

## ***WATER WORKOUT FOR STRESS FRACTURE REHABILITATION***

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Stress fractures are the result of repetitive, cyclic loading of bone at a level below what would normally cause a bone to break. Although impact forces make our bones stronger, bone adaptation requires time and repetitive overloading overwhelms the reparative ability of the skeletal system resulting in micro-tearing and ultimately stress fractures. Commonly occurring in the lower leg, ankle and foot, it is no surprise that stress fractures occur primarily in sports that require a large amount of running and jumping. Some of the common causes of stress fractures include:

- Increased quantity of training
- Using poor athletic equipment (worn out running shoes)
- Undertaking a new activity
- Changes in training environments (non-absorptive surfaces)

**Regardless of the underlying causes for stress fractures, the healing process requires time and thus, all impact forces must initially be avoided. This does not mean that an athlete needs to avoid activity. It does, however, mean that training techniques must be changed to eliminate high-impact training in the short term with gradual return to regular training activities within a six to eight week period.**

As an alternative to high-impact training, ***deep-water running*** and ***shallow water exercises*** may be employed. Together, these activities will help maintain strength and cardiovascular fitness while the body heals. Presented below is an intensive 6-week program for stress fracture rehabilitation of the lower extremity. This program requires 5 days of water training per week and is designed to progress through the various stages of healing from a stress fracture to safely return to previous levels of activity.

A few important notes before beginning:

1. In water, your stride rate will be slower than on land due to the increased resistance of moving through the water. Do not worry about this because you're still going to positively stress your cardiovascular system while reducing the stress to your injury.
2. While running in water, you may actually move forward and end up running laps in the pool, especially if your torso is angled forward. This is fine but if space is limited, you will want to maintain an upright posture by utilizing your trunk muscles. This will result in little or no forward movement.

3. The temperature of the water will affect your heart rate. Generally, heart rates are 10% lower during water running than on land. This is due in part to the cooling effect of the water, but is primarily due to the pressure of the water on the body, causing more blood to return to the heart so that more blood is pumped out of the heart with each beat.

## ***PROGRAM DESCRIPTION***

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### **Phase I (Weeks 1-2)**

This phase immediately follows a diagnosis of acute stress fracture in which impact activity is not only painful but prohibited. The primary goal here is to minimize stress to the affected area while being able to train at a level to maintain cardiovascular fitness. This is achieved through **Deep Water Running**. Accordingly, it may appear necessary to run for long periods of time in deep water in order to maintain fitness. However, research has shown that it is very difficult to run in deep water for extended periods of time at a high enough intensity to maintain cardiovascular fitness. As a result, interval training in water has been shown to be more effective at maintaining and improving cardiovascular fitness and is comparable in benefits as dry-land training. Further, interval training gives the physical and mental breaks necessary to maintain focus and intensity throughout training.

### **Phase II (Weeks 3-4)**

At this point, the fracture has been given some time to heal as repetitive impact has been avoided. It is now appropriate to incorporate **Shallow Water Running** with deep water running. This progression will provide some stress to the injury area but at a reduced load due to the buoyant effects of water.

### **Phase III (Weeks 5-6)**

This phase focuses on maximally loading the body in water using shallow water running and progressing to **Shallow Water Exercises**, while continuing to maintain cardiovascular fitness with deep water running. As well, it is now appropriate to begin a slow, progressive return to reduced-impact cross-training activity such as biking, elliptical, stair climber, etc. †.

† **Any pain or discomfort upon beginning weight-bearing exercises requires that you stop the exercise. Further progression may in fact harm the healing tissues more. As a result, you may need to prolong your rehabilitation by repeating the previous week's training program and allow your body to continue to heal.**

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## Phase IV (Weeks 7-8)

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The final phase focuses on maximally loading the body in shallow water. As well, it is appropriate to incorporate relatively higher impact activities in order to make a smooth transition from water to land.

### ***EXERCISE DESCRIPTION NOTES***

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✦ **Cross-Training Activities:**

This activity should be limited to stationary cycling, a stair climber or elliptical trainer due to the relatively low-impact of these types of machines.

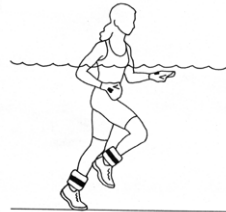
✦ **1:4:1 Progression:**

1 minute hard, 1 minute easy; 2 minutes hard, 1 minute easy; 3 minutes hard, 1 minute easy; 4 minutes hard, 1 minute easy; 3 minutes hard, 1 minute easy; 2 minutes hard, 1 minute easy, 1 minute hard, 1 minute easy.

✦ **Deep Water Running:**

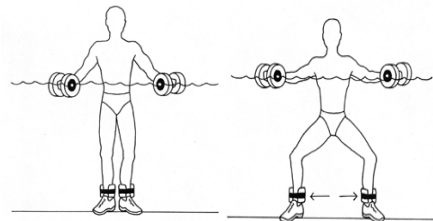
Many facilities have buoyancy waist or ankle belts that may be used to assist for the initial stages of a deep water running program. Wearing a pair of running shoes may help to provide buoyancy making the workout a little easier.

✦ **Shallow Water Running:**

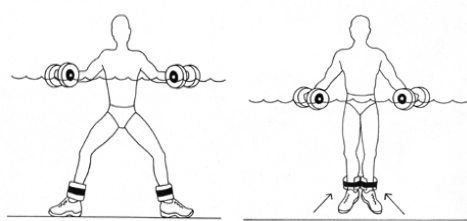


✦ **Shallow Water Exercises:**

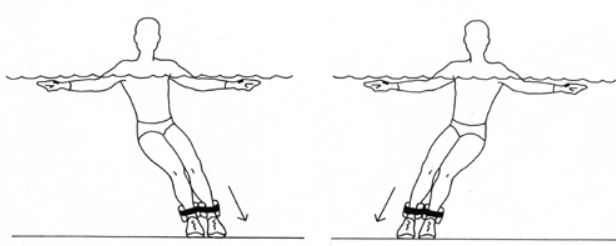
Half Jacks:



Straddle Jumps:



## Mogul Jumps:



***Note: It is important for you to follow any specific instructions given to you by your Doctor. Your active participation in your rehabilitation will dramatically improve your recovery time and aid in the effectiveness of your in-office treatments. If you have any questions regarding the information provided in this handout, please don't hesitate to contact your Doctor.***

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>Phase I:</b> Week1	5 Minute warm-up 2 sets 5 x 1:30 hard (30 second recovery b/t reps 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up 1 set 6 x 2:30 hard (30 second recovery) 5 minute cooldown	5 minute warm-up 30 minutes steady deep water running	Off	5 minute warm-up 1-4-1 Progression 5 minute cooldown	5 minute warm-up 4 x 5 minutes hard (1 minute recovery) 5 minute cooldown	Off
Week 2	5 Minute warm-up 3 sets 5 x 1:30 hard (30 second recovery b/t reps 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up 1 set 7 x 2:30 hard (30 second recovery) 5 minute cooldown	5 minute warm-up 40 minutes steady deep water running	Off	5 minute warm-up 1-4-1 Progression 5 minute cooldown	5 minute warm-up 5 x 5 minutes hard (1 minute recovery) 5 minute cooldown	Off
<b>Phase II:</b> Week 3	5 Minute warm-up 2 sets 6 x 1:30 hard (30 second recovery b/t reps 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up 1 set 8 x 2:30 hard (30 second recovery) 5 minute cooldown	5 minute warm-up 50 minutes steady deep water running	Off	5 minute warm-up 1-4-1 Progression 5 minute cooldown	5 minute warm-up 6 x 5 minutes hard (1 minute recovery) 5 minute cooldown	Off
Week 4	5 Minute warm-up 3 sets 6 x 1:30 hard (30 second recovery b/t reps 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up <b>DEEP Running:</b> 1 set 4 x 2:30 hard (30 second recovery) <b>SHALLOW Running:</b> (30 second recovery) 5 minute cooldown	5 minute warm-up 40 minutes steady deep water running	Off	5 minute warm-up 1-4-1 Progression 5 minute cooldown	5 minute warm-up 6 x 5 minutes hard (1 minute recovery) 5 minute cooldown	Off

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>Phase III:</b> Week5	5 Minute warm-up 2 sets 7 x 1:30 hard (30 second recovery b/t reps) 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up <b>DEEP Running:</b> 1 set 4 x 2:30 hard (30 second recovery) <b>SHALLOW Running:</b> 1 set 4 x 1:30 hard (30 second recovery) 5 minute cooldown	5 minute warm-up 40 minutes steady deep water running	Off	5 minute warm-up 1-4-1 Progression 5 minute cooldown	5 minute warm-up <b>SHALLOW Running:</b> 1 set 6 x 1:30 hard (30 second recovery) 5 minute cooldown	30 minutes X-training
Week 6	5 Minute warm-up 3 sets 7 x 1:30 hard (30 second recovery b/t reps) 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up <b>DEEP Running:</b> 1 set 4 x 2:30 hard (30 second recovery) <b>SHALLOW Running:</b> 1 set 4 x 1:30 hard (30 second recovery) 5 minute cooldown	5 minute warm-up 40 minutes steady deep water running	30 minutes X-Training	5 minute warm-up 1-4-1 Progression 5 minute cooldown	5 minute warm-up <b>SHALLOW Running:</b> 1 set 4 x 1:30 hard (30 second recovery) <b>SHALLOW Exercise:</b> 3 sets 15 reps <b>Half Jacks</b> (30 second recovery) 5 minute cooldown	45 minutes X-Training
<b>Phase IV:</b> Week 7	5 Minute warm-up 2 sets 8 x 1:30 hard (30 second recovery b/t reps) 2 minutes b/t sets) 5 minute cooldown	5 minute warm-up <b>SHALLOW Running:</b> 1 set 4 x 1:30 hard (30 second recovery) <b>SHALLOW Exercise:</b> 3 sets 15 reps <b>Half Jacks</b> (30 second recovery) 5 minute cooldown	5 minute warm-up 40 minutes steady deep water running	30 minutes X-Training	5 minute warm-up 1-4-1 Progression 5 minute cooldown 20 minutes light jog on land	5 minute warm-up <b>SHALLOW Running:</b> 1 set 4 x 1:30 hard (30 second recovery) <b>SHALLOW Exercise:</b> 3 sets 15 reps <b>Straddle Jumps</b> (30 second recovery) 5 minute cooldown	45 minutes X-Training
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