



LAND-BASED STRENGTH AND CONDITIONING FOR SWIMMING

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Competitive swimming is comprised of four strokes: the freestyle, backstroke, breaststroke, and butterfly. Depending on the competition level of the individual, the sport of swimming can be a year-round commitment and require a very demanding training schedule. Incorporating land-based strength and conditioning into a training regimen can give the athlete a competitive edge, especially in a sport where a 100th of a second could determine the outcome of a race. Full-body strength and power exercises should be included when designing a program to reduce the risk of injury for the shoulder complex, knee joint, and hip adductors (1,2). Due to year-round swim meets for club and high school swimmers, implementing a periodized strength and conditioning program may be difficult. Proper rest, recovery, tapering, and peaking should be included when developing programs around swim meets, especially for those individuals competing for state, regional, and national cut times. The strength and conditioning professional can better achieve these goals by developing a relationship with the swim coach so the athletes are training at the same intensities, tapering at the same time, and peaking before major competitions.

When designing a program, three phases of the swim should be examined for strength and conditioning exercise considerations: the start (the dive from starting blocks or side of the pool), the swim, and the turn (the reverse of direction upon reaching the wall, several different styles can be used depending on the swimming stroke). The percentages for each variable will change depending on the distance of the swim, for example, the 50-m freestyle race is approximately 20% for the start, 30% for the turn, and 50% for the swim (based on required exertion not time) (2). When training for overall fitness and performance, a thorough well developed program that covers all of the major muscles should be incorporated (Table 1 and 2). As with every sport, there are sport-specific exercises or movements the athlete should perform in order to mimic the specific event or activity they are trying to improve.

Studies have shown that adding plyometric training and focusing on triple extension at the hip, knee, and ankle could decrease overall time (1,2). Box jumps, broad jumps, and scoop tosses that include vertical tosses can be performed for overall power. Additionally, these exercises can be adapted for specific training

needs by using a modified horizontal scoop toss that simulates exploding off the blocks (Figures 1, 2, and 3).

The anchored barbell squat press exercise is performed by squatting and exploding through a triple extension movement with the hips, knees, and ankles and finishes with an upper body press using the chest, shoulders, and triceps (Figures 4, 5, and 6). This can help with improving times off the blocks and decreasing turn times during the swim. Additionally, a donkey kick exercise using a medicine ball is a sport-specific movement that may help improve strength and power at the turn during the race (Figures 7 and 8).

Due to a higher occurrence of shoulder injuries in swimmers (approximately 47 – 80%), incorporating shoulder-specific exercises like alternating dumbbell front raise movements may help to reduce the occurrence of those injuries (Figures 9 and 10) (2). Additionally, swimmers could benefit from rotator cuff strengthening exercises such as planks or stability ball walkouts in their training programs to reduce the instance of shoulder injuries (3). The core should also be trained in all directions and planes of movement since a strong and stable core will allow the swimmer to produce powerful pulls and kicks for longer periods of time (2). The around the world exercises challenge the core in the sagittal and transverse planes. They use a medicine ball and a partner to catch passes from the front, both sides, and behind the athlete (Figures 11, 12, and 13). Standing medicine ball rotations are an example of core rotational movements that can be performed without a partner (Figures 14, 15, and 16).

Strength and conditioning professionals should take advantage of the times during the year when intensity and volume can be increased so that gains can be made prior to tapering before a major event. As with any strength and conditioning programs, athletes should be monitored closely as to avoid overtraining during a competitive season. The workouts in Tables 1 and 2 are examples of higher intensity and higher volume routines. The sample workouts in Tables 1 and 2 can be used as part of an off-season program for swimmers or can be modified by decreasing intensity or volume when tapering for a competition.

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MODIFIED HORIZONTAL SCOOP TOSS (FIGURES 1, 2, AND 3)

Start with the medicine ball placed between the feet. In one quick explosive movement, grasp the medicine ball with both hands on either side of the ball. Swing the arms forward and explosively jump while releasing the ball horizontally against the wall.



FIGURE 1. MODIFIED HORIZONTAL SCOOP TOSS - START



FIGURE 2. MODIFIED HORIZONTAL SCOOP TOSS - BLOCK START



FIGURE 3. MODIFIED HORIZONTAL SCOOP TOSS - RELEASE

ANCHORED BARBELL SQUAT PRESS (FIGURES 4, 5, AND 6)

Start in an upright position holding the end of the bar with both hands at chest level. Flex at the hips and knees to perform a squat, then drive through the heels, extend the hips, and drive the bar above the head.



FIGURE 4. ANCHORED BARBELL SQUAT PRESS - START



FIGURE 5. ANCHORED BARBELL SQUAT PRESS - SQUAT



FIGURE 6. ANCHORED BARBELL SQUAT PRESS - TRIPLE EXTENSION

LAND-BASED STRENGTH AND CONDITIONING FOR SWIMMING

DONKEY KICK (FIGURES 7 AND 8)

Start in a supine position with the trainer in front and ready to toss the medicine ball. To perform the exercise, the trainer should carefully toss the ball toward the feet of the athlete. The athlete should simultaneously extend at the knees and hips in order to strike the ball with the bottom of the feet and drive the ball back to the trainer.



FIGURE 7. DONKEY KICK - START



FIGURE 8. DONKEY KICK - FOOT CONTACT WITH EXTENSION

ALTERNATING DUMBBELL FRONT RAISE (FIGURES 9 AND 10)

Start with dumbbells in front of the body with elbows slightly bent. Staying under control, move the arms quickly up and down, while performing flexion and extension at the shoulder.



FIGURE 9. ALTERNATING DUMBBELL FRONT RAISE



FIGURE 10. ALTERNATING DUMBBELL FRONT RAISE

AROUND THE WORLD (ATW)

The ATW core circuit includes four different exercises: sagittal plane toss, rotation toss (left and right), and a reverse toss. The trainer will start out in front of the athlete with the sagittal plane toss, then move to a side for a rotational toss, followed by taking a position behind the athlete for a reverse toss, and finally to the other side to finish the rotations. The amount of repetitions and medicine ball size will depend on the athlete's fitness level. Using a 4 – 6 lb medicine ball for 2 – 5 repetitions per exercise is a good place to start for most beginners.

ATW - SAGITTAL PLANE TOSS (FIGURE 11)

The athlete will start in a seated position with the legs out in front and knees slightly bent. Arms should be extended with the hands in front of the face ready to receive the ball. The trainer will perform a chest pass aiming slightly above the head. The athlete will catch the ball, go backwards, and tap the ball to the ground over their head to create an eccentric load on the core. The athlete will then return the ball back to the trainer quickly and explosively following through with the arms. The concentric toss back is done in one movement with the hands over the head; it is not a sit-up and chest pass.



FIGURE 11. AROUND THE WORLD - SAGITTAL PLANE TOSS

ATW - ROTATION TOSS (LEFT AND RIGHT) (FIGURE 12)

The athlete will be seated with legs out in front and knees slightly bent, while the trainer will stand perpendicular. The trainer will toss the ball to the athlete across their body. When the athlete receives the ball, they will rotate with arms extended following the ball with their eyes and tap the ball on the floor to the opposite side of the trainer. Then, the athlete will explosively toss the ball back to the trainer.



FIGURE 12. AROUND THE WORLD - ROTATION TOSS

LAND-BASED STRENGTH AND CONDITIONING FOR SWIMMING

ATW - REVERSE TOSS (FIGURE 13)

The athlete will start in a seated position with legs out in front and knees slightly bent facing away from the trainer. Simultaneously, the trainer will pass the ball over the head of the athlete, where they will catch it at chest-height while moving forward. The athlete will tap the ball to the ground in front of them and then return the ball explosively back to the trainer over their head. The trainer and athlete must aim their tosses carefully so that they do not hit each other and the athlete is always keeping a straight and centered back to avoid the risk of injury.



FIGURE 13. AROUND THE WORLD - REVERSE TOSS

STANDING ROTATIONAL WALL TOSS (FIGURES 14, 15, AND 16)

The athlete will start with the medicine ball directly out in front of their body and with their elbows slightly bent. The athlete will swing their arms backwards in a rotational pattern with their elbows slightly bent and follow the ball with their eyes to maximize rotation. The athlete should toss the medicine ball into the wall powerfully, catch the rebound, and perform the same movement to the opposite side. The athlete should also let their ankles, knees, and hips move freely throughout the range of motion.



FIGURE 14. STANDING ROTATIONAL WALL TOSS - START



FIGURE 15. STANDING ROTATIONAL WALL TOSS - RIGHT



FIGURE 16. STANDING ROTATIONAL WALL TOSS - LEFT

TABLE 1. OFF-SEASON RESISTANCE TRAINING PROGRAM EXAMPLE

TYPE OF EXERCISE	EXERCISE	SETS/REPS	TYPE OF SET
LBPWR	Sled Push	4 sets	Circuit
HPWR	Modified Horizontal Scoop Toss	4 x 5	Circuit
VPWR	Box Jump	4 x 5	Circuit
UBS	Incline Press	4 x 8	Superset
UBS	One-Arm Dumbbell Row	4 x 10	Superset
LBS	Kettlebell Swings	4 x 10	Superset
LBS	Deadlift	4 x 8	Superset
Core	Around the World	3 x 8	Circuit
UBE	Pull-Ups	3 x 10 - 15	Circuit
UBE	Push-Ups	3 x 10 - 15	Circuit

KEY:

LBS = Lower Body Strength
 UBS = Upper Body Strength
 UBE = Upper Body Endurance

LBPWR = Lower Body Power
 HPWR = Horizontal Power
 VPWR = Vertical Power

TABLE 2. OFF-SEASON RESISTANCE TRAINING PROGRAM EXAMPLE

TYPE OF EXERCISE	EXERCISE	SETS/REPS	TYPE OF SET
LBS	Anchored Barbell Squat Press	4 x 8	Complex Set
HPWR	Broad Jump	4 x 5	Complex Set
UBS	Bench Press	4 x 8	Compound Set
UBS	Dips	4 x 10 - 12	Compound Set
UBS	High Pull	4 x 8	Compound Set
UBS	Suspension Trainer Rows	4 x 12 - 15	Compound Set
LBS	Leg Press	4 x 8	Complex Set
LBPWR	Donkey Kicks	4 x 5	Complex Set
Core	Ab Wheel	3 x 3	Circuit
Core	Standing Rotational Wall Toss	3 x 10	Circuit
UBS	Alternating Dumbbell Front Raises	3 x 8	Circuit