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RUDDER INSTALLATION INSTRUCTIONS

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Introduction to Rudder Installation Instructions Kit #8025413

The addition of a rudder to a kayak results in additional control and efficiency, especially in certain sea and wind conditions or for specific uses such as drift fishing. The presence of a rudder is by no means essential, nor does it mean it must be deployed at all times. A rudder is not a substitute or replacement for paddling experience and ability.

CAUTION: Considerable effort has been given to these instructions to provide for a successful installation of your new rudder but the process does require permanent alteration of your kayak. Please read all instructions prior to beginning the process. Be safe, measure twice before proceeding with any step requiring drilling or cutting of your hull. Use caution when tightening screws in inserts molded in hull as they cannot be replaced. If you are uncomfortable with any part of this process, we suggest you contact your local dealer for support and advice. It is possible they will undertake this installation for you at a moderate cost.

All directions included in these instructions reference starboard (right), port (left), forward, aft, behind, etc., are given as if you are standing behind your kayak looking forward.

Call our Customer Service line: 800.445.3763 (and follow prompts for consumer assistance) should additional assistance be required.

Identify your Kayak:

This kit contains parts and instructions that enable rudder installation on a number of different Wilderness Systems kayaks and Mad River canoes. As such, it is likely that you will have parts left over that do not apply to the specific model kayak you are working with.

Depending on phase of installation, there are portions that are common to all or most models and parts that are specific to different models. Instructions have been provided to cover the following rotomolded models:

Wilderness Systems:

Cape Horn 140, 150, 170 (rotomolded models)

Pamlico 120, 140

Tarpon (pre 2009 model year) 120, 140, 160, 160i

(2009 and later Tarpons (identifiable by the presence of Orbix hinged hatch systems) are shipped "rudder-ready" and are covered by Kit #8025416 for Rudder Ready Kayaks)

Tsunami 135, 140, 145, 160, 165, 175

(2009 model year Tsunami's may also be factory prepared as "Rudder Ready" and would be best covered by Kit #8025416 for Rudder Ready Kayaks. Models produced prior to 2009 are covered by this kit.)

Ride 135

Original Ride will require addition of the #8025415 Ride Rudder Kit Module to provide the unique rudder bracket deployed on the original Ride.

Pamlico 135T, 145T, 160T, and Excel

Tandem models will require the addition of the # 8025417 Tandem Kayak Module to provide the extension straps and extra footbraces required to allow rudder positioning to be adjusted for solo or tandem paddling.

Mad River Canoe:

Synergy 12, Synergy 14

It is critical that you confirm that the section of instructions you are following is applicable to your kayak as you work your way through the procedure.



Rudder Kit #8025413 Parts List

Part Number	Description	Quantity
17060011	Cable, Rudder, 131"	2
5715-0300	Tubing, Nylon, #11; 5/32" x .106	20'
2CHINDECL	Deck Loop, Nylon, black	1
3455-0099	Round Pad Eye	4
3290-0120	Handle with Bungee	1
7075-0102	Rudder Rest, V Block with bungee	1
7110-0100	Turtle Lift line adjuster assembly	1
2RUD01	Rudder Split Ring, 5/8"	3
30700041	Clevis Pin, 3/16 x 5/8, stainless	2
17060016	BTS Rudder Assembly w/ lift line	1
14820023	Rudder Bracket, Molded, Black	1
7100-0302E	Rudder Bracket, "U", Aluminum	1
17010021	Footbrace Extrusion, Aluminum, Black	2
17010025	Footbrace, Keepers Assembly, Black, 08	2
3140-0300	Nylon Cable Clamp, 1/8"	4
3250-0100	Copper Ferrule	4
5715-3200	Shrink Tube, 1/4" x 4"	1
2CORD3/16	Bungee Cord, 3/16" x 1.75', Black	1
2FAS010	Screw, 1/4-20 x 3/8" Phillips truss head	2
2FAS011	Screw, 1/4-20 x 1/2" Phillips truss head	2
3585-0302	Screw, 1/4-20 x 5/8" Hex head	2
30000015	Screw, 1/4-20 x 5/8", Socket head	2
1FAS0011	Screw, 1/4-20 x 1", Phillips truss head	4
30000003	Screw, 1/4-20 x 1 1/4", Phillips truss head	4
3585-0223	Screw, 10-32 x 3/4" Phillips flat head	2
1FAS0045	Screw, 10-32 x 1", Phillips flat head	3
3585-0106	Screw, 8-32 x 1/2", Phillips pan head	2
3585-0112	Screw, 8-32 x 5/8", Phillips flat head	2
3585-6203	Screw, #8-32 x 3/4", Phillips pan head	3
K4FAS007-1	Screw, #14 x 3/4", Phillips truss head	12
3585-0116	Screw, #14 x 5/8" Phillips truss head	2
3545-0303	Rivet, Countersink, Star with seal	2
30300001	Rivet, Cherry, Black	4
2FAS080	Slab nut, 1/4"	2
2RUD004	Cap Nut, 10-32, Nickel/Brass	3
3430-0102	Locknut, 8-32 Nylon/Stainless	8
1FAS016	Locknut, 10-32 Nylon/Stainless	4
3430-0303	Locknut, 10-32, Thin, Nylon/Stainless	1
1FAS090	Washer, #10 x 5/8",	3

	Neoprene/Stainless	
3730-0101	Washer, ¼", Flat, Nylon	2
3730-0312	Washer, 1/4", Neoprene/Stainless	4
3730-9010	Washer, #10 x ½", Sealing	2
3730-0103	Washer, ¼" Lock, Stainless	4
1FAS043	Washer, neoprene ¼ x ½"	4
17070009	Equal Arm 3/16" Allen Wrench	1

Additional Tools & Materials Required

Depending on the model of kayak being worked on, not all tools below may be required. You can determine specific tools necessary by reviewing the instructions for your particular model kayak.

Phillips Head Screwdriver	Scissors
Rivet Gun	11/32" drill bit (if your Tsunami has 3 point footbrace attachment)
Drill with 5/32 (5 mm) and ¼" (7 mm) drill bits	Measuring Tape or Ruler
Non-permanent Marker	Cable Crimpers
Electrical Tape	Cable Cutters
7/16" Deep dish socket and ratchet (required to install aluminum "U" shaped rudder bracket)	Lexel© or comparable marine sealant, small tube

Installing the Rudder Bracket:

- 1) Inspect the stern of your kayak. Until 2007, Wilderness Systems used 2 individual threaded inserts to provide for mounting rudder brackets. During the 2007 model year, Wilderness Systems switched to a "double-barrel" insert with two threaded mounting holes contained within a single insert.
- 2) If your kayak has the double barrel insert you will use the molded black rudder bracket provided with the kit. Installing the molded rudder bracket:
 - a. Remove the two filler screws and set aside.
 - b. With the raised "stop" pin facing up, align the bracket with the mounting holes in hull. Place #3730-0103 ¼" lock washers (2 on each screw) over #30000015 ¼-20 x 5/8" hex head screws and thread screws into mounting holes using the 3/16" Allen or hex head wrench provided with kit.
 - c. Start both screws before tightening either one completely. Tighten each screw fully.
- 3) If your boat has two individual inserts, use the aluminum "U" shaped bracket. Installing the aluminum "U" bracket:
 - a. Remove the two filler screws and set aside.
 - b. Install a #3730-0103 ¼" lock washer on both #3585-0302 ¼-20 x 5/8" hex head bolts and slide the bolts into the hole and slot in bracket.
 - c. With the raised stop pin facing upwards, start the bolts into threaded holes in inserts. Use 7/16" deep socket to drive the bolts. Do not tighten either bolt fully until you have confirmed that the bracket will position the rudder blade in a true vertical position:
 - i. Remove the split ring from rudder post and insert post into rudder bracket.
 - ii. Deploy the rudder blade into a lowered position. Step back and confirm that the blade is oriented vertically. If so, tighten the bolts on the bracket completely.
 - iii. If blade is angled, the slot in the rudder bracket allows for the bracket to be slightly angled to provide true vertical orientation of the blade. Adjust angle of bracket until blade is vertical and tighten completely.

NOTE: The original Ride sit-on-top utilized a unique rudder bracket not contained in this kit. The bracket and necessary mounting hardware are available in kit #8025415: Original Ride SOT Rudder Kit Module

Installing the Rudder Rest

The rudder rest cradles the rudder blade on the deck of the kayak when it is not deployed. It includes a tie down mechanism to secure the blade in this position when not in use. Depending on the model, Wilderness Systems/Mad River Canoe has utilized a number of rudder rest systems.

Rudder blades should always be in stowed position and secured when carrying or transporting your kayak.

When launching, do not forget to release your rudder blade before entering your kayak.

Cape Horn 140, 150, 170; Pamlico 120, 140, 145T, 160T, Excel; original Tarpon 160 (Tarpon 160i see below):

- 1) Identify the #7075-0102 V-block rudder rest.
- 2) Place the V-block rudder rest on the raised flat mounting surface located 11" +/- (measurement will vary slightly by model) forward of stern of boat. Center the V-block on the mounting panel so that the center notch is aligned with the seam bisecting the kayak deck.
- 3) Using the holes on the sides of the block as guides, mark and drill holes in hull using the 5/32" drill bit.
- 4) Push 2 #3545-0303 rivets through the holes in the block and then through drilled holes in deck and secure with rivet gun. If the rivet does not snap off on first trigger pull, release trigger and push head of rivet gun flush against the rivet flange and pull again.
- 5) To secure rudder blade when stowed, lift the attached bungee cord on the V-block up and over end of rudder blade.

Pamlico 135T

- 1) Rudder rest is factory installed on this model. Note bungee cord loop sewn to the molded stern carry handle. To release bungee, lift cord off of single deck loop across from carry handle. To secure, hook bungee into single deck loop.

Pre-2009 Tarpon 120, 140

- 1) Back out screws holding existing carry handle at stern of kayak.
- 2) Replace with #3290-0120 Carry Handle with Bungee Cord provided with this kit. Use original hardware to install replacement carry handle, making sure the bungee cord loop faces forward.
- 3) Use bungee cord loop to secure blade in stowed position.

Tarpon 160i:

- 1) Measure 11 ½" forward from stern along center line of deck and locate raised circle molded in deck.
- 2) Drill 5/32" hole at indent in center of circle.
- 3) Tie off the length of #2CORD3/16 black bungee cord into a loop.
- 4) Place bungee cord under cut-out in #3455-0099 round pad eye.
- 5) Position round pad eye on deck so that center mounting hole aligns with hole drilled in deck and bungee cord loop faces forward.
- 6) Secure pad eye to hull with a #3585-0223 10-32 x ¾" screw and #3430-0303 10-32 lock nut.

Tsunami 135, 140, 145, 160, 165, 175:

- 1) Identify sternmost "star" deck fitting centered on deck and routing existing deck rigging through one hole.
- 2) Thread length of #2CORD3/16" bungee cord through unused hole in deck fitting.
- 3) Insert rudder post in stern bracket and rest rudder blade on deck.
- 4) Tie bungee cord in a loop tight enough to hold the rudder blade down against the deck. Depending on size of hole in deck fitting it may be possible to thread bungee through from each end and tie a stopper knot on each end to create a loop.

Ride (original Ride):

- 1) Identify the two top mounted threaded inserts on deck 1 ½" from stern.
- 2) Measure 10 ½" forward of these inserts along edge of center trough on each side. Measure down on inside of trough 1" and mark locations.
- 3) Center a #2CHINDECL single deck loop over the mark, aligned parallel with keel line and mark mounting holes
- 4) Drill marks with a 5/32" bit. Insert #3545-0303 rivet into each hole and secure.
- 5) Place rudder into bracket and flip blade to stowed position. Tie a stopper knot in one end of bungee cord so that it cannot slide through pad-eye. Run bungee up and over blade and through other pad-eye. Adjust bungee so that blade is held firmly in place and tie off with stopper knot.

Ride 135:

- 1) No rudder rest installation is required. To secure rudder in stowed position, lift the sternmost run of deck bungee (runs perpendicular to keel line of boat) and slip the rudder blade underneath. There is a molded groove in deck to help contain the rudder blade properly.

Mad River Synergy 12, 14:

- 1) The rudder rest is incorporated into the top of the stern mesh cover. No installation required.
- 2) Flip blade into stowed position and slide loop of bungee cord attached to cover over the end of rudder blade to secure.

Installing the Rudder Lift Lines

The lift line assembly allows you to deploy or stow your rudder while underway. It consists of a long cord loop deployed on the deck of your kayak along the right side, running from the head of the rudder to a position next to the cockpit. As with the rudder rest installation, recommended installation will vary by model. Please identify your model kayak from the procedures below and proceed as instructed.

The precise location of the forward terminus of the lift line will vary on different models and is also subject to personal preference. As you will use the lift line by grasping at the forward end, you should consider modifying location to provide easy and convenient access to the line from your preferred paddling position. Some paddlers feel much more comfortable if lift line is visible from paddling position, others are fine operating by feel alone.

Ideally, the lift line should run "flat" or horizontal from closest pad eye towards stern to the cockpit. Location need not be determined by having to remove all slack from the line. The tension in the line is adjustable and process will be described in course of these instructions.

All Models:

- 1) Unclip the split ring on base of rudder post and insert post into rudder bracket on stern of kayak.
- 2) Unroll the cord attached to the rudder assembly and lay out along the right side of your kayak from rudder forward to cockpit or seating position. Lay out cord so that it creates a smooth loop without tangles.

Installing the Lift Line Deck Fittings

Specific locations for lift line deck fittings are provided below. Location may differ but installation procedure is the same as follows (except where noted):

- 1) For positions between rudder head and cockpit:
 - a. Use a #3455-0099 round pad eye. Drill 5/32" hole at specified location.
 - b. Orient round pad eye such that slots in base of pad eye are oriented parallel to the keel line of kayak. Feed loops of lift line through each slot so that the lift line runs in a true loop from rudder forward to cockpit and back to rudder.

- c. Secure pad eye to hull using a #3585-0112 8-32 x 5/8" Phillips flathead screw with #1FAS090 neoprene/stainless washer and #3430-0102 lock nut on under side of hull. Position washer so that neoprene side is against hull interior.
- 2) At forward most position next to cockpit
 - a. Place a #2CHINDECL single deck loop with two holes over location so that it is oriented parallel to keel line and mark mounting holes. Drill a 5/32" hole at each mark.
 - b. Insert a #3585-0112 8-32 x 5/8" Phillips flathead screw through sternmost hole in pad-eye and sternmost hole in hull and secure with #1FAS090 neoprene washer (neoprene against hull) and #3430-0102 lock nut.
 - c. Place the end of the lift line loop through center hoop of deck loop and secure front mounting hole with same hardware. Make sure the lift line forms a smooth loop and one turtle line tensioner is above and one below the pad eye.
 - d. Insert a #3585-0112 8-32 x 5/8" Phillips flathead screw through front hole in deck loop and front hole in hull and secure with #1FAS090 neoprene washer (neoprene against hull) and #3430-0102 lock nut, making sure lift line is captured under single deck loop.

Cape Horn 140, 150, 170:

- 1) Measure position approximately 31 1/2" forward of stern and above the scooped panel marking junction of hull and deck. This position will be near or at the stern corner of the stern hatch. Mark position and then center #3455-0099 round pad eye over mark. Make sure outer edge of pad eye does not overlap edge of hatch. If it does, adjust mark as necessary to relieve conflict. Secure round pad eye as described in Step #1 "Installing Lift Line Deck Fittings " above.
- 2) Determine preferred location for front pad eye nearest cockpit. The factory location is just below the first "e" in "Wilderness Systems" logo. Install #2CHINDECL single deck loop as described above in Step #2 above.

Pamlico 120, 140:

- 1) Mark position on starboard side of deck approximately 2" aft of, and slightly below "Pamlico" model name decal. Drill at mark and install #3455-0099 round pad eye as described in Step #1 above.
- 2) Locate "Wilderness Systems" logo on starboard side of hull. Measure 8" towards stern and at height that allows lift line to run horizontal from previous pad eye installed in previous step and mark location. Center #2CHINDECL over mark and install as described in Step #2 "Installing Lift Line Deck Fittings " above.

Pamlico 145, 160T, Excel:

- 1) Measure 2" towards stern from "Pamlico" model name logo and in line with logo. Drill at mark and install #3455-0099 round pad eye as described in Step #1 above.
- 2) Locate stern mounting bolt for seat runner along starboard side of cockpit. Measure 7" towards stern from bolt and mark. Center #2CHINDECL deck loop over mark and mark 2 mounting holes. Drill at mounting marks as described in Step #2 "Installing Lift Line Deck Fittings " above.

Pamlico 135T:

- 1) Locate two pad eyes securing starboard side of stern deck bungee. Center #3455-0099 round pad-eye between and 1" below those pad eyes and mark and drill as described in Step #1 above.
- 2) Locate stern seat bolts on starboard side. Measure 20" forward of front bolt and 2" down from crease defining cockpit coaming. Mark and center #2CHINDECL deck loop mark. Mark 2 mounting holes and drill as described in Step #2 "Installing Lift Line Deck Fittings " above.

Pre 2009 Tarpons:

- 1) Locate the #2CHINDECL deck loop on starboard side of hull just behind the cockpit.
- 2) Loosen the sternmost mounting screw slightly. Do not remove entirely.
- 3) Remove the forward mounting screw completely and pass the end of the lift line cord under front end of pad eye and capture it between the mounting screws. Make sure that one of the turtle line adjusters is above and the other below the pad eye.
- 4) Replace the front mounting screw and tighten both mounting screws completely.

Installing lift line guides (round pad eyes):

Depending on model length and time of manufacture, some Tarpons have molded-in threaded brass inserts at pad eye locations between the stern of kayak and cockpit terminus of lift line.

If your boat has inserts:

- 1) Remove the filler screws and position a #3455-0090 round pad-eye over the insert. Thread the lift line through the slots in base of pad-eye and orient pad-eye so slots are parallel to keel line. Make sure lifeline runs in a true loop for its entire length.
- 2) Insert #3585-0223 10-32 x 3/4" Phillips flat head screw through pad-eye and into insert. Tighten securely.

If your Tarpon does not have inserts at designated locations, install #3455-0099 round pad-eyes as follows:

- 1) Locate center point of recess. Drill a 5/32" hole through hull at this point.
- 2) Align round pad-eye over lift line and insert #3585-6203 8-32 x 3/4" Phillips pan head screw through pad-eye and hole drilled in recess.
- 3) Accessing underside of hull via the stern hatch, secure screw with #1FAS090 neoprene/stainless washer and #3430-0102 lock nut. Position washer so that neoprene side is against hull interior.

Tarpon 120:

- 1) Measure 31" forward from stern along angled side panel. Mark location in line with and about 3" aft of the "Tarpon 120" logo. Drill at mark and install round pad-eye as described above for locations without inserts.

Tarpon 140:

- 1) Has inserts located 8" and 24" forward from stern. Discard filler screws and install round pad-eyes as described for locations with inserts.

Tarpon 160:

- 1) Mark location approximately 2 1/2" below the center hatch strap on stern hatch. Drill and install #3455-0099 round pad-eye as described above for locations without inserts.
- 2) Mark location 54" forward from stern. Pull lift line taut along side of boat passing desired position of cockpit mounted pad eye and adjust mark so that lift line runs horizontal. Drill at mark and install round #3455-0099 pad-eye as described for locations without inserts.

Tarpon 160i:

- 1) Has inserts located 20" and 48" from stern. Discard filler screws and install round #3455-0099 pad-eyes as described for locations with inserts.

Tsunami

During the 2009 model year Wilderness Systems began building Tsunamis "rudder-ready" featuring preinstalled rudder cable tubing inside hull from stern to alongside the seat in cockpit. Depending upon when your Tsunami was produced, it may have this outfitting or feature a combination of outfitting to accommodate installation of fasteners to secure pad-eyes for the rudder lift lines. Variations of Tsunami outfitting will include preinstalled round pad-eyes at select locations, molded in inserts, or neither.

For locations with preinstalled round pad-eyes:

- 1) Loosen screw securing pad-eye sufficiently to slide lift lines under edge of pad-eye. Route lift line so that it fits under slots in base of pad-eye and forms a true loop.
- 2) Secure pad-eye by tightening center screw.

Tsunami 135:

- 1) Locate the two circular recesses along starboard side of deck, one behind and the other in front, of stern hatch.
- 2) Drill at center of each recess with a 5/32" bit. Secure #3455-0099 round pad eye with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 3) Thread lift line under pad-eye so that line runs through slots on edge of base of pad-eye and forms a loop.

Tsunami 140:

- 1) Locate the two circular recesses along starboard side of deck. Sternmost is 15" forward of stern. Front location is 39" forward of stern.
- 2) Drill at center of each recess with a 5/32" bit. Secure #3455-0099 round pad eye with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 3) Thread lift line under pad-eye so that line runs through slots on edge of base of pad-eye and forms a loop.

Tsunami 145:

- 1) Locate the two circular recesses along starboard side of deck. Sternmost is 15" forward of stern. Front location is 45" forward of stern.
- 2) Drill at center of each recess with a 5/32" bit.
- 3) Secure #3455-0099 round pad eye with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 4) Thread lift line under pad-eye so that line runs through slots on edge of base of pad-eye.

Tsunami 160:

- 1) Locate 2 circular recesses along starboard side of deck. Sternmost may have molded-in threaded insert. If so, loosen and discard filler screw. Use #3585-0223 10-32 x 3/4" Phillips flat head screw to secure pad-eye.
- 2) If no insert, drill at center of recess with a 5/32 bit. Secure with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 3) Forward recess does not have an insert and will require drilling with a 5/32" bit at center. Secure with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 4) The forward most location has a #3455-0099 round pad-eye pre-installed on hull. Loosen mounting screw enough to slide the lift line into position under the pad-eye and tighten down pad-eye.

Tsunami 165:

- 1) Locate 3 circular recesses along starboard side of deck. Sternmost recess may have molded-in threaded insert. If so, loosen and discard filler screw. Use #3585-0223 10-32 x 3/4" Phillips flat head screw Phillips pan head screw to secure pad-eye.
- 2) If no insert, drill at center of recess with 5/32" bit and secure with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 1) Center and forward recesses do not have molded-in inserts and will required drilling with a 5/32" bit.
- 2) Proceed to install round pad-eyes using #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 10-32 Cap nut to secure round pad eye at each location.

Tsunami 175:

- 1) Locate 3 circular recesses along starboard side of deck. Sternmost recess may have molded-in threaded insert. If so, loosen and set aside filler screw. Use #3585-0223 10-32 x 3/4" Phillips flat head screw to secure pad-eye. If no insert, drill at center of recess with 5/32" bit and secure with #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 Cap nut.
- 2) Center and forward recesses do not have molded-in inserts and will required drilling with a 5/32" bit.
- 3) Proceed to install round pad-eyes at these locations using #1FAS0045 10-32 x 1" Phillips flat head screw, 1FAS090 neoprene/stainless washer, and #2RUD004 10-32 Cap nut to secure round pad eye at each location.

Ride (Original Ride; see below for Ride 135)

- 1) Measure 32" forward from side mounting screw on starboard side of hull. Mark point on hull even with bottom of the "Ride" graphic. Drill 5/32" hole at mark.
- 2) Align a round pad eye over mark so that slots in base run parallel to keel line. Hold lift line against hull so that the line runs through the slots and forms a loop.
- 3) Secure pad eye to hull using a #3585-0112 8-32 x 5/8" pan head screw with #1FAS090 neoprene/stainless washer and #3430-0102 lock nut on under side of hull. Position washer so that neoprene side is against hull interior.

Ride 135:

- 1) Locate the 4 recesses along the right side of hull between rudder and seat. The forward most two will require drilling hole at center of recess with a 5/32" drill bit.
- 2) On stern most recesses, remove filler screws and discard.
- 3) Align a round pad eye over threaded hole in sternmost insert and align lift line cord so that it runs under slots in base of pad-eye. Secure pad-eye with a #1FAS0045 10-32 x 1" Phillips flathead screw with a #1FAS090 neoprene/stainless washer and #2RUD004 Cap nut on underside of hull. Position washer so that neoprene surface is against underside of hull.

Synergy 12, 14:

- 1) Locate the 4 circular recesses molded in hull along right side of deck, including one just behind the seat.
- 2) Drill at center of each circular recess with at 5/32" drill bit.
- 3) Place #30300001 cherry rivet through hole in center of #3455-0099 round pad-eye. Push end of rivet into hole in hull but do not cinch it down with rivet gun.
- 4) Make sure lift line runs true and forms a smooth loop. When satisfied, align the round pad-eye over the lift line so that lift line runs through slots in base of pad eye and secure with rivet gun.

Adjusting the tension in the lift line

The lift line should be tensioned sufficiently so that it does not droop or sag between fittings. It should also not be drum tight. To adjust to proper tension:

- 1) Make sure the rudder blade is stowed and centered in the rudder rest.
- 2) Slide the top turtle line tensioner forward until it contacts the forward-most pad-eye on the lift line. Pull the knot in the lift line out of the turtle, pulling the line taut without moving the turtle. Untie original knot and tie a new knot against the body of the turtle.
- 3) Repeat process with turtle on lower side of pad-eye.
- 4) Release the rudder blade from the rudder rest and test the lift line's functionality by pulling the lower turtle forward causing the rudder to deploy and then the top turtle forward, causing the rudder blade to rise to stowed position. Tension should remain consistent during both operations and rudder blade should deploy and stow completely. Adjust tension as necessary by tying new knots at each turtle.
- 5) Once function of the lift line is as desired, pull the new knots out of the turtles, cut off excess line and melt the knot with a lighter or a match to make it permanent.

Installing the Steering Cable Tubing

The rudder is controlled by cables running under the stern deck of the kayak, linking the rudder assembly to the footbraces. The cables run through plastic tubes suspended from the stern deck. On most boats it will be necessary to drill entry ports just ahead of the rudder to route the cables from outside the hull to the inside. Care should be taken when drilling these holes as to size, location, and orientation of holes.

Drilling Entry Ports for cables

Depending on model, there are designated locations for drilling holes to route cables from rudder assembly to the interior of the hull. These locations may be raised "bumps" called "frog eyes" or indentions in hull. Refer to your specific model for instructions.

Cape Horn 140, 150, 170:

- 1) Locate the raised entry ports ("frog eyes") on either side of deck, approximately 18" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly down towards the bottom of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Pamlico 120, 140:

- 1) Locate the frog eyes on either side of deck, 10 ½" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly down towards the bottom of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Pamlico 145:

- 1) Locate the frog eyes on either side of deck, 10 ¼" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly down towards the bottom of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Pamlico 160/Excel:

- 1) Locate the frog eyes on either side of deck 11" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly down towards the bottom of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Pamlico 135:

- 1) Locate the frog eyes on either side of hull 9" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly in towards center of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Pre 2009 Tarpons: (On sit-on-top kayaks, it will also be necessary to drill exit ports next to seat to route cables from interior of hull to exterior to allow for connection to footbrace assembly. See steps #4 & 5 below.)

- 1) Locate the stern cable ports on either side of the hull approximately 6" forward of stern. Ports have a scooped recess on stern side of raised flat surface to allow clean run of cables from rudder head forward.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly in towards center of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.
- 4) Move to the cockpit area of kayak and identify the forward facing vertical triangular panel near to and in line with the stern end of foot brace mounting panels on both sides of boat.
- 5) Drill a 5/32" hole in center of that panel. This will be the exit point of your rudder tube and cable.

Tsunami

In maintaining its' traditional position of constant improvement of its' products, during the 2009 model year, Wilderness Systems began outfitting Tsunami 135, 140,145, 160, 165, and 170 as "rudder ready". Additional steps are taken on the factory floor to install the tubing to guide the rudder cables. If you inspect the stern of your Tsunami and find a short length of white plastic tubing protruding from the stern cable port locations, you're in luck and can skip forward in the process to the section detailing inserting the rudder cables and attaching the footbraces.

If your Tsunami is an older edition without installed tubing, please proceed as follows:

Tsunami 135:

- 1) Locate the indents on either side of deck near side seams, approximately 5" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly down towards the bottom of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Tsunami 140 and 145:



- 1) Locate the raised cable steering ports on either side of hull just below junction of hull and deck, approximately 4" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly in towards center of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Tsunami 160:

- 1) Locate the raised cable steering ports on either side of hull just below junction of hull and deck, approximately 4" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly in towards center of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Tsunami 165:

- 1) Locate the raised cable steering ports on either side of hull just below junction of hull and deck, approximately 4" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly in towards center of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Tsunami 175:

- 1) Locate the raised cable steering ports on either side of hull just below junction of hull and deck, approximately 4" forward of stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Angling the drill bit slightly in towards center of the hull, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.

Ride: (Original Ride, see Ride 135 below) (On sit-on-top kayaks, it will also be necessary to drill exit ports next to seat to route cables from interior of hull to exterior to allow for connection to footbrace assembly. See Step #4 below.)

- 1) Locate the rudder cable ports on deck approximately 6" forward from stern.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling
- 3) Angling the drill bit slightly downwards, drill a 5/32" hole through the flat stern face of each frog eye. The angle of the drill should allow the bit to pierce the flat stern face of the frog eye but not the angled surface on the forward side.
- 4) On either side of seat, identify raised triangular panels. Measure 1" down from top in center of flat forward-oriented face and drill 5/32" hole with drill pointed towards stern of boat. This will be the exit point of your rudder tube and cable.

Ride 135: (On sit-on-top kayaks, it will also be necessary to drill exit ports next to seat to route cables from interior of hull to exterior to allow for connection to footbrace assembly. See Step #4 below.)

- 1) Locate the indented rudder cable entry ports on stern of boat on either side of rudder bracket.
- 2) Remove rudder from rudder bracket to allow for easier access for proper drilling.
- 3) Drill a 5/32" hole centered in each indent.
- 4) On either side of seat, identify flat indented panels. Measure 1" down from top in center of flat forward-oriented face and drill 5/32" hole with drill pointed towards stern of boat. This will be the exit point of your rudder tube and cable.

Synergy 12, 14:

- 1) Locate two indents just forward and slightly above the bolts for mounting rudder brackets,
- 2) At each indent, you can feel or touch a small marker @ center indicating point for drilling.
- 3) Use a 5/32" bit and drill at a slight angle inward towards center of boat to ensure that bit does not go in and then come back to outside of hull.

- 4) Locate the flat vertical panels on each side of seat. Mark point on each panel at height equal to the footbrace position. Drill a 5/32" hole centered in panel on each side. This will be the exit port for cables to connect to footbrace assemblies.

Installing Steering Cables and Cable Tubes

The next step in the rudder installation is to route plastic tubing under the stern deck of the kayak forward to the seating area. Once the tubing is installed, the rudder cables will be connected to the rudder head and then fed through the tubes to ultimately connect to the footbraces.

Installing the Rudder Tubes

Different models will have differing locations for cable clamps to suspend the tube and cables. Please reference your particular model kayak below for specific instructions. Open all stern hatches to improve access to interior of kayak.

During the 2009 model year Wilderness Systems, in keeping with our commitment to ongoing product improvement and evolution, began factory installation of hangers and tubing for rudder cables on select models. Depending on time of manufacture and model, you could have a kayak that has been built "rudder-ready" or not, particularly Tsunamis and the Ride 135.

Sit – In Kayaks with bulkheads

If your sit-in kayak has internal foam bulkheads it will be necessary to drill holes to route the rudder cables through the bulkhead as follows:

Lay out tubing on each side of hull, running from fitting installed as directed for your specific kayak. Try to orient the tubing so that it runs as straight as possible from last cable clamp towards the footbraces in cockpit area.

Drill a 1/4" hole, using a long 1/4" bit through the bulkhead within 1" of top of bulkhead on each side to route the tubing through the bulkhead. Push the tubing through the hole. For maximum water tightness, apply a small bead of Lexel© or other marine sealant to rudder tube as it passes through hole.

Sit-on-Top Kayaks

Running cable tubes in the inside of a sit-on-top kayak can be challenging due to lack of access to interior of hull. Tactics to make this easier could include setting kayak on its' side and letting gravity help route the tubing outside of any scupper tubes. You may also find it helpful to put the kayak bow down to encourage the tubing to slide forward.

It is essential that the tubing run to the outside of any scupper tubes. The rudder will not function properly if tubing runs inside one scupper and then outside the next as the bend in the tubing will bind the cable.

All Models:

- 1) Uncoil plastic rudder tubing. Locate center point of tubing and cut tubing with scissors to create 2 equal 10' pieces.
- 2) Lightly heat one end of each piece of tubing so that the plastic melts forms a mushroom-shaped end with flange. The flange will prevent the tubing from sliding through hole in hull.
- 3) Feed the opposite end of tubing into hole drilled in hull in previous step. Push and/or pull tubing forward until flanged end contacts outside of hull.
- 4) Follow instructions for your specific model below.

Cape Horn 140, 150, 170:

- 1) Remove one lock nut securing deck loop on both ends of the forward strap on stern hatch.
- 2) Clip a #3140-0300 1/8" cable clamp over tubing. Place mounting hole over the exposed screw end and use original nylon lock nut to secure.
- 3) Repeat for opposite side.



- 4) Thread tubing through holes drilled in bulkhead and then between the sides of the seat and sides of hull forward to the footbraces.

Pamlico 120, 140:

- 1) Locate the sternmost deck loop pad-eye on the deck rigging in front of oval hatch on each side.
- 2) From inside the hull, remove the nylon lock nut from the sternmost mounting screw. Clip a #3140-0300 1/8" cable clamp over the tubing and place mounting hole over the exposed screw end. Secure with original lock nuts.
- 3) Repeat for opposite side.
- 4) Thread tubing through holes drilled in any existing bulkheads and then forward between side of seat post and side of hull.

Pamlico 135T, 145T:

- 1) Locate the front-most deck loop on the deck rigging in front of the oval hatch on each side.
- 2) From inside the hull remove the nylon lock nut from the sternmost mounting screw.
- 3) Clip a #3140-0300 1/8" cable clamp over the nylon tubing and place mounting hole over the exposed screw end. Secure with original lock nut.
- 4) Thread tubing forward between side of seat and side of hull.

Pamlico 160T/Excel:

- 1) Locate the front-most deck loop on the deck rigging in front of the oval hatch on each side.
- 1) From inside the hull remove the nylon lock nut from the sternmost mounting screw.
- 2) Clip a #3140-0300 1/8" cable clamp over the nylon tubing and place mounting hole over the exposed screw. Secure with original lock nut.
- 3) Thread tubing forward and through large hole in seat post on each side.
- 4) Cut cable tubes 2" forward of where they emerge from front of seat.

Pre 2009 Tarpons:

- 1) Insert tubing as instructed into frog eyes at stern of boat.
- 2) Reaching through the stern hatch, pull tubing forward.
- 3) Feed tubing so that it runs between the sides of the hull and the scupper tubes in hull. The straighter the tubes run the smoother the rudder will operate.
- 4) Using the round center hatch in front of seat, pull the tubing forward to, and then through the newly drilled hole at stern end of footbrace mounting panel.
- 5) Grasp protruding end of tube and pull until slightly taut. Hold tube with pliers at point where it exits hull and cut tubing about 1/4" in front of pliers.
- 6) Lightly heat the end of the tube so that it flares wide, similar to the head of a mushroom. Allow it to cool and harden before releasing pliers.

Tsunamis (Non rudder-ready editions):

- 1) Locate the deck loop on the deck rigging forward of the oval hatch on each side .
- 2) From inside of hull remove the nylon lock nut from end of screw.
- 3) Clip the #3140-0300 1/8" cable clamp over the tube, place mounting hole overexposed end of screw and secure with original nut.
- 4) Route as described above through any existing bulkheads.
- 5) Route tubing between side of seat and side of hull forward to the foot pedals.

Ride: (Original Ride, see Ride 135 below)

- 1) Feed the straight un-flared end of tubing into holes drilled in frog eyes. Push tubing as far forward as possible.
- 2) Reach through the circular hatch and pull tubing forwards towards seating area. Route tubing to the outside of any scupper tubes.
- 3) Feed end of tubing to and then through hole drilled in flat panels on either side of seat.
- 4) Measure 12 1/2" forward of that hole and 1" down from top on hull on each side.
- 5) Drill 5/32" at that location.
- 6) Pull tubing forward until taut. Clip a #3140-0300 1/8" cable clamp over tubing. Insert a #3545-0303 rivet through mounting hole in cable clamp and secure it to hole just drilled.

- 7) Position pliers so that they abut forward edge of cable clamp and cut tubing at forward edge of pliers.
- 8) Melt the end of the tube so that it flares into a mushroom shape which will prevent it slipping backwards out of cable clamp. Hold with pliers until cool.

Ride 135 (non-rudder-ready editions):

- 1) Feed the straight un-flared end of tubing into holes drilled in frog eyes. Push tubing as far forward as possible.
- 2) Reaching through the circular hatch and pull tubing forwards towards seating area. Route tubing to the outside of any scupper tubes.
- 3) Thread end of tubing to and then through hole drilled in flat panels on either side of seat.
- 4) Measure 12 ½" forward of that hole and 1" down from top on hull on each side.
- 5) Drill 5/32" at that location.
- 6) Pull tubing forward until taut. Clip a #3140-0300 1/8" cable clamp over tubing. Insert a #3545-0303 rivet through mounting hole in cable clamp and secure it to hole just drilled.
- 7) Position pliers so that they abut front edge of cable clamp and cut tubing at forward edge of pliers.
- 8) Melt the end of the tube so that it flares into a mushroom shape which will prevent it slipping backwards out of cable clamp. Hold with pliers until cool.

Synergy 12, 14:

- 1) Feed the straight un-flared end of tubing into holes drilled in frog eyes. Push tubing as far forward as possible. Due to lack of access to interior of hull it can be frustrating to feed the tubing forward as needed. When feeding one side, it can help to rotate the boat so that the side being fed is down. This will enlist gravity in helping to guide the tubing towards the outside of hull. When one side is complete, rotate boat 180 degrees and repeat.
- 2) Use the circular center hatch to reach inside and grab the leading end of the tubing. Pull tubing to desired side and route to exit hole drilled near footbraces.
- 3) Feed end of tubing through hole and pull taut from outside. Grasp tubing with pair of pliers with pliers butted up against hull where tubing exits and cut tubing about ¼" in front of pliers.
- 4) Heat end so that it flares in a mushroom shape and allow to harden and cool. Release pliers and allow tubing to retract towards hull. Flared end will keep it from slipping through hole into inside of hull.

Threading the Rudder Cables inside the Cable Tubes

The following instructions apply to all models.

- 1) Uncoil the rudder cables.
- 2) Remove split ring and pin from each rudder wing. Place eyelet on end of rudder cable on top side of rudder wing with hole aligned with wing, reinsert original pin and secure with split ring. Repeat with other wing, taking care to make sure you're keeping the cables separate so they can be routed to appropriate side in hull.

NOTE: Some rudder wings were produced with holes that are too small to accommodate the standard pin. If you have this size wing, use the #3585-0106 8-32 x 1/2" Phillips pan head screw and #3430-0102 8-32 lock nuts provided with kit as substitutes for the pin and split ring.

- 3) Feed the opposite end of cable into tube. You may find it helpful to wrap the leading end of cable tightly with a thin wrap of electrical tape to lessen resistance with tubing and to contain any protruding strands of rudder cable. If cable binds or stops feeding into tubing do not continue to push cable forward as this may result in a kinking of cable. Instead, pull cable back towards stern and then push forward vigorously to see if cable will "pop" past bend or obstacle.
- 4) Continue feeding cable until end of cable protrudes from end of tubing in cockpit. Pull cable forward until it is taut. This will help straighten the tubing as much as possible. If you applied tape to end of cable, remove it at this time.

Installing the Keepers Footbrace Steering System

The rudder is controlled by cables linking the rudder to the footbraces. Push forward on the portside footbrace and the rudder will pivot to port and turning force to port will be exerted on the hull by the angle of the rudder blade.

These instructions apply to all solo model kayaks. Additional components and instructions for footbrace installation in tandem kayaks (Pamlico 135T, 140T, 160T, and Excel are included in the BTS Tandem Kayak Module Kit, #8025417).

Keeper footbrace installation:

- 1) Remove existing footbraces and hardware and discard.
- 2) Attach the metal footbrace track extrusions to the inside of hull using 2 #2FAS010 ¼-20 x 3/8" Phillips truss head screws positioned in holes at forward end of each extrusion. Insert screws from outside of hull through original holes, aligning holes in extrusion.
- 3) Use 2 #2FAS011 ¼-20 x ½" Phillips truss head screws to secure end of extrusions nearest the seat. Tighten fully.

Instructions for Tsunami's with 3 mounting holes for original footbraces:

A limited number of Tsunami models were produced using 3 fasteners for each footbrace rail. Please follow instructions below to complete the rudder installation. Necessary parts have been provided with the kit.

- 1a) Remove original footbraces and set aside.
 - 2a) Secure bow end of #17010021 aluminum footbrace extrusion from exterior of hull using #2FAS010 1/4-20 x 3/8" screw with #1FAS059 neoprene stainless washer (neoprene side against hull exterior). Place washer over end of screw and push screw into original hole aligned with bow position on extrusion. Thread screw into extrusion and tighten slightly.
 - 3a) Repeat process for sternmost mounting position, using ##2FAS010 ¼-20 x ½" screw and #1FAS059 ¼ x 5/8" neoprene washer. Tighten sufficiently so that extrusion is held in position.
 - 4a) Push point of pencil or marker through center hole and mark position on the backside of extrusion. Remove extrusion from hull.
 - 5a) Drill 11/32" hole through extrusion at mark. Repeat process to drill center hole in other extrusion.
 - 6a) Reattach bow and stern ends of extrusion and tighten. Insert a #2FAS080 ¼" slab nut into newly drilled hole in center of extrusion. Seat nut so that it is flush against center channel in extrusion.
 - 7a) From outside of boat, slide a #1FAS059 neoprene/stainless washer over a #1FAS0011 ¼-20 x 5/8" screw (stainless side against head of screw).
 - 8a) Insert screw through center mounting hole and through extrusion, engaging the threads on the slab nut. Tighten securely to compress neoprene against hull for best seal.
 - 9a) If your hull has significant curvature at point of installation and tightening center screw down fully causes distortion in hull, remove screw and place one or two #1FAS043 neoprene washers as spacers between extrusion and interior side of hull. Insert screw from outside of hull through spacer and engage slab nut to secure extrusion.
 - 10a) Follow instructions below to complete installation.
- 4) Examine the molded footbrace rails. Position rail so that raised stopper on one end is towards bow of boat and slide rail with footpedals installed into extrusions.
 - 5) Secure rudder in rudder rest, making sure it is centered.
 - 6) Cut the 4" length of #5715-3200 shrink tubing in half and slide one ½ and 2 #3250-0100 copper ferrules over end of each rudder cable and push back several inches on cable.
 - 7) Thread end of cable through hole in end of footbrace rail nearest the seat. Thread cable from the inside of footrail to the outside. Pull cable through footrail until slightly taut.
 - 8) Sit in kayak with footpedals in centered position on rails and judge the fit compared to your leg length. You can adjust footpedal as needed but make sure footpedal can be adjusted to fit as long legged or short legged paddlers as you expect to use the boat. Leaving footpedal in midposition, mark its' location on the extrusion.

- 9) Maintaining the foot pedal at its' mark, slide end of cable back through inside of ferrules and push first ferrule up against end of footbrace rail and position second ferrule about ¼" behind the first. Firmly crimp both ferrules several times to secure loop in cable.
 - 10) Repeat for opposite side, striving to keep footbrace in equal and balanced position to the first.
 - 11) Cut off cable extending beyond the rearmost ferrule.
 - 12) Slide shrink tubing over both ferrules and heat with lighter to shrink tightly around both ferrules end of cable.
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Testing the Rudder System Operation

- 1) Initial testing is best done on dry land. Position the kayak so that it will safely bear your weight and the rudder will not contact the floor or ground when it is deployed. A good way to achieve this is to put boat on a deck or bank with stern extending off end of structure.
 - 2) Release the rudder from the rudder rest.
 - 3) Grasp the lift line at the lower turtle and pull forward. Rudder should deploy from the rest and drop into working position smoothly.
 - 4) Test steering position of rudder by pushing forward on one footbrace and then the other. Rudder should swing back and forth across the stern of the kayak smoothly.
 - 5) Return rudder to a centered position by placing foot pedals in a balanced position. Grab the top turtle on lift line and pull forward. Rudder blade should rise over deck and drop onto rudder rest. Note the degree of adjustment with pedals to make rudder blade drop smoothly into rudder rest.
 - 6) Assume seated position in cockpit and repeat tests. Work on getting a "feel" of the rudder position and position of the turtles when rudder is fully deployed or stowed so you can operate by feeling alone.
 - 7) Repeat testing process in shallow, protected water in calm conditions with help and assistance at hand before venturing into deeper water further from shore.
 - 8) Thoroughly test the rudder's effect on your boat's handling in various conditions and with boat facing into, abeam, and away from wind and waves.
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Getting Used to Your New Rudder System

- 1) Always secure rudder blade in stowed position on rudder rest when carrying or cartopping your kayak.
- 2) Always remember to release tie down securing rudder blade in rest before launching your kayak. Even though your rudder blade has the capability to "kick up" when contacting an obstruction, it still pays off to be cautious when approaching land or in shallow water and raising the blade before contacting the bottom. It is possible that the blade could be bent or deformed by striking an underwater obstacle.
- 3) The presence of a rudder on the stern of a kayak means you need to take extra care in handling the kayak. The rudder assembly and rudder blade can be easily bent if banged on the ground. Remember that the addition of the rudder will change the balance point of your kayak. You will need to determine the new balance point to ensure safe handling of your kayak.
- 5) Care should also be taken when handling the stern of a ruddered kayak as the edges of a rudder are sharp and can cut hands or wrists should boat twist or turn when being loaded or unloaded. If you carry your boat upside down on top of your car, don't assume you still have adequate room to walk under stern of boat. Addition of a rudder "lowers" the height of an upside down kayak by about 6". Be aware as well that the sharp hard edges of a rudder blade will easily scratch or damage your vehicle finish upon impact.