

ONLINE TRAINING CONCEPTS

MOCKE 
PASSION » PURPOSE » PERFORMANCE

Congratulations and well done on purchasing the Training for Surfski Course. The intention of this course is to help you train and get fit and better for surfski paddling.

The emphasis of this document is directed towards training for surfski racing, although, preparation for your local canoe series, time trial or recreational paddling involves the same training principles. This document is also intended to stimulate thought and discussion about the training course you have just purchased. Are you achieving your racing goals? Have you reached a plateau or are you losing your competitive edge?

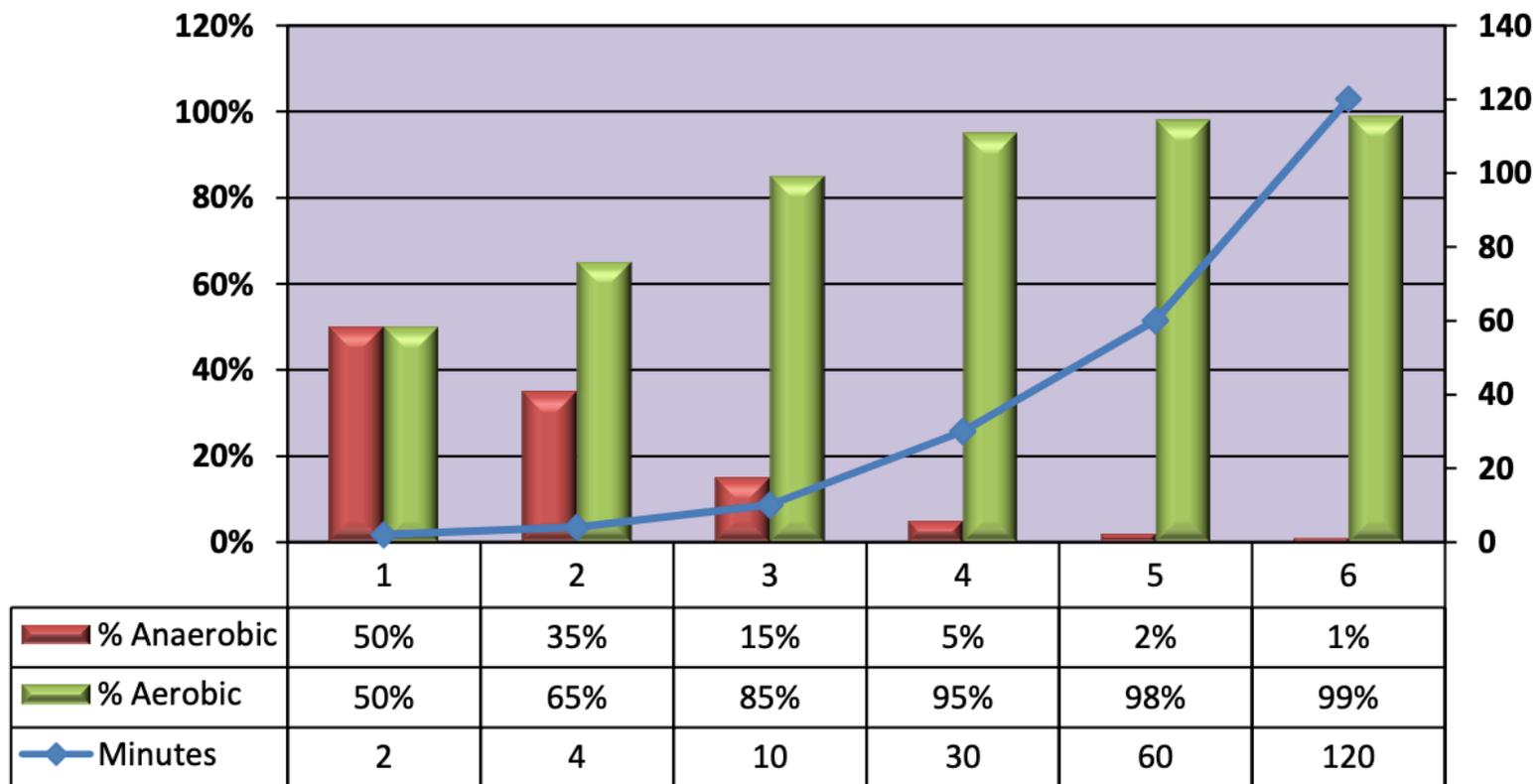
Every training session should have a purpose. Most of us are limited to the amount of time that we can spend paddling. So make sure you spend this time effectively and specifically to reach your objectives.

We hope that this course will allow you to achieve more than you had ever hoped for and make you reach your dream.

CONCEPT I: AEROBIC TRAINING FOR AEROBIC RACING

The major energy source for paddling differs depending on the intensity and duration of exercise. Table 1 illustrates the relative contribution of aerobic (reactions involving oxygen) and anaerobic (reactions not requiring oxygen) energy sources. The energy spectrum describes the concept that as exercise progresses beyond several minutes, the aerobic system predominates. By understanding this energy spectrum, it is possible to train for specific improvements of the appropriate energy system.

Table 1: The Duration of Maximum Exercise Energy Spectrum



If the race lasts longer than 30 minutes, 95% or more of the energy for the race is derived from aerobic sources. When this concept is applied to training, it is clear that most training time should be spent on aerobic development.

For example, if available training time is two days per week and one day is devoted to anaerobic workouts, then 50% of the training time is spent preparing for 5% of the race. A better balance might involve a long aerobic paddle one day and an anaerobic threshold paddle the second day. Aerobic training takes place at intensity below the anaerobic threshold. You should be able to talk comfortably and enjoy the scenery at this level. The anaerobic threshold occurs at the intensity at which the breathing rate begins to elevate rapidly. If you are working harder than this, you are training for something else.

Remember to use your time effectively by designing your training composition to compliment your racing. If your race is mostly aerobic, then use most of your time to boost your aerobic system.

Maximizing aerobic fitness is the most important means of achieving most racing goals.

Concept II carries this theme further by introducing "the long training paddle"

CONCEPT II: THE LONG TRAINING PADDLE

The long training paddle is performed continuously at a relatively comfortable intensity for an extended length of time. Although the work intensity increases progressively as training improvements are achieved, the training stimulus is generally accomplished by increasing exercise duration. If you decide to try the long paddle, gradually increase a training session on alternate weeks to two hours or more.

The long aerobic training paddle enhances the rate at which the exercising muscles can utilize fat. Stored fat is the body's largest source of potential energy. Average fat reserves represent about 100,000 kcal of energy, while carbohydrate energy reserves are less than 2000 kcal. While the quantity of fat available for energy is almost limitless, carbohydrates can be depleted rapidly. As fat becomes the remaining energy source, it will become preferred for much of your endurance performance. Fat is only metabolized in the presence of oxygen and the long paddle is the perfect tool to train the athlete's ability to mobilize and utilize fat as an enhanced energy source.

The long training paddle is a convenient way for the paddler with time constraints to increase the weekly training workload (training stimulus). If you are currently paddling one hour two days per week and increase one training session to two hours, your weekly workload increases by a very significant 50%.

During the long training event hydrate freely with fresh water, also take along an energy supplement in the form of a drink or carbohydrate rich gels. Use this carbohydrate only if necessary to push you through an energy low. By restricting food intake during the paddle, you place an urgent demand on your fats to be a primary source of energy. At the end of your exercise, replenish immediately with lots of carbohydrates, electrolytes, and water.

The long paddle should become an important part of your training program. The increased weekly workload will improve your aerobic fitness. On race day, the long paddle will help boost your performance and leave you with a powerful finish.

As the weather gets nicer and the evenings get longer, it is easier to slip in a third weekly workout. The emphasis so far has been to establish that all important aerobic base including a weekly aerobic paddle, a lactate threshold paddle, and a biweekly long paddle. Now that you're comfortable with this workload, it's time to increase the workout intensity by including the 1000 meter time trial. Adding this strategy to your training offers potentially huge benefits from a quick, high intensity workout.

CONCEPT III: THE 1000 METER TIME TRIAL

Races are the highest quality workouts and can have the greatest impact on your fitness. The time trial is a race against the clock and should be performed at top speed but with your best form. The racing benefits derived from the 1000 meter time trial typically are greater than those from other distances.

The 1000 meter time trial will improve your speed, power, economy, and endurance. These are all the things that we desire in order to enhance our paddling performance. Here are some reasons to focus on the 1000 meter workout:

1. Race pace training increases aerobic capacity more than a less intense but longer workout.
2. 25% of the energy required to paddle 1000 meters is produced anaerobically. Improved anaerobic capacity will enhance your kicking power at the end of longer races and improve your ability to utilise mid-race surges.
3. Practicing at 1000 meter speeds decreases the "perceived effort" experienced in longer races.
4. The faster pace develops neuro-muscular coordination for maximum power production and sustained faster pace.
5. 1000 meter pacing improves your paddling economy in order to allow you to paddle faster for a given effort and to conserve muscle glycogen.
6. This training heightens the aerobic capacity of fast twitch muscles, therefore, increases your VO₂max and paddling velocity at lactate threshold.
7. Faster paddling improves biomechanics, dynamic flexibility, and range of motion for greater speed development.
8. Faster turnover develops optimal stroke cadence for racing.
9. Training variation offered by the 1000 meter time trial adds physiologic adaptation specific to that form of training and adds to your overall fitness.
10. The speed developed from the 1000 meter time trial improves performances at longer distances.

A 1000 meter course in a canal or at your local beach is perfect for this time trial. Start with a 20 minute easy warm-up paddle. Record your 1000 meter time so that you can monitor your improvement. Warm-down for 20 minutes. Stretch after your workout and relax while you re-hydrate and replace carbohydrate stores.

You should realize large performance benefits for very little training time.

You want to get faster? Gradually increase your ability to paddle fast. Much of that new speed will come from having a higher VO₂max rather than from the development of anaerobic capacity. More oxygen processed by the muscles creates more energy, more muscle force, and a higher paddling velocity. Some speed will come from improved economy, because economy means higher speeds without incurring greater oxygen cost. Some will come from lifting the lactate threshold (LT), because a higher threshold allows speeds to be sustained for longer periods of time. And some will come from better neuromuscular coordination - improved reactivity of the nervous system. This heightened ability to utilize available muscular force to drive the boat forward reduces wasted energy on non-propulsive, stabilizing movements. And some speed will come from pure strength - the ability to stabilize the body and generate large amounts of force.

Optimal speed development involves carrying out a lot of work at target race pace (TRP). The "specificity principle" implies that specific exercise elicits specific adaptations creating specific training effects. In other words, you must practice the specific thing that you want to improve. This practice will also be at an intensity that will boost your lactate threshold paddling velocity (LTPV). LTPV is a great predictor

of performance in both endurance and sprint events. When you paddle faster than LTPV, lactate production outpaces consumption and large amounts of lactate begin to accumulate in the blood. Someone with a high LTPV can paddle faster with less lactate accumulation and less fatigue. As LTPV improves in response to appropriate training, it pushes up VO₂max and pulls up paddling velocity.

CONCEPT IV: STRATEGY FOR SPEED DEVELOPMENT

The speed development strategy is a simple systematic plan that deserves some effort. The essence of this concept is that you must be able to paddle the TRP (target race pace) for a short distance before you can sustain it in a long race. What to do?

1. Determine your TRP. For example, if you are preparing for a 15km race, review your times from previous races over the same course, and decide on your goal for this race. Check the pace chart (Table 2) to determine your required km/h for the course. If your time for your last race over this distance was 01:30:00 your average speed was 10km/h.
2. Your goal is to break 001:25:00 this time out. Your TRP is 10.5km/h. This is a fairly big step, but see if it works. You need to learn to paddle this new pace reliably. According to the pace chart, you must be able to stroke 1000m in 00:05:42. If necessary, establish a slower goal for a while, because you'll need to paddle this speed for 8 X 1000m repeats with a 3 minute recovery between each repeat. This should be a hard effort but not an all out sprint. All repeats should be the same speed/time. Otherwise, adjust your pace accordingly.

	Distance Travelled						
Km/h	500m	1000m	10km	15km	20km	25km	35km
9.0	00:03:20	00:06:40	01:06:40	01:40:00	02:13:20	02:46:40	03:53:20
9.5	00:03:09	00:06:18	01:03:09	01:34:43	02:06:18	02:37:53	03:41:02
10.0	00:03:00	00:06:00	01:00:00	01:30:00	02:00:00	02:30:00	03:30:00
10.5	00:02:51	00:05:42	00:57:08	01:25:42	01:54:16	02:22:50	03:19:58
11.0	00:02:43	00:05:26	00:54:32	01:21:48	01:49:04	02:16:20	03:10:52
11.5	00:02:36	00:05:12	00:52:10	01:18:15	01:44:20	02:10:25	03:02:35
12.0	00:02:30	00:05:00	00:50:00	01:15:00	01:40:00	02:05:00	02:55:00
12.5	00:02:24	00:04:48	00:48:00	01:12:00	01:36:00	02:00:00	02:48:00
13.0	00:02:18	00:04:36	00:46:09	01:09:14	01:32:18	01:55:22	02:41:31
13.5	00:02:13	00:04:26	00:44:26	01:06:39	01:28:52	01:51:05	02:35:31
14.0	00:02:08	00:04:16	00:42:51	01:04:17	01:25:42	01:47:07	02:29:58

3. Secondly, continue this recovery time progression until you are down to 1 minute breaks between the repeats. At this point, try 2 x 1000m repeats, striving for the TRP for each repeat.
4. Now increase your pace for the 8 X1000m repeats and continue the process

Note that the 500m and 1000m speeds are calculated as steady-state velocities. Because you actually start at zero mph and accelerate for approximately 50 meters, your maximum speed is actually just a bit faster than indicated. This correction factor varies for individuals and is easier to just ignore.

Always establish a goal time for a race. This should not be a wild guess but a sure thing because you have practiced TRP. Make your own pace chart to include intended race distances. The influence of waves, wind, and current may affect your overall time, but your performance will improve regardless.

A proper training balance minimizes injury risk (tendonitis, muscle strain) and maximizes performance gains. For all elite athletes this balance combines paddling with cross training: resistance workouts for upper body strength and running for cardiovascular fitness. Here are some ideas about cross training for paddling.

CONCEPT V: CROSS TRAINING FOR PADDLING

Cross training includes 1) progressive resistance exercise, 2) cardiovascular fitness training, and 3) maintenance training when you can't paddle.

1. Progressive resistance exercise is a system of training that uses resistance (weights, body weight, or friction) to progressively increase workload to enhance strength/endurance. It involves three variables: resistance, sets, and reps. A general model consists of lifting a weight 8 to 12 times (reps) for 3 sets and increasing the workload over a period of weeks and months. Start with light weight for 8 reps and slowly build to 12 reps. When this is achieved move on to increased weight, drop back to 8 reps, and progressively build again. This same system can be used when doing push-ups, pull-ups, or when using a variety of exercise equipment. General strengthening and specific strengthening can be combined to maximize the cross training benefit.

a. General strengthening

In order to reach your true potential as a paddler, the “core” muscles which are attached to your pelvic girdle and spine need to be strengthened. These muscles stabilize the body when paddling, allow strong, coordinated movement, and resist unwanted energy absorbing motion. This allows a particular pace to be sustained with a lower total energy cost. General strengthening implies total body exercise, not just strengthening the primary boat movers. Greg Barton (world champion kayak paddler) describes his favourite strengthening exercises in *The Barton Mould*. Also, C. Hoyt promotes strengthening the primary muscle groups with the following exercises:

- Torso rotators: sit-ups, static trunk rotations, bridging, dead lifts
- Shoulder extensors and medial rotators: bench press, rowing, pull-ups, pull-overs
- Shoulder lateral rotators and flexors; elbow extensors: push-ups, dips, bench press, triceps extensions, lateral raises, cross cable laterals
- Hip and knee flexors and extensors: curls, extensions, raises
- Spine stabilizers: rowing, dead lifts, surfer

b. Specific strengthening

The specificity-of-training principle suggests that training should closely mimic what you do when you race. Strength routines should be specific to the muscular patterns, overall body posture, and muscle mechanics associated with the forward stroke. Specificity is important because the nervous system recruitment of various motor units are totally different for two dissimilar activities. Pulley weights or a modified rowing machine can be used to simulate stroke mechanics.

Regular resistance training strengthens the paddler and improves paddling economy. Strength stabilizes the paddler's movements, reduces wasted motion, and minimizes energy losses between the paddler, boat, paddle, and water. A strong, stable "body/boat unit" allows higher quality training and racing. When economy is improved, endurance is enhanced because fewer total muscle fibers are required to produce the force necessary to paddle at a given speed. When exercising fibers are fatigued, they are replaced by rested muscle fibers. Therefore, increased strength increases economy by a) improving stability, b) decreasing the number of muscle cells required to sustain activity, and c) delaying total fatigue by allowing collections of cells to share the work in an alternating manner.

2. Does exhaustion or stressed breathing limit your performance goals? Paddling is not the best exercise to develop a large cardiac output. Cardiovascular training requires the use of large muscle groups (such as legs) in repetitive motion, non-stop, for relatively long periods of time. Activities include running, cycling, swimming, walking, hiking, etc. Keep in mind your beginning fitness level. Easy walking may provide adequate training stress if you are not comfortable with high intensity work. Vigorous running may be necessary to provide adequate stimulus for improved aerobic fitness if you are already in great shape.

3. Cross training can be used to maintain fitness or perhaps improve paddling performance when you can't get to the water. Off-season is a perfect time to cross train. The purposes are to slow the de-training effect of inactivity and to strengthen your "weak spots". If you are "land locked" for a while, increase your running and progressive resistance exercise to maintain fitness.

Don't give up valuable paddling time in order to cross train, but incorporate progressive resistance exercise and running to compliment your paddling. You will feel strong and fit and your training capacity and racing performance will escalate.

Many athletes use a heart rate monitor (HR monitor) when training and racing. Knowing your heart rate under various conditions can teach you much about your performance physiology. In endurance athletics, monitoring heart rate may

reveal problems in your training program, errors in your race pace, and warn you of stress caused by environmental factors. Understanding the implications of heart rate can help you avoid training and racing errors.

CONCEPT VI: LONG DISTANCE PADDLING

This is not intended to be a comprehensive training discussion, but is meant to address some fundamental concerns that will help to make your long distance race a positive experience. I assume that you have been exploiting your "long training paddle" (Concept II) and "race pace training" (Concept IV) to prepare yourself for the rigors of long distance racing. Count on this race distance being very demanding, especially as the day warms up. Be prepared to race for 4 to 5 hours. The following are some highlights to consider for the race day:

1. Your race pace should be at a comfortable speed that you have been practicing (race pace training). Monitoring a stop watch can help you avoid the common mistake of "going out too fast." Strive for even splits so that your last mile is as fast as your first.
2. Hydration is the most significant performance and health consideration for an event this long, especially if the weather is hot. Practice drinking lots of water and/or carbohydrate and electrolyte replacement liquids (sports drinks) during your long distance training so that your stomach adapts to the intake while you exercise. Some drinks may not be compatible and may be too sweet, salty, or bad taking. Try diluting them with plain water or find a new drink that works for you.
3. During exercise in the heat, you can lose more water through perspiration and ventilation than you can drink and absorb. If you don't have the urge to urinate every hour, you may ultimately have a performance problem or a health problem (renal failure is life threatening). So, back off and drink lots of ice water to stimulate gastric motility and fluid absorption. Dehydration can also be determined by weight loss and blood pressure drop (decreased blood volume). 1.5l of water weighs about 1.5kg and this degree of dehydration is not uncommon and it can have serious consequences. Dehydration often results in nausea and just finishing the race becomes challenging. Stay ahead of the game and prevent dehydration by drinking early and drinking lots.
4. Proper nutrition is part of a comprehensive race strategy. During a race of this length you need to supplement your energy reserves with carbohydrate ingestion. Sport drinks work well and often contain needed electrolytes. Fruit juice, fruit, cookies, pretzels, etc. Don't experiment during the race, but practice intake during your long training paddles. If you experience stomach upset during the race, head for the ice water and salty pretzels. Symptoms of low blood sugar often begin with a subtle mood change and grow into emotional or grumpy behaviour, and ultimately the total exhaustion.

Have a support crew or a cooler with extra fluids and foods that you might need. If you don't feel great, experience cramping or overwhelming fatigue, or have sore-bottom-syndrome, don't give up. A comfortable boat/paddler unit is more

important than a fast boat. Taking the time to rest, stretch, rehydrate, and eat will make you feel a whole lot better. If you respond to these symptoms early, you can get it back together and still finish well. Remember to have fun!

A safety reminder about hypothermia is relevant to "training concepts" because winter workouts are recommended in order to maintain or improve your paddling fitness. As the seasons change, so do our safety priorities. During the summer months we are concerned about hyperthermia and dehydration. In winter, we are exposed to the cold and vulnerable to the onset of hypothermia. Hypothermia will affect your performance and diminish the enjoyment of paddling. But more importantly, it is a health safety issue with serious consequences. Observation and awareness may help to save yourself or a friend. A little preparation and planning can make cold weather paddling more fun, more comfortable, and a lot safer.

CONCEPT VII: THE TRAINING BALANCE

Training is a balance of work and recovery. Work involves applying a force over a distance (work=force x distance) such as paddling a surfski. Recovery is a combination of rest and nutrition and it allows you to apply more force to do more work the day after a hard workout. These three components, work, rest, and nutrition, comprise the "total athlete," at least on a physical level. If one element is neglected you will fall short of your performance potential.

Physiology: Training occurs when the body adapts to a workload. The body doesn't get stronger during exercise, but rather, it develops afterwards during recovery. Recovery after strenuous work enhances fitness by:

1. repairing muscle and connective tissue
2. restoring metabolic enzymes (that make energy conversion possible)
3. replenishing carbohydrates (readily usable energy source)
4. normalizing nervous, endocrine, immune, and cardiovascular systems
5. increasing muscle protein, aerobic enzymes (boosts VO₂ and lactate threshold), and stored energy

This last training response not only repairs the muscles and maintains fitness, but also boosts strength and endurance. If these physiological adjustments don't occur (inadequate recovery between strenuous workouts), the athlete is susceptible to chronic fatigue, over-training, and performance decline.

So, how long does it take to recover after a hard workout? Researchers say about 36 to 48 hours depending upon the individual athlete and the type of training. This recovery window corresponds nicely with the training practice of alternating hard and easy training days. So, you don't have to push yourself hard every day and, in fact, this practice may prove counter-productive.

The additional good news is that you can ensure and accelerate recovery by replenishing carbohydrate stores immediately following a strenuous workout. Three to four hundred calories of carbohydrate (sports drink, fruit juice) within 10 minutes post exercise and again an hour or two later maximizes physiological restoration and prepares you for your next workout. The benefit of carbohydrate replenishment is three-fold:

1. it enhances muscle and liver glycogen stores
2. it prevents muscle protein breakdown
3. it promotes protein synthesis

These factors are essential to the recovery process. Adequate carbohydrate replenishment is effective in accelerating recovery for both strength and endurance training.

Smart training is the process of maximizing work while minimizing fatigue. Too much work and not enough rest hinders your training progress and leads to fatigue, staleness, and injury. Too much rest and not enough work provoke too little training stress to maintain or improve fitness.

Stress comes in many forms. The stresses associated with job and family responsibilities consume energy which might otherwise be available for training or racing. When the energy demands of the day or week are prioritized, paddling often becomes subordinate. However, training may be the best prescription for renewed vitality. There are short-term and long-term health benefits which accompany this stress management paradigm. Aside from staying fit and resilient, training may help to mediate many chronic cardiovascular, metabolic, nervous, and immune system disorders. Training is a reliable stress management tool used to maintain physical, mental, emotional, and cosmic fitness.

Conclusions: The essence of the "total athlete" includes a balance of work, nutrition, and rest. Recovery is as necessary as work. Carbohydrate intake immediately following training helps to speed the recovery process by restoring fuel and building protein. In order to maximize training effect, the exercise/recovery balance is crucial. Proper training is good for you.