

## Fortbewegungsarten in Cave Diving

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# Cramp! A diver's Guide

Posted By [Laura Harris](#) on 14 November 2003

## Don't Cramp your Style

Many divers adopt a particular pattern of repetitive movements during their dive which overuse specific muscle groups, depleting their glycogen reserves and loading them with lactic acid. Such movements will be governed by finning style, kick frequency, attitude in the water, kit configuration, specific tasks and so on. During strenuous, repetitive or sustained exercise, lactic acid is produced faster than the body can repay the oxygen debt needed to remove it. The acidic build up reduces energy production and slows movement as muscle fatigue sets in. This can happen with increased work load for example, when a diver is fighting a current head-on. It is at this point during exercise that cramp is most likely to hit.

One of the best ways to prevent muscle overuse in diving is to vary your finning style during a dive. Cave and wreck divers have already adapted to using a wider range of kicks to account for diving in overhead environments and narrow spaces, the emphasis being to avoid silt-outs. Flutter, modified flutter, frog, modified frog and shuffle kicks are all used throughout a dive along with hand pulls and ceiling push-offs, switching between styles as the topography dictates. As well as these techniques there are scissors, dolphin and backward kicks, sculling, pivot turns and flaring to help break the monotony of the flutter kick. In open water we don't necessarily need such a variety of finning techniques but it helps spread the work load and your muscles will thank you for it. If we take three of these styles and look at the muscles involved it becomes easier to demonstrate this.

The flutter kick is the most commonly used finning technique and the one we all learn during our first open-water course. The kick comes from the hip, legs are extended with a strong downward thigh thrust propelling the diver forwards. The main muscle groups involved with this action are the hip flexors (iliacus and psoas) and the quadriceps (front of thigh) and the hip extensors (hamstrings) for the return effort.

The modified flutter is used in cave and cavern diving to reduce the likelihood of a silt-out. Rather than kicking from the thigh the thrust comes only from the knee while the thigh remains stationary and horizontal. The prime muscles involved in producing the knee bend will therefore be the hamstrings (back of thigh), gastrocnemius (calf) and soleus (smaller calf muscle involved in ankle action) followed by the quadriceps to straighten the knee. This style won't propel you as fast through the water but will



rest tired thigh muscles by altering the work load expectation on them. If you are diving in calm, current-free water it is an easy enough style to adopt. It's also worth using on dives that have a silty bottom composition, especially if you are using the same point for entry and exit and will be retracing your route.



The frog kick uses a completely different set of muscles and is the ideal companion to the flutter kick. It is similar to the breaststroke style kick. Legs move from being extended straight along the midline of the body, knees then flex to assist a leg spread as wide apart as is comfortably possible and feet are rotated so that the bottom of the fins face each other. The power comes from the action of forcing the legs closed again and displacing the water between the fin blades. Even though the quadriceps are

still used in this movement they are no longer the prime movers but become assistors and the emphasis changes instead to the adductors (inside thigh), abductors (outside thigh), gluteals (buttocks) and the hip rotators.

This is not a recommended style of kicking however if you suffer from either a groin injury or lower back stress (it can shorten the deep muscles within the sacro-iliac joint leading to sciatic nerve compression).