

# Freediving in the Time of Novel Coronavirus

5 June 2020 (V1.1)

## **Preface / Disclaimer**

The information in this paper is not intended or implied to be a substitute for professional medical or legal advice. All content, including text and information, are provided for general informational purposes only. The knowledge and circumstances regarding COVID-19 are changing constantly and, as such, it is impossible to make any guarantees that the information is up-to-date and accurate. You should seek advice from medical and legal professionals if you have specific questions about your situation.

The information in this paper is in all cases subject to central, state and local government laws, rules and regulations, and guidelines by applicable health authorities (e.g. WHO; CDC).

The information in this paper does not make freediving in the time of the novel coronavirus safe. To the contrary, its purpose is to raise awareness of the risks presented by the novel coronavirus to recreational freediving.

This paper does not address competitive freediving.

# **Initial Considerations for Teaching and Training**

## **Introduction**

The novel coronavirus (SARS-CoV-2) is a contagious pathogen. In severe cases, the disease it causes (COVID-19) can result in organ failure and death. Patients who recover may suffer long-term damage to lungs, heart and other organs (see “Fitness to Dive” below).

Since January, COVID-19 has killed hundreds of thousands worldwide.<sup>[1]</sup> Businesses and borders closed, and the world went into a state of lockdown like never seen before.

Central and local governments are now easing lockdowns, in some cases following declining rates of transmission. With lockdowns easing, it is unclear whether transmission rates will decline, remain stable, or increase. At this time, there is no vaccine for COVID-19, and no cure.

## **Risks**

The global health effects of SARS-CoV-2 are unprecedented. Persons exposed to SARS-CoV-2 may suffer respiratory failure, long-term organ damage, and death. In general, younger and healthier individuals are more likely to develop mild symptoms, or remain asymptomatic.

However, even those with mild or no symptoms may infect household members, family and friends, some of whom may have less robust immune systems (and suffer more severe effects). When determining whether and how to risk exposure to SARS-CoV-2, potential effects on older and/or less healthy friends and family members should be considered.

SARS-CoV-2 appears to spread mainly person-to-person, through respiratory droplets produced when an infected person coughs, sneezes or talks.<sup>[2]</sup> **This airborne pathogen presents particular risks for a sport like freediving, in which robust breathing before and after breath holds is unavoidable, and in which providing rescue breaths has been a fundamental skill.**

**As noted below (“Risk of Action; Risk of Inaction”), COVID-19 is a new risk for freediving, one that most divers have not yet assessed. Before diving, buddy teams should openly discuss the risks of COVID-19, and decide whether they accept the risk of rescuing another diver, and of being rescued. Divers not accepting those risks should refrain from freediving.**

**Because instructors are responsible for student safety, each instructor must unequivocally accept the risk of rescuing students before teaching every course. Instructors not accepting that risk should not lead in-water activities.**

## **Freediving and SARS-CoV-2**

There are three primary ways to decrease risk of transmission of SARS-CoV-2 while freediving. First, by limiting those with whom you come in contact. Second, by following guidelines from health organizations, government, and industry groups (such as Divers Alert Network). Third, by modifying freediving practices.

The issues addressed in this paper—such as breathing above water, buddying above water, and freediving rescues—are specific to freediving/snorkeling, and may not apply to other aquatic activities.

## Limiting Contact

Mitigating risks presented by SARS-CoV-2 requires limiting those with whom you come in contact (such as students or training partners) to those persons reasonably expected to have lower risk profiles. For example, training solely with a member of your household appears to present little additional risk of COVID-19 (actual rescues, discussed below, may be an exception).

In addition, if you live in a country with robust testing and tracking, and a smartphone-based system indicating likely exposure to SARS-CoV-2 (such as currently exists in China or South Korea), you may choose to teach persons with “green” status (or the equivalent).

Similarly, if you live in an area with few cases of COVID-19 and restrictions limiting arrivals, you may choose to teach those who have remained in your area and who appear healthy (based on a COVID-19 Health Declaration, and signs of illness). However with travel restrictions lifting, the number of such areas may decrease rapidly.

At this time, positive antibody tests do not appear to provide a high degree of certainty against exposure to SARS-CoV-2. If on-site PCR (antigen) testing becomes available to dive centers, daily testing could help limit contact to SARS-CoV-2.

As always, you may refuse to teach or serve any customer for health and safety reasons. You may refuse service to those who appear sick (e.g. coughing, short of breath), or whom you believe may have been exposed to SARS-CoV-2 (e.g. those who have arrived by air travel, or from an area with a significant number of cases). This would be the case for any communicable and potentially life-threatening disease (such as tuberculosis or Ebola). **Due to risk of community transmission by asymptomatic carriers, however, such informal screening does not appear to reasonably mitigate risk of COVID-19.**

## Health and Safety Guidelines

Central, regional and local governments are issuing rules and guidelines relating to business operations and SARS-CoV-2. These address topics such as closures, social distancing, disinfecting, use of PPE, maximum group size and occupancy. You are required to follow all applicable government rules and guidelines.

International, national, and local health authorities are issuing guidelines on SARS-CoV-2. We strongly recommend that you follow all health authority guidelines. For example, see the CDC’s “Considerations for Public Pools, Hot Tubs, and Water Playgrounds During COVID-19”.<sup>[3]</sup>

Industry groups, such as Divers Alert Network (DAN), are also issuing guidelines for diving and SARS-CoV-2. “[COVID-19 and Diving Operations](#)” (DAN, 04.05.2020) addresses topics such as staff and customer safety, disinfection, dive boats and operating procedures.<sup>[3]</sup> We strongly recommend that you follow all guidelines from DAN and other industry groups.

## Modification of Practices

Modification of teaching and training practices may also mitigate risks presented by SARS-CoV-2 to recreational freediving. Modifications of some of those practices are discussed below (“Modification of Practices”). Though such modifications should in theory decrease risks presented by SARS-CoV-2, it is unclear whether in practice risks can be reasonably mitigated. For example, a single snorkel blast or recovery breath in the direction of another diver may carry significant risk of transmission.

## Mitigation of Risk

Freediving instructors are trained to perform risk evaluations for open water sessions. That process requires (i) evaluating conditions; (ii) identifying risks; and (iii) either determining how to mitigate those risks, or canceling.

Based on our analysis of the risks presented by SARS-CoV-2 to freediving, we believe that some risks may be decreased by limiting contact, some by following health and safety guidelines, and some by modifying teaching and training practices. **Without rigorously limiting contact, following guidelines and modifying practices, we do not believe it is possible to reasonably mitigate risks presented by SARS-CoV-2 to recreational freediving. Even with those precautions, however, it remains unclear whether risks presented by SARS-CoV-2 can be reasonably mitigated.**

## Fitness to Dive

Other parts of this paper address the risk of transmission of SARS-CoV-2. This part addresses health risks faced by those who recover from COVID-19, and wish to freedive (“Fitness to Dive”).

Persons who recover from COVID-19 may suffer long-term health effects, including hypoxia, damage to heart, lungs (where fibrosis may occur, causing structural changes of the lung leading to increased risk of barotrauma), kidneys and central nervous system, and pulmonary blood clotting (which may lead to heart attack, stroke, and increased risk of decompression illness).<sup>[4]</sup> These potential health effects make it especially important that anyone recovering from COVID-19 receives proper medical clearance before diving.

A modified Medical History Form, or addendum to current form, should be used to identify students who may have been affected by COVID-19. DAN has published a Health Declaration Form / COVID-19 (to be used in addition with a medical history form).<sup>[5]</sup> We understand that the RSTC will release an updated Medical History Form to address COVID-19, and we recommend you use a version of that form if adopted by the agency with which you teach (RSTC forms are available at <https://wrstc.com/standards-downloads/>).

In general, the papers from UCSD and ECHM (see Note [4]) recommend that a diver who has had symptoms consistent with COVID-19, has tested positive for SARS-CoV-2, or tested positive for COVID-19 antibodies, should follow an evaluation plan appropriate for the severity of that diver’s symptoms. We recommend following the guidelines suggested by UCSD and ECHM, any updates to them, and similar guidelines from RSTC and DAN. DAN recommends that persons who have recovered from COVID-19 follow a three-step process to determine fitness to dive: first, receive physician confirmation that they have no symptoms of COVID-19; second, regain 100% of prior fitness level (if appropriate, with medical supervision); and third, pursue medical clearance to begin diving again. If you have had COVID-19 and are considering returning to diving, DAN requests that you contact their non-emergency medical services staff (in the U.S., 800.446.2671) for consultation.

Freedivers may also wish to consider the potential health effects listed above when deciding whether and how to risk exposure to SARS-CoV-2. **COVID-19 could leave you less fit to dive, or permanently unfit to dive.**

## **Modification of Practices**

### **Staff and Customer Procedures**

All businesses benefit from clearly communicated procedures to decrease risk of SARS-CoV-2 transmission, including distancing, occupancy, PPE, disinfecting, etc. Have clear instructions for staff and students—for office, shop, classroom, confined water and open water—and communicate them to your students before the first in-person session.

Scheduling sessions (classroom, confined water, open water) to avoid crowds and facilitate distancing is recommended.

### **Classroom**

Classroom sessions may be done remotely on an adequate platform for group teaching (e.g. Zoom). Exams likewise may be done remotely/digitally, with instructor proctoring and remediation, and retention of pdf answer sheets. **Online/remote meetings, teaching sessions and examinations eliminate risk of transmission, and are strongly recommended.**

If you meet in person, please follow relevant PPE, distancing, occupancy and other staff and customer safety rules and guidelines. In person meetings may still be prohibited in some jurisdictions: please check local rules before scheduling in-person sessions.

Some skills may involve robust breathing (such as “recovery breathing” or “full breath”), which increase the risk of transmission of airborne pathogens (similar to choir groups). In these cases, follow distancing and occupancy guidelines, while taking into account the direction of breathing and air flow. Persons demonstrating/practicing these skills should not be positioned upwind (outdoors) or up flow (indoors) of others in the group.

Open space and airflow may reduce these risks in outdoor settings (though distancing guidelines must still be observed). For this reason, outdoor meetings are preferable to indoor meetings, which may have a risk profile similar to enclosed spaces such as buses or aircraft.

**Summary: Online meetings have no risk of transmission, and are strongly recommended.**

For in-person meetings, outdoor settings impart less risk than indoor.

### **Gear**

Sharing gear generally, and gear in proximity to airways specifically (such as snorkel, mask, nose clip, gloves), carries a significant risk of transmission, and is strongly discouraged. After donning gear, do not share or allow others to touch your gear.

For rental equipment, DAN guidelines on disinfecting (see “COVID-19 and Diving Operations”) should be followed rigorously.

### **Ratios**

Decreasing ratios for both confined and open water may help divers avoid breathing aerosols exhaled by other divers, and may decrease risk of transmission of SARS-CoV-2. In general, a maximum ratio of two students per instructor (and per lane or float) may decrease risk of transmission, in both confined and open water.

Please note that for household members, there appears to be less risk of transmission from freediving. For example, a ratio of 4:1 may be appropriate for a household group of four (e.g.

two parents, two children). Similarly, a ratio of 4:1 may also be appropriate for two household groups of two, with one household group per lane or float. Please note that household members do not decrease risk to the instructor: only among themselves.

We note that although having one person per float or lane may decrease risk of transmission of SARS-CoV-2, it does not appear to allow for proper buddying (a key safety skill), and for that reason is not recommended. Likewise, COVID-19 should not be viewed as a reason to freedive or spearfish alone.

### **Pool and Confined Water: Indoor; Outdoor**

SARS-CoV-2 appears unstable in water, and highly sensitive to oxidants (such as chlorine).<sup>[2]</sup> Nonetheless, divers should avoid spitting or nose blowing near other divers in any confined or open water environment.

As with classrooms, open space and airflow may reduce risk of transmission in outdoor settings (though distancing guidelines must still be observed). For this reason, outdoor pools may have a lower risk profile than indoor pools.

In any pool, distancing within your group and with other pool users must be considered. For this reason, confined open water in an uncrowded area may have a lower risk profile than a swimming pool.

Changing rooms, restrooms, and other areas with high-touch surfaces appear to have higher risk profiles. For this reason, consider requesting that persons arrive in swimwear and don the rest of their gear on deck or near the water, avoiding changing rooms. It's important to communicate such procedures to students in advance of training sessions.

Confined Water locations, such as a lagoon or a shallow part of a lake, provide the best options to physically distance your group from others, and are thus a preferable teaching/training situation.

### **Pool and Confined Water: Breathing Before and After Breath Holds**

Breathing before and after dives may involve robust breathing (similar to choir groups), which increases the risk of transmission of airborne pathogens (similar to choir groups). In these cases, follow distancing and occupancy guidelines, while taking into account the direction of breathing and air flow. Those demonstrating/practicing these skills should not be positioned upwind (outdoors) or up flow (indoors) of others in the group.

For Static and Dynamic, orienting the diver to breathe out from the pool (i.e. toward the pool deck) may decrease the likelihood of breathing toward buddy or instructor. This can be done before diving by preparing while facing the side of the pool, and after diving by grabbing the edge of the pool and breathing toward the deck. The buddy can be next to the diver, breathing away from him/her, ready to assist if necessary. The instructor can be behind the diver, also ready to assist.

As noted for classrooms, since aerosols may linger in indoor environments, holding sessions in outdoor pools (or confined open water) may impart lower risk profiles.

### **Snorkels**

In both confined and open water, divers breathing through snorkels appear to present significant risk: while face down in the water, even experienced divers are unlikely to be aware of air

flow, and the positions of other divers. It appears reasonable to allow only one diver at a time to breathe with a snorkel, with others maintaining an upright position while staying clear of the snorkel-breather's airflow.

'Blast clearing' of snorkels also appears to present significant risk: these blasts of exhaled air and saliva may carry significant viral loads towards instructors and other divers. To prevent this, the diver can cover the snorkel top with a hand before blast clearing. Other alternatives include (1) with snorkel attached to the back of the mask strap, rather than the side, remove the snorkel, lift the mouthpiece vertically upwards and let gravity drain any water, and (2) a modified counter-clockwise roll simulating a surface displacement clear. It may be safer to discourage blast clearing entirely.

## **Buddying Generally**

Until now, proper buddying has depended on proximity to the diver. That proximity may be incompatible with distancing during the COVID-19 pandemic. Maintaining recommended or required distance (e.g. 2m) may prevent a buddy from keeping a diver's airway above water, which could result in problems such as laryngospasm (complicating rescue) and inhalation of water. **This is a significant issue, for which we see no satisfactory resolution. This means that in order to maintain physical distance the buddy is not close enough to the diver to provide conventional assistance, and that divers must realize that diving well within their limits, with the lowest possible risk of blackout or LMC, is critical.**

## **Static Buddying**

In static apnea, the buddy may touch the diver in order to keep him/her oriented towards the side of the pool, and to request a signal (showing consciousness). To avoid transmission, please follow standard disinfection procedures, which may include the use of hand sanitizer (at least 70% alcohol) before and after each dive, and avoiding touching one's own face. Buddy and instructor may also wear a cloth mask or facial covering to decrease risk of airborne transmission.

Divers should be reminded to surface facing the side of the pool, and to exhale recovery breaths away from the pool and toward the deck. The buddy can be next to the diver, breathing away from him/her, ready to assist if necessary. The instructor can be behind the diver, also ready to assist.

## **Dynamic Buddying**

A dynamic buddy typically does not touch the diver. Though use of a kickboard or float is still recommended in case of emergency, divers should be advised to grab the side of the pool or the lane marker, rather than a potentially-contaminated float. Kick boards and floats should be disinfected prior to each buddy's use.

Divers should be reminded to surface facing the side of the pool, and to exhale recovery breaths away from the pool and toward the deck. The buddy can be next to the diver, breathing away from him/her, ready to assist if necessary. The instructor can be behind the diver, also ready to assist.

## **Rescue Scenarios: LMC Assist; Surface Blackout Rescue; Underwater Blackout Rescue**

Demonstrating and performing rescue scenarios with divers appears to present a significant risk of transmission of SARS-CoV-2. Because of the need to secure airways, the risk appears to be present underwater as well as at the surface. Leaving masks on for the demonstration or performance of these techniques may protect against hand-nose transmission of pathogens (as would proper use of hand sanitizer), as well as against airborne pathogens entering through the nose. It does not, however, appear to protect against hand-mouth transmission, nor against airborne pathogens entering through the mouth, and for those reasons does not appear to mitigate risk of transmission sufficiently.

Demonstration and performance with a mannikin (e.g. lifeguard mannikin), with proper disinfection of the mannikin before each person's use, appears to be a reasonable way to mitigate risk of transmission in teaching and exercising rescue scenarios. Since training such scenarios with mannikins has until now been rare, it is unclear if students trained on a mannikin would perform actual rescues as proficiently as students trained on actual divers. For this reason, additional practice with each scenario may be appropriate. In addition, properly disinfecting mannikins before use will require additional time. Both activities should be considered when scheduling confined and open water sessions that include teaching and exercising rescue scenarios.

**Demonstration and performance with household members appears to have less risk of transmission of SARS-CoV-2.** For this reason, an instructor who has a household member freediver should be able to demonstrate rescue scenarios safely with that person. Similarly, students who are household members should be able to perform rescue scenarios safely with each other.

## **Buoys; Lines**

As noted above, reducing student to instructor ratios appears to be a reasonable way of decreasing risk of transmission. Buoys may be considered high-touch surfaces, and disinfection before, during and after use may decrease risk of transmission. For free immersion, the line may be considered a high-touch surface, and use of hand sanitizer after each dive, before touching face, is recommended.

For dive centers, or locations where multiple buoys and student/instructor teams are planned (e.g. sharing a boat), a minimum of 5m between buoys may decrease the risk of airborne pathogens traveling from one buddy team and buoy to another. This may be the case with an instructor teaching two household groups, and using two buoys (one for the dive line, the other for resting). For two instructors and two buoys (each with a dive line), a minimum of 10m between buoys is recommended to minimize risk of entanglement.

## **Open Water: Breathing Before and After Dives**

Breathing before and after dives may involve robust breathing (similar to choir groups), which increases the risk of transmission of airborne pathogens (similar to choir groups). In these cases, follow distancing and occupancy guidelines, while taking into account the direction of breathing and air flow. Those demonstrating/practicing these skills should not be positioned less than 5m upwind of others in the group.

For depth disciplines, having the diver prepare to dive by breathing while facing downwind may decrease risk of transmission for buddy and instructor. In that case, the buddy can be on the



other side of the buoy, also breathing downwind, and the instructor can observe from a safe distance.

Please see above for specific issues regarding use of snorkels.

### **Underwater Buddying: CWT / CNF / FIM**

Underwater (i.e. breath hold) buddy techniques do not appear to create significant risk of transmission of SARS-CoV-2.

After the dive, the buddy should be to the side of the diver (not in front), out of the path of air-flow from recovery breaths (which can be forceful), but ready to assist if necessary. The instructor can be behind the diver, also ready to assist.

As noted above, until now, proper buddying has depended on proximity to the diver. At the surface, that proximity may be incompatible with distancing during the COVID-19 pandemic. Maintaining recommended or required distance (e.g. 2m) may prevent a buddy from keeping a diver's airway above water, which could result in laryngospasm (complicating rescue), or inhalation of water. **This is a significant issue, for which we see no satisfactory resolution.**

### **Open Water Rescue Scenarios**

The discussion of demonstrating and performing rescue scenarios above applies to both confined and open water. In open water, you may wish to attach the mannikin to the dive line with a lanyard, both to prevent its loss and to provide students with practice of removing the lanyard in rescue scenarios (e.g. level 2 and higher courses).

### **Actual Rescues**

For decades, a foundation of freediving has been the ability and willingness of a buddy to assist or rescue a diver who panics, suffers from loss of motor control (LMC), or blacks out (BO): *"Always dive with a trained buddy; never freedive alone."* Without support and/or rescue breaths, survival of such divers is uncertain in the case of panic or LMC, and unlikely in the case of BO.

Assisting a panicked diver requires close proximity of buddy to diver. If underwater, the diver must be helped to the surface, and supported there until control is regained. At the surface, the necessary proximity violates distancing requirements, and carries significant risk of transmission of SARS-CoV-2. **It does not appear possible to mitigate this risk.**

Assisting a diver who has an LMC also requires close proximity of buddy to diver: to support the diver at the surface until their ability to breathe and keep their airways above water is recovered. This proximity violates distancing requirements, and carries significant risk of transmission of SARS-CoV-2. Exception: for static apnea only, it may be possible for a buddy to wear an N95 mask (or equivalent) to decrease risk of airborne transmission (at this time, such masks may not be readily available in all areas). **For disciplines other than static apnea, it does not appear possible to mitigate this risk.**

Rescuing a blacked-out diver underwater requires securing airways, which may result in hand-mouth (and with nose clip, hand-nose) transmission. It is unclear if this risk can in practice be mitigated to a reasonable extent (e.g. buddy disinfecting hands before each dive, and after each rescue).

Rescuing a blacked-out diver at the surface requires close proximity of buddy to diver: to support the diver at the surface until consciousness is recovered. This proximity violates distancing requirements, and carries significant risk of transmission of SARS-CoV-2. **It does not appear possible to mitigate this risk.**

Rescuing a blacked-out diver at the surface involves tap/blow/talk (or blow/talk). Blowing across a diver's eyes carries significant risk of airborne transmission to the victim. **It does not appear possible to mitigate this risk.**

A blacked-out diver who does not recover after tap/blow/talk requires rescue breaths. **With rescue breaths, transmission between diver and buddy must be assumed. It does not appear possible to mitigate this risk while the diver remains in water. Please note that barriers such as pocket masks and rescue breathing masks protect against fluid-borne pathogens (such as HIV), but do not protect against airborne pathogens (such as SARS-CoV-2).**

**Rescue breaths are the most effective means of helping a blacked-out diver begin breathing again.** If a buddy refuses to give rescue breaths to a blacked-out diver, and if the diver can be moved quickly from water to a hard surface (such as pool deck, platform, boat or shore), the buddy may give chest compressions. This may be an option for pools, and locations where the dive line runs from platform or boat (i.e. where the time to get the diver to a hard surface would not compromise the rescue), **but should not be considered as an effective replacement for rescue breaths: compressions are better than no assistance, but not as effective as rescue breaths.** Compressions should decrease risk of airborne transmission between diver and rescuer as compared to rescue breaths (with which transmission between diver and rescuer must be assumed). Proximity of rescuer to diver, however, violates distancing requirements, and appears to carry significant risk of transmission of SARS-CoV-2. **Without the proper use of PPE (see below), it does not appear possible to mitigate this risk. We strongly recommend that all divers discuss risks presented by SARS-CoV-2 before in-water activities, and only dive if each diver accepts the risks of rescuing and being rescued.**

An alternative for a diver that can be moved quickly from water to a hard surface is a manually triggered ventilator (MTV), which allows safe positive pressure (similar to rescue breaths). MTVs require specialized equipment and training (such as DAN's Advanced Oxygen Provider Course), and should be performed by two rescuers. Proximity of rescuers to diver, however, violates distancing requirements, and appears to carry significant risk of transmission of SARS-CoV-2 to rescuers (by exhaled air). **Without the proper use of PPE (see below), it does not appear possible to mitigate this risk.**

Another alternative for a diver that can be moved quickly from water to a hard surface is a Bag Valve Mask (BVM, aka Ambu Mask), which can be used with or without supplemental oxygen. BVMs require specialized equipment and training (such as DAN's Advanced Oxygen Provider Course), and should be performed by two rescuers. Proximity of rescuers to diver, however, violates distancing requirements, and appears to carry significant risk of transmission of SARS-CoV-2. **Without the proper use of PPE (see below), it does not appear possible to mitigate this risk.**

For chest compressions, MTV and BVM (i.e. out of water alternatives to rescue breaths), proper use of PPE—cloth facial covering, or if available FFP2, KN95 or N95 mask—by rescuers may significantly reduce the risk of transmission of airborne pathogens such as SARS-CoV-2. Of

the three methods, Divers Alert Network Europe notes that the best option may be use of BVM, with both rescuers using proper PPE.

**Conclusion: Proximity required for rescue/assist of panicked diver, LMC and surface BO violates distancing requirements, and carries significant risk of transmission of SARS-CoV-2. It does not appear possible to mitigate this risk.**

**For rescue breaths, transmission between diver and buddy must be assumed. It does not appear possible to mitigate this risk while the diver remains in water. Barriers such as pocket masks do not protect against SARS-CoV-2.** Though in theory compressions and oxygen-provider equipment and training may provide alternatives to rescue breaths, they have until now been used rarely in freediving (to our knowledge, only by medical personnel at a small number of competitions). Whether they can provide a practical alternative to rescue breaths, which have been the standard of care for decades in recreational freediving rescues, remains unclear.

### **Risk of Action; Risk of Inaction**

As noted above, rescues generally, and rescue breaths specifically, present significant risk of transmission of SARS-CoV-2 between diver and rescuer. COVID-19 is a new risk for freediving, one that most divers have not yet assessed. Before diving, buddy teams should openly discuss the risks of COVID-19, and decide whether they accept the risk of rescuing another diver, and of being rescued. Divers not accepting those risks should refrain from freediving, as they would in effect be diving alone, and consequently violate the fundamental rule of safe freediving.

It is important to consider that divers accepting those risks *before* diving may still fail to rescue another diver due to fear of COVID-19. At the 2013 AIDA Depth World Championships, two professional safety divers refused to give rescue breaths to a competitor who suffered a lung squeeze (with blood visible on his mouth). Professional paramedics have refused to administer CPR to suspected COVID-19 victims.<sup>[6]</sup>

**Other than household member teams, we believe it is important each diver considers the possibility that, facing a diver in need, he/she may not perform a rescue.** Allowing a diver to die would be a burden for life. Rescuing a diver may endanger self and family. The necessary decision would have to be made in seconds, possibly in the context of wind, waves, cold and hypoxia.

**Likewise, other than household member teams, we believe it important for each diver to consider the possibility that, in the event of panic, LMC or (especially) BO, he/she may not be rescued.** This highlights the importance of diving well within one's personal abilities—far from any risk of LMC or BO—and avoiding hyperventilation and overweighting. This is a good time to test breath hold ability with dry statics and breathing tables, and keep in-water breath holds far from maximum.

## **Conclusion**

SARS-CoV-2 is a contagious pathogen with potentially life-threatening effects. Essential elements of freediving—such as breathing before and after breath holds, buddying, and rescues—present unusual risk of transmission: risk profiles comparable to choir groups (during breathing), and unprotected sex (during rescue breaths). Before COVID-19, diving near one’s limits could have life-threatening consequences. Today, a successfully rescued diver faces potentially life-threatening consequences of COVID-19. Diving conservatively was important, and is now more so.

Long-term health effects of COVID-19 include hypoxia, damage to heart, lungs (where fibrosis may occur, causing structural changes of the lung leading to increased risk for barotrauma), kidneys and central nervous system, and pulmonary blood clotting (which may lead to heart attack, stroke, and increased risk of decompression illness). A diver may recover from COVID-19, but be left permanently unfit to dive.

SARS-CoV-2 presents a multitude of risks to recreational freediving, many of which are complicated. Focusing on more than one at a time is challenging, and analyzing the whole even more so. Some may be mitigated significantly. Others do not appear to have a possibility for reasonable mitigation.

**Taken as a whole, the sum of unmitigated risks appears significant.** More accurately, the probability of avoiding COVID-19 decreases with each unmitigated risk. For example, if the odds of an instructor being infected with COVID-19 were only 10% per course taught (*it may be far higher than that*), an instructor teaching five courses would have a 40% chance of being infected. An instructor teaching ten courses would have a 65% chance of being infected by COVID-19. Those are not good odds.

**There appear to be two cases in which reasonable mitigation of risk is possible.** The first is training with a household member. The second is for those living in countries with robust testing and tracking, and a smartphone-based system indicating likely exposure to SARS-CoV-2 (such as currently exists in China and South Korea), who may choose to teach or train only with persons of “green” status (or the equivalent).

**Aside from those exceptions, it does not appear possible to reasonably mitigate risks presented by SARS-CoV-2 to recreational freediving.** In freediving, risks that cannot be reasonably mitigated leave cancellation as the reasonable option.

The directors of Ultra Trail of Mont Blanc races (the world’s largest mountain running event) cancelled for 2020 due to coronavirus, noting the following (translated from the original French):

*In the mountains, we are familiar with risk and commitment. When the conditions are not right, it's more reasonable to turn back and go home. Risk-taking is part of our culture, as is judgment. In the face of undue risk, to turn back is to show courage. When you give up an ascent, you know that there will be other – and even more amazing - opportunities to return to, when the conditions are right and the storm is over.*

This storm will pass, and freedivers who remain fit will again have amazing opportunities.

## **Participants**

**ALBINSSON, Eric (Sweden; US).** Instructor Development Programs Specialist: *PADI Americas*.

**CHRISTEN-DREW, Oli (Switzerland; Indonesia).** Wave Program Director: *Molchanovs*. Instructor Trainer: *Molchanovs; AIDA; PADI Freediver*.

**KASTRINAKIS, Stavros (Greece).** Founder: *Freedive Club Greece*. Instructor Trainer: *AIDA; PADI Freediver*.

**KING, Robert, M.Sc., J.D. (US).** Past Vice President: *AIDA International*. Instructor Trainer: *PADI Freediver; Molchanovs*. Master Instructor: *AIDA*.

**KRACK, Kirk (Canada).** President: *Performance Freediving*. Advanced Freediving Instructor Trainer, Wilderness EMT

**MARRONI, Laura, BSc, MBA, (Italy).** Executive Vice President: *DAN Europe Foundation*.

**MILAT, Vedran, M.Sc. (Croatia).** Past Treasurer: *AIDA International*. Senior Judge: *AIDA; CMAS*.

**MILLER, Georgina (UK).** Chair: *British Freedive Association*. Instructor Trainer: *SSI Freediving*. Master Instructor: *PADI Freediver*. MSDT: *PADI*

**MOLCHANOV, Alexey (Russia).** Co-Founder: *Molchanovs*. Instructor Trainer: *Molchanovs*.

**SCHIMIAK, James, MD (US).** Medical Director: *Divers Alert Network*.

**THOMAS, Guy (Belgium; Italy).** Local Vice President: *Croce Rossa Italiana*. Director of Safety: *DAN Europe Foundation*.

**TRUBRIDGE, William (New Zealand; Bahamas).** Founder: *Vertical Blue*. Instructor Trainer: *Apnea Academy; AIDA*.

**VALDIVIA-Valdivia, Juan M., MD, FAANS (Peru; US).** Instructor: *Molchanovs; AIDA; CMAS*.

**WANG, Aolin (China).** President: *AIDA China*. Instructor Trainer: *Molchanovs*. Master Instructor: *AIDA*. Instructor: *Apnea Academy*.

**ZUCCARI, Andrea (Italy; Egypt).** Founder: *Freediving World*. Instructor Trainer: *Apnea Academy; DAN EqualEasy*.

## Notes

[1] <https://news.google.com/covid19/map?hl=en-US&gl=US&ceid=US:en>

[2] [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fprepare%2Ftransmission.html&fbclid=IwAR1UWVsuv0v1jWldY-gokeD6Yc9JZ1KH4ve5GvJfhhFm0gPwezLYuN0FDfM4](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fprepare%2Ftransmission.html&fbclid=IwAR1UWVsuv0v1jWldY-gokeD6Yc9JZ1KH4ve5GvJfhhFm0gPwezLYuN0FDfM4)

<https://www.sciencedirect.com/science/article/pii/S004313542030436X>

[3] [https://www.cdc.gov/coronavirus/2019-ncov/community/parks-rec/aquatic-venues.html?fbclid=IwAR3\\_beZ\\_U\\_f7g0YVq7qEGWR4VQ1J-terD0NghJ7m9cD39u-g6ec05FuhfB8](https://www.cdc.gov/coronavirus/2019-ncov/community/parks-rec/aquatic-venues.html?fbclid=IwAR3_beZ_U_f7g0YVq7qEGWR4VQ1J-terD0NghJ7m9cD39u-g6ec05FuhfB8)

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[4] “UC San Diego Guidelines for Evaluation of Divers during COVID-19 Pandemic”, <file:///Users/robertking/Downloads/UC%20San%20Diego%20Guidelines%20for%20Evaluation%20of%20Divers%20during%20COVID-19%20%20pandem....pdf>

“EUBS & ECHM position statement on the recreational and professional diving after the Coronavirus disease (COVID-19) outbreak”, [file:///Users/robertking/Downloads/English-EUBS-ECHM%20position%20on%20diving%20and%20COVID-19%20\(21st%20May%202020\).pdf](file:///Users/robertking/Downloads/English-EUBS-ECHM%20position%20on%20diving%20and%20COVID-19%20(21st%20May%202020).pdf)

<https://www.nytimes.com/2020/05/10/world/europe/coronavirus-italy-recovery.html?referring-Source=articleShare>

<https://www.bbc.com/news/health-52662065>

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[5] [https://www.daneurope.org/c/document\\_library/get\\_file?uuid=63afae66-fa0d-4e39-b60f-f9a3e12784b2&groupId=10103](https://www.daneurope.org/c/document_library/get_file?uuid=63afae66-fa0d-4e39-b60f-f9a3e12784b2&groupId=10103)

[6] <https://www.nytimes.com/2020/05/10/nyregion/paramedics-cpr-coronavirus.html?referring-Source=articleShare>