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View of Illorsuit 1959: The photo of (part of) the village from offshore shows my tent between the first and second houses from the left. Most of the buildings shown belong to the Royal Danish Trading Company. The family houses are smaller and, some of them, in more traditional style.

Photo: Ken Taylor

Illorsuit Adventure

by Ken Taylor

We still hadn't seen any seal when Karli said the water wasn't calm enough any longer for the hunting we'd been hoping for. So we turned back to Illorsuit and soon there were small waves with white tops. Well, that was a bit more challenging for me, but Karli said I was doing fine. I had to hope he was right because the kayak I was using — Ludwig Quist the headman of the village had lent it to me — was much less stable than my own Scottish kayak, which was several inches wider than the Greenland ones. We'd been paddling back toward the village for a while, and then I made my mistake. We'd just passed two especially fine looking icebergs, and I was twisting around to take another look at them. Maybe that tilted the kayak, maybe a larger wave got hold of the foredeck, whatever it was that happened, suddenly I was capsizing.



I'd been sent to Illorsuit by Dr. Harald I. Drever, a geologist at St. Andrews University, who'd been there himself four times and greatly admired the kayaking skills of the villagers. While Campbell Semple, my kayaking buddy of several years, and I'd been on a kayaking trip the year before, we'd met Dr. Drever at Kinlochbervie on the northwest coast of Scotland. During the winter, he'd arranged for me to spend the summer of 1959 at Illorsuit studying how the villagers made and used their kayaks for seal hunting.

One thing I'd been noticing was how easily even quite small wavelets were able to curl over its low and flat foredeck.

First, there'd been the 10-day trip by boat from Copenhagen, then the 1-week side trip to another village called Ikerasak, and then I'd duly arrived at Illorsuit. There were 108 villagers, all Inuit, and apart from a crew of 4 Danish carpenters, I was the only outsider in the village that summer. At the time, Illorsuit was one of seven small hunting settlements in the Uummannaq Bay district of north-west Greenland.

It took a few days to get my tent up and my belongings organized, but from the get go, of course, the villagers could tell that I was totally fascinated by everything about their kayaks and their seal hunting. So it wasn't long before Ludwig offered me the use of his kayak to try my luck at hunting



Photo: Ken Taylor

Ludwig wins center: So, it was Ludwig's kayak, and that's him in the two photos of the end of a race that Drever had asked me to organize. He had just won the race. Interesting that one of the conditions of taking part in the race (I don't know if set by Drever or by the kayakers themselves) was that they all had the full complement of hunting gear on their kayaks. Ludwig's the one in a white kayak and wearing a white topped "yachtsman's" cap. His kayak was actually sealskin covered but with the hull and the deck at stern and stem painted white for camouflage.

seal. Fourteen-year-old Peder Møller would use my Scottish kayak, and Karli Zeeb, one of the best kayakers of the village, would go with us to keep an eye on me. At that point I'd tried out a few of the local kayaks in four different villages that I'd visited, but this would be my first chance to do so for more than a few minutes at a time. As I later discovered when I measured them all, Ludwig's kayak was the widest one in Illorsuit. But I still found it a lot more tippy than my Scottish kayak and even a bit more tippy than the kayaks I'd tried at two of the other villages I'd visited. This might turn

One thing I'd been noticing was how easily even quite small wavelets were able to curl over its low and flat foredeck.

out to be not so easy. I just had to hope that all would go well so long as I was careful.

After a day's delay because of the weather, we set off, heading south from the village, along the coastline of Ubekendt Island. The weather was sunny and the sea was calm. Karli and I

both had shotguns and rifles with us, as well as the traditional sealing harpoons. Since we'd hunt using the guns, we needed very calm water conditions. So we were wearing *akiulisaaq* sprayskirts (*tuitoq* in the local dialect), not the *tuiliq* full jackets. I'd tried out the fit of Ludwig's kayak the day before, and it seemed comfortable enough. When we were getting ready to leave, he lent me a pair of his sealskin boots (*kamit*) to wear. As I learned that day, and later when my own pair had been made, these *kamit* are extremely comfortable but also quite bulky. Wearing them meant that I was squeezed more tightly than ever into the kayak, so that it was actually not as good a fit as I'd expected it to be. I had to keep stretching my legs and lifting my weight off the seat, trying to get comfortable. After we'd been paddling for awhile, Karli stopped to show us how to use the harpoon, and Peder and I tried it out. He was no better at it than I was since he did not yet have a kayak of his own nor any experience in the use of the hunting gear. It was fun, but we both had a long way to go before we would be able to throw the harpoon efficiently.

We paddled on for quite a few miles but there was no sign of seal. Sea gulls, icebergs, beautiful scenery — it was all very pleasant — but no sign of seal. Of course, I'd been paying a lot of attention to how Ludwig's kayak handled. One thing I'd been noticing was how easily even quite small wavelets were able to curl over its low and flat foredeck. That was a new experience for me as my Scottish kayak had a few inches more freeboard than the Greenland ones, and a high foredeck. Other than that everything seemed to be fine.

Before I'd left Scotland, Campbell was able to borrow a whitewater kayak for us to have for an evening at the Glasgow Western Baths to see if we could learn to roll it. I've mentioned that our Scottish (sea) kayaks back then were quite wide affairs, and I don't remember ever hearing of anyone even trying to roll one of them. After a lot of trial and error, by the end of the evening we were both able to do the Pawlata roll. Then when I'd visited the Ikerasak village a week or two before arriving at Illorsuit I'd tried out a few of the local kayaks and managed a couple of rolls to everyone's delight. But that was it; that was all the rolling I'd ever done before that day.



I yelled for help as I went over and tried to grab a lungful of air. I wasn't too alarmed since I knew that Karli was close by and I knew how to do the Pawlata roll. So I tried to roll back up.

Unfortunately, now that I was upside down in the frigid Greenland water, I completely forgot that I needed to change my grip on the paddle to do a Pawlata. Not too surprisingly, I didn't make it. But I did come up part way, on the left side of the kayak, enough to yell again for help and grab some more air. Then I did it again, but there was still no sign of Karli, and now I was becoming alarmed. I knew enough not to wet exit (if even I could have from such a tight-fitting kayak), but things were not going well. As I came halfway up for the third time, at last Karli had his kayak beside me. I grabbed his arm to pull myself up and — at the time I couldn't believe what he was doing — he took my hand and pushed me back under. Later he explained that, of course, I'd almost pulled him over on top of me. I'd let go of my paddle when I grabbed him, but luckily it was still right there in front of me. I tried one more time and half-rolled back up again, and he was able to grab me. He put his paddle across the deck of his kayak and the hull of my kayak, and between the two of us we got me out of the water and my kayak right-side up again.



Photo: Ken Taylor

Ludwig wins right: In this photo you can see that the stern of his kayak is missing the characteristic upturned point. It had been broken by ice at the beginning of the previous winter. I've often wondered if he was planning to build (or have built) a new one and if that was why he seemed not all that concerned about the water getting into it when I capsized.



Photo: Ken Taylor

View of Illorsuit Geol trip: The photo looking down on (again part of) the village with the four people in the foreground — the older man on the right is Johan Zeeb. He is the husband of Anna who is identified in the “correction” about the skinning of Drever’s and, 21 years later, my kayak in the latest Sea Kayaker, and they are the couple the American artist Rockwell Kent talks a lot about in his book Salamina about the time he spent in Illorsuit in the early 1930s. In that photo my tent is out of sight behind Johan. The younger man on the left (wearing sealskin pants) is Algot Zeeb, the man I left the kayak with when

I finally reached the village beach after the capsizing. He’s Karli’s brother. They are, I’m reasonably sure, Johan’s nephews (brother’s sons). The young woman beside Algot is Katanguaq, from Ikerasak, on her way to Qullissat (a town on Disko Island, abandoned in 1972), where soon after she married “a fine young hunter,” as I was told some months later in Copenhagen. The other young woman is her new friend Julianna of Illorsuit.

I was soaking wet and freezing cold and not at all happy that what seemed to really matter to Karli was the water that had gotten into Ludwig’s kayak. I’d seen how important that was some days before at the Uummannatsiaq village when a young man was demonstrating how to roll in someone else’s kayak. His *tuliq* pulled free of the kayak coaming letting some water into the kayak. The owner of the kayak was very upset. And now I was responsible for the same thing happening to Ludwig’s kayak.

Peder came alongside on my right, facing in the opposite direction, and took a firm hold of the coaming of my kayak and of the foredeck thongs immediately in front of me. We got my *tuitoq* loosened and out of the way for Karli to take a look at how much water was in the kayak. Too much. So he had me wriggle out and sit on the afterdeck, my feet also outside of the manhole, with my paddle across the afterdecks of our two kayaks. I sat on the blade of my paddle and held the loom of it in my left hand together with the afterdeck thongs of his kayak. By this time he had one blade of his paddle tucked under one of the foredeck thong sliders of my kayak, with the other end of it under the foredeck thongs of his own. So we had the kayaks well “catamaraned” together and, using a piece of an old woolen sweater that was under the sealskin “seat” of Ludwig’s kayak, he began to sponge out the water. That was fine with me — for a bit. But I’d been underwater for some time, equipped with only a *tuitoq*, and I was soaked to the skin. Soon I was saying, “Isn’t that enough? Let me get back in and let’s head for home.” But Karli was insisting on sponging out every last drop of water that he could. And I was getting colder and colder.

Finally, Karli was satisfied and helped me get back into the kayak. It felt so good to be paddling again, and I was hoping it'd help me warm up. I suppose it must have, to some extent, but we'd a long way to go. We paddled for what seemed like ages and still no sign of the village. I was beginning to feel seriously cold and my arm muscles were moving less and less easily. Of course, Karli and Peder were staying close beside me, urging me on but also looking very serious, which I didn't like. Eventually I was so cold that I simply couldn't move my arms any more and was only able to paddle, if you can call it that, by rigidly holding onto the paddle and bobbing and twisting from side to side. I was beginning to think I wouldn't make it back to the village and was wondering what would happen then, when at last we came around one more curve of the shoreline: And there was Illorsuit. But it still seemed so far away! We kept going. I don't remember what we said to each other, but finally we were opposite the very end of the village beach. I ran the kayak ashore and Karli's brother

Of course, Karli and Peder were staying close beside me, urging me on but also looking very serious, which I didn't like.

Algot appeared and helped me get out of it. I left it with him and staggered up to the tent, walking like a drunk with my left leg seriously cramped. I felt incredibly cold now that I'd stopped paddling. By this time there were several people waiting at my tent and they stripped off my

clothes, rubbed and rubbed and rubbed me down with towels, and got me into my sleeping bag, between the two reindeer skins I'd borrowed. I was given a sweet, scalding hot mug of coffee and at once felt miles better and stopped shivering. I was also given some cod and potato and some soup, and soon I fell asleep.

I woke up what felt like a long time later to find the tent full of people of all ages having a huge party with my coffee and my Scottish beer. Peder I could tell was the center of attention, having a wonderful time telling every detail of what had happened. Everything looked good until I realized I was lying in a pool of freezing cold water! Everyone rushed over to see what was wrong. But nothing was wrong. It was just that my buttocks were still so incredibly cold that it felt like ... what I just said. Without the energy to get up, I joined in the party, drank soup and coffee, told them my version of what had happened, and was soon asleep again. The next day, apart from my embarrassment, I was back to normal. And, pleased that he'd sent Karli along to look after me, Ludwig was amused that I'd capsized and very forgiving about all the water I'd let get into his kayak. 

Ken Taylor was born in Glasgow and by his twenties kayaked most of the West Coast of Scotland. After his visit to Illorsuit, he studied anthropology at Madison, Wisconsin, which led to his doing research on Kodiak Island, Alaska, and spending two years with the Yanomami Indians in Brazilian Amazonia. He now lives at Twin Oaks Community in Virginia. Ken notes that the rescue Karli performed was a classic example of the "paddle bridge rescue" as described by John Heath in his June 1997 Sea Kayaker article, "Eskimo Rescue Technique."

(Editor's note: A kayak built to fit Ken by Emanuele Kornielson, a local kayak builder on the island of Igdlorssuit, just north of Disko Bay, on the West coast of Greenland, "became the basis for the design of a number of recreational kayaks." Source: Duncan Winning, "Lines of Igdlorssuit Kayak," Scotland.)

The MASIK

EDITOR'S LETTER

In this issue of *The Masik* we offer several perspectives of Greenland. Ken Taylor writes of Greenland in 1959, when he was kayaking there as a young man. Helen Wilson interviews John Pedersen about the annual competition, and, in another interview, she offers her own perspectives on competing. John Pedersen describes his experience at the Delmarva Paddler's Retreat, showing us a view of the U.S. through the eyes of a Greenlander.

This issue also offers four perspectives on the kayak. In Part 2 of his "It's a Qajaq!" series, Mike Bielski surveys the materials used in its construction. Joel Fleisher details a repair kit that no SOF kayaker should be without. Having one can turn a potentially trip-ending event into a minor inconvenience. We consider the kayak as a hunting tool — but from the perspective of the hunter, as taught by John Pedersen at the Delmarva Paddler's Retreat. Last, Robert Morris, author of *Building Skin-on-Frame Boats*, presents a completely new way (for boat construction) of attaching a skin to a kayak or baidarka frame. Robert views this as an open-source project and welcomes input into the steps he describes.

The Qajaq USA community lost one of its own when Jo Hamilton died of cancer last September. Rene DuFresne pays loving tribute to her mentor and friend. Jo's husband, Dave, generously provided the photograph of Jo that accompanies the article.

I am grateful to all the authors for their contributions. I appreciate their insights and the hard work that went into writing the articles. Special thanks to Helen Wilson for agreeing to be interviewed, contributing her own interview, and helping with proofreading. Thanks also to Wes Ostertag for his proofreading assistance. Finally, special thanks to Alison Sigethy for laying out this issue under extremely short notice. Arranging the many photographs, step-by-step instructions, and articles with multiple sidebars was no easy task, but she managed it all with ease and good humor.

Tom Milani
August 2009

Share those happenings — publish your experiences in *The Masik*.

Any material related to traditional kayaking is encouraged, and queries are welcome. Articles may be edited for length and clarity. Please send photos with your submission in JPEG format. Stand-alone photos and captions are also welcome. Materials should be sent to thomasm@qajaqusa.org or mailed to Tom Milani, 1211 Duke Street, Alexandria, VA 22314.

PRESIDENT'S LETTER

Our mission at Qajaq USA is to “support Qaannat Kattuffiat and their efforts to preserve, study, and promote the traditions and techniques of Greenland kayaking while seeking to further the appreciation and development of Greenland-style kayaking in the United States.” One of the most direct ways that we do this is by bringing American and Greenland kayakers together at Qajaq USA events. This allows cultural exchange and allows American kayakers to “learn from the source,” rather than relying on hearsay and well-meaning (but often unfounded) advice. The encounter is also a rich experience for the Greenlanders too. They get to see and paddle a variety of skin boats, including historical designs that are unused in Greenland today, as well as seeing how traditional kayaking has blossomed outside of Greenland. The challenge of bringing Greenlanders to Qajaq USA events is no small effort but it remains at the core of what Qajaq USA is all about.

This issue of the Masik includes several articles relating to Greenlander John Pedersen, who was one of our guests at Delmarva last year. Delmarva provided a reunion for John and me. I first met John in 2002 when I was competing in my second Greenland National Kayaking Championship. John’s combined love of cross-country skiing and paddling makes him a great athlete and a serious competitor. I was interested in learning as much as I could about traditional technique and talked with as many of the competitors as I could. When I talked with John I was very surprised that he was also interested in learning some of my ideas of what makes for a strong and powerful canted forward stroke. “Shouldn’t I be learning this from you?” was my reply. John answered that teachers are all around us as long as we observe and have the desire to learn and improve. In John is an athlete who is interested in different schools of thought — he processes what works for him and learns from different sources — good advice for us all. During the competition we enjoyed a good rivalry and had some very close finishes, and completed the games as good friends.

What I found fascinating about John's teaching was his emphasis on paddling as quietly as possible. And not just in terms of sound, but regarding “mental noise” as well.

It was a thrill for me to see John again at Delmarva, and to teach with him. What I found fascinating about John’s teaching was his emphasis on paddling as quietly as possible. And not just in terms of sound, but regarding “mental noise” as well. John stressed that your full attention and even your full being should be focused on your forward stroke to get the best results. Although this type of stealth is required for hunting, it should not be overlooked that an efficient and powerful stroke is also a quiet stroke. Since taking John’s class I often practice by closing my eyes and striving for a smooth and clean catch, power phase, and exit, that produces virtually no noise. These are skills that can benefit all kayakers and not just hunters in Greenland.

Greg Stamer

Putting Together a Skin-on-Frame Repair Kit

by Joel Fleischer

I was paddling back to our campsite on South Twin Island, on a calm evening in the Apostle Islands in northern Wisconsin, cruising along at a good clip, when I heard what can only be described as a “whirring” sound. By the time the sound registered in my brain, I found myself high-centered on a large boulder submerged only inches below the glassy water. After spinning the vinyl-skinned kayak around on the boulder a couple of times, it slid off to the side of the boulder and I was free, leaving a large white skid mark on the boulder. I fearfully ran my hands along the underside of the kayak, feeling for a large hole that I knew must be there, but I could feel nothing except some roughened kayak skin. The one mile paddle back to the campsite was miserable as I imagined repairing the kayak by firelight on the second day of a four day trip. When I returned to shore, I found that the hull was no worse for the wear. But, the paddle back to camp would have been more miserable if I had not been able to take comfort in the fact that I could repair the kayak had I needed to, thanks to the repair kit in my forward hatch.

When putting your kit together, try to imagine what could go wrong and think of how you would go about fixing it.

A repair kit is a must-have item in the gear of any kayaker, even more so for anyone who paddles a skinboat. Plus, it’s useful for repairing more than just your kayak! Most of the items in the repair kit can also be used for other purposes, such as repairing a wetsuit or a drysuit, sewing a button back on your shorts, attaching items to your PFD or your kayak, etc.

What’s in my repair kit?

- **Leatherman Multi-Tool:** This is a great tool for doing everything from cutting line to pulling needles through fabric with the needle-nose pliers. It also works as a makeshift handle for the camp cookpot.
- **Duct Tape:** Probably the number one most useful item in the repair kit. If you’re able to get off the water, it’s useful for temporarily patching holes in the kayak skin. Duct tape should be placed over the hole from the outside and the inside to make a sort of “sandwich” repair. If you’re on the water, use an X-rescue/repair. To do an X-rescue/repair, pull the damaged kayak upside down onto the deck of the rescue kayak as in an X-rescue, accomplish the repair, and launch the kayak. You



The repair kit. Photo: Joel Fleisher

can also use duct tape for taping broken gear back together, etc. It can also be used for first aid purposes, closing up cuts, securing a splint, etc.

- **Parachute Cord:** Available from Army Surplus Stores, 550 cord is another repair kit item that has as many uses as you can think up for it. It can be used to lash items to your PFD or to your kayak, and to splint broken kayak stringers or ribs. Furthermore, you can “gut” it, i.e., cut the ends off, pull out the lighter weight cords inside, and use them to sew up holes in the kayak skin
- **Sewing Kit:** How are you going to sew a hole closed if you don’t have a sewing kit? Also useful for repairing tents, sleeping bags, clothing, tarps, etc. Forget the lightweight needles normally included with a sewing kit. Buy large canvas/leatherworking needles, both straight and curved and some nylon or polyester upholstery thread. Avoid cotton covered polyester. Use polyester or nylon thread that’s rated for outdoor/UV resistance.
- **Butane Lighter:** Start a campfire, burn the ends of threads or cord to avoid fraying, etc.



The author imagines the repairs he'll have to do after high centering his kayak on a large boulder in the Apostle Islands. Photo: Mark Kuehne.

- **Seal Cement:** Neoprene contact cement is technically not a kayak repair item, but if you blow a seam on your wetsuit or your neoprene booties, you'll be glad you have it.
- **GOOP:** From the makers of Shoe Goo, Amazing GOOP is useful for gluing patches over holes in the hull, or, if the hole is small enough, glob some GOOP over top of the hole and you're good to go. It cures quickly, so, if you make your repair before breakfast, by the time you're packing up, it should be ready to go. Alternately, you can use Aquaseal, thinned with Cotel for a 2-hour repair time.
- **Fabric Patches:** Bring scraps left over from skinning the kayak. Use GOOP to secure them over larger holes, or, use the needle and thread to sew the patch in and seal it with GOOP or Aquaseal. If you paddle a fiberglass kayak, you may want to include strips of fiberglass tape.
- **5-minute Epoxy** (*not pictured*): A double tube of epoxy is small, resealable, and handy for more permanent repairs, assuming that you have the time to do them. If a stringer breaks, epoxy the break and back it up with a piece of wood epoxied on as a backing block. Secure it with zip ties until it cures. If you paddle a hard shell kayak, 5-minute epoxy can be used to fix cracks and small holes.
- **Zip Ties:** Who knows? Zip ties are useful for all kinds of things, such as splinting broken stringers or ribs in the kayak hull or tying your garbage bag shut.

You might want to include a piece of sandpaper in the kit as well, as many of the adhesives and epoxies adhere better to a rough surface.

When putting your kit together, try to imagine what could go wrong and think of how you would go about fixing it. Think of multiple uses for the items you have and think light and small. Use a Sharpie to write the contents of the repair kit on the outside of the drybag.

Finally, keep the repair kit in a place where it is easily reached. If the rest of your group hasn't spent as much time preparing for eventualities you may be the hero of the day



Rev. Joel Fleischer is a Lutheran pastor in Marquette, Michigan, and a co-owner of Black Dog Kayaks, a company that designs and produces skin-on-frame kayak kits. Any day is a good day to paddle on Lake Superior, and Joel can often be found there abusing the company's products. You can email Joel at joel@blackdogkayaks.com



Ole P. L. Petersen 2000, from the Greenland Image Database

Skinning without a Needle:

Fastening a skin around a kayak or boat frame, using splines — an open-source project?

Text and photos by Robert Morris

Introduction

One of the lovely qualities of the skin-on-frame boat-building experience is the relaxed but steady tempo of the building process. I enjoy the opportunity to talk with my students, and there is plenty of time to look carefully and check that the lines of the boat are attractive and sweet. There is also ample time to dwell on the thought: “There must be an easier, faster or better way of doing this,” and to contemplate changes to the design, the tools, or the building process. This article describes my exploration of: “There must be a different way to put the skin on my kayak.”

Most of the “better way” ideas I’ve worked on have been tempered by the knowledge that radical boat-building experiments can trigger the biological process of natural selection. Like warming up a chili gradually, taste testing with each added pinch of pepper, I prefer to creep toward change, making incremental modifications over the course of building several boats.

Some ideas, however, are extremely difficult to develop gradually. They are so different from existing practice that they can only be fully assessed by trying them out. Like skydiving, there is no real way to ease into a commitment. You either do it or you don’t.

In 2005/2006 I took a year off from kayak building to study at Simon Fraser University. While that year was among the most exciting and challenging in memory...sometimes during slow moments my thoughts would drift to kayak building. One of the things I began to turn over in my mind was an old problem of skinning without needle and thread. I had been wrestling with this particular puzzle for about 10 years. I’ve long wanted to experiment with waterproof, non-woven materials, such as Mylar and vinyl, but many of these would tear if sewn. Losing the need to use thread would open up a huge inventory of materials, each with its own unique set of physical attributes.

In school, without the pressure to build, I could indulge in a lot of mental modeling, doodling, and problem solving. Gradually, over a few months, I developed an idea that wedges or “splines” could be used to fasten the skin into a groove or grooves in a gunwale or stringer. I spent the next year thinking through and refining the idea, popping into my shop to machine small sample sections of gunwale, and hunt for appropriate materials. With most obvious bugs worked out, I then successfully skinned four kayaks, with increasing ease and finesse.

The seed of this idea was the memory of making a silk-screen frame where the fabric was fastened by rope wedging it into a groove. Splines are familiar to most of us as the fasteners holding screens to window frames and screen doors. While anyone with an active dog can tell you it's easy to remove the screen from a door or window, it is much more difficult to take apart a printing screen. This is because the varnish on the border and frame of a printing screen glues the spline into the groove and the fabric to the frame. This system can withstand huge forces shearing the joint, and it nicely resolves the difficulty of mechanically fastening an elastic material to a rigid material.

If polyester fabric could be held in a screen frame, I thought, couldn't nylon or any other membrane be held in a boat frame using the same system?

The instructions that follow explain the answer to that question. I have adapted a method to skin kayaks with splines rather than thread and needle. As it stands, I'm confident in the strength and leak resistance of the system, as outlined in the instructions. I think that this is just the beginning of an idea not fully developed, but with enormous potential for experimentation and development. I like the idea of open-source development and would like to see how the idea of skinning with splines can be evolved. I want to share the results of my experiments with the Qajaq USA community and see how far and wide they can be stretched. I have included notes on my development process (see sidebar) because I think that my errors, false starts, and misunderstandings are as important to fellow builders as descriptions of what worked.

Materials:

- (1) Skin
- (2) Adhesive
- (3) Spline material (cotton sash cord)

Tools:

- (1) *Either* a $\frac{1}{8}$ " kerf x $\frac{1}{2}$ " depth "slot cutter" router bit and router or a $\frac{1}{8}$ " kerf table saw blade, and 1"x 4"x 12" pine or other softwood
- (2) Spline roller — the spline roller has a grooved wheel on one end and a crowned wheel on the other.



- (3) Hammer
- (4) Hardwood stick $\frac{1}{8}$ " thick by $1\frac{1}{2}$ " wide by about 6" long
- (5) Utility knife with sharp blade
- (6) Scissors
- (7) Thumbtacks (only for raw woven material)
- (8) Carpet tape
- (9) Large syringe and brush or tube of adhesive with applicator nozzle

Preparation:

- (1) Before the gunwales are bent, cut a groove $\frac{1}{8}$ " wide, $\frac{1}{2}$ " deep, centered down the full length

of both gunwale tops. This is easy with the wing cutter in a router. If you prefer to use the table saw you need to make a sub-table. Take a piece of wood 1" x 4" x 2" and make a piece to sit on top of your table saw throat plate, as illustrated below. This will allow you to cut a saw kerf of constant depth in the shaped top of your gunwales. Ensure that the throat plate is fastened to the table saw securely so it cannot move in relation to the blade as you cut.



The two options for ripping the spline groove are a router bit and a table saw blade through a shaped sub-table. Both cut $\frac{1}{8}$ " wide and are set for $\frac{1}{2}$ " depth of cut.

(2) Plane or radius the top outside edges of the gunwales $\frac{1}{8}$ ". The softened edge will allow the fabric skin to adhere to the edge of the gunwale when varnished or painted. The strength of this fastening system is supplemented by the adhesion of the skin to the surfaces of the gunwale. It also eases the process of drawing the hull skin snug as the spline is driven into the groove (see step 10).

(3) Build your frame *without* a breast hook. If you have decided to use a breast hook, the outside $\frac{3}{8}$ " needs to be glued to the gunwales. As seen in the photo below, when the spline groove is cut, the outside edge of the breast hook would be cut off and fall away. If you want a breast hook, you can

fit one that sits between the gunwales, like a deck beam, following the techniques used for measuring, cutting, and fitting the flat deck beams.



Notice how the spline groove cuts the outside sections of the breast hook away. The only solutions are to avoid using a breast hook, use adhesive to hold the pieces to the gunwale, or double the thickness of the breast hook.

(4) When you kerf-saw the gunwale tips to fit them together, the measurement across the top edge of the gunwale tips must equal your stem thickness. This can be easily accomplished now or may be dealt with later by using thicker stock to make your stems.



The inside edges of the spline groove meet in a point and the outside dimension of the gunwale tips is the same as the stem material to be used, in this case just shy of $\frac{3}{4}$ ".

(5) When you finish your frame and oil the wood, try not to get oil in the groove. If you are using untreated woven fabric, avoid oiling the top or outside faces of the gunwales.



Notice the smooth transition from two spline grooves to one. The groove wraps around the tip of the stem, but does not go any further.

The Deck:

(6) Lay your skin material over the frame of the deck, and temporarily fasten it so it will not shift around. Leave about 2" of extra material outside the groove. Ensure that it is not twisted or wrinkled.



Skin is stretched over the deck of the kayak first pulling out gross wrinkles and ensuring some degree of longitudinal tension in the skin.

(7) Trim the skin to the shape of the deck, leaving about 2" of surplus material on each side. If your kayak is 22" wide, for example, the skin at the widest point should be 26" wide.



Measure, mark and cut 2" of surplus skin.

(8) Use a syringe or brush to wet the inside of the groove with adhesive. In the case of fabric, use the polyurethane, varnish, or paint that you will be using to waterproof the hull. Other materials will require different adhesives.

(9) Cut two pieces of cotton sash cord, each the length of your boat. To prepare the cords, saturate them by soaking in the adhesive. To keep things from getting totally messy, before use, wring them out by pulling them between two pinched fingers. Wet cord will provide a reservoir of adhesive to fully saturate the seam. Dry cord might starve the seam of strength.

(10) Starting at the cockpit on one side, working first toward one end, then toward the other, force the cord into the groove over the deck skin material. Use the spline roller to force the spline down to the bottom of the groove, trapping the skin under it. Try to keep the skin straight and even. It can be easier if you first force the fabric down with the roller, then push the sash cord in after.

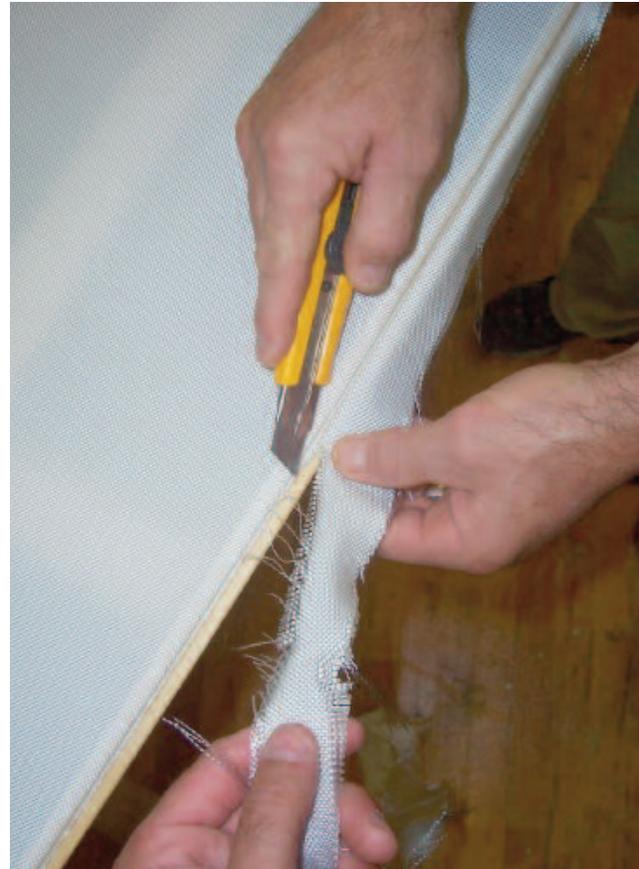


An extra pair of hands help to tension and hold the skin as you roll the spline in. It is a good idea to wedge the spline just in the top of the groove along the whole boat before forcing it down to the bottom of the groove. This prevents large wrinkles from being formed as the skin is pulled into the groove.

(11) Repeat the process on the other side of the kayak deck. Watch that the skin is evenly tight. If you notice that it is not tight, pull it out, retighten the fabric, and try again. This can get quite messy, very fast. I *highly* recommend the use of gloves. You need to make every effort possible to keep the wet polyurethane or other adhesive from dripping or soaking the skin more than absolutely necessary.

(12) At the point where the cords meet at the bow and stern, trim them flush. One cord will stop and the other continue to the end of the stem.

(13) *Carefully* use a fresh, sharp, razor knife to trim the skin just below the top of the groove. The loose end will be trapped and sealed inside the groove in the next steps. Trimming should not be rushed. One slip can ruin your work.



When trimming the deck, angle your knife and trim the cloth inside the groove. This leaves a bit to wrap around the first spline as the second spline is forced down on top.

The Hull:

(14) Turn the boat over and position the skin along the keel stringer. Use tacks for fabric skin, or tape for non-woven materials, to temporarily fasten the skin to the gunwales.

(15) Flip the kayak right side up and trim the hull skin the way you did the deck, leaving 2" of extra material around the edges.

(16) Use a syringe or brush to wet the inside of the groove with adhesive. In the case of fabric, use the polyurethane, varnish, or paint you will be using to waterproof the hull. Other materials will require different adhesives.

The polyurethane is dry and trimming begun. Notice the wrinkle. This could have been pulled tight before the polyurethane dried.

(17) Starting at the cockpit on one side, working first toward one end, then toward the other, and removing the temporary fastenings as you go, force the pre-saturated cord into the groove over the deck skin material so that it is flush with the surface of the gunwale

(18) Use the spline roller to force the spline down to the bottom of the groove, trapping the excess material from the deck skin under it. You want to compress the first layer of saturated cotton cord, squeezing out the polyurethane. This will wet the hull fabric and the second spline inside the groove and eliminate any air spaces.

(19) Repeat the process on the other side of the kayak deck. If you notice that the skin is not tight, Pull it out, *slightly* retighten the fabric, and try again.

(20) On the tops of the stems at the ends of the deck, work with the cord on one side, fastening the skin on that side first, and then do the other side. The smaller the diameter of the kayak, the shorter the length of material available to stretch into shape. This is particularly noticeable toward the ends of the kayak. Picture the difference between stretching one elastic band or stretching five tied end to end. The greater the total length the more extra material available. This means that you must avoid cutting the skin too small at first, because you will not be able to stretch it enough to fit. If you do happen to cut the skin too small you can peel it back and shave down the size of the stem as an alternative to having to start again with a new skin.



(21) Proceed around the front of the stem. I've found that a piece of scrap wood or steel a bit thinner than $\frac{1}{8}$ " makes a good caulking iron to hammer the last little bit of cord over skin into the groove. Many layers of adhesive will seal the exposed cord, but it should sit slightly below the surface of the stem. If it does not, open the skin up and deepen the groove slightly with a hand saw.

(22) When the adhesive is dry, carefully trim the excess hull material

(23) Saturate the exposed spline and groove with adhesive.



Completed stem.

The Sewn Cockpit Rim:

(24) In the case of woven skins, the cockpit can easily sewn in, because there is no center sewn deck seam to deal with. If you are sewing in your cockpit, drill the sewing holes $\frac{1}{4}$ " from the bottom of the rim, $\frac{1}{2}$ " apart, and trim the fabric $\frac{3}{4}$ " from the inside edge. Be sure to sear the edge of the fabric before sewing. You can use piping or a simple fold under the fabric to finish the edge.



Because a deck with no center seam has no slack skin to pull up into the rim, it needs to be sewn closer to the bottom of the rim. This means the stitches need to be spaced closer together.

Splined Cockpit Rim:

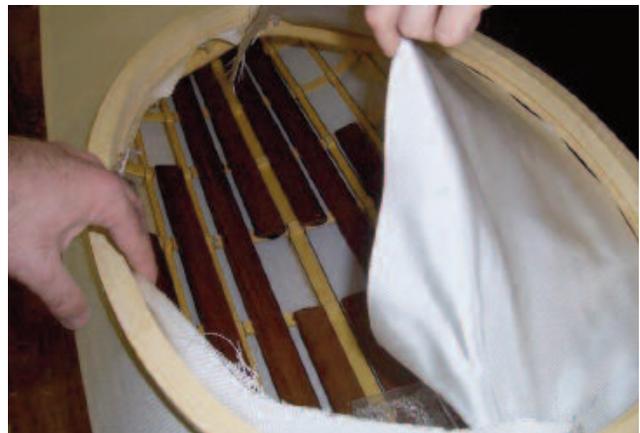
(25) For non-woven skins or the sewing-adverse, you need to make a cockpit with a thickness of $\frac{1}{2}$ " (not including the lip). The height of the rim must be 1" or more. $\frac{3}{8}$ " from the bottom of the cockpit, rip a $\frac{1}{4}$ " deep by $\frac{1}{8}$ " wide groove. Rounding off the inside bottom edge will increase the surface area that the skin can adhere to.

(26) Using pins, tack the skin below the cockpit groove at the port, starboard, fore, and aft points, like the points of a compass around the rim. Don't pull the skin very tight. Pin halfway between the first 4 pins then halfway between all 8 pins. Those 16 pins should be enough to hold the cockpit in place level and straight without getting too much on the way of the splining process.



Note the ends of the $\frac{1}{8}$ " dowels, the $\frac{3}{8}$ " lip separating the spline groove from the edge of the cockpit rim, and the spacing and locations of the tacks positioning the skin in preparation for trimming the fabric and inserting the spline.

(27) Trim the skin flush to the top of the rim. This ensures that there is enough material for the spline to hold when you bed it in the bottom of the groove. You need to trim this material because the skin cannot be pulled up and into the groove otherwise. Trim closer than 1" with caution. This is your margin of error, and if you cut it off, it is gone.



Note how the untrimmed cloth cannot be pulled snug to the inside face of the rim, but the trimmed edge can easily be pulled flush to the inside face of the rim.

(28) Without removing the pins, dry-fit the spline and cloth to ensure that you have a good fit and get a bit of practice snugging the cloth. You may need to remove the pins and pull the cloth tight, then replace them, in order to snug the cloth.



Note how much of the fabric is pulled into the spline groove. The fabric was trimmed flush to the top of the rim. You can see how vulnerable the raw edge is to fraying. There is little margin for error. When in doubt, sear the edge!

(29) Pull the cord and spline out of the dry groove. Lay a plastic garbage bag in the bottom of your boat to catch adhesive drips.

(30) Saturate the inside of the groove with adhesive. Soak the spline with polyurethane before insertion.

(31) Wearing rubber gloves, working from the one side of the rim, and starting with the middle of the spline cord, work around the rim, forcing the skin into the groove using the cord. If you tension the skin too much, it will pull out either from the cockpit rim or the gunwales. If you do not introduce enough tension, the skin will be wrinkled and the cockpit will move. This sounds scary, but is really simple to judge once you are doing it.

(32) After the adhesive has dried, trim the skin just below the edge of the spline groove using a very sharp blade.

(33) In the case of nylon or polyester, shrink the fabric once the adhesive is dry.

(34) If needed, waterproof or dope the skin, ensuring that you put as much adhesive as possible into the spline grooves.

(35) Install deck lines and fittings. The deck lines should load the frame, not the skin.

(36) Launch.

Notes:

(1) One potential option would be to glue in a decorative wood spline above the cotton splines. This could either fill the depth of the groove flush to the surface of the boat or could sit slightly proud of the surface. A higher spline could be profiled to cover and seal the edges of the skin where it curves around the edge of the groove. A T- or mushroom-shaped profile glued to the surface on both sides of the spline groove would add yet more strength and protect the seal from abrasion.

(2) Spline grooves cut in stringers and gunwales—or even dedicated “spline rods”—could be used to tighten skin on kayaks skinned with non-shrinking material or material that slackens easily. The process would involve tightening after skinning by driving splines into grooves, pulling the skin tight from the middle rather than the edges. Could a T-profile keel wear strip be fastened this way, tightening and protecting the hull simultaneously? A $\frac{1}{4}$ " x $\frac{1}{8}$ " spline groove can pull $\frac{1}{2}$ ", and a $\frac{1}{2}$ " deep spline groove could pull 1"!

The Splined Baidarka

This baidarka has had a few modifications to my usual practice to allow for a spline-fastened skin. The main issue that makes skinning the baidarka different from skinning the Greenland kayak is the complexity of the bow and stern forms. The fact there is a stringer running down the center of the deck allows the use of a single piece of skin rather than the two-part skin found on the Greenland kayak.



Note the single spline groove down the center of the deck stringer

Both the bow and stern deck stringers are grooved $\frac{1}{8}$ " x $\frac{1}{2}$ ". These grooves extend down to the bottom corner of the keel stringer at both the bow and stern, along the center lines of the bow and stern structures.



The spline groove extends right to the bottom of the keel.



The cockpit ends of the stringers feather out to nothing. The groove should be brought flush to the bottom of the stringer (perhaps cut $\frac{1}{8}$ " into the deck beam?)



The bow end of the bow deck stringer is rebated into the bow plate to enable it to feather out to flush at the tip of the bow, but still hold the splines and skin. I sewed the skin where the top and bottom meet.

Where the spline and skin run under the cockpit rim, the splines are cut flush with the outside surface of the rim. Keeping the splines from wrapping around under the cockpit rim reduces the bulk of the seam the skin to lay flat against the rim and also wrap around the rim spline. Inside the rim, where there are four layers of fabric formed by the two doubled over halves of the seam, the layers of fabric trapped between the rim and the outer layer of skin need to be trimmed so that they do not extend as far as the groove. Four layers of skin are too bulky to force into the cockpit rim groove. If you tried, you would probably split the rim at the groove



It is impossible to pull the skin into the groove at the base of the jaw. In fact it is difficult to get closer than an inch to the base of the jaw with the splined skin. I sewed the skin using very small stitches.



Note the skin cannot be forced into the spline groove near the base of the jaw.

Another solution would be to make a 4"x 8" skin rectangle. This would be splined into the turn of the jaw before the rest of the skinning begins. The main skin would then be sewn to this piece to make up the required material.

Skin the boat as well as you can, getting as close to the jaw as possible, then sew the patch to the skin where necessary. If you want to avoid sewing at all, you could carve a spline groove around

Note that the double layer of cloth inside this Baidarka cockpit rim. The spline was cut off outside the rim because it would have been too bulky to wrap into the cockpit spline groove. This is not an issue with kayaks splined at the gunwales



Note position of rectangular skin material. The skin can be sewn to this filler piece.

sides of the turn of the jaw so there is room to insert a filler with splines. Doing so would require bedding the top and bottom halves of the bow jaws with Sikaflex or 3M 5200 to waterproof the joint this would expose to immersion. 

Development process — what worked & what didn't

On the Greenland kayaks that have been my initial test beds, the most reasonable places to put the spline grooves have been along the tops of the gunwales. This position would work fine for the hull, as the top and outboard face of the gunwale provide a lot of surface for the fabric to adhere. The deck presented problems, however. I worried that the cockpit and masik could be high enough above the deck that that angle keeps the fabric off the top surface of the gunwale. This means that unlike with a silk-screen frame, in this area, adhesion of the fabric to the frame is restricted to just the inside the groove. The skin tension between the gunwale and cockpit act to pull the fabric up, out of the groove. I worried that without the resistance to shear provided by adhesion to the gunwale top, the cloth and spline

would simply be pulled out of the groove. How could I keep the spline in the groove?

For a long time I was stalled, playing around with wedges and other shapes for wooden splines. I thought that the shape of a spline could lock under tension, the way blades are more firmly locked into planer or jointer cutter heads. In the end I realized that for most home boat shops, this was a dead end, not only because it required too much technology, but that the high degree of precision required for success seemed to be contrary to the spirit of the boats. I needed a spline design that could be easily and inexpensively made with minimal technology.

My solution to the fabric pulling up toward the masik was made up of two parts. I would install

the deck skin first, and the hull skin second. I also decided to use square wooden splines cut with my table saw and planed to thickness and width. The square shape would prevent the fabric from moving by providing greater surface area for gluing parallel to the sides of the groove. The pressure of a second spline over the first, the deck spline, along with maximizing the surface area for adhesive, would hold the deck skin tightly in the groove.

The problem I ran into with the square splines used on the first kayak was that the increasing tension of the fabric as the splines were hammered in, tended to make them twist inside the groove. It was difficult to judge the pre-tensioning

I want to share the results of my experiments with the Qajaq USA community and see how far and wide they can be stretched.

of the cloth to tighten the deck, and still prevent the splines from twisting. One of my splines did rotate, and as it turned, it forced its groove open. The result was a three-foot long longitudinal crack in one gunwale, running from the outboard face to the bottom of the groove. I repaired the split inside the skin with a syringe, clamps and epoxy, but I could see that the square wooden splines would be too problematic to recommend them to other kayak builders.

I decided to use cotton cord splines, exactly as I had long ago for my silk screens. In this plastic age, cotton cord turned out to be surprisingly difficult to find. I finally turned up cotton sash cord in the window section of Home Depot, along

with a spline roller. This is a tool that looks like a double-ended pizza cutter with 1-inch wheels. It is the perfect tool to evenly force a rope spline

The seed of this idea was the memory of making a silk-screen frame where the fabric was fastened with by rope wedging it into a groove.

down into a groove. While sash cord isn't square, I think that it actually makes a better spline, because it is soft enough to apply even pressure, pushing the skin into tighter contact with irregularities in the texture of the groove. I figured that compressed into the bottom of a groove, it wouldn't be round either, and locked in with cured polyurethane it would not be twisting or rolling.

The cotton spline worked beautifully, and the skin went onto the decks and hulls of the next two kayaks easily. I experimented with wrapping the skin over top of the second spline to get a tighter locking butt joint, but this created a lot of difficulty with controlling skin tension. I pulled the spline and reverted to the pattern described.

The main problem I had with the second boat was accidentally cutting the edge of the deck fabric while trimming the loose ends of the hull fabric. This can be fixed with polyurethane bedding compound such as Sikaflex or 3M 5200 if the problem is near the bow or stern. Amidships, though, you would have to pull the skin off and start again.

I rejected using D-rings to fasten the deck lines because the stress on the skin close to the seam could pull the skin out of the groove. I've used

the traditional method of wedging a leather line passed through a hole in the gunwale, which loads the gunwale rather than the skin. Using pad eyes (inchworms) or screw eyes would also work.

The fourth kayak worked like a charm. Total time spent fastening the cloth to the hull was 2½ hours, including coffee and discussion time! The cockpit rim took another hour because I sewed it on the deck. My next kayak, I will be using the spline method to fasten the rim as well as the hull and deck.

In trying to work as much as possible from the known to the unknown, so far I have only skinned with the 11.5 oz ballistic nylon I have used for almost all my boats. I would like to experiment next with Mylar or polyurethane film. I also think I'll soon be trying silk waterproofed with wax. I was once told that this was the material used on early slalom kayaks, and I would like to see how lightly I *could* build a recovery kayak.



Robert Morris, the author of Building Skin on Frame Boats, began building SOF kayaks in 1993. The author of several magazine articles, Robert has also appeared in the Canadian National Film Board documentary Caribou Kayak about the project he, his wife, Marianne Dupre, and Mark Reuten worked on in Kugaaruk, Nunavut, building Netsilingmeot kayaks with three community elders. Robert has recently closed his business Brewery Creek Small Boat Shop. He wants to spend more time with his family, to concentrate on his new career teaching high school, and to focus his kayak-building time on research and development. Robert hopes this article represents the first fruits of his shift of focus.



Photo: Tom Milani

Reproduction of my experience in the U.S.

*I would like to tell you the way I tell it to Greenlanders
— real hunting qajaqs in USA!*

Text and photos by John Pedersen



The Capitol, a monument for Delmarva

My trip to the United States, from our country, started in a strange way, as I had to fly to Europe first and then fly right above the same country I left, the next day, on my way to Washington, DC.

On arrival when I got off the airplane, I was struck by a heat and moisture we have never experienced here — the weather was about 27° C and very humid — and it reminded me a little of entering a sauna.

At the arrival hall I was received by a woman called Alison. She had been in Greenland before, and was a participant in the 2006 Greenland national championships in Sisimiut.

Later the same day, on my request, Alison guided me around in the center of Washington, and I had a chance to see the famous “Capitol” and “Thomas Jefferson Memorial.” Today, when I see these monuments pop up on TV, they remind me solely about my trip to Delmarva, a qajaq camp on the eastern coast of the U.S., situated about 150 kilometers from Washington, DC.

The next day, before driving to Delmarva, I spend a few hours walking around in Alexandria, which is at the river Potomac. The city is a little similar to a common city in Denmark — the difference is in the signs and the English text — but I noticed not seeing any bicycles at all.

The town was very much characterized by the American election between Obama and McCain, obviously a very important election for the people, because you could see posters all over the place.

During my sightseeing I had a chance to visit Alison’s art studio, and it turned out for me that she made the finest sculptures in glass materials. She had a lot of art where qajaqs were the center of her expression. I realized that qajaqs were important in her life, even the plates on her car say: qajaq.



Kayaking must be very important for the owner

At the Potomac river I saw a lot of big luxury boats, exclusively used for pleasure, many of them as big as houses, not very suitable for our kind of boating in waters with ice.

Big passenger jets with room for several hundred passengers flew above the river, preparing for landing, every 30 seconds, and this was only a national airport, funny to think about, when you come from the third biggest city in Greenland and only see small propeller-driven planes few times during a week. [John is referring to Reagan National Airport here.]

At the river I saw something that would wake up a hunter's hunting instinct: Canada geese. They were so tame that I could stand within 10 meters of the birds without frightening them! A delicacy so close, and I didn't have a rifle.

Later that same day, we took off for Delmarva, and we were driving on some very big highways with 6 lanes, very unreal when you come from a town with only 25 kilometers of roads and about 100 cars. The traffic almost looked like a river with a waterfall of cars. During the ride I sucked in every new impression or thing I saw. Everything was so big, and before I had digested an impres-

sion, a new one popped up, and the next, next, next — new impressions everywhere. Everything a little different from what I have seen before — new type of houses, bridges, grass, trees, crops, and even the asphalt smelled different.

At the arrival in Delmarva, I met, to my relief, Maligiaq, with whom I should share a room in a cabin called The Manor House. Now I had a like-minded person to talk to, a person who had been in the U.S. several times before, and with whom I could talk in my own language.

The camp was called Camp Arrowhead, and had about 20 cabins in a forest full of large trees, some of which were about 20–30 meters in height. All houses were built of wood like ours.



A bird with a funny behavior

And not long away from our cabin, they had a funny domestic animal called guinea hen, a bird with a bald head, which I spent quite some time watching, and was very amused by their behavior. The birds had a leader who was in charge of the direction, and when it started to run, the rest of the flock instantly followed, regardless of the different obstacles they met. Funny birds to watch.



Qajaq talk: explaining, listening, looking

The same night I also met several persons who had been in Greenland, participating in the national championships. But the most exiting persons I met were the Americans, the ones who had not been in my country before. They showed an interest and a dedication for qajaqs and our culture I had never seen before. In the beginning of the conversation the topic was always qajaq, but as we talked, they often turned their curiosity on my person and the customs of my country. I found it very interesting talking to people so dedicated to their hobby, you could almost feel their soul, and they could talk about the same topic, even obvious things for us, for hours. I don't know how they managed to find all these words, but it is a fact that they really love to talk, these Americans.

Because I was in America, I had to eat their food too. The first day in the dining hall, I just sat down and studied how they put together their meals from the different pots and pans. After a while, I was sure what to eat, and ended up with a plate full of meatballs, white bread, and vegetables. I sat down, and the man sitting next to me had a strange expression on his face when he looked at my plate...

During suppertime, I learned a new custom, alcoholic drinks while eating, every night. A custom I was very unfamiliar with, but a custom I quickly adapted and followed like everyone else. This was a special social event for the Americans, and getting a little drunk/tipsy in the evening was quite normal for many.

Day two was a big experience for me, as people started arriving from all over the country bringing their self-built qajaqs. I had never seen such a variety of Greenland qajaqs before. Real hunting qajaqs from the 16th – 17th – 18th –19th century. I had never expected to see such fine qajaqs outside Greenland. Replicas of our forefathers' pride, made in USA!



A very beautiful qajaq

I was told that the qajaqs were mainly used for rolling, qajaq trips, and to play in the waves, quite different from our way of using a qajaq back home. Most of us only use rolling as a matter of survival, qajaq trips without a purpose are barely known, and the qajaqs are not used when waves are present.

Almost every qajaq is a replica of old hunting qajaqs, and the way they were built was with some of the most beautiful workmanship I have ever seen. Every little detail has been carefully meas-

ured, calculated, shaped, and built with a tolerance within a few millimeters. This must have been very time consuming. The qajaq builders were always willing to share their experience with you, and they love to talk about its history, origin, type of wood, lashing, angles, and curves. Most of them have built their qajaqs by themselves, some a few, some 10–15, and even a couple of persons had most of their income from building qajaqs.

I tried to paddle as many different types of hunting qajaqs as possible, and it was truly joyful. The variety of the hydrodynamics was exiting, and I was often thinking about what kind of prey this specific qajaq I was paddling had been hunting, and in which conditions, and why the hull had this special shape for exactly that location it originated from.



Greenland hunting qajaq, made in U.S.A

About 150 persons joined The Delmarva Paddler's retreat event, which was organized by Qajaq USA, a sister-organization under our Qaannat Kattuffiat, and it has members from all over the U.S. who interested in Greenland/Arctic qajaqs. I also attended one of the board meetings, and noticed that every little thing was written on paper and planned and scheduled to the



Some of the best on the ropes I saw?

minute. Time is obviously a valuable thing, and they don't like surprises or delays.

Maligiaq and "The Famous Dubsid," had the *al-lunaariaqattaarneq* class (ropes), and it was obvious to me that Americans did not practice their strength, flexibility, and balance on the ropes. Even the best on the ropes would have to give up in competition with our smallest children. But the lack of ability on the ropes was just the opposite in rolling. Americans are on average much better rollers than Greenlanders. Even a 13-year-old girl gave one of the best rollers in Greenland something to think about. Quite a few did over 200 pts. I was amazed!

As a special invited Qajaq USA guest, I had accepted the request to teach and show some different paddling and hunting techniques for the participants in the strokes class. Greg Stamer, President of QajaqUSA and a former participant of the QU-2002 Ilulissat Nationals, and I were instructors. The classes started with an explanation of how we teach our children who are learning to qajaq, a description of the paddles used in our area, and my showing the hunting and stalking strokes on land. All participants, without exception, were dressed in the correct Western kayak clothing, made of water-repellent Gore-

Tex, neoprene footwear, and high-tech tuiliks. I was the only person in common, everyday clothing, like we usually do back home. After 10–15 minutes of explaining, we entered the qajaqs so the participants could see the techniques in practice. In the water I quickly noticed a difference in our way of paddling. The majority of the paddlers used solely their arms and were not like us, trying to conserve as much energy as possible by using torso rotation. All paddlers didn't mind dipping their hands into the water, as the water temperature was about 16° C, and not 2 °C like our waters. The paddles were held much higher and close to the qajaq, because they didn't mind getting wet. When I tried to teach people how to use their torso, they found it very difficult, because many of them had been using the same “wrong”



Wet feet before entering a kayak.....

technique for several years. The next lesson was quiet strokes, minimizing dripping from the blades, then hunting and stalking technique with sliding strokes, followed by harpooning the prey. The type of paddling I showed them had never been seen before, and made quite an impression on the participants. On our way home we practiced long-distance paddling technique with mental focus on our paddling. Some were fasci-



New qajaq's with very oval cockpits

ated and were able to put their minds into the paddle and concentrate. Talk is good, but not good for your paddling.

There was also a difference in ending the qajaq trips. People just speeded up and plowed the qajaqs into the sandy beach, exited the qajaq, and walked out, into the water. Maligiaq and I were the only ones who used the pier for exiting, like we do in Greenland — obviously, they have not been walking in water with a temperature of 2 °C.

While I stayed in the camp, five to six very different qajaqs were launched, Greenland and *akilinermiut* types (our neighbors in the west). It was a shame I did not have the chance to follow the building and the progress of the qajaqs; I really wanted to see how they build from start to end. I noticed that instead of our sealskin stringers they used leather or ropes and wood instead of bones. They had big oval cockpits instead of our round cockpits. The nylon skin was coated with something they called polyurethane, a very glossy, strong, and flexible material, and it can be tinted into all different colors; some of the qajaqs even looked as if they had real sealskin. It is a material that could be interesting for us to try in our cold waters. [John is referring to the kayaks built in the class taught by Brian Schulz during the extended Delmarva session.]



Leaving Delmarva

Some of the event is financed by an auction. Gifts are donated by the participants. The merchandise was kayak clothing, books, art, kayak gear, and things brought home from Greenland. The Greenland merchandise was the most popular and sold at prices up to five to six times its value, wild! A donated glass sculpture was at the auction, made by the first person I met in the U.S., and the first piece of qajaq art I touched in the U.S. That sculpture meant a lot to me, and I had to own it. When the auction began, I stood up and announced that I did not want to hear any more bids. This was luckily respected. I was a little embarrassed when I did that, but I got the sculpture *Zen*. *Zen* is now occupying the best place in my living room.

The last day was a little special, as most people were leaving the camp that day. Many people came to me with their farewell greetings. A moment of melancholy for me. The event, the people, the country, had given me such a big experience, an experience for life. I was glad I have had the chance to meet all those warm-hearted and polite people.

And all of a sudden I was sitting on board a plane

on my way back home, all by myself. For the first time, I had a chance to rewind the tape, and make some reflections. I was looking at a switched off LCD screen in front of me, and the screen showed me a movie called: Delmarva Paddler's Retreat 2008.



The first and last persons I met in the U.S.

*To my other qajaq-family:
I want to thank all the people who made
my trip to the U.S. possible.
And a special thanks to all whom I met,
and had a chance to teach.
I hope to see you again some other time.
— John Pedersen, Ilulissat, Greenland.*



Home again

An interview with Helen Wilson

*Editor's note: This interview was conducted by e-mail in October and November 2008.
Photos Helen Wilson*

MASIK: How did you prepare for the competition?

Helen Wilson: Preparing for the competition turned out to be as much mental as it was physical. Throughout the winter and spring, I went through the rolling list about four times a week. A friend lent me a couple of harpoons, and I had fun learning how to use them. A couple of months before the competition I began working on rope gymnastics. Shortly after learning a few basic moves I injured my shoulder and could no longer practice either rolling or ropes. At this point I could do almost all of the rolls on the rolling list and get the minimum qualifying score of 30 points in rope gymnastics. This is when I turned the focus of my training over to studying the language and reading as much as I could about Greenland. I had some concerns that my shoulder would not heal in time for the competition and I wanted to get as much out of the experience as possible. In a way it was a good thing that I had to stop training because it made me take a step back and really evaluate why going to Greenland was



Excited participants work together to get all of the qajaqs off the ferry.

so important to me. As it turned out, doing well in the competition was a minuscule part of my reasons for wanting to go, and the more I read about Greenland and its kayaking history, the more I wanted to dive into the cultural aspects of the place.

MASIK: How long were you in Greenland?

Helen Wilson: I was in Greenland for 10 days. I'd planned on being there for 8 days, but because of fog my flight was postponed. This worked out well because the competition ended up finishing a day later than planned, and if I would have left



A view of Qaqortoq from the second portage of a race

as scheduled, I would have missed the ropes competition and the final banquet. The downside to this was that I missed all of my connecting flights from Copenhagen back to the United States, and United Airlines charged me quite a bit of money to reschedule.

MASIK: What events did you compete in?

Helen Wilson: I competed in the short distance race, individual rolling, team rolling, harpoon throwing, and rope gymnastics.



Maligiaq Padilla awaits instructions during the individual rolling competition.

MASIK: Where did you stay during the competition, and how was that experience?

Helen Wilson: Dubsid and I had rented a room several months before the event. When we arrived the tourist office couldn't find our reservations and informed us that the room that we thought that we had rented was being renovated. They suggested several apartments, none of which were close to where the competitions would take place. We took one that was up a long, steep hill from the center of the town. The apartment itself was charming. We felt right at home with the comforts of a full kitchen, bathroom, and even a balcony overlooking a lake. The distance from the competition wasn't really an issue. We'd take what we'd need for the day's events to the schoolhouse, so our things were always readily available. After our flight was delayed, Air Greenland provided us with a room in a hostel overlooking the bay.

MASIK: Did you bring your own kayak or use a kayak there? What gear did you bring?

Helen Wilson: I borrowed kayaks there. The day of our arrival, and a day before the Championship began, Dubsid and I asked at Qajaq Qaqortoq, the local kayak club, if we could try out some of their kayaks. They pointed out two that we could use. The first one that I sat in went up to my armpits, probably not so good for layback rolls.



John Pedersen fights the wind to finish the long-distance race. Many competitors gave up and hitched a ride back on the rescue boats.

The second didn't have a masik, and my knees were wedged into a really uncomfortable spot. Basically, it was a bad fit for both Dubsid and me. However, we did take it out rolling. After a few rolls I decided that it would work for the rolling competitions, although I planned to keep my eye out for another one.

After the arrival of the other competitors, Maligiaq lent me a Sisimiut kayak. It didn't fit very well either, but oddly enough I didn't care. I

think that a part of me had started settling into the marvelous and carefree Greenlandic attitude of not worrying about things and just letting them happen. I ended up using the Sisimiut kayak for the short-distance race and the individual rolling competition.

I couldn't find this kayak when it was time for the team rolling competition, so Maligiaq lent me a kayak that I was told that Cheri Perry had built and left in Greenland. I didn't actually get to use it though because one of the women on my rolling team said that she didn't want to use her kayak for the competition because it leaked and didn't roll well, so she agreed to be on my team if I traded kayaks with her. I agreed.

For the harpoon throwing competition I borrowed a kayak from a man named Emaanooraq Nathansen. The kayak was quite impressive, with hunting equipment covering its decks.

It sat extremely high on the water, which made it feel very unstable, but it was a lot of fun to paddle.

I brought all the gear that I would need except the kayak. I had brought extra layers to compensate for the cold water — thicker fleece, warmer gloves, etc. — but I made a last-minute decision to dress in exactly what I wore when I practiced at home. There was just something comforting about being in clothes that I was used to.



Medals were given out at two separate awards ceremonies. Due to the many events and categories, almost everyone was a winner at something.



Aka Høegh, a well known artist in Qaqortoq, plays a drum in her living room.

MASIK: What did you think of the skin-on-frame kayaks that you saw? Did you have the opportunity to paddle any?

Helen Wilson: The skin-on-frame kayaks were similar to the ones that I have seen in the United States. Most of the competitors had a “rolling kayak” and a “racing kayak.” The racing kayaks had skegs. There were also a few kayaks that had attachments for harpoons and other hunting equipment.

MASIK: What were your impressions of Greenland — the land and the people?

Helen Wilson: Greenland is a beautiful country. The hills are speckled with colorful houses, and a magical mist seems to hang over the place. The people are remarkable and take great pride in their culture. Flags are everywhere. I really enjoyed the free spirit and carefree attitude that the people seem to possess.

MASIK: Did going to Greenland and competing change you in any way? If so, how?

Greenland absolutely changed me. I'd been mentally preparing for this trip for several months, but I didn't really know what to expect. A couple of afternoons I went hiking by myself. One day I hiked to the highest point of a hillside. I spent hours up there looking at the town and reflecting on why I was there and what I would take back with me. The overwhelming feeling that I felt at the top of the hillside as I overlooked the bay and small town of Qaqortoq is something that will never leave me. There's something magical and special about the place that I can't put into words. I've looked through my pictures several times since I've been back, and each time I find myself smiling. The friendships that I made will last a lifetime. The competition itself was amazing because it gave me the opportunity to be a part of the Greenlandic culture for a few days. The place really left a mark on me.



A man carves a tupilak from a caribou antler in a building simply marked "Workshop."

MASIK: What are your future kayaking plans?

Helen Wilson: I'd like to teach more. I'm hoping to travel to more symposiums next year, as well as to go back to Greenland if I can manage it financially. I'm also hoping that there are some expeditions in my future. The world is a big place with lots of water to explore. I'd love to start by kayaking down the coast of Greenland, possibly to the Championship, or exploring the Faroe Islands.

MASIK: What advice would you give to anyone who's considering competing in Greenland?

Helen Wilson: For anyone who's considering competing in Greenland I'd tell them to go with an open mind. It's important for competitors to remember that the Championship isn't as much about winning as it is a celebration of the Greenlandic culture. Greenland is a magical place, and I think that the more open visitors are to experiencing that magic, the more it'll become a part of them.

Biography: Helen Wilson lives in Arcata, California. She competed in the 2008 Greenland National Kayaking Championship and received first-place medals in individual rolling, group rolling, and the distance harpoon throw. She found her experiences in Greenland to be life-changing and wishes to share them with others. When not paddling, Helen works at The Arcata Eye newspaper, is the program assistant for Kayak Zaks, and teaches rolling at the Arcata Community Pool. She is also the President of Explore North Coast (explorenorthcoast.net), Humboldt County's Sea Kayaking Association; is on the organizing committee for Humboldt Bay Paddlefest (humboldtbaypaddlefest.com); and is a board member for the Humboldt State University Alumni Association (alumni.humboldt.edu), the school where she received her BA degree in English. Her Web site is www.greenlandorbust.org.

Helen Wilson interviewing John Pedersen

Editor's note: Helen Wilson conducted this interview with John Pedersen by e-mail. Their correspondence took place from October – November 2008 to January 2009



*John Pedersen picture from relay-race
Courtesy: John Pedersen*

Helen Wilson: When did you start qajaqing?

John Pedersen: The first time I was sitting in a qajaq was 35 years ago. It was a qajaq of an adult person, and it was huge, and because of that I did not have to use floats beside the qajaq. I built my first qajaq in 1986. Before that I borrowed qajaqs from hunters we met on hunting trips, but mostly for fun.

Helen Wilson: What is the process in the town for preparing for the Championship?

John Pedersen: We usually begin training sessions in February exercising *Allunaariaqattaarnej* [rope gymnastics]. This continues until May. In May we launch our qajaqs, when the weather permits, because it's still cold and the temperature varies from -5 to 0 degrees Celsius. Everyday qajaqing will first be possible from June, but we are living beside the world's fastest producing glacier,

which produces up to 25 meters a day, and the width of the glacier is 5 kilometers. That's a lot of ice. Very often, it is not possible for us to exercise on the water, due to too much ice coming out from the fiord.

Helen Wilson: How is it determined where the Championship will take place?

John Pedersen: The Qaannat Kattuffiat (QK) decides that. The different clubs around the coast send an application if they can afford to host the championships. The policy of the QK is to spread the championships to as many cities as possible. That is to avoid championships in the same town too often.

Helen Wilson: How often do you travel between towns, and how is this done?

John Pedersen: We travel once a year by ferry due to the cost. Traveling by ferry can consume a lot of time. When we went to Qaqortoq we spent 3-1/2 days on the ferry just to get there.

Helen Wilson: What kind of food do Greenlanders typically eat?

John Pedersen: In general, fifty-fifty Western food – local food. Western food is more Danish cuisine, and local food is seal, whale, sea birds, land mammals, caribou, musk ox; fish — cod halibut, salmon; land birds — duck, geese, grouse; berries — bilberries and “sortebær” (blackberries).

Helen Wilson: Are you aware of any changes to the rules for 2009?

John Pedersen: The QK had a board meeting in early 2008 and decided to add five new rolls for the 2008 championships, but on the papers given to the participants, the five new rolls were not on the list. I don't know what went wrong.

Helen Wilson: Who makes the sealskin tuiliks?

John Pedersen: The tuiliks are most often sewn by old women who still remember the skill, and they are getting fewer and fewer. The QK had a tuilik sewing class a few years ago. It was quite successful with six participants, but I haven't heard they had another class since that.

We have always been glad to share our interests to a small group of people coming from outside of Greenland. I think that foreign participants will always be accepted as long as they respect our way of living.

Helen Wilson: Can you tell me about this process?

John Pedersen: Tuilik means "the one with shoulders." That is because you have to use a whole sealskin for the front of the tuilik. It must remain uncut from bottom to shoulders to make it waterproof and strong. Also the back must be made of a whole skin. The tuilik is made of five pieces of skin: the hood, the front and back, and the arms. The preferred skin comes from young seals about 2 to 3 years old. When the seals are older, the skin is too thick and will be too heavy when it's wet. It is sewn with very small double-stitches. Sinew from caribou or whale is preferred, as this will, when wet, expand and prevent water entry through the stitch-holes.

Helen Wilson: How do Greenlanders feel about the increase of foreign competitors?

John Pedersen: Since I started club-related qajaqing, there have always been five to seven foreigners at the championships every year, and they have always been accepted as guests by the local participants. We have always been glad to share our interests to a small group of people coming from outside of Greenland. I think that foreign participants will always be accepted as long as they respect our way of living.



Lars Kristian Pedersen doing: Nusuinnarlugu, pallortillugu/nerfallartillugu, tunumut.

Photo: John Pedersen

Helen Wilson: How old were your children when they began doing ropes? Do they qajaq as well?

John Pedersen: I joined our local club in 2002, and all my children joined the next year. Taatsiannguaq was 12, Tanja 11, and Lars Kristian 8; we went to the championships in Nuuk that year. Since 2003 Tanja and I have always won gold medals. Taatsi and Tanja are now going to school outside Ilulissat; Taatsi in Nuuk and Tanja in Denmark. Lars Kristian is the one remaining, and he will be showing off at SSTIKS 2009. 



Your mind is stronger than your body, & it will get you home

Tom Milani and John Pedersen

Editor's note: This article is based on conversations with John Pedersen before and during the Delmarva Paddler's Retreat, the instruction he gave during the strokes class he taught at Delmarva, and comments he has posted on the forum. John Doornink also contributed to this article.

John demonstrates the Greenland stroke.

Photo: John Doornink

Introduction

John Pedersen was born in Ilulissat, and except for when he was a student in Denmark, has lived his entire life there. John learned kayaking and hunting from his uncle, who was like a second father to him. When he was learning to kayak, 90 percent of the instruction was on strokes and especially on torso rotation; rolling was much less emphasized. He said it took a long time for the lessons to sink in, but when he was older, his uncle's lessons came back to him often.

Kids and kayaking

Children in Greenland are afraid of the water because most of them have not learned how to swim — which is natural, given its temperature. To give them a sense of security, they sit in kayaks with outriggers. For 1 to 2 months they receive no instruction. Instead, they play, in the process becoming more comfortable in a kayak and more used to handling a paddle. Instruction begins after that (step-by-step, correcting one thing at a time, so as to not overload the ability to absorb instruction).

Paddles

In Ilulissat, paddles are sized anthropometrically. Paddle length equals the distance from the ground to the palm, when the hand is bent 90 degrees at the wrist (and the paddle is a little wider than others from the coast). The ends of the paddle tend to be flatter. The more rounded the end, the higher water can fall from it onto the water's surface, and the noisier it will be.

Strokes

The goal when paddling is to be as efficient as possible. The paddle is held at a low angle, because a low angle results in less water sliding the length of the paddle to exposed hands (Greenlanders don't wear gloves when paddling). A low angle also means that you do not stress your shoulders, and you conserve energy. In calm water, the paddle enters the water close to the kayak, near the bow. In rougher water it enters farther out. The top edge of the paddle is vertical or tilted toward the bow. The paddle follows the bow wake, exiting just behind the hip. The paddle can snap up at the end.



*Students stand in circle with John and Greg,
Photo: Jenny Owen*

Feet press off the foot brace, and the torso rotates with each stroke. The arms should not bend too much (no more than 80 degrees). A kayaker relying on his arms will quickly tire. This form should be maintained regardless of the speed.

Hunting

The kayak is a tool used in hunting, where stealth and efficiency are needed. The paddle must always exit/enter the water without noise. When the paddle exits the water, it is held for a moment at just an inch or two above the surface to allow water to drip from the blade ends. After the pause, the stroke begins from the other side. Enter – Exit – Pause – Enter. This is the stroke used for approaching prey, but even when paddling long distances, a hunter would pause between strokes to reinforce technique.

When the hunter has closed within about 50 meters of his prey, his strokes become even more deliberate. Now, the goal is to remain not only silent, but unseen. The kayak is equipped with a white hunting screen mounted across the bow, and the hunter must keep his body and paddle

behind it. To do this, he adopts a sliding stroke. The paddle is held by one blade, while the other enters the water at the bow and plunges quickly. Its course parallels the keel and exits aft, just above the surface of the water. After letting the water drip off the edge, the hunter passes the paddle forward, hand-over-hand, and the stroke is repeated on the other side.

When in shooting range of the prey, in this case a seal, the hunter allows the paddle to slide into the water (to be retrieved later), grabs his rifle, shoots, replaces the rifle in the scabbard, grabs his spare paddle, and paddles as hard as he can. He harpoons the seal without the aid of a norsaq — the norsaq adds distance but throwing by hand is more accurate. The seal is always harpooned to prevent it from sinking and to make sure that the seal is really dead, and not just stunned. The harpoon is attached to a float by a line coiled in a holder on the deck. After the seal is secured, the main paddle is retrieved.

The Flow of Paddling

For long-distance paddling, calm waters are required (a must), if you will have that type of psychological flow. The only thing you have to concentrate on will be your paddling strokes. If you have to think about other things — being aware of waves, watching birds, daydreaming — you will not be able to get that flow. You must have the ability to enter a trance-like feeling to be able to paddle like that. You must try to make, and think about, the perfect stroke each time. You don't have the time to think about anything else. Follow a monotonous rhythm in your mind (mine is a Greenland drum).

For me, when fatigue sets in, I think that my strokes becomes more efficient, because I want to conserve as much energy as I can. 



Introduction

In the first installment we looked at books on kayak building and how to start conceptualizing your kayak-building project. Now it's time to start gathering your materials. If you've only purchased lumber from a big box store, all the talk about quarter-sawn and green wood can seem overwhelming, and even if you have some experience with wood, choosing a fabric and coating may seem daunting. Knowing where to look to find what you need is most of the battle. Here is how to get started.

(Image above) Steam bending is one of the skills necessary when building a skin-on-frame kayak, and it is considerably easier when working with the right materials. Photo: Emilie Sargent

Lumber

There are three areas of concern when choosing lumber: the gunwales; the rib stock; and the deck beams, stems, and stringers. It's unlikely that you'll end up using the same species of wood for all three parts — or even that you'll acquire them from the same supplier — so it's best to consider them separately.

Gunwales

The gunwales are the major structural element of your frame, so this is not the place to skimp on ma-



Species for Steam Bending

Rules of thumb

1. Exotic woods do not bend well.
2. Softwoods do not bend well and should be avoided.

The following chart lists the minimum radii that can be achieved by domestic hardwoods based on air-dried stock 1" thick at 25% moisture content before steaming. Tighter radii are possible, but at higher risk of failure.

Species:	Smallest Radius
Oak (red & white)	2"
Hickory	2"
Elm	2"
Walnut	3"
Ash	4.5"
Cherry	6"
Maple	8"

Source: Veritas Steam Bending Instruction Booklet. This guide is available free from Lee Valley Tools: www.leevalley.com.

materials. Knot-free, quarter-sawn wood is preferred because of its dimensional stability. Knot-free, flat-sawn wood is an alternative. Because flat-sawn wood has a tendency to cup over time, it should be oriented so that the so that the outside of the tree is the outside of your work piece (i.e., the smaller rings are toward the inside). Unfortunately, gunwale stock is the most difficult to acquire, because there are very few places left in the United States with trees capable of producing long, knot-free, quarter-sawn boards in the desirable softwood species, and there are few alternatives that offer the same light weight, strength, and resilience. If you are lucky enough to live in the Pacific Northwest, you may be able to find your gunwale stock locally. If not, you have a couple of options.

Your first and probably most convenient option is a big box home center or construction lumber supplier. Each will generally carry S-P-F softwood, which is shorthand for spruce-pine-fir. You will have to do some hunting through piles to find decent stock. Quarter-sawn and knot-free wood fetches a higher price, so manufacturers are quite careful to cull any from the ordinary stock you're likely to see. You may not find a single piece of wood with only a couple small tight knots and nice straight grain that's long enough for an entire gunwale, but all the texts cover joining shorter pieces with scarfs to make a suitable plank from the good parts of several pieces of stock.

If you want to use Sitka spruce, Douglas fir, western red or yellow cedar, which can be obtained in long, quarter-sawn, knot-free stock, your best bet will be to find a specialty supplier that carries marine or aircraft lumber. If you're not able to find a local marine supplier in the phone book, try checking Glen-L.com (<http://www.glen-l.com/resources/lumber-suppliers.html>) or the advertisers in a magazine like *Wooden Boat*.



This sawmill, located between Summit City and Fife Lake in Northwestern Lower Michigan, is typical of a small operation, and like many mills it was not listed in the local phone book. Photo: Mike Bielski

Rib Stock

Green wood is important for rib bending stock. Wood is bendy because of an organic polymer in its cellular structure called lignin. As lumber dries, the lignin loses its elasticity, making the wood comparatively rigid and unsuitable for bending. This is especially true for kiln-dried wood. The heating process used to dry it locks the lignin in place, and it cannot be revived.

Air-dried wood has not been subjected to heat, and usually is not dried to as low a moisture content as kiln-dried wood, so a little bit of soaking will usually yield a piece that will bend quite well. However, if you can find air-dried wood, you'll probably find green wood.

It may sound counterintuitive, but you may have an easier time finding a sawyer if you live in a city. Harvested urban lumber from trees felled through storm damage, utility work, or construction has become fashionable. Consequently,

many cities are making use of such lumber through grants from the USDA Forest Service, so check with your local government. You may find that your municipality has a full-time arborist on staff who would be happy to help you in your quest for green wood.

It still holds true, though, that the majority of trees are outside of city limits, and this is where you will have the best chance of finding green stock. Try calling local tree services and landscaping companies. Although many of these companies will sell their byproducts as mulch or firewood, some may know of local sawyers, if they don't mill lumber themselves. If this doesn't yield results, a targeted Internet search on a site like www.woodweb.com may work. You can also contact sawmill manufacturers. Woodmizer (woodmizer.com or 800-553-0182) is one of the foremost manufacturers of portable mills, and they maintain lists of sawmill owners for the express purpose of connecting sawyers with people who need their services.



Here is some of the lumber available on a recent trip to Recycle Ann Arbor's ReUse Center, with contact information for one of the local sawyers. More information on their programs can be found at: www.urbanwood.org. Photo: Mike Bielski

Sources

A list of sources for sundries follows. The company name is given first, then the link. In cases where two links are shown, the first link is to the home page of the Web site, and the second is to a listing of a particular item or family of items. Where the link was long, it was shortened using the tinyurl utility, available at <http://tinyurl.com/>.

Artificial sinew
Jas Townsend & Son, Inc.
www.jas-townsend.com
tinyurl.com/mmx5f

Tandy Leather
www.tandy-leather.com/index.asp

#9 Seine twine
Brunson Net
www.brunsonnet.com
<http://tinyurl.com/nxoxak>

Deck lines
Leather – Tandy Leather
www.tandy-leather.com/index.asp

Belt blanks and scraps: Leather Supply
www.eleathersupply.com/beltstrap.shtml

Leather belting: McMaster-Carr
www.mcmaster.com/

Synthetic : Neocorp
www.neocorp.com/index.html

Deck Beams, Stems, and Stringers

Of the remaining pieces, the stems are the most critical. The stems must remain straight once exposed to moisture in your finished kayak, and quarter-sawn stock offers the most dimensional stability and warp resistance. For the stringers, it makes the most sense to make sure you have enough material for the stringers when purchasing your gunwale stock. Deck beams are the easiest pieces to acquire. Even inexpensive 2 x 4s from the box store will have knot-free sections with straight enough grain to make nice deck beams.

Fabric, coatings, and colors

Fabric and coating choices are the most difficult ones you will have to make when building your kayak because there is no single combination that is the best answer in all situations. Whether you end up choosing based on cost, availability, performance, or ecological impact, there are two basic rules to follow if you want to get the most durability from your skin. First, make sure that the coating you intend to use will stick to your choice of fabric. If you don't, the coating will likely delaminate. Second, make sure that the coating you use is not less flexible than the fabric you use. If the fabric flexes more than the coating, the coating will eventually relieve this stress by cracking.

Fabrics

Cotton Canvas. Cotton canvas is not without its environmental problems, but unlike polyester or nylon, cotton comes from a plant. Cotton canvas is traditionally referred to as "duck" or "cotton duck" and eschews the standard weight measurements for a system of "numbered ducks." In this system, the lower numbers are the heavier fabrics, with #12 being equal to about 11.5 oz/sq yd and #10 equal to 14.5 oz/sq yd.

Cotton canvas has some excellent characteristics for boatbuilding. When wet, it gets tighter, and its strength increases by 10% to 20% [1]. On the other hand, of the fabrics typically used as kayak coverings, it has the lowest percentage of stretch before failure (5% to 10%). Compared with synthetic fabrics of the same weight, it is less abrasion resistant, but this will only come into play if the coating is worn down to the fabric itself. Because it is a natural fiber, it is susceptible to mildew and rot when exposed to fresh water. Oil-based paints and coatings adhere extremely well to cotton canvas. Because canvas is not very elastic, it may be difficult to stretch onto a frame. Keep in mind that it shrinks when wet so any small imperfections will likely work themselves out when it's in use. Its low elasticity makes cotton a good match for almost any coating. One of the most important features of cotton canvas is that it is widely available and very inexpensive.

Polyester Fabric. Although polyester can be made from plant-derived cutins, the majority of polyester is manufactured from petroleum-based sources. It has several advantages over cotton canvas. Since it is a synthetic fabric, it does not have the tendency to rot or mildew. It is stronger than canvas, so fabric in the range of 8–14 ounces can be substituted for heavier weight cotton fabrics, decreasing the weight of the kayak while maintaining its performance characteristics. Polyester is more resistant to abrasion than cotton once the coating is breached, and it is much more difficult to tear once punctured. Polyester is also more elastic than cotton. There are different types of fibers used in fabric production, with regular-strength fibers able to stretch 24% to 50% of their original length before failure, and high-strength fibers able to stretch in the range of 10% to 24% [2]. In an application like a kayak skin, the fabric's elasticity contributes to puncture



Here is a photo of Tom Yost-designed kayak skinned with clear PVC. Photo: Tom Yost

resistance by allowing the fabric to deflect when hitting an object like a rock. This elasticity also allows it to be stretched more easily and more successfully on the frame, and due to its low water absorption and minimal shrinkage, it is likely to retain the skin tension of the original stretching, even after coating and repeated use. Not all coatings will stick to polyester, however, particularly those coatings intended for use on wood. Because polyester resin is common in boatbuilding, most marine products will adhere quite well. Not all polyester fabrics are suitable for use as skinning material, and polyester is significantly more expensive than cotton. It is also more difficult to locate. One of the most reliable sources is Dyson, Baidarka, and Co. in Bellingham, Washington. You can reach George Dyson via his email at gdyson@gmail.com, and he will send you a current price list for fabric in PDF form, along with a short primer on choosing the right fabric for your application.

Sources continued...

Sewing needles

Sailrite

<http://sailrite.com/Categories/Hand-Sewing-Needles>

Dura-Tuff urethane

Fisheries Supply

www.fisheriessupply.com/online/default.asp
<http://tinyurl.com/n4p4f6>

CreativeWholesale.com

www.creative-wholesale.com/Dura-Tuff.html

GacoFlex UA-7090 Clear Aliphatic Polyurethane

Gaco Western

www.gaco.com/pds_ua7090.html

Paint

RustOleum: RustOleum was originally developed as a marine product by Scottish-born sea captain Robert Fergusson. Although most people are familiar with their terrestrial products, they still produce marine topsides paint. I spoke to a supervisor who, not surprisingly, said he had never heard of such a use, but recommended the marine topsides paint. Both standard and marine paints are oil-based, and will adhere well, but he felt that the added UV protectants in the marine version would help it last longer.

Nylon Fabric. Used as a replacement for silk in parachutes during WWII, nylon is made from coal, water, and air. The term “ballistic nylon” also derives from the same era, when it was used for jackets intended to protect bomber crews from flak. Today, the term “ballistic” is liberally used to describe almost any heavy-weight nylon fabric. A synthetic like polyester, nylon resists mold and mildew quite well. Nylon is also strong, with 8.5–10 oz fabric most frequently used in skinning kayaks. Much more resistant to abrasion than cotton, nylon has the same general range of abrasion resistance as polyester. Of the three fabrics, nylon is the most elastic. Type 6 nylon fibers stretch 150% of their length before failure, and Type 11 (higher grade) fibers stretch 300% before failure [3]. The ability to absorb energy from impacts by stretching makes nylon fabric ideal for encounters with foreign objects. Because of its elasticity, nylon is the easiest of the three fabrics to stretch around a kayak frame. Further, nylon will shrink somewhat (the amount depends on the individual fabric) when heated, so any shortcomings can literally be ironed out after the fabric is sewn on. Unlike polyester, nylon loves water, but unlike canvas it stretches when exposed to moisture. Depending on the individual fabric, many kayaks skinned with nylon will have skins tight at the time of coating that will go slack and tighten depending on temperature and humidity. While adhesion can be a problem for some coatings when applied to nylon fabric, a more serious concern is the elasticity of any coatings compared with the elasticity of the nylon fabric itself. Many types of nylon fabric are available from various sources, but the majority are coated, making them unsuitable for use on kayaks. Nylon fabrics suitable for kayak skinning can be reliably obtained through Dyson, Baidarka, and Co. (see above for contact

information), and The Skin Boat School, Anacortes, Washington (www.skinboats.org).

Other options. If you're building a folding kayak, fiber-reinforced PVC is a no-brainer. It's tough, and no waterproof coating is needed. Non-reinforced PVC, an alternative, stretches better than its fiber-reinforced siblings, and as a result, it is finding use on nonfolding kayaks. Like fiber-reinforced PVC, it is available in a variety of colors. It also comes in clear, which shows off the kayak's frame. Non-reinforced PVC is less abrasion resistant than the fiber-reinforced version. Both require toxic adhesives. Costs of non-reinforced PVC are in the same range as cotton canvas (and remember that it does not need a coating to be waterproof), and it is carried by Wal-Mart, making it nearly as accessible as canvas. Fiber-reinforced PVC is not as widely available, but is carried by specialty fabric suppliers like Seattle Fabrics (www.seattlefabrics.com).

Coatings

With the exception of PVC, none of these fabrics are waterproof. The choices for coatings far outweigh the types of fabrics. They run the gamut from simple to complex, with traditional oil-based varnishes and paints at one end, and two-part catalyzed urethanes at the other. When considering which coating to use, there are two guidelines to keep in mind: (1) Make sure that the coating you intend to use will stick to the fabric you use, and (2) make sure that your skin is not more flexible than your coating.

Paints and Varnishes. The simplest coatings are traditional oil-based paints and varnishes. Even oil-based house paint is surprisingly flexible and durable as a coating for canvas, but if you intend to use house paint for a synthetic fabric, make sure that it will adhere to synthetic materials first



Yost Sea Glider. Photo: Tom Yost

by contacting the manufacturer. Oil-based marine paints will be more durable and abrasion resistant, and since polyester resin is a standard boat-building material, many marine paints will adhere to polyester and other synthetic fabrics. When in doubt, contact the manufacturer. Traditional varnishes are also well suited as coatings because their natural resins are much more flexible than modern polyurethane-based varnishes. Again, they are exceptional for use with canvas, but you should check with the manufacturer about whether or not they will adhere to synthetics.

Paints come in a variety of colors, and these colors can be adjusted with liquid universal tinting colors from paint supply stores. Likewise, varnish can be tinted with universal tinting colors, artists' oil colors, or powdered earth pigments. While neither paints nor varnishes can match the flexibility of nylon, they are a good match for cotton canvas or polyester once stretched over a frame.



Nikumi, a multichined baidarka skinned in a clear vinyl, designed by Tom Yost.

Dopes. Some books on kayak building make reference to products called “aircraft dope” as a skin coating. Early aircraft, like early kayaks, were built of wooden frames covered with fabric. The products used to coat the fabric on aircraft also have some qualities attractive for boat building. Chief among these are the “taughtening” dopes. These dopes can somewhat mitigate the difficulties of stretching stiff fabrics like cotton canvas by taking up any slack for a drum-tight skin after the fact. There are also fabrics used for aircraft that are designed and engineered as a system to work with particular dopes that have found their way onto kayak frames, such as Ceconite and Dacron, and most of the dopes are available tinted and clear. The problem with these coatings is their lack of abrasion resistance. A possible solution, also from aircraft suppliers, is a product called leading edge tape. Intended to protect the leading edge of propellers and wings from nicks and chips, it can be applied to abrasion-prone areas along the chines, keel, and stems of kayaks. It is

also a good solution for kayaks covered with other coatings, if abrasion is a concern. You can find these materials from suppliers like Aircraft Spruce (www.aircraftspruce.com).

Polyurethanes comprise the majority of frequently used coatings, but all polyurethanes are not the same. Technically, “polyurethane” is defined as a synthetic resin in which the polymer units are linked by urethane groups. The diversity of products in the polyurethane family include varnishes, paints, adhesives, and foams, and these are intended for an equally wide range of substrates, from wood to concrete to metal roofs.

At the low end are consumer products intended for use on wood. They are widely available and inexpensive. The trend among manufacturers of these products has been to produce harder finishes that protect the wood from dents and abrasion. These sound like desirable qualities, but the maximum amount of expansion in a piece of kiln-dried red oak is about only about 2.5% [4],

which is not a good match for the amount of flex most fabrics exhibit (because there is not much technical information available from manufacturers on these finishes, using their intended substrate as a guide is reasonable). This is not to say that that they will not work. Keep in mind that although a given fabric may stretch 12.75%, some of that elasticity is used when the fabric is stretched around the frame, and this reduces the overall flex in the final skin. Like traditional varnishes, polyurethanes can be tinted with universal tinting colors, powdered pigments, and some liquid aniline dyes. Oil-based polyurethanes can be tinted with artist's oil paints.

The next step up are marine polyurethanes, which come in one- and two-part coatings, both clear and opaque. These products are more difficult to locate and may be much more expensive than the previous class. Since they are designed for use in a marine environment, they will have some qualities that would make them preferable to consumer-grade wood coatings, but some of these properties make them unsuitable for use on fabric. It's very difficult to generalize, but based on conversations with several manufacturers, it can be concluded that the more abrasion-resistant coatings, which are usually two-component coatings, are stiffer and should be avoided. From a safety standpoint alone this is not bad advice, as the catalyzing agent is almost always isocyanate, which is very toxic and can't be readily absorbed by face-mask-type respirators.

Hypalon. Hypalon is a coating that is neither a varnish nor a polyurethane, but a flexible polyethylene that is produced as both a liquid and sheet. Hypalon is flexible and has excellent UV and abrasion-resistance properties. Hypalon sheets are used for a wide variety of products, including pond liners, single-ply roofing, and in-

flatable boats. In its liquid form, it is used as an elastometric roof coating, and it is also marketed in liquid form for the renewal of inflatable rafts that have developed pin holes. It has many promising features, such as flexibility and abrasion resistance, but it is very expensive and somewhat difficult to apply, and users do not report good results on kayak skins.



Here is a close-up photo of a kayak built by Dick VanZanten covered with three coats of Coelan Marine Coating. Photo: Dick VanZanten

Goop and Coelan. Skin Boat School/SpiritLine's Goop and Coelan Marine Coating are both designed for flexible fabrics in a marine environment. Skin Boat School/SpiritLine Goop, a flexible, two-part urethane coating that started life as a coating for concrete, was designed to be odorless so that it could be used in interior parking structures without necessitating the closure of the facility. The formula was then tweaked by Skin Boat School proprietor Corey Freedman's father, a chemical engineer, to make it more appropriate for use on skin boats. The coating will stick well to synthetic materials used for kayak skins, and it builds quickly to completely fill the weave, creating an extremely tough, flexible, ultra-glossy

finish. It is a two-part urethane, so accurate measuring of its components is critical. It is not brushed on, but poured onto the skin and spread with a spreader. Three coats are applied in succession with no break between coats. You have to babysit for runs, drips, and bubbles, and extreme care needs to be used to get a thin, even coat. If the coating goes on too thick it will foam. It can be fussy to apply, and first-timers may run into some problems. In most cases, even if the coating looks less than ideal, it will not affect its performance. Goop can't be tinted like other finishes. Instead, the fabric must be dyed and then coated. On synthetic fabrics, this means using acid dyes. Caution must be taken not to use too much dye, which can cause delamination of the coating. Whether the fabric is tinted or left natural, Goop will produce a translucent skin. An opaque skin is not really possible. The Skin Boat School Web site has very detailed, well-illustrated instructions that cover skinning with nylon, dyeing, shrinking, and coating. Corey Freedman is available and willing to talk at length about any issues regarding the product. Skin Boat School is the only distributor and can be reached at (www.skinboats.org).

Coelan is a German company that makes a range of specialty coatings for a variety of unique substrates. The Coelan web site (www.coelan.com) is extremely comprehensive, containing significant technical details about the product's design, application, and performance, as well as head-to-head, real-world test results from outside companies. Coelan is designed to work with synthetic fabrics, such as those used on inflatable boats, and it flexes 300%, which is the maximum flex of the typically used fabrics. There are two different primers, one intended for use with a rigid substrate, and one for a flexible substrate. It is very abrasion resistant, and since it is a one-part

product, it is simple to apply using brushes or rollers. The base product is clear and can be colored with tubes of colorant in a wide range of colors. An entire tube will make the product opaque, but less than a full tube will add color while the coating remains translucent. The base product has a glossy sheen, but the company also makes a coating called "silk" that can be applied in a single final coat for a matte finish. The manufacturer does not recommend thinning, but if you choose to thin the product, you must use Coelan's proprietary thinner. Coelan does not store well, so be sure to buy in small tins. The manufacturer recommends storing the remains in a tin upside down, so when the product develops a skin the unused portion will be exposed to the top when you open it up. (Testing has shown that the product Bloxygen sprayed into the tin with unused product will keep it from skinning.) Premapro, in Charlotte, North Carolina (www.premapro.com), is the only North American distributor for Coelan. Service and technical assistance are exceptional. Tony Nuskin handles technical questions, and in addition to being a paddler himself, he is very motivated to help skin-on-frame builders, and he has even spoken to the engineers in Germany when he was not able to answer questions. Outside testing has shown literally no degradation in Coelan samples with 100% exposure year-round for nearly 5 years. This, combined with Coelan's flexibility, make for an extremely long-lived coating.

Sundries

Curved upholstery needles are the easiest to find, available everywhere sewing supplies are sold. Thread should be synthetic to avoid rot. Dacron is the first choice. It can be found in braided form in backing line for fly fishing. Dental floss is the second, but it absolutely must be unwaxed dental floss; no coating will stick to the waxed version.

Artificial sinew can be used to lash deck beams and the like. It is widely available from stores that sell historic reenactment supplies, such as Smoke and Fire (www.smoke-fire.com) or Jas. A. Townsend (www.jastown.com). An alternative is nylon seine twine.

Notes

[1] Statistics courtesy of Sin, Seng, Guan, & Co.,

wholesale distributors, www.Sinsengguan.com.

[2] Rabhavendra Hdege, Atul Dahiya, M. G. Kamath, *University of Tennessee School of Engineering*, April 2004.

[3] Test results courtesy of *Machine Design* magazine, www.machinedesign.com.

[4] Computations made using formulas available on US Department of Agriculture, Forest Products Laboratory, www.fpl.fs.fed.us.

What the manufacturers said...

While researching this article I called the manufacturers of twenty-three different coatings. Here are a few highlights:

Epifanes: I emailed Epifanes, and they asked me to call because there was just too much information to be conveyed via email. When I spoke to them the tech staff got together, and their consensus is that their traditional varnish was the best choice, but it has an extremely long cure time of around three weeks under ideal conditions. They said they generally don't recommend it for small boat projects like this because of that feature. Of the other products, they recommended their monourethane topsides paint. It gives up some abrasion resistance to their enamels, but it's the most flexible of the coatings and adheres well to synthetics, so it will probably last longer in the long run. After our conversation they took my name and address and mailed me a set of color chips for all of their products, and a CD-ROM with the technical specifications on each of their finishes.

Interlux: Couldn't recommend anything, and gave special warning that above all else not to use Cetol.

Kop-Coat Marine Group (manufacturers of Pettit): Frank Winkleman, the Manager of Product Devel-

opment, said that they didn't have any products that would work well on fabric, and he wasn't even sure whether they would adhere to nylon or polyester fabrics. He said that for canvas a traditional oil-based undercoater followed by enamels was the typical guideline, but they didn't make any similar products.

United Gilsonite Laboratories (UGL, Manufacturers of Zar stains and polyurethanes, DryLok masonry waterproofer, and ULTRA Max waterborne oil-modified polyurethanes, among other products): Couldn't recommend any of their products, and didn't think that they would even stick to nylon. They had never had such a strange question before.

Fox Industries Engineered Products: Since Spiritline's Goop started life as a concrete coating, I though I'd look into other similar products. Fox Industries makes a product called FX-446 Water-based Polyurea, which is intended to stick to "a wide range of rigid and flexible substrates." They call the end result "an impervious highly abrasion resistant surface." When I called their tech line, they had never heard of such a use, but they were very confident that it would stick well to nylon and polyester and be flexible, so it was at least worth trying.

Jo Hamilton Tribute

by Rene DuFresne

Photo generously provided by Dave Hamilton.



Two bears grace the lid of a casserole dish on a sideboard, tuilik-clad men and women on T-shirts fill drawers, and qajaqs on coffee cups hang from hooks in dozens of households around the country. Many shared the friendship of the potter that touched hearts. Jo Hamilton, a founding member of the Northern Lights Qajaq Society, lost her battle with leukemia in mid-October 2008.

Jo's life with Qajaq USA was just 4 short years, but in that time she turned a fear of water into a beautiful elbow roll, a group of scattered Greenland-style paddlers into a family and many strangers into friends. All the while she suffered the indignities and infirmities of her illness with grace and an attitude that inspired all. Her passions were many — husband, friends, dance, motorcycles, cooking and gardening, church, her many qajaqs, car and pets. Greenland-style rolling was her latest accomplishment, and she jumped in with so much joy, she brought many people along with her.

She and her husband spearheaded the Traditional Paddlers Gathering, an annual event held in Akeley, Minnesota. Jo's enthusiasm was infectious, and this past September, Jo lived to see her dream of the Gathering becoming a Qajaq USA sanctioned event, and her friends become a family as the Northern Lights Qajaq Society took shape. Many shared her company at the Gathering; Michigan Training Camp; the Sea Kayak Georgia, Sweetwater and Inland Sea Society symposiums; and many Inland Sea Kayaker (Minneapolis) and Paddle Pusher (Brainerd, Minnesota) events. Jo taught us kindness and caring by providing a warm scene at the campfire, skillful mentorship and a slice of almond cake wherever she went. Grace, beauty and humor personified, Jo is survived by her husband, David, and a legacy of stories and fresh baked bread.

The bears on the lid of the casserole dish are Jo's depiction of her spirit guides, sent to her in visions, to lead her to her next place. This winter, while you gaze in wonder at the northern lights, take a moment to locate the constellations Ursa Major and Ursa Minor (the two bears). The North Star shines a little bit brighter with Jo up there. 

Rene's Bio: Retired in 2005, and paddling since 1997, I try to paddle or roll every day of the season. I travel a bit and usually have a qajaq or two along with me. Member, Northern Lights Qajaq Society, Qajaq USA, Inland Sea Kayakers, Paddle Pushers. Jo was my friend and mentor. See our last trip at www.bbbtour08.blogspot.com.

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