.

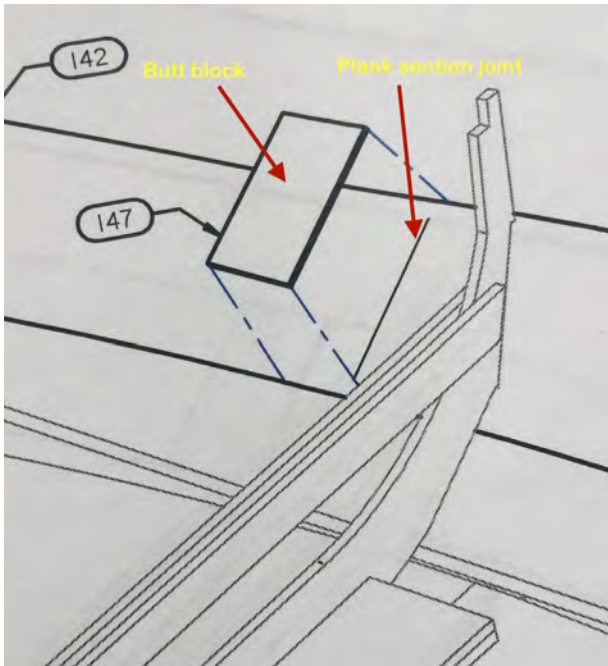


Step Six: Set the plank into position and secure every four to six inches, or as needed, with drywall screws. By adjusting the tension on individual screws (with a ratcheting screwdriver) students should be able to control the curve of the plank; have them eyeball it frequently until all

the bumps and wobbles are gone and it looks 'fair.'



Construction tip: to help students get screws into the right spots, especially at the tops of the plank sections where they meet the narrow frames, use a drill and countersink bit to make precisely-located pilot holes.



Step Seven: Butt blocking: At the spot in the middle of the boat where the two plank sections meet, cut a six by eight inch rectangle of $\frac{1}{4}$ " plywood, paint and peanut butter it, and clamp or screw it into place with an equal overlap on both plank sections.



Construction tip: At the bow, after painting and peanut buttering the inside tips of the two plank sections, drill pilot holes and join them together with zip ties instead of screws



Step Eight: Once the plank is in place, harvest excess epoxy or 'squeezeout' (and, if necessary, mix more) to form a robust fillet between the dory bottom and the plank.

Weeks Eight - Nine

Making and hanging the middle and sheer (top) planks

Getting the next two planks on the boat is largely a repeat of the garboard installation. For each additional plank, four plank sections and two butt blocks need to be cut, trimmed, rounded, painted and peanut buttered, and screwed in place, so there is plenty of work for all hands. That makes planking a great activity for a weekend build day (see section 7, “Family and Community Build Days,” for more details).

Making and attaching the middle plank:



Step One: Back out all the screws that held the garboard in place while the epoxy was drying. Inspect the top edge of the garboard to make sure it is clean, smooth, and ready for the next plank to be attached to it. Saw off any part of the butt blocks that may extend beyond the top of the plank and use a chisel to remove any clumps of dried epoxy.

Step Two: Roll out and trace the middle plank pattern, taking care to place the joint between the two sheets of plywood forward of the middle frame, so that the butt block will be ‘staggered’ vis-a-vis the one on the garboard plank.

Step Three: Saw out the plank, leaving an extra inch or so along the bottom edge.

Step Four: Dry-fit the plank to the boat, plane the upper edge until it aligns neatly with the notches in the frames and transom, and then round the top inner edge with rasps and sandpaper.

Step Five: Draw a glue line along the bottom edge of the plank where it overlaps the garboard. Remove the plank from the boat and lay a batten along the glue line and mark the outside of the batten so as to leave an even, $\frac{3}{4}$ -inch-wide overlap.

Step Six: Paint and peanut butter the plank and frame edges, as well as the top $\frac{3}{4}$ inches of the garboard, and clamp the plank in place with drywall screws.

Step Seven: Once the screws are in place, form a robust fillet along the seam between the planks.

Sheer (or top) plank:

Step One: The process is the same as with the middle plank except that with the sheer the top of the plank should be cut a little wide (it can be cut or planed down later, once the outwale has been attached).

Week Ten

Attaching the outwales and the sheer clamp support blocks; cutting out the thwarts and stern sheets

Once the sheer plank is hung, the hull of the dory is almost complete. The last structural element is the gunwale, or rail, which reinforces the thin, curved planking at the top of the boat and provides a solid platform for the oarlocks. The Brooklyn Oyster Dory plans call for both an outwale--a long strip of solid wood attached to the outside of the planking--and a sheer clamp--another long strip inside the planking and separated from it by support or 'spacer' blocks. The result is a beam-style structure that makes for a very sturdy gunwale.

Attaching the outwales and the sheer clamp support blocks:



Step One: Find or mill two matching 1-by-2 ($\frac{3}{4}$ " by 1 $\frac{1}{2}$ ") boards at least 15 feet long. Clamp one of them to the top of the sheer at the bow of the boat, leaving enough overhang so that the end of the board can be trimmed to meet the outwale that will be placed on the other side.

Step Two: Bend the board around the plank and the frames, clamp in to the top of the transom, and draw a glue line on the plank. On the inside of the boat, at the same height, use a sharpie to mark the glue lines for the spacer blocks.

Step Three: Repeat 1) and 2) for the other side of the boat, carefully sawing the forward ends of the two planks so they meet symmetrically at the bow (don't worry too much about a perfect fit, as epoxy can fill any gaps) Check to see that the outwale heights are the same on both sides of the boat, then trace their bottom edges with a sharpie to mark the glue lines.

Step Four: Pull the two outwales off the boats, paint and peanut butter the surfaces that are to be in contact with the boat, as well as the sheer plank above the glue line, and then clamp or screw the outwales in place.

Step Five: Drill two pilot holes in each block, paint and peanut them, and screw them into place on the inside of the sheer.

Step Six: Once the epoxy has cured, saw off the protruding aft ends of the outwales so that they are flush with the back of the transom.



Construction tip: if you use screws to clamp the outwales make sure to drive them from the inside of the boat, through the sheer plank and into the outwale, so as not to leave any marks on the outside of the outwale. Take care not to place any screws inside the glue lines for the spacer blocks, since once those blocks go on it will be impossible to retrieve any screws trapped underneath.

Cutting out the thwarts and stern sheets:



Step One: Lay out and trace the mylar patterns on ½” plywood, using the ‘factory’ edges of the sheets when possible, to minimize sawing.

Step Two: Use rasps and sandpaper to round all the edges of the thwarts, top and bottom.

Step Three: Where necessary, use rasps to widen the ½” notches in the ends of the thwarts that are designed to lock into the frames.



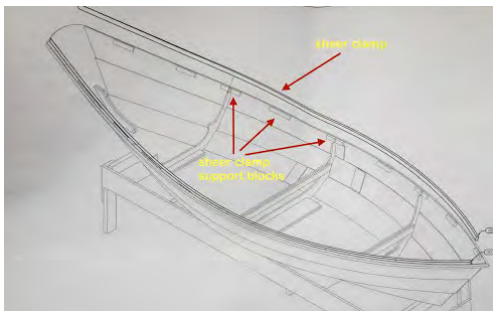
Construction tip: After the relative ease of cutting ¼” plywood for the planking, it can be a challenge to return to the ½” plywood necessary for the thwarts and stern sheets (the seat in the stern of the boat). Instructors may wish to precut some of the seat stock with a jigsaw, especially the notches and the deep concave curve in the stern sheets.

Step Four: To strengthen the thwarts and stern sheets, laminate them to ¾” pine boards and plane them down to size once the epoxy has cured.

Week Eleven

Attaching the sheer clamp and the thwarts

Step One: Remove the clamps or screws used to secure the outwales and the spacer blocks while the epoxy was curing.



Step Two: Bend the sheer clamp (or inwale) into the boat, clamping them temporarily so that you can mark the spot to cut them at the point where they intersect with the transom.

Step Three: After cutting and dry-fitting both sheer clamps, mark, paint and peanut butter them at the spots where they will connect to the spacer blocks, then screw or clamp them in place.

Step Four: After dry-fitting the thwarts, paint and peanut butter the tops of the seat supports the seat notches and install the seats. The stern sheets are meant to be removable, so no epoxy is necessary.



Construction tip: Instead of screws, use clamps or heavy objects (cans of paint, for example) to weight down the seats while the epoxy cures.

Step Five: Use any extra epoxy to fill screw holes in the planks and the dory bottom.

Week Twelve

Sanding, painting and hardware installation



Congratulations, your builders have completed a 14-foot dory that would float perfectly if you were to launch it today. But don't do that! The dory isn't really done until you fill the laps with epoxy, sand and paint the hull, and add a few vital pieces of hardware: the oarlocks and the drainplug.

Step One: With chisels and mallets, knock free any clumps of dried epoxy remaining on the inside of the boat. Turn the boat over and do the same on the outside of the hull.

Step Two: With the hull still upside down, mix 'peanut butter' that is thinner than usual, then use the tongue depressors as ladles to drip a continuous bead of epoxy into the upturned laps (the gaps between the planks).

Step Three: Cut strips of 2 inch wide fiberglass tape about four feet long, soak them in a cup of liquid epoxy, squeeze out the excess, and lay them lengthwise along the garboard-dory bottom joint, with half of the tape on the garboard and the other half on the bottom. Smooth the tape with a chip brush to remove air bubbles and collect any dripping epoxy.

Step Four After the epoxy has cured, and before the next work session, instructors with proper PPE (Personal Protective Equipment) should sand the boat with an orbital sander. Hand sanding may be necessary in tight corners and along the fillets.



Safety tip: Because inhaling partially cured epoxy is potentially hazardous (see the [product safety discussion](#) referenced in Section 3, ‘Safety Considerations’), students should not handle or be present when the orbital sander is being used, and the sanding should be done outdoors if possible.



Step Five: At the next session, students may give the boat a light sanding with a medium-grit sandpaper (150 or so) provided they are wearing protective masks.



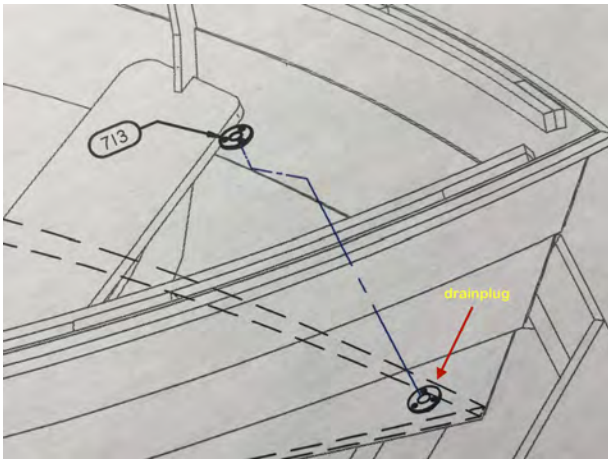
Step Six: Apply one or two coats of clear primer to the dory, inside and out. In between coats, give the dory a quick scuffing with fine-grit sandpaper (220 grit).



Step Seven: Apply two coats of finish paint, if desired, and any additional desired details--the dory’s name, for instance!



Step Eight: On both sides of the boat, drill $\frac{3}{4}$ " holes through the spacer blocks one foot aft of the trailing edge of the two thwarts and insert the oarlock sockets. Drill pilot holes with a countersink bit and secure them to the blocks with wood screws.



Step Nine: Near the bow end of the dory bottom, drill a 1" hole and epoxy a bronze drainplug (also called a garboard plug) in place. Cover the threads of the plug with painters tape to avoid any possibility of epoxy infiltration.

Step Ten: Gather your team and raise a glass of sparkling cider--you have completed the construction of a Brooklyn Oyster Dory!

Section Six



Suggested Discussions, Activities and Field Trips



Suggested Discussions, Activities and Field Trips

A key aim of the Brooklyn Oyster Dory program is to introduce student builders, along with their families and their neighborhoods, to the harbor and estuary. Of course building, launching and rowing a small boat does that in a direct and visceral way, but we think it is also important to explore and develop other avenues of connection and understanding--particularly when they're oyster-related!

In Sunset Park we piloted a series of themed discussions and activities to take place during the snack break. We also took the builders on several field trips. Below are some suggestions for both. Additional ideas for lessons and activities are available on our curricular platform here: <https://platform-beta.bop.nyc/lessons>.





Geography of New York Harbor

The primary goal here is to familiarize builders with the basic layout of the harbor and their neighborhood's connection to it. A good way to open conversation is to unroll a nautical chart of the upper harbor and ask students what makes it different from a map. *What is the meaning of all those tiny numbers on the chart? Why would they be important to the captain of a ship? What about that circle in the corner (the compass rose)? What are the cardinal directions and why would captains need to know them?*

Other possible prompts and questions:

- Where is Brooklyn and where is your neighborhood?
- Can you show the group a place you've been outside of your neighborhood?
- Where are the other four boroughs?
- Where is New Jersey?
- What are the main waterways and tributaries that connect to the harbor, and where do they come from?
- Where is the ocean?

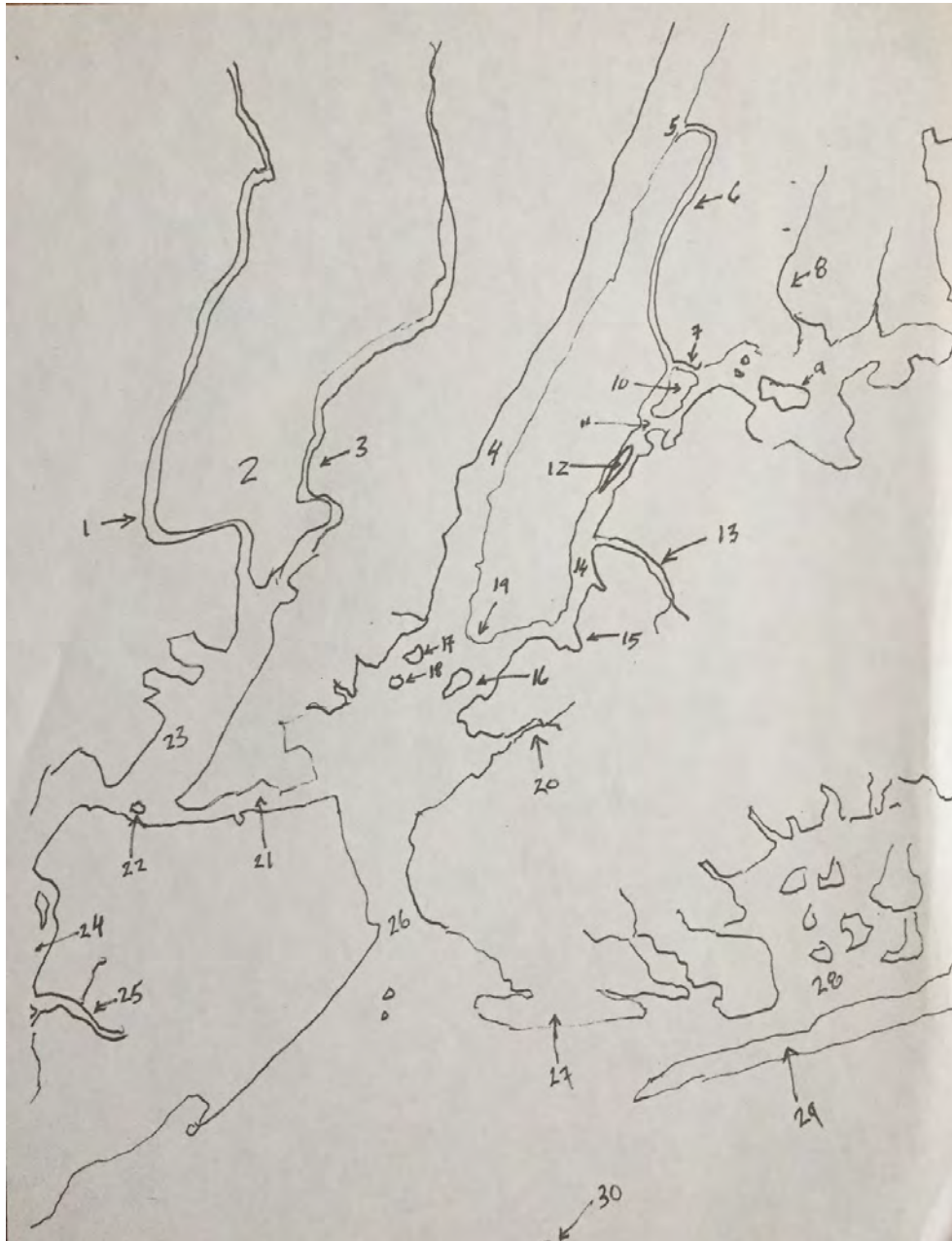
Discussion Topic 1 Continued

As a followup activity, pass around photos of harbor landmarks and ask students to identify them and locate them on the chart.



Discussion Topic 1 Continued

If your group seems particularly interested in geography, you can administer a take-home 'quiz': pass out copies of the diagram to the left (or something similar) along with a list of place names, and ask each student to come back the following week with a number assigned to each name. You might also ask each student to do a bit of research, and be prepared to tell the rest of the group about one place on the map.



Key

Arthur Kill
The Battery
Bronx Kill
Bronx River
Brooklyn Navy Yard
Coney Island
East River
Ellis Island
Fresh Kills
Governors Island
Gowanus Canal
Hackensack River
Harlem River
Hell Gate
Hudson River
Jamaica Bay
Kill van Kull
Liberty Island
Meadowlands
Newark Bay
Newtown Creek
Passaic River
Randall's Island
Rikers Island
The Rockaways
Roosevelt Island
Sandy Hook
Shooters Island
Spuyten Duyvil
Verrazano Narrows



Ecology of New York Harbor

What is an estuary? Is the water salt or fresh? What kinds of animals and plants live in estuary and how do they relate to each other? Why should city residents care about the health and balance of that overall 'ecosystem'?

One effective way to address these questions is to have students take on the role of different estuary organisms, with the class working together to create an estuarine 'food web' that connects the organisms to each other.

Front



Blue Crab - *Callinectes sapidus*

Back

Blue Crab (an animal)

Habitat: in the mud and sand of bays and estuaries.

Food: shellfish, worms, small fish, plants and almost anything it can find along the bottom, including dead animals and other waste (detritus).

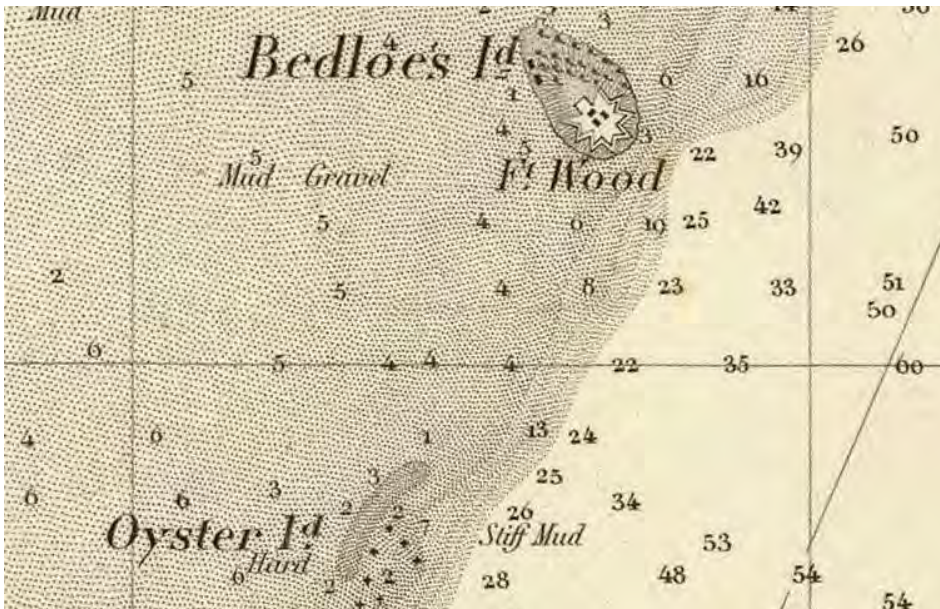
Predators: eels, drums, striped bass, spot, trout, some sharks, humans, cownose stingrays, birds, sea turtles, beavers, otters, seals.

Other info: Adult females are more common in higher-salinity waters, except in summer, when they go upstream to mate. Then they come back downstream with the fertilized eggs stuck to their underside. A few weeks later, the eggs hatch, and the baby crabs go through several funny-looking larval stages. Once they look like crabs, the juveniles go back upstream to spend the winter in the mud, in a state of semi-hibernation.

1. Start by making (and, if you wish, laminating) a set of two-sided cards of the sort illustrated above (a good lineup of estuary animals and plants is available on the Billion Oyster Project's digital platform).
2. Have each student 'adopt' one or two cards, study the information on the back of them, and then stand or sit in a circle.
3. Introduce a ball of yarn and explain that the thread represents energy exchange or, more colloquially, consumption--in other words, it connects prey to predators. Hand the end of the thread to a student and have them hold it and roll the ball of yarn to someone whose card is a consumer of the animal or plant their card represents.
4. That student then reads off the list of their 'predators,' and rolls the yarn to one of them.
5. Continue until a complete web is formed between the various cards. Pull on the web and ask what students feel. *What happens to the web when 'organisms' drop out of the game? How does all of this apply to the estuary?*

[A detailed food web lesson plan is available on the BOP digital platform.](#)

Oysters and the History of New York



Oysters are a convenient lens through which to view the history of New York City and in fact there's a very popular book--"The Big Oyster," by Mark Kurlansky--on exactly that topic. There were more than 200,000 acres of subtidal oyster beds when the first European colonizers arrived in the early 1600s, and for another three centuries this keystone species and seemingly inexhaustible food

source nourished all kinds of life, human and otherwise, until overfishing, dredging and pollution finally wiped them out. Now, at the beginning of the 21st century, there's a restoration effort afoot, with the triple aim of rebuilding habitat, cleaning the water, and providing a natural means of storm surge protection.

If you have a digital projector or big laptop and your build space has a wifi connection, you can show your students a [Google Slides version of that tale compiled by the Billion Oyster Project](#). If not, you can prompt discussion with a few maps and images pulled from it and elsewhere on the internet.

One is the 'Historic Tidelands' map published by the Regional Plan Association, showing the extent of tidal wetlands that once existed (only about 10 percent remain). *Where do you*



Discussion Topic 3 Continued

think the places were that oysters grew best? Where do you think most of the flooding was during the last hurricane, and where do think it will happen next time?



This is also a good opportunity to discuss the importance of oysters and the estuary to the city's original Native American population, as well to other marginalized communities such as the legendary oystermen of Sandy Ground, a free black settlement on Staten Island. *How did these people live and what became of them when the oysters went away?*



It's a long and mostly sad story, but from our perspective the most recent chapter is an uplifting one. *What kinds of restoration projects are there in the harbor? How much do they cost and what makes them worthwhile? How does BOP 'restore' oysters? How do you think BOP should choose where we put our next oyster reef?*

Boats of New York Harbor



This is a fun snacktime activity that relies on a series of easily-assembled photos of different kinds of boats and ships. A dozen or so should be plenty.

Before beginning, ask students to describe the kinds of boats they've been on already, in New York or elsewhere, and the experiences they've had. Then on to the photos. Each can tell a story about a different aspect of the harbor:

- Working waterfront: container ships, bulk carriers (freighters), tugs and barges, sludge ships, etc. *Where do these ships come from and where do they dock? What are they carrying and how do those things add to the life of the city?*
- Ferries: Staten Island Ferry, NYC Ferry, Water Taxi, Sea Streak, etc. *Who rides these boats and why? How much do they cost? Are they faster than the subway?*
- Other passenger vessels: cruise liners, Statue Cruises, Circle Line, dinner boats and party boats. *Why do people go on these boats? What do they like about being on the water? Do you think the harbor is beautiful?*

Discussion Topic 4 Continued

- Other passenger vessels: cruise liners, Statue Cruises, Circle Line, dinner boats and party boats. *Why do people go on these boats? What do they like about being on the water? Do you think the harbor is beautiful?*
- Safety and security: fireboats, icebreakers, police boats, warships. *Why do you need firefighters and police officers on the water? Is it dangerous out there? Who works on these boats and how did they get those jobs?*
- Recreational: powerboats, jet-skis, kayaks, paddleboards, canoes, rowing gigs and Brooklyn Oyster Dories, sailboats. *How are these vessels propelled? What are the advantages and disadvantages of each design? What makes the oyster dory useful?*

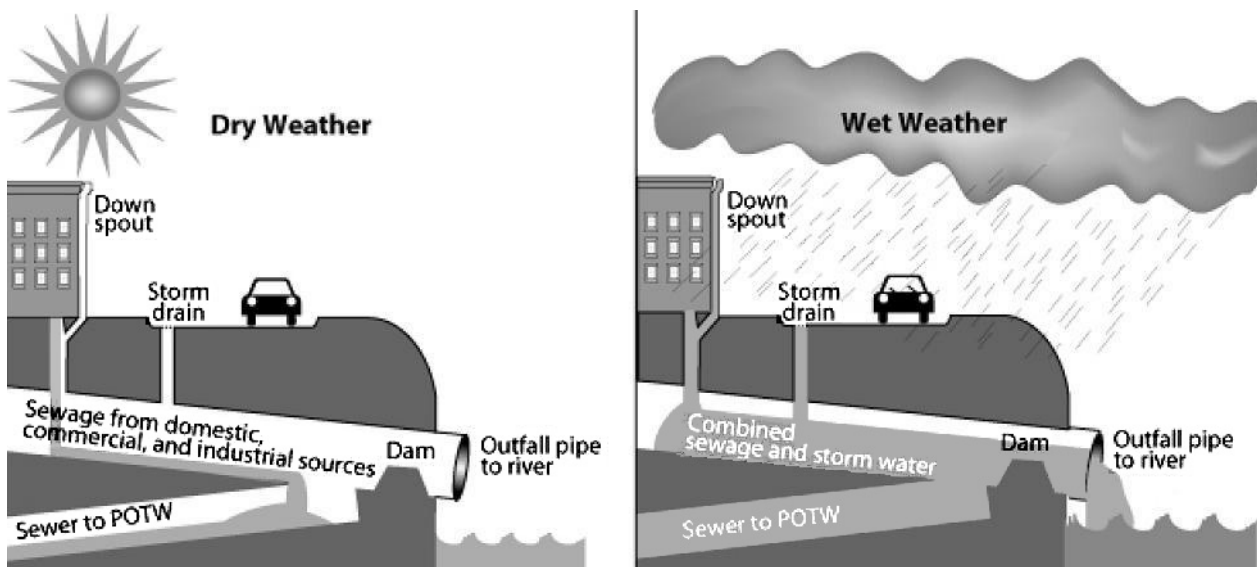
Drinking Water, Wastewater and CSOs



When it comes to boating or otherwise coming into contact with the harbor, the big question for students (and most other people) is how clean the water is. But because the city's drinking water system has a lot to do with that, it's worth a bit of preliminary discussion. You can start with this map from the Department of Environmental Protection (DEP), the city agency that operates the system. *Where does the water come from and how does it get here? Who makes sure that it is clean and safe?*

The next set of questions have to do with the wastewater system, also operated by the DEP. *How much water do you and your family use every day, and what happens when you're done using it-- where does it go?* Normally to one of the city's 14 wastewater treatment plants--except when it rains. That's when 'combined sewer overflows' (CSOs) occur.

Questions for students: *How big a problem do you think sewage pollution is? Do you think it might be worse in some parts of the harbor than in others, and if so, what parts? What are some things that the city might be able to do about it?*



Discussion Topic 5 Continued

Central Park Rainfall in inches (source: http://www.nws.noaa.gov/climate/index.php?wfo=okx)											
	6 days prior	5 days prior	4 days prior	3 days prior	2 days prior	1 day prior	day of test	MPN (Enterococcus CFU/100 ml)	Sample time	Battery High Tide	
5/23/2019	0.03	0	0.06	Trace	0	0	0.48			12:03 AM	
5/30/2019	0	0	0.2	0	0.17	0.8	0.95	384		6:01 AM	
6/6/2019	Trace	0	0.86	0	0	Trace	0.04	10	10:00 AM	11:27 AM	
6/13/2019	0	0	0	0.62	0.45	0	0.6	168	9:10 AM	5:37 PM	
6/20/2019	0	0	0.04	Trace	0.79	0.11	0.42	135	9:08 AM	11:31 AM	
6/27/2019	0.53	0	0	0	0.86	0	0	10	8:50 AM	4:10 AM	
7/11/2019	0	Trace	0	0.04	0	0	0.79	<10	8:30 AM	4:13 AM	
7/18/2019	0	0	0	0	0	1.82	0.51	41	8:40 AM	10:16 AM	
7/25/2019	0	0	Trace	1.66	0.52	0.02	0	<10	8:40 AM	2:30 AM	
8/1/2019	0	0	0.01	0	0.01	0.36	0	1112	8:40 AM	9:03 AM	
8/8/2019	0	0.21	0	0	0.04	1.18	0.2	41	9:15 AM	2:54 AM	
8/15/2019	0.08	0	0	0	0.07	Trace	0	52		9:07 AM	
8/22/2019	Trace	Trace	0.64	0	0	0.1	1.01	21	11:21 AM	1:04 AM	
8/29/2019	0.09	0	0	0	0	0.08	0			7:54 AM	
9/5/2019	0	0	0	0.3	0	0	0	10	1:30 AM	1:37 AM	
9/12/2019	0.32	0.02	0	Trace	0.01	0	0.17	10	11:30 AM	8:03 AM	
9/19/2019	0	0	0	Trace	0	0	0	<10	8:23 AM	11:51 AM	
9/26/2019	0	0	0	0.11	0	0	0.02	<10	10:35 AM	6:43 AM	
10/3/2019	0	0	0	0	0	0.03	0.34	1222	8:32 AM	12:17 AM	

NYC DOH Enterococcus Standards (for Swimming)	
Green:	<35 MPN--acceptable for swimming
Yellow:	35-104 MPN--unacceptable if levels persist
Red:	>104 MPN--unacceptable for swimming



Finally, your builders might want to investigate levels of sewage pollution at or near your proposed launch site. There may be some data available on the DEP’s website, but you may get more information from the Citizens Water Quality Testing Program, a network of community scientists who do their own testing. *What are community scientists anyway?*

[A detailed CSO lesson plan is available on the on the BOP digital platform.](#)



Waterfront Park Design

In this exercise, students take on the role of urban planners to reimagine their neighborhood's waterfront park, if it has one, or to draw up a proposal for a new one from a nearby and (at least hypothetically) available parcel. Ideally the discussion expands to address the wider question of changes they would like to see in their community and strategies for making those changes happen.

The first step is defining what's there. *What do students know about the park (or piece of land) and its history? What are the chief elements of the park's design? What kind of access is there to the water? How does one get there? What is happening nearby?*

Next, introduce a series of images showing features or amenities of other parks. These can be standard--playgrounds, ballfields, bathrooms--or exceptional and even fanciful--pools, beaches, amphitheaters, restaurants, climbing walls, sculpture gardens, zoos. Students add their own ideas to the list and then, using stickers or stars, vote for their five favorites.

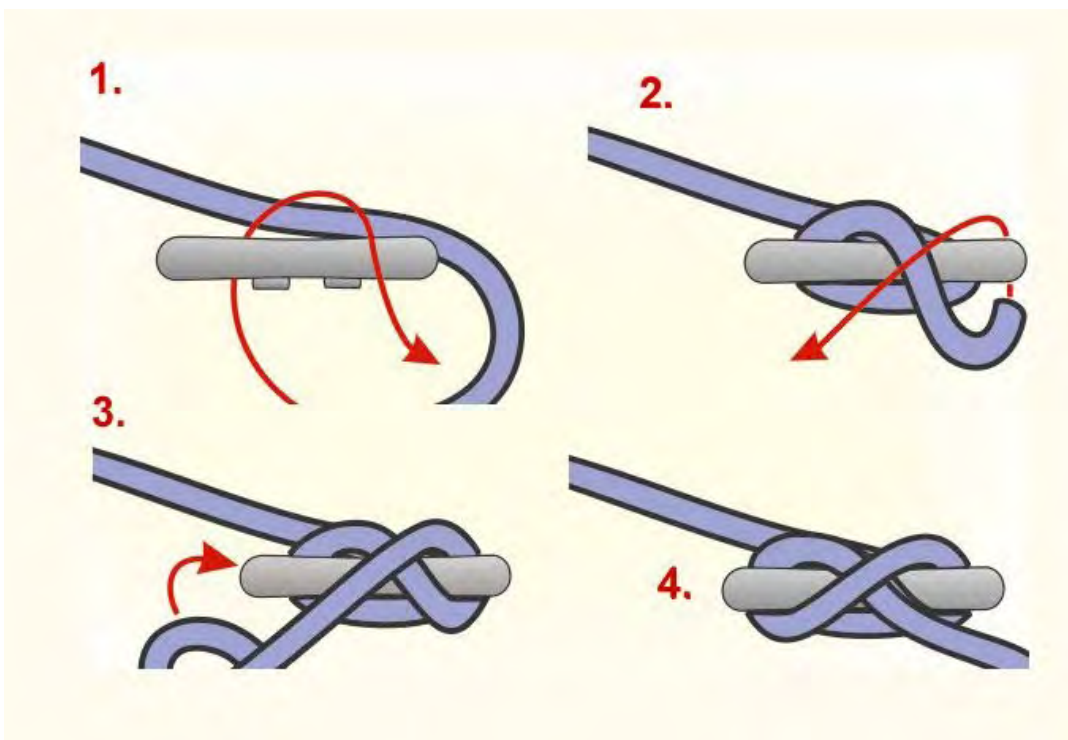
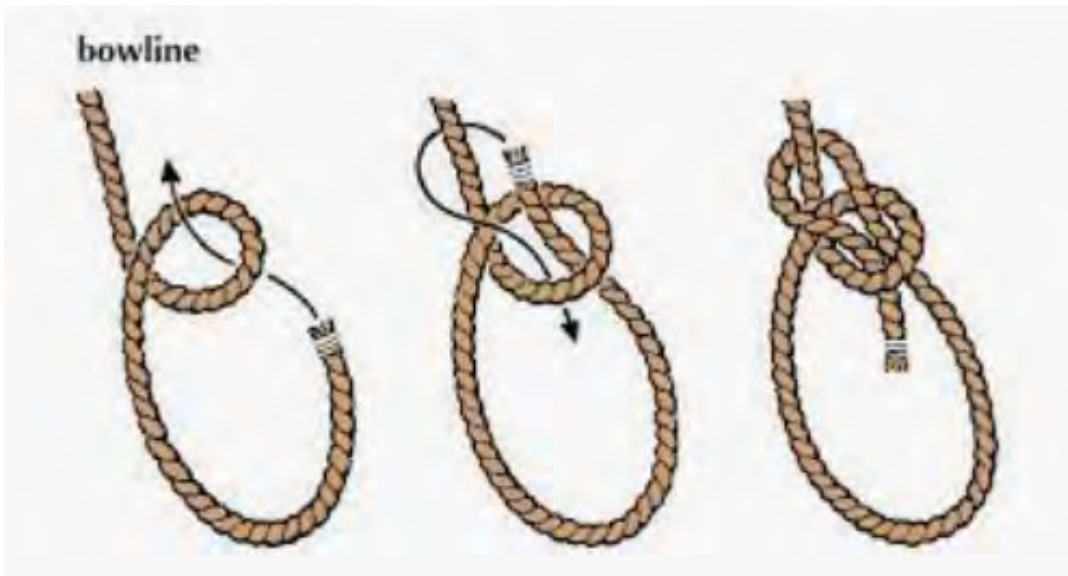
An alternate strategy is to divide the group into smaller teams and have them draw or place the elements of their ideal park--ball fields, playgrounds, boat launches and boathouses, dog runs, trees and benches, restaurants and bathrooms, etc--on a blank map of the site. When they're finished, each team presents their design to their fellow builders.

Questions for the closing discussion: *If you wanted to see these changes happen, who would you go to first and what arguments would you use? What would the next steps be? One challenge might be the expense--how much do you think the changes would cost and why would the city pay for them, as opposed to other things that need to get paid for? Do you see other neighborhood improvements you'd like to make? If so, where would you start?*



Nautical knots and hitches

This is a simple, physical activity for days when time is short or students are too tired or distracted to focus on an extended discussion. It's also a good opportunity for interns and students to take the lead as teachers. Each student is issued a short length of line and then shown how to tie a few classic knots: the square knot, the bowline, the double half-hitch. Students who figure out a knot early can help others until everyone has mastered it, and then the group moves on. A good last challenge for the session: making off to a cleat.



Indoor Rowing

Another physical activity that, ideally, takes place right before the learn-to-row field trip (see below for more on that): Set up a rowing station using a sawhorse or a bucket as a seat, with two oarlocks mounted at the right height and distance (about eight inches higher than the seat, and four feet apart). Each student learns the basic rhythm of the stroke, how to balance the oars on the oarlocks, and the importance of keeping the blades square to the 'water.'



Waterfront Park



As soon as the weather turns nice, but preferably after you've had a chance to discuss harbor ecology and oyster history as outlined above, consider a field trip to the water's edge--ideally to the place where you intend to launch your dory. This can be a logistical challenge since, in Brooklyn at least, there are not that many protected beach locations where young people can safely get down to actually touch and use the water: Bushwick Inlet Park in Williamsburg, Brooklyn Bridge Park in Brooklyn Heights, Valentino Pier in Redhook, Bush Terminal Park in Sunset Park, Calvert Vaux and Kaiser Parks on Coney Island Creek, and several spots in Jamaica Bay.

The Billion Oyster Project maintains small oyster research stations (ORSs) and community oyster reefs in all of these spots, and for us the main event of this first field trip is pulling out an ORS or reef file to 'monitor' the oysters. Students can measure and record the size of the oysters with calipers, and count and attempt to identify the myriad other creatures that live on and around them--fish, crabs, shrimp, amphipods, plus sessile (non-mobile) animals including sponges and tunicates. They can also test for salinity and other water quality parameters and observe and record meteorological conditions. An online guide to monitoring oysters and site conditions can be found on our digital platform; with advance notice, BOP staff are also usually available to support student visits.

A second focus of the trip can be a discussion about boating. Where would you launch small boats and where would you store them? What about tides and currents, the wind, wakes from passing vessels?. What kinds of training and safety rules should there be?

Don't forget to leave time for students to wander and beachcomb, skip rocks, and generally enjoy and take ownership of the city's biggest public space--the shore and the harbor.



Fabrication Space or Factory



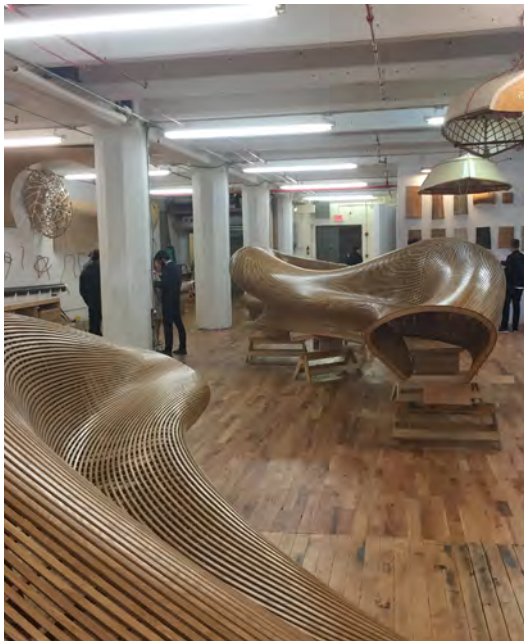
Because we ran our builds in Industry City, it was relatively easy for us to arrange visits to the workshops and ‘maker spaces’ of all kinds of craftspeople and fabricators. But it should not be difficult to arrange similar trips in other parts of the city. Generally speaking, the owners of small manufacturing businesses and the people who work for them are delighted to see young people making things with their hands, and consequently happy to show them how they make things in their own workspaces.

As mentioned in the preceding section, such a visit can sometimes be a great way to get a tricky part of the boat made. That was the case on our second dory build, when we visited a nearby furniture manufacturer and had all three frames cut for us as part of a demonstration of how a

Computer Numeric Control (CNC) router works.



Art & Design



Industry City also offered plenty of opportunities for students to visit art and design studios and shows, as well as participate in the Design Festival held every May. But there are artists and designers working in every neighborhood and, like craftspeople and small manufacturers, they are generally open to sharing their work with young people. We see such visits as a good way to expand students' ideas of potential future careers. While we believe in STEM education and the value of mastering manual skills early in life, that kind of training does not disqualify you from pursuing a 'creative' path--on the contrary.



Learn to Row



The idea of this field trip is to give builders a chance to develop their on-water skills and confidence a few weeks ahead of the dory launch, so that when they climb into their own boat they will be able to row their family and friends around.

Prospect Park Lake is a great, protected learning space and there is a fleet of small rowing craft available for public use via advance arrangement with the Village Community Boathouse (they will also provide volunteers to assist). Not everyone will be able to master rowing in two hours on the lake, but they will feel more at ease in small boats--and have a great deal of fun.



Section Seven



Family and Community Build Days



Family and Community Build Days



Since the parents of most of our builders were not able to visit during our regular work sessions, we scheduled a pair of open houses on weekends--half-day sessions where family members, friends and anyone else interested could drop in and check out our progress, and join in the build if they wished. Many parents and siblings, schoolmates, and even some passersby took advantage of the opportunity.

As we see it, shared build days are valuable because:

- They allow students to take the lead as educators, showing off their work, offering pointers on tools and techniques, and explaining the connection of the boatbuilding project to larger harbor and estuary themes
- They are a festive outreach opportunity--a kind of open house--to which neighborhood residents, community board members, elected officials, and members of the press can be invited
- Many visitors turn out to be pretty good, or at least enthusiastic, builders themselves, so they can be a way to recoup lost time, if necessary, and make and attach major parts of the boat--a plank, for instance, or a rail

A few suggestions:

- Have plenty of food on hand--coffee and donuts if it's in the morning; mac and cheese or a tray of tamales if it's lunch; guacamole, hummus, and snacks if it's after work
- Put up some photos of the preceding sessions so students can explain the building process
- If there's wall space, consider displaying charts, maps, and other images from the preceding snacktime discussions



Section Eight



Launching the dory, subsequent programming, and community



Launching the dory, subsequent programming and community engagement



Launching the dory

After the two Sunset Park builds, we launched our dories in the outer lagoon at Bush Terminal Park--a protected spot that is ideal for beginning boaters. We scheduled the events on Saturdays around high tide, when the gravel 'beach' there is less steep and slippery and the water level allows for access to the neighboring inner lagoon. In addition to the dories, we brought in extra kayaks and canoes so that everyone would have a chance to get on the water.

Launching the dory, subsequent programming and community engagement

One key to the success of the launches is the learn-to-row field trip to Prospect Park earlier in the build (see Section 6, “Suggested Discussions, Activities and Field Trips”). Many of the students get the hang of the basic stroke and so are able to climb into their new dory and row with confidence.

Also critical is the insurance umbrella provided by the Gowanus Dredgers, a local paddling club. Everyone who rows or paddles has to sign on of their waivers (minors need a parent’s signature) and don a life jacket before getting in a boat. We keep a small kayak on hand at all times, in case an inexperienced rower or paddler needs to be ‘rescued’ and towed back to the beach.



At our launches we ask each student to say something about the build, and keep adult speechifying to a minimum. One other launch ‘tradition’: builders use sharpies to sign the bottom of the stern sheets, the passenger seat at the back end of the dory.

Not every neighborhood has a launch site like Bush Terminal Park. We strongly recommend working with an established community boathouse or a local paddling group to identify potential sites for your launch, and to arrange for on-water supervision and insurance coverage (a list of community boathouses can be found in Section 9, “Additional Resources”).



Subsequent programming

One of our goals in Sunset Park is to use the Brooklyn Oyster Dory program as a means of establishing a fully-fledged community boating program. With the precedent set by the first launch, when students and family members signed waivers and climbed into boats for a supervised rowing and paddling session, it was easy to schedule additional days of public programming later in the season. We brought in the boats and set up a sign-in table

for waivers, then sent people out on a first-come, first-served basis--an average of about 75 people at each event. In the future, with more boats and more volunteers, we'd expect those numbers to grow and recreational boating, with all its benefits, to become an integral part of the neighborhood.

A second use for the dories is to support Billion Oyster Project's community reef at Bush Terminal Park. This is an installation of dozens of wire cages and mesh bags containing several thousand live oysters that we hope to see grow and knit together into a self-sustaining oyster bed, with all the ensuing habitat and water-quality benefits. To monitor the growth of those oysters, our scientists and community volunteers have so far accessed them on foot, in waders--a precarious operation even at low tide. Provided we are able to store the dories in or near the park, we foresee using them as workboats that can ferry the heavy oyster cages and bags from the reef to the shore, then back again once the monitoring is complete.

How your dory will be used is of course dependent on the place it winds up living and the programming needs there. And in the event there is no obvious, permanent home for the boat, it can always be donated to a community boathouse or the Billion Oyster Project.

Community Engagement

The next step for community boating in Sunset Park is the creation of a community boathouse--a group of neighborhood residents who come together to take on the responsibility of offering free or low-cost boating for the public. Such programs obviously depend on boat storage on or near the water, but for new programs something as simple as a storage container can suffice, especially if the boats, like dories, are easily stackable.



Of course it's never simple to obtain permission for boat launching and storage--public agencies and private landowners alike are rightly cautious about saying yes. We've found the best way to proceed is to start by seeking support at the most basic level of government, the Community Board.

A high point for us was the testimony of two of our builders before the Parks and Waterfront Committee of Community Board 7 in Sunset Park. The committee was impressed by their arguments for water access and a storage container and unanimously passed a resolution of support, as did the full community board a few weeks later.

Section Nine



Additional Resources

- **Brooklyn Oyster Dory tool list**
- **Brooklyn Oyster Dory materials and supplies list**
- **Paper dory model cutout sheet**
- **Example of shop safety guidelines**
- **Waiver examples**
- **List of community boating groups in New York Harbor**

Brooklyn Oyster Dory Tools

12--Scissors

6--Pull saws

Sheet rock saw

Coping saw

2—battery-powered jigsaws
with charger (to be used by
instructors or interns only)

4--rasps (Nicholson #49)

4--block planes

1--rabbet plane

4--chisels, various widths

2—mallets

4--hammers

4--ratcheting screwdrivers

2—battery-powered screw guns
(drills) with charger

Pliers

Vise grip pliers

Channel lock pliers

12--bar clamps

6--C clamps

12--spring clamps

4--tape measures

Straightedges/rulers, various
lengths

Square

Speed square

Bevel gauge

Classroom compass

Level

Plumb line

Chalk line

Orbital sander (to be to be used
by instructors or interns only)

Materials and Supplies List

Lumber for strongback:

4-- 2x4x8' fir
2-- 1x8x10' pine
2-- 1x8x8' pine

Lumber for dory:

4-- 4x8x1/4" okoume marine ply
(available locally from M.L. Condon in
White Plains or Roberts
Plywood in Deer Park, Long Island)
2-- 4x8x1/2" okoume marine ply
2-- 1x4x16' clear mahogany (for rails)
2-- 1x8x8' clear pine (for thwarts)
1-- 1/2x3/4x12' pine moulding for
lofting batten

Hardware:

Brass or bronze oar sockets and
oarlocks (two pair)
Brass or bronze garboard plug (drain
plug)

Epoxy:

1--1 gallon West System pump kit
(slow hardener)
2--half gallons of wood flour for filler
Coffee cups for mixing
Tongue depressors
White vinegar for cleanup
Rags
1-inch chip brushes
Fiberglass tape—2"x50'

Safety and personal protection:

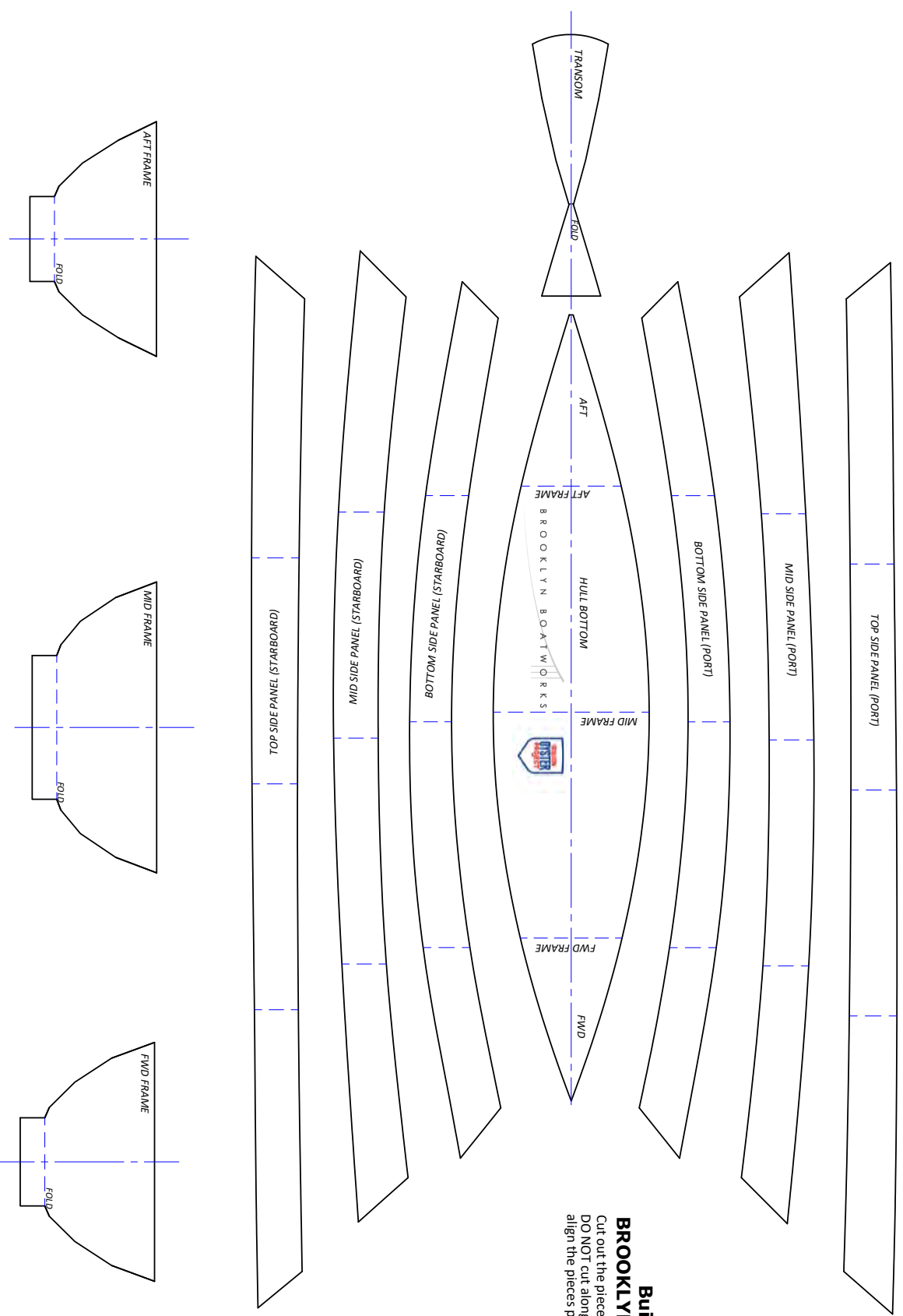
Denim aprons
Safety goggles
Latex and nitrile gloves
Work gloves
Dust masks for sanding
First aid kit

Decking screws--various lengths
Drywall screws—1" for planking
Small finish nails for lofting

Sandpaper--60 and 150 grit
Sanding discs—60 and 150 grit

Tape—Scotch, packing and painters
Paint: Clear sealer (eg, Interlux
interprime)

Assorted pencils, pens, and
sharpies, plus dry erase markers for
whiteboard



**Build a paper
BROOKLYN OYSTER DORY!**
Cut out the pieces, and tape them together.
DO NOT cut along the dashed lines, instead use them to align the pieces properly.

PERSAK & WURMFELD
 office: +1.718.222.4401
 email: design@persakwurmfeld.com
 address: 88 Jay Street, Unit 604A
 Brooklyn, NY 11201
 website: persakwurmfeld.com

BROOKLYN OYSTER DORY	
CLIENT:	BROOKLYN BOATWORKS
TITLE:	PAPER BOAT
BY:	PW
DATE:	MAR-06-2018
SCALE:	1:16
SIZE:	11X17
VERSION:	00
SHEET:	1 OF 1

Brooklyn Oyster Dory Guidelines for Boatbuilding

Please review the following:

- 1) As an afterschool boatbuilder, a parent or family member, or a volunteer, I understand the importance of experience and good judgment, and of taking personal responsibility for my actions
- 2) I understand that I will be working with wood, powerful adhesives, sharp hand tools, and power tools, and that all of these materials and tools are potentially hazardous.
- 3) I will listen carefully to, and follow, the instructions given regarding the work to be performed and the proper use of the materials and tools. I will wear proper protective equipment including gloves when mixing epoxy, eye protection when using power tools, and a dust mask when sanding.
- 4) If I have questions or concerns about materials, tools, or techniques, I will ask my instructor before proceeding.

Please sign to indicate that you have read and understood these guidelines.

Name (print):

Signature:

Parent or guardian's name, if under 18 (print):

Parent or guardian's signature:

Date:



Brooklyn Oyster Dory Project Permission, Minor Waiver and Release of Liability

Child's Name _____

Date of Birth _____

Address: _____

City _____ State _____ Zip _____

Parent/Legal Guardian's Name: _____

Parent/Legal Guardian's Phone(s): _____

Parent/Legal Guardian's e-mail: _____

Emergency Contact Person: _____

Relationship to Child: _____

Phone(s):: _____

Any medical or emotional, visual or auditory aids we should know about your child (allergies, asthma, diet, medication needs etc.):

As Parent/Legal Guardian of the minor child named above, I give my permission for my child ("Participant") to participate in boat building and water activities. I agree to the following for myself and on behalf of the Participant:

1. Acknowledgement and Assumption of Risk. I acknowledge and fully understand that the Participant will be engaging in activities that involve risk of damage to personal property or serious injury, including permanent disability and death, and severe social and economic losses which might result not only from the Participant's own actions, inactions or negligence, but the actions, inactions or negligence of others, the condition of the premises or of any equipment used, water hazards, and the effects of weather, including heat, humidity, cold and/or precipitation. Further, there may be other risks not known or not reasonably foreseeable at this time. I assume all the foregoing risks and accept personal responsibility for all expenses, medical or otherwise, following any such damages, injury, permanent disability or death to or of the Participant.

2. Release, Waiver and Discharge. I release, waive and discharge and covenant not to sue Billion Oyster Project, Brooklyn Boatworks, Sunset Spark, 1-10 Bush Terminal Owner LP, and their respective directors, officers, employees, agents, successors and assigns, all of which are hereinafter referred to as "Releasees", from any and all liability to the participant, his or her heirs and next of kin or any other person, for any and all claims, demands, losses, or damages, including death or damage to property, which, in whole or in part, arise from, relate to or are alleged to arise from educational, boatbuilding, or water activities, any and all related events and activities in which the Participant is participating or the facilities or equipment used by the Participant or by others, or are caused or alleged to be caused in whole or part by the negligence of the Releasees or otherwise, and covenant not to sue the Releasees with respect to these actions, events and activities. If any part of this waiver is determined to be invalid by law, all other parts of this waiver shall remain valid and enforceable.

3. Consent for Emergency Treatment. The undersigned hereby authorizes a representative of Billion Oyster Project, Brooklyn Boatworks, Sunset Spark or an adult who bears this document, to authorize emergency treatment for the Participant named above if a Parent or Guardian cannot be reached at the time of the emergency.

Permission Waiver

As Parent or Legal Guardian, I am signing this document on behalf on my minor child and agree to be specifically bound to all the terms and conditions of this waiver and release.

I HAVE READ THE ABOVE WAIVER AND RELEASE, FULLY UNDERSTAND ITS TERMS, UNDERSTAND THAT I HAVE GIVEN UP SUBSTANTIAL RIGHTS BY SIGNING IT, AND HAVE SIGNED IT VOLUNTARILY.

Parent/ Guardian Name: _____

Signature: _____

Date _____



Brooklyn Oyster Dory Project Photo Release

Child's Name _____

Parent/Legal Guardian Name: _____

Address: _____

City _____ State _____ Zip _____

Phone: _____

E-mail: _____

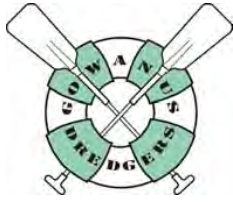
As Parent/Legal Guardian of the minor child named above, I agree to the following for myself and on behalf of the Participant:

Consent to Photograph, Film or Videotape. I hereby consent to Participation in interviews, the use of quotes, and the taking of photographs, movies or videotapes of the Participant ("Media") by Billion Oyster Project, Sunset Spark, and Brooklyn Boatworks, and Industry City 1-10 Jamestown, and by reporters and other members of the press. I also give permission of the above organizations the right to edit and use said Media for appropriate purposes including but not limited to: publicity, electronic and print publications, websites and all other forms of media. I also hereby release Billion Oyster Project, Sunset Spark, and Brooklyn Boatworks, Industry City 1-10 Jamestown, and their employees and agents from all claims, demands, and liabilities whatsoever in connection with the above.

I HAVE READ THE ABOVE RELEASE, FULLY UNDERSTAND ITS TERMS, UNDERSTAND THAT I HAVE GIVEN UP SUBSTANTIAL RIGHTS BY SIGNING IT, AND HAVE SIGNED IT VOLUNTARILY.

Signature: _____

Date _____



WAIVER AND RELEASE OF LIABILITY (IMPORTANT - READ BEFORE SIGNING!)

In consideration of being allowed to participate in any way in the Gowanus Dredgers Canoe Club athletics/sports program, and related events and activities, the undersigned agrees to the following:

- Captain**
Bill Duke
- First Mate**
Lee Reiser
- Secretary**
Nick Lung-Bugenski
- Treasurer**
Owen Foote
- Trustees**
Bart Chezar
Eymund Deigel
Rebecca Freeman
Tim Gamble
Ted Gruber
Katina Johnstone

1. Prior to participating, I will inspect the facilities and equipment to be used, and if I believe anything is unsafe, I will immediately advise a coach, instructor, supervisor, or other event organizer of such condition(s) and refuse to participate.
2. I acknowledge and fully understand that I will be engaging in activities that involve risk of damage to personal property or serious injury, including permanent disability and death, and severe social and economic losses which might result not only from my own actions, inactions or negligence, but the actions, inactions or negligence of others, the rules of play, the condition of the premises, or of any equipment used. Further, there may be other risks not known or not reasonably foreseeable at this time.
3. I assume all the foregoing risks and accept personal responsibility for all expenses, medical or otherwise, following any such damages, injury, permanent disability or death.
4. I release, waive, discharge and covenant not to sue the Gowanus Dredgers Canoe Club, its affiliated clubs, their respective administrators, directors, agents, coaches, and other employees of the organization, other participants, sponsoring agencies, sponsors, advertisers, and if applicable, owners and leasers of premises used to conduct the event, all of which are hereinafter referred to as "releasees", from any and all liability to me, my heirs and next of kin for any and all claims, demands, losses or damages on account of injury, including death or damage to property, caused or alleged to be caused in whole or in part by the negligence of the releasees or otherwise.
5. I consent to the use of my photograph and/or digital image taken during all activities. Said photographs and/or digital images may be used for advertising, marketing and educational purposes including, but not limited to, billboards, print media, brochures, newsletters, videos, CD's, Web Pages and as needed by the program. I hereby waive, release and forever discharge the Gowanus Dredgers Canoe Club from any and all claims or liability arising from the use of my photograph for the above purposes.
6. Items 1-4 of this waiver may not be modified in any way. If any part of this waiver is determined to be invalid by law, all other parts shall remain valid and enforceable.

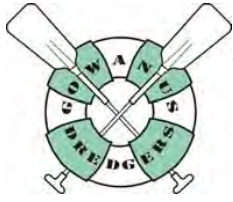
I HAVE READ THE ABOVE WAIVER AND RELEASE AND I UNDERSTAND THAT I HAVE GIVEN UP SUBSTANTIAL RIGHTS BY SIGNING IT, AND SIGNED IT VOLUNTARILY.

Participant's Name: _____ Signature: _____ Date: _____
 (PLEASE PRINT.)
 Address: _____ City: _____ State: _____ Zip: _____ Date of Birth: _____
 Cell Phone: _____ Add me to your E-mail list: _____

PO Box 24403
 Brooklyn, New York 11202
 tel 718.243.0849
 e-mail dredgers@excite.com
www.gowanuscanal.org

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PLEASE PRINT NEATLY. revised 3/13



WAIVER AND RELEASE OF LIABILITY FOR MINORS (IMPORTANT - READ BEFORE SIGNING!)

In consideration of being allowed to participate in any way in the Gowanus Dredgers Canoe Club athletics/sports program, and related events and activities, the undersigned agree to the following:

Captain
Bill Duke
First Mate
Lee Reiser
Secretary
Nick Lung-Bugenski
Treasurer
Owen Foote
Trustees
Bart Chezar
Eymund Deigel
Rebecca Freeman
Tim Gamble
Ted Gruber
Katina Johnstone

- Participant:** Prior to participating, I will inspect the facilities and equipment to be used, and if I believe anything is unsafe, I will immediately advise a coach, instructor, supervisor, or other event organizer of such condition(s) and refuse to participate.
- Parent/Guardian:** As the parent or legal guardian of the participant I will instruct the minor participant that prior to participating, we will inspect the facilities and equipment to be used, and if I believe or the participant believes that anything is unsafe, we will immediately advise a coach, instructor, supervisor, or other event organizer of such condition(s) and refuse to participate.
- We acknowledge and fully understand that each participant will be engaging in activities that involve risk of damage to personal property or serious injury, including permanent disability and death, and severe social and economic losses which might result not only from my own actions, inactions or negligence, but the actions, inactions or negligence of others, the rules of play, the condition of the premises, or of any equipment used. Further, there may be other risks not known or not reasonably foreseeable at this time.
- We assume all the foregoing risks and accept personal responsibility for all expenses, medical or otherwise, following any such damages, injury, permanent disability or death.
- I release, waive, discharge and covenant not to sue the Gowanus Dredgers Canoe Club, its affiliated clubs, their respective administrators, directors, agents, coaches, and other employees of the organization, other participants, sponsoring agencies, sponsors, advertisers, and if applicable, owners and leasers of premises used to conduct the event, all of which are hereinafter referred to as "releasees", from any and all liability to me, my heirs and next of kin for any and all claims, demands, losses or damages on account of injury, including death or damage to property, caused or alleged to be caused in whole or in part by the negligence of the releasees or otherwise.
- I consent to the use of my photograph and/or digital image taken during all activities. Said photographs and/or digital images may be used for advertising, marketing and educational purposes including, but not limited to, billboards, print media, brochures, newsletters, videos, CD's, Web Pages and as needed by the program. I hereby waive, release and forever discharge the Gowanus Dredgers Canoe Club from any and all claims or liability arising from the use of my photograph for the above purposes.
- Items 1-5 of this waiver may not be modified in any way. If any part of this waiver is determined to be invalid by law, all other parts shall remain valid and enforceable.

WE HAVE READ THE ABOVE WAIVER AND RELEASE, UNDERSTAND THAT WE HAVE GIVEN UP SUBSTANTIAL RIGHTS BY SIGNING IT, AND SIGNED IT VOLUNTARILY.

PO Box 24403
Brooklyn, New York 11202
tel 718.243.0849
e-mail dredgers@excite.com
www.gowanuscanaal.org

Participant's Name: _____ Signature: _____ Date: _____
(PLEASE PRINT.)
Address: _____ City: _____ State: _____ Zip: _____ Date of Birth: _____
Parent/Guardian: _____ Signature: _____ Relationship: _____
Cell Phone: _____ Add me to your E-mail list: _____

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Community-based Non-motorized Boating Organizations in the NYC Metropolitan Area

Brooklyn

Brooklyn Bridge Park Boathouse www.bbpboahouse.org

Gowanus Dredgers Canoe Club www.gowanuscanal.org

North Brooklyn Community Boathouse (formerly North Brooklyn Boat Club)
www.northbrooklynboatclub.org

Red Hook Boaters www.redhookboaters.org

Sebago Canoe Club www.sebagocanoecub.org

NYC Urban Park Rangers

www.nycgovparks.org/events/urban-park-rangers-canoeing-and-kayaking-programs

Bronx

Bronx River Alliance www.bronxriver.org

Friends of Brook Park www.friendsofbrookpark.org

Rocking the Boat www.rockingtheboat.org

Manhattan

Downtown Boathouse www.downtownboathouse.org

East River CREW www.eastrivercrew.org

Inwood Canoe Club www.inwoodcanoecub.com

Manhattan Community Boathouse www.manhattancommunityboathouse.org

New York Kayak Polo www.nykayakpolo.org

New York Outrigger www.newyorkoutrigger.org

New York RiverSports www.pier66nyc.org

Row New York www.rownewyork.org

Village Community Boathouse www.villagecommunityboathouse.org

Queens

Empire Dragon Boat Team www.empiredragonboat.com

Gateway Bike and Boathouse www.GatewayBoathouse.org

Harbor Lab www.harborlab.org

Long Island City Community Boathouse www.licboathouse.org/

Staten Island

Kayak Staten Island www.KayakStatenIsland.org

New Jersey

Hoboken Cove Community Boathouse www.hobokencoveboathouse.org

Ke Aloha Outrigger at Hoboken Cove www.kealohaoutrigger.org

North of NYC

Yonkers Paddling and Rowing Club www.yprc.org