WATERSKIING FOR PEOPLE WITH PHYSICAL DISABILITIES

This program is offered through the Boulder Parks and Recreation EXPAND Program and EXPAND Beyond.

June through August (8 weeks)
Boulder Reservoir
Tuesdays 7:00-11:00 a.m.

Welcome to EXPAND's Adaptive water-ski program. Thank you for your interest and support in this exciting program.

We are very pleased that this program has grown and developed into such a popular and successful experience for people with physical disabilities in the Denver-Metro area. We could only have accomplished this through all the efforts and hard work of the volunteers involved!

In this manual you will find a great deal of information regarding: disabilities, adaptive equipment, skiing instruction techniques, safety procedures, volunteer responsibilities, and much more. We hope that this will help to orient you to the waterskiing program. Please continue to ask us questions throughout the Summer. Thanks again for your volunteer efforts and we look forward to a great Summer!

General Information

1. This program is specifically designed for individuals with physical disabilities. Physical disabilities include:
    - Traumatic Brain Injury (TBI) – TBI affects 1.5-2 million individuals per year. Persons with MTBI often have intact intellect, language and sensory motor skills, yet experience a wide variety of clinical symptoms including: light headedness, vertigo, tinnitus, impaired memory, reduced attention span, inability to grasp new or abstract concepts, headaches, insomnia, blurred or double vision and a variety of other symptoms that can significantly impact their lives.
    - Spinal Cord Injury – Often occurs from an accident and cause either: paraplegia – total or partial paralysis of both lower limbs, or quadriplegia – total or partial paralysis of all four limbs.
    - Paralysis – Inability to use a part of the body. Can be caused from a stroke, accident, etc.
    - Cerebral Vascular Accident (CVA) – stoppage of blood circulation to part of the brain.
    - Multiple Sclerosis (MS) – a chronic, slowly progressive disease of the central nervous system that usually occurs between the ages of 20 and 35.
    - Spina Bifida – a congenital closure defect that generally occurs in the lower lumbar region of the spine.

    - Cerebral Palsy – a condition characterized by the inability to control muscular

movements due to injury, infection or faulty development of the motor controls of the brain.
- Amputee – loss of a limb such as a leg, arm, etc..

2. Arrive at the dock next to the Boat House at the Boulder Reservoir at 6:45 a.m. on Tuesdays. Please show the gate attendant your recreation pass to get in.

3. Notify **Cory Lasher** at least a week in advance if you are unable to attend a Tuesday session. **Cory can be reached at work 303-413-7269 or her work cell at 303-704-9817.**

4. In case of bad weather, call Cory's work number at 303-413-7269 and she will leave a voice message by 6:30 a.m. if the program has been called off. Please leave your name indicating that you have called and received the message so she does not need to call you. We will try and make up one rain date if needed, depending on volunteer availability.

5. If your volunteer position should change through the course of a Tuesday morning, make sure you inform the Shore Boss to make sure all positions are covered.

6. Life jackets must be worn by all volunteers who are on the dock and in the boats.

7. Keep all motorized wheelchairs off the dock.

8. Please treat all equipment with care! This includes skis, wetsuit boots, jackets, and personal flotation devices.

9. And most importantly.....ENJOY!

Skier Progression and Volunteer Positions

Progression	Volunteer Staff Position
1. Skier arrives. 2. Introduction to Ski Buddy. 3. Dry land orientation. 4. Paperwork; registration, emergency information and waiver forms. 5. Name placed on skier schedule.	Dry land Supervisor and Ski Buddy
6. Prepare to ski: - equipment and ski selection - wetsuit boots, ski jacket, life vest 7. Equipment sizes and specifications recorded on Participant Information sheet.	Ski Buddy and Equipment Manager
8. Ready to ski! 9. Skier moves to the dock area. Ski Buddy accompanies to return chair to land. 10. Transfer to the ski on the dock. 11. Review skiing progression and hand/voice commands. 12. Enter water behind pull boat and position ski. 13. Chase boats are ready. 14. Skier signals pull boat when ready. 15. Water start assistance available.	Dock Starters and Instructor
16. Skiing. 17. Deep water start assistance available. 18. Two laps around reservoir.	Pull Boat - instructor - quick release Chase Boat - rescuers
19. Return to dock, drop off skier. 20. Assistance to dock and out of the water. 21. Ski Buddy meets on dock with chair.	Retriever and Ski Buddy
22. Return to land. 23. Equipment returned to land. 24. Remove wetsuit, jacket and life vest. 25. Guard against cold; blankets, hot drinks. 26. Make skier progress notation.	Ski Buddy

Volunteer Positions and Responsibilities

SHORE POSITIONS

Shore Boss

a. Assign volunteer positions as they arrive.
b. Determine the schedule of skiers.
c. Oversees all volunteer positions and flow of the day.
d. Inspects necessary paperwork registration, emergency information, and waiver forms.
e. Notifies Dock Boss of skiers ready to be included on the skier schedule.

Dock Boss

a. Maintains communication with pull boat and chase boat drivers through marine radio.
b. Oversees organization on the pier.
c. Skier to boat assignments.

Equipment Manager/Instructor (experienced in all aspects of skiing for individuals with disabilities)

a. Determines best ski for the individual.
b. Fits cage and makes adjustments to equipment for skier.
c. Ski buddy documents equipment selection on skier information form.
d. Provides dry land orientation.
e. Instructs skier.

Dock Starter

a. Assists as needed in wheelchair mobility onto pier.
b. Helps in transfer onto ski from wheelchair if needed.
c. Moves ski and skier into the water.
d. Double check fit of skier life vests and boots.
e. Make any necessary adjustments to the ski equipment.
f. Assists in water start if needed.

Dock Retriever

a. Jump in from dock to meet skiers in the water **after** they have finished skiing and help them to the dock and up into their chair.
b. Help passengers on and off boats.
c. Requires lifting.

Ski Buddy

a. Give one-on-one support and assistance to one skier for an entire water-ski session.
b. Keep track of Participant Information Sheet on skier.
c. Make sure skier has all proper paperwork filled out before they get on the ski schedule.
d. Communicate with the Dock Boss concerning the needs of skier, cage size, etc.
e. Assist skier with the following, if needed: boots, jacket, towel, coffee, donuts, etc.

f. Provide help, if needed, for skier on and off the dock and be ready with their chair when they're done skiing.
g. Prepares equipment for each skier according to skier schedule and brings down to pier

prior to when needed.
h. Documents equipment selection on skier information form.

Dry land Preparation (may be EXPAND interns)
a. May include set-up and pick-up of the following equipment: trailer, canopy, coffee station, dry erase board, life jackets, wet suit boots and jackets, etc.

BOAT POSITIONS

Pull Boat Drivers
a. Abide by the rules of the Boulder Reservoir.
b. Protect the skier at all times, safety first!
c. Establish clear communication with the skier.
d. Arrange personnel on her/his boat.
e. Notify the Dock Boss of volunteer or passenger changes on her/his boat.
f. Stop your engine when picking someone up from the water.
g. Provide instruction to skier.

Pull Boat Quick Release/Observer (This volunteer must have some water-ski experience)
a. Watches and anticipates falls from the skier, release tow rope at the right moment.
b. Act as co-captain to the boat driver, communicates skiers needs to the driver.
c. Watches skier for hand or head signals, feet slipping out of position, etc.
d. Hold up red flag when there is a fallen skier.
e. Handle tow rope (remove knots, pull in rope, etc.)

Chase Boat Rescuers
a. Enters water to help skier after a fall.
b. Makes sure skier is fit properly.
c. Helps chase boat starter in positioning skier in the ski, attaching rope to ski, or getting rope handle to skier.

Chase Boat Starters
a. Generally a small person to reduce the drag on the skier.
b. Enters the water after the Chase Boat Rescuer.
c. Positions skier in ski.
d. Assists with deep water start.

EQUIPMENT

I. SKI BOAT

All boats used in this program are privately owned, except for one patrol boat, which has been graciously donated for our use. The boats are used as pull boats which the skier is pulled behind or as chase boats. One or two chase boats follow the skier with rescuers aboard ready to enter the water to assist a fallen skier if needed.

II. PERSONAL FLOTATION DEVICE

All skiers, volunteers in the water and people on boats or on the pier must wear a life vest securely fastened. There are specific vests better suited for skiing. All vests need to be properly fitted and tightly buckled before skiing.

III. WET SUITS, PADDLE JACKETS, GLOVE AND WET SUIT BOOTS

Each skier needs to wear protection from the cold water and air. A variety of options are available. Volunteers entering the water should wear protection as well.

IV. QUICK OR TRICK RELEASE

A quick/trick release is a device used to quickly separate the ski rope, under tension, from the boat. Quick releases must be utilized any time the rope is directly connected to the ski/inflatable or in the event the skier cannot let go of the ski rope unassisted. It is used with E-skis, Freedom Ski, and Ski Seat.

V. E-SKI AND KAN SKI FREEDOM SKI

The E-ski is a seven layer marine grade plywood lamination 7 feet long, 18 inches wide tapering back to 15 inches at the tail, 1 inch thick with the nose curved up 7 inches. On the center line, at the tail and on the bottom of the ski there is a fin 4 inches deep and nine inches long. On the top of the sit ski is an aluminum tubing seat or "cage" with a cross bar to support the back of the thighs to prevent forward movement. Forward of this apparatus is a velcro strap to retain the user's feet from slipping off the ski. At the front of the ski is a slot. In back of the slot is a 3 inch high by 8 inch long by 3 inch thick block of wood with a “V” slot cut out of the middle.

The Shadow Freedom Ski is made of the most advanced materials. It's a wide beginner board with a notched nose and towing eye as well. Use a “pull” rope with space on the skiers side of the easy up block. When the skier wants a free rope, he gives a sharp tug on the handle and the knot comes free of the “V” slot.

VI. OUTRIGGER FOR SIT SKI

The "outriggers" are simply a pair of old trick skis (or home made wood skis using trick skis as a pattern) connected by a 22 inch long by 2 inch by 1/2 inch aluminum strapping. The strapping sandwiched between the sit ski and the cage is then bent to a 45 degree angle (the lower the angle, parallel with the ski, the more stable; the higher the angle,

perpendicular to the ski, the more maneuverable). The outriggers allow individuals with more severe disabilities, who do not have the ability to balance a sit ski, to enjoy skiing.

VII. KAN SKI, COMP I AND SUPER COMP

The Kan Ski is a light weight fiberglass and graphite slalom sit ski which features a concave bottom and competition fin. There are two skis, one for the recreational skier and one for the competitive sit skier with personalized cage widths in three heights. Skiers hold directly on to tow rope using a deep "V" handle which fits over the nose of the ski.

TEACHING PROGRESSIONS

There are many people that will interact with a skier. To avoid confusion for the skier, we ask that only the "instructors" provide instructions to a skier. Many times volunteers are skilled water skiers. This is a benefit and can be used in positions like "Pull Boat Quick Release" but, there are many times where a "Sit Skier" will need to do just the opposite of what a "Stand-up" skier would do.

I. **SIT SKIERS**
E-ski and Kan Ski

QUADRAPLEGICS, individuals without functional use of their arms, hands, and legs, may be best suited to using the outrigger sit ski with the rope attached directly to the ski. TETRAPLEGICS, individuals without normal use of their hands and legs but with functional use of their arms, may find using the "easy up" block and outrigger sit ski more to their liking. With practice, most tetraplegics progress to a standard sit ski. PARAPLEGICS, individuals without functional use of their legs, and DOUBLE LEG AMPUTEES will use a standard sit ski and hold directly onto the rope, although, the easy up and/or outrigger ski may be used as a learning tool.

A. **DRY LAND INITIATION**

- Review the above sections on SAFETY and COMMUNICATION and ask the participants to demonstrate their knowledge of the signals. Pay particular attention to the proper use of the hand/head signals.

- Explain the difference between the standard sit ski and the outrigger sit ski.

- Go over each part of the skis and familiarize the participants with their correct names. Be sure to mention the cage and sling, foot binding, fin, easy up "V" block

and handle with knot, and the deep “V” handle.

- Explain the use for the two different types of personal floatation devices. Remember, a life vest for most skiers and the life jacket for those persons unable to turn over in the water.

- Review the need for and operation of the quick release.

- Demonstrate the two techniques for mounting the ski.

The first technique is the "side entry". The skier floats parallel to the ski, in a sitting position, feet floating straight in front of him. The skier reaches over the cage to the opposite side edge of the ski while sculling on the surface of the water with his other hand. As he pushes down on the side of the ski forcing it under the water, he pushes himself up and over the cage with a sculling motion from his free hand. Once in the cage, the skier can then place his feet in the bindings.

The second technique is referred to as the "back entry". This is where the skier straddles the ski from the back and by pushing down on the ski floats over the cage. The ski is then allowed to float up, under the skier.

Note: The side entry technique is used by most paraplegics and tetraplegics while the back entry is used by most amputees and other disabilities where limited leg motion is present. Most quadraplegics will need physical assistance to get on the ski.

- Explain the two static balance (balancing the ski while floating in the water) techniques. The first technique utilizes both arms sculling on the surface of the water, keeping the skiers weight over the mid-line of the ski. Using the second technique, the skier holds onto the edge of the ski at the base of the cage and pushes the ski under his bodies mid-line.

- Explain the progression for using the outrigger ski with rope attached to tow block.

(A) Mount ski, lean forward and hold onto the cage or ankles/legs.
(B) Communicate with driver, i.e. "IN GEAR" and "HIT IT!"
(C) Remind the skier to RELAX!
(D) Once on a plane, stay within the boat wash. It is difficult to control the ski outside the boat wash while it is being towed. Explain that with practice it is possible to cross the wash.

(E) Maneuver the ski by subtle weight shifts in the direction skier wants to go. Have them try turning their head then their shoulders in the direction they want to go. Remind the skier to experiment slowly. FINESSE is the way to success!

- Explain the progression for using the easy up. The start is the same as the ski being towed. Repeat A-E above. Instruct the skier not to touch the handle until they are

ready to release the knot from the "V" block. There is no hurry to rush the release. The skier will reach down and pick up the handle and sharply pull it toward himself. The knot will come loose of the "V" block and the skier will have a free rope.

B. STARTING AND SKIING

- Skier and instructor move into water four feet deep. Water must be deep enough for the ski to float at a 45 degree angle.
- Skier mounts the ski trying both techniques.
- Skier maintains static balance trying both techniques.
- Skier will communicate with the boat driver when he is ready.
- Boat driver will get the rope handle to skier (if it is not already connected to ski). It is the skiers responsibility to hold onto the handle.
- Be sure the rope is attached to the tow ring or is firmly in "V" block.
- Skier says "IN GEAR!"
- Be sure the ski is at a 45 degree angle with the tip out of the water 1 foot.
- Skier looks through the ski to the horizon or back of boat.
- Skier leans forward and holds cage or ankles.
- Skier says "HIT IT!"

C. SUPPLEMENTARY INSTRUCTIONS WHEN SKIER HOLDS THE ROPE TO START

- Place the deep V handle over the tip of ski.

- Explain the two hand positions for the start.

The first is with arms straight and low. The handle is held in front of shins and the elbows are pressing against cage for extra support.

D. SUPPLEMENTARY DRIVER INSTRUCTIONS WITH SIT SKI TOWED

- To start, accelerate slowly. The driver must slow down if the ski begins to porpoise (tip bouncing) and speed up if the ski is not planeing.

- Don't turn so sharp as to pull the sit ski over the wake. The ski is very difficult to

control outside of the wake when it is being towed.

- When returning to the beach/dock the driver must maneuver the skier as close to dock as safety will allow, before the observer operates the quick release and releases the sit ski.

- When the easy up block is used the same starting technique as the towed ski is used. The sit ski is more difficult to control at slower speeds, so, after the rope is released from the easy up block the speed must be increased to 16 m.p.h. or faster. Watch for the hand/head signals.

E. WITH SIT SKIER HOLDING ROPE

- When the sit skier is holding the handle, the pull from the driver is similar to an able bodied skier. The wider the sit ski the less power needed at the start. A sit ski 15 inches or more will need about the same throttle as a skier on double skis. A more advanced sit ski (13 inches or less) will need the same pull as a standard single ski.

F. STARTING AND SKIING FOR SINGLE LEG AMPUTEES, WITHOUT A PROSTHESIS

- The most preferable method is to use a training boom.

- With deep water starts use a long "V" rope.

- Keep the ski and the body in a straight line with the pull of the boat.

- The stump should be straight and pushed backwards to act as a rudder.

- Once up, the stump should not wave about but be kept close to either the front or side of the sound leg.

- The arms should be kept bent and as low as possible, elbows close to the waist. The skier must keep the center of gravity as low as possible with the pull coming through the leg.

G. SUPPLEMENTARY DRIVER INSTRUCTIONS

For a deep water start with a single leg amputee, who is not using prosthesis, it is particularly important that the skier is in a straight line with the pull of the boat.

Start the skier by gently "dragging" him at an idle speed until he gets his balance and is tracking absolutely straight.

Wait for his call to say that he is ready, then give him full power as with any slalom skier.

SOME ADVANCED TECHNIQUES

Once the skier has mastered the takeoff and skied a few runs it is natural for him to become more adventurous and risk more falls. Half of the fun of learning can be to survive a fall and laugh and talk about it to others who may have been witnesses. The skier might comment, "Next time I will.....". It's all part of the learning and increasing the confidence.

The first advanced maneuver that any skier attempts will probably be the **wake crossing**. This is where the control practice within the wake is useful. When attempting this the skier should make a very positive move to cross the wake. He should not try to "ease" across because the ski will have a tendency to 1) be sucked into the wake and tip toward the boat, or 2) to dip the outside edge and tip away from the boat. Either of these will likely result in a fall.

Approach the wake with authority and establish one continuous move over it. Some skiers with higher injury levels and less trunk balance may want to hold the towline in the one hand closest to the boat while holding onto the lower vertical seat cage bars with the other hand to stabilize the ski somewhat. Advanced skiers also use this technique to gain a greater angle at the wake and for greater speed.

Higher wake crossing speeds naturally lead to the next adventure of **wake jumping**. A skier can "grab air" easily with sufficient speed. With the boat speed of 22-24 mph and an aggressive approach from outside of the wake, clearing the water by 12" is common. The key to a controlled jump is to attack the wake hard and to hit it squarely with the ski level. This will allow the ski to go over the top and not slice through the wake. The jump through the air is the easy part.

Landing and maintaining control after a jump is a bit more difficult. This author prefers a handhold on the bottom front vertical seat cage bar when performing this maneuver for two reasons: 1) to stabilize the ski and assure that it lands squarely and, 2) to stabilize the upper body within the seat cage.

The skier may also attempt to shift a bit more weight to the rear of the ski for the landing to help keep the tip from 'digging in'. One of the hardest falls that I have taken has been when the ski "nose dives" after a jump. Be prepared for a sudden stop!

In the event of such a fall be sure to give the boat driver the "skier OK" (raising an arm overhead) signal if all is well.

A well executed **slalom turn** is something of beauty to see performed. It is a

combination of power and finesse. The skier changes speed and direction in one motion. As he crosses the wake he is at maximum speed, he decelerates as the turn is performed and then accelerates to maximum speed once again.

FITTING AND ADJUSTING THE KAN-SKI

I. **Mounting cage to board:** Remove the four T-nuts on the board and place the cage on to the ski with mounting studs through middle holes. Replace the T-nuts.

II. **Adjusting sling height:** Sling height is the most subjective setting of the KAN-SKI. The lower the sling, the more stable the ski will feel and the easier it will be to control. The higher the sling, the easier it is to move the ski onto an edge and the more sensitive it will feel. Start with the sling in a low position and move it up as you gain experience and confidence.

   A. To adjust height, simply release the buckle located on the underside of cage and tighten or loosen straps as desired. If you have excess strap ends fold them back up under strap positioning piece.

   B. Be sure there is room for user's hips to drop below the top rails of the cage. Check that there is no part of user's buttocks touching the bottom rails.

III. **Checking cage width:** The cage should fit snugly, you will need to twist your hips to get into it. The object is to have your hips slide forward below the top rails to keep you positioned firmly while skiing but also allowing you to pop out if you should fall.

   Note: It should be more difficult to get into the cage when dry, however, it will fit looser when wet.

IV. **Adjusting foot plate:** Sit in cage with feet in foot plate. There should be contact between the back of user's knees and knee support bar. Also, the user's feet should be snug in the foot plate while allowing the heels of the feet to maintain contact with the foot plate. It is IMPORTANT THAT FEET ARE FIRMLY IN THE FOOT PLATE BINDING BEFORE ATTEMPTING TO SKI.

V. **Final adjustment:** After all above adjustments have been made, position yourself in the ski again and be sure everything is set correctly. Remember, it is easier to make these adjustments on land instead of while in the water.

VI. **Testing your ski:** Try skiing with the cage and foot plate in this position. While skiing on flat, smooth water (try directly behind the boat inside the wake) notice the attitude of the ski on the water.

   A. If the ski tip is bouncing up and down or "porpoising" move the cage forward.
   B. If the ski is tip heavy or "plowing" move the cage. Try moving just one hole at a time until proper position is found.

SAFETY

WATER SAFETY TEST

It is not required that participants be swimmers before they learn to ski.

Many skiers have learned to ski first and then learned to swim because of their new-found enjoyment in a water sport.

Have the participants get into the water (this is a good opportunity to observe the abilities of the participants) and demonstrate their capability of turning themselves from a face down position to a face up position with a life vest on.

If they can't turn themselves to the face up position unassisted, let them try the exercise wearing a life jacket.

If the participant cannot turn himself over, the rescue boat must be a wave runner.

COMMUNICATION

I. VERBAL COMMANDS

There are four verbal commands between the skier and boat driver. They are:

"Clear!"
This command can be either a question from the boat driver asking if the propeller is free of obstruction (i.e. people, ropes, snags, etc.) or a statement from the observer or skier that the area is clear.

"Out of gear!"
This command can be either a question from the skier to the boat driver asking if the transmission has been disengaged, or a response from the boat driver informing the skier the transmission is in neutral.

Note: If there isn't a transmission (i.e. direct drive boats) the motor must be shut off whenever the boat and any part of the participant is close enough to touch.

- "In gear!"
  This is the command from the skier for the driver to take up the slack rope.

- "HIT IT!"
  The command from the skier to the boat driver to start.

II. HAND SIGNALS

hand up after fall = O.K.

thumb up = faster

thumb down = slower

pat head = back to start

slash neck motion = cut boat power; stop now

OK with fingers = everything O.K.