

Swim Bag: Underwater Cameras

Product manufacturers and retailers provide the products reviewed in Swim Bag to SWIMMER at no cost.

BY LAURA HAMEL

With advances in technology, amazing image creation is possible for even the novice photographer. Great equipment can't replace professional training or artistry, but the consumer imaging electronics available today offer a variety of affordable options and quality that reach the pro level pretty quickly.

However, our goal with this review is not to delve too deeply into the technical and artistic aspects of photography, but rather to simplify the act of capturing images—anyone can use these cameras with minimal effort. None of our testers are professional photographers or videographers, and, although we touch on some of the technical aspects of each unit, this review is focused on the everyday user.

For readers who have technical expertise—serious hobbyists and professionals—more in-depth information and technical specifications of each model can be found on the manufacturers' websites. Details about options made available through the various software and mobile apps for the cameras are beyond the scope of this review. Although the video cameras reviewed here have the capability to capture still images and most of the still cameras have the ability to capture video, we've divided them up by two primary applications: video cameras mounted to a pole for coaches and swimmers who wish to film stroke technique and view it for analysis, and hand-held still cameras for fun and recreational photography.

CAPTURING STROKE TECHNIQUE

Whether competing or not, most swimmers want to use correct and efficient technique. If a picture tells a thousand words, then a video tells a million, making it much easier for coaches to detect and correct stroke deficiencies.

The unwieldy camera contraptions of yore—cart-mounted, with wires, cables, or stabilized by bands and buoys—are no longer needed thanks to the boom of the action camera industry. There's something about seeing just how badly you drop your elbow that makes it easier to correct, even if your coach has told you a zillion times—seeing is believing.

Although these four action cameras do much, much more than capture swimming technique in a pool, we confined our review mostly to that application. All the models have optional attachments and mounts, and depending upon what the camera will be used for when it's not being used for technique analysis, the sky's the limit (literally).

All are easily mounted on most any extension pole so you can walk alongside a swimmer in the water and capture video from a variety of angles. (Take your own height and the height of your pool deck into account when purchasing an extension pole.) Each camera comes with enough attachments in the box to get the job done. Each camera also has an inversion setting or feature to compensate for being upside down at the end of a pole.

Our testers, coaches who regularly video swimmers to critique technique, recommend shooting at 720p rather than 1080p to keep file size down. The output isn't quite as spectacular, but it's plenty good enough for this application. Reducing the HD format also allows for the frames-per-second to be bumped up, which also increases file size. The more frames per second, the more the video can be slowed to see every aspect of a swimmer's stroke.

1. Garmin VIRB Elite | Garmin.com/virb | \$270



The VIRB Elite is so much more than a camera that our testers were disappointed that an expedition of some kind wasn't part of testing. With features such as GPS and activity tracking, ANT+ wireless connectivity to heart rate monitors and other devices, even the ability to have it start recording automatically with some types of motion, this unit is perfect for the coach who needs a technique camera for swimming but who wants to record a Himalayas trek in the off-season.

The camera itself is waterproof to 1 meter, but we only used it with the included dive housing, making it good to 50 meters. The housing isn't bulky—it traveled through the water easily at any angle—and the mount is compatible with GoPro accessories.

The VIRB is easy to operate when in the housing, but the settings must be configured prior to insertion. The LCD screen isn't backlit, which conserves battery life, but makes it harder to see in low-light conditions, although for stroke technique videos this wasn't a problem. Images can be transferred to a computer via Wi-Fi, mini USB, or up to a 64G micro SD card. Output quality of the VIRB Elite is crisp and clear—great for stroke technique and recreational action video—and Garmin packs in a lot of features and quality for a great price.



2. GoPro Hero 4 Black (and Silver) gopro.com | \$500 (and \$400)

Everything about the GoPro is top notch. With the plethora of attachment options, it can be mounted to nearly anything, at any angle. In addition to the pole mount in the pool, we used the QuickClip, which attaches to a baseball cap worn backward, to film swimmers from a paddleboard in the open water. Our favorite discovery was that the QuickClip fits snugly on the lip of a silicone swim cap (wear two caps for better stability) and allows a swimmer to capture water-level perspective of the action. The housing is rated to 131 feet.

The Hero 4 Black has the ability to shoot 1080p at 120 frames per second or 720p at a crazy 240 FPS. This isn't necessary to accurately diagnose and treat stroke problems, but it's pretty dang cool.

The Hero 4 Silver is \$100 cheaper and has slightly fewer HD options than the Black, but is otherwise the same camera, with the added benefit of a touchscreen. The touchscreen cannot be used when the Silver is in its waterproof housing, but GoPro includes other access doors that allow the touchscreen to be used above water.

Both units utilize micro SD cards and mini USB ports for data transfer, as well as Wi-Fi. Wireless features will not connect when the camera is submerged at the end of the extension pole.

Both Heros offer pro-level 4K output that might be overkill for stroke technique video purposes, but their versatility, ease of use, and stunning video quality make it easy to see why GoPro sets industry standards.

3. Intova Nova HD | intova.net | \$199



The Nova HD is a solid unit that feels good in the hand and is easily operated by large buttons. It also has a wrist-mounted remote control, but it doesn't communicate with the camera when it's submerged at the end of the extension pole. The Intova also floats, a great feature for an underwater camera.

There aren't any mounting attachments in the box, but the quality tripod receiver is metal (no plastic threads!) and will fit an extension pole with a tripod mount. Purchase of a ball mount is advised to increase angle possibilities for technique video capture. Intova makes an array of optional mounting brackets, including several specifically designed for scuba diving. The Nova HD also has a setting to compensate for the loss of color at depth (more on this in the next section).



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The Nova HD is attached to its rugged waterproof housing, which is rated to 200 feet. The back of the housing opens for access to the micro USB and mini HDMI ports and micro SD card slot, but the battery is not removable. Fortunately, the Intova has good battery life, 2 to 3 hours of filming depending on whether or not you're using the LCD screen.

Video quality is perfectly suitable for assessing technique. Although it's not at the same level as GoPro, it's a great multipurpose camera at a great price.

4. Polaroid XS100i HD | polaroid.com | \$180



The XS100i HD packs some cool features into a small and well-priced unit. The camera itself is waterproof to 30 feet—there isn't a separate housing. It's easily mounted to an extension pole, or even a broomstick, with the included clamp-style pole bracket. The bracket is slightly bulky, which caused a bit more drag when walking along the side of the pool with the pole submerged. The included ball and socket mounting brackets afford different angle possibilities, although a separately purchased ball joint mount expands the options.

The settings are simple and an internal gyroscope automatically inverts the video when the camera is mounted upside down. The unit doesn't have its own screen, and, as with the others, the Wi-Fi won't get a signal to a mobile device while the camera is submerged. The battery isn't removable, which means the unit will have to be recharged between uses, although you can expect about 2 hours of filming.

Image transfer is via Wi-Fi, micro SD cards, or mini USB or HDMI ports. Video quality is not at the pro level, but it's perfectly suitable for assessing stroke technique, and at a significantly lower price than the pro-level cameras.

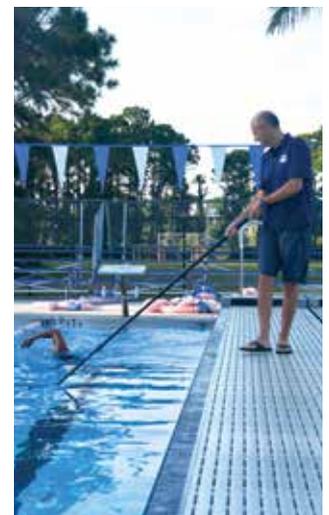


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» » » Tested
FOR Masters Swimmers
BY Masters Swimmers



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CAPTURING MEMORIES

Let's face it, nothing breaks up the monotony of four descending 500s like a lanemate with an underwater camera looking to shoot fun underwater pictures for the annual team banquet. Yes, the coach will be annoyed, but at least 50 percent of your teammates will be happy to interrupt their 500s to pose for you. (And there's an art to this, so see our sidebar "How to Take an Underwater Group Pic.")



3
(Above) Taken with the Nikon 1 AW1.

(Left) The Nikon Coolpix AW120, taken with the Nikon 1 AW1.

1. Nikon Coolpix AW120 | NikonUSA.com | \$250



The Coolpix line is known for its versatility and breadth and varies from simple point-and-shoot models to ones that can bridge the gap between dabbler

and hobbyist. The AW120 is a great vacation camera. It isn't near the same level as the AW1 for output quality, but it's much more compact—it easily tucks inside a swimsuit and will stay there securely when used with the attached neck strap.

Settings are easy to configure, and although there aren't really any manual modes, there are lots of preset scene modes to play with. The AW120 features Wi-Fi data transfer capability, standard SD card, and GPS for geotagging images. Although the battery is removable, there isn't a battery charger to misplace—you just charge the battery when it's in the camera.



1
(Above) Taken with the Nikon Coolpix AW120



2
(Right) Taken with the Polaroid iS085

2. Polaroid iS085 | polaroid.com | \$80

The iS085 is the perfect fun camera for anyone who doesn't mind sacrificing advanced features and pro-quality output for compactness, simplicity, and economy. The Polaroid is waterproof to 10 feet, which rules out snorkeling for most swimmers (unless you're content to float near the surface the whole time), uses

AAA batteries, a micro SD card, and is the only camera we tested that has a dual screen (for the all-important selfie!). There are a few filters, including one that boosts color, and a built-in flash. Picture quality underwater can vary, with some distortion. Still, for the price, the Polaroid delivers the goods for itinerate swimmers on a budget and proud members of selfie nation.

3. Nikon 1 AW1 | NikonUSA.com | \$800



Touted as the first rugged waterproof camera with an interchangeable lens, the AW1 is a thing of beauty with a lot packed into a relatively small package.

This makes it the perfect multipurpose or travel camera. It takes amazing images above and below the water, shoots HD video, is sizeable enough to grasp and use in variable conditions, yet small enough to pack easily. It even has GPS to geotag your images.

The settings are easy to use for the beginner and will be familiar to experienced DSLR users. In addition to underwater settings to normalize white balance (see “Got the Blues?”), there are the standard manual, aperture, and shutter shooting modes and a few specialty modes. Images are transferred from a standard SD card, mini USB, or mini HDMI ports.

The AW1 should impress anyone with even a passing interest in photography. It’s loaded with features, and the output quality eclipses any point-and-shoot cameras. If you’re an adventurous traveler, the Nikon 1 AW1 can function as the only camera you’ll ever need beyond a smartphone.



HOW TO TAKE AN UNDERWATER GROUP PORTRAIT

Certain aspects of physics make it challenging to get a good underwater group portrait. Here’s how to make it simpler:

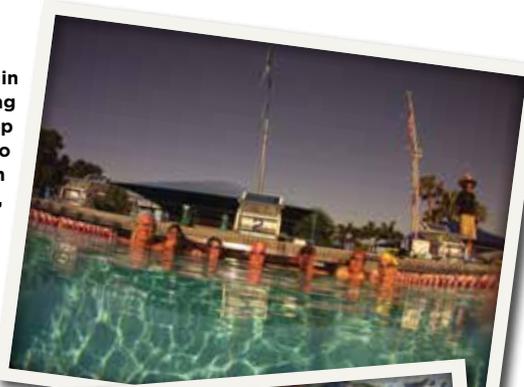
- Ask your subjects to expel air together as they descend. This briefly and temporarily overrides those built-in buoyancy devices known as lungs. It also allows everyone to pose at the same time without bubbles obscuring their faces.
- Ask them to resist the urge to wave their arms around or let them float up away from their bodies. If they’re exhaling, they should be able to sink with minimal arm gyrations. When arms float up and away, they often end up obscuring someone else’s face.
- Once everyone strikes a pose, snap a pic or two and everyone ascends.
- Remember: this is for fun, so be safe. With some practice, you’ll soon be spicing up your club’s Facebook page with fun images.



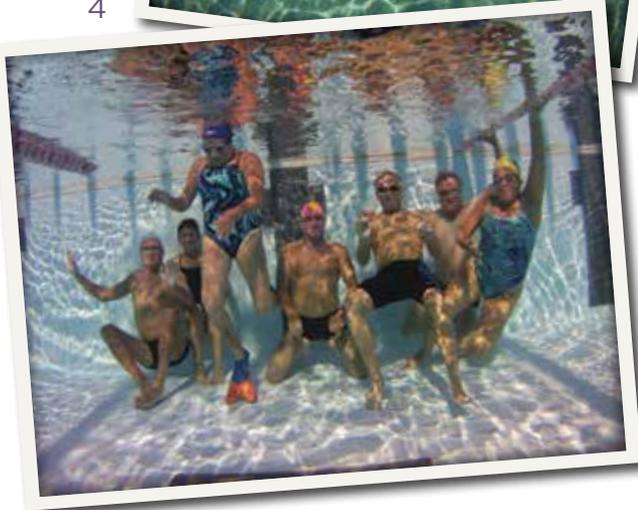
Both images taken with the Nikon 1 AW 1, top image using the underwater white balance settings, bottom image without.

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The Micro HD+ in the snorkel setting floods the top picture with too much red when it's above water, but seconds later, the underwater pic turns out great.



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4. SeaLife Micro HD+ sealife-cameras.com | \$500



The SeaLife Micro HD+ is another one of those bridge devices that can be many things all in one neat package and is great for the adventuresome user who wants high quality but versatility. The unit shoots stills and 1080p video. In spite of the ergonomic feels-good-holding-it body of the Micro HD+, it's small enough to shove into a buoyancy compensator when scuba diving or the cargo pocket of some board shorts.

The camera, rated to 200 feet, is completely sealed, with no doors, hatches, or O-rings. A waterproof USB connection handles data transfer and battery charging (the battery isn't removable). Onboard Wi-Fi can also facilitate image transfer, and adaptors for foreign electrical outlets are included in the box.

The large piano-key-style buttons make changing settings on the fly easy. And the Micro HD+ has a sense of humor—you'll be presented with a "that was easy" message after using the aptly named "easy set-up" menu. The menu asks you to choose between land, shallow water (snorkeling), and deeper water (diving), and you should check these settings each time you turn the camera on, as it doesn't remember them. This might seem like a pain, but it actually prevents you from taking a whole slew of images on the wrong setting and then having to discard or attempt color corrections later.

5. SeaLife DC1400 | sealife-cameras.com | \$530



The DC1400 shares some features of the Micro HD+, but it's completely different in that there's a separate land camera and a rugged housing that takes it to 200 feet. As with the Micro HD+, the DC1400 has large keys that are easy to operate underwater, and the same easy set-up menu that quickly adjusts the white balance settings to accommodate land, shallow water, and deep water.

Depending on the setting used, the reaction time of the camera is pretty slow from the time you press the shutter button to the time it actually takes a picture, so this meant that underwater portrait subjects occasionally ran out of air and had already started for the surface. Image transfer is via standard SD card or mini USB.

The DC1400 housing is bulkier than housings for any of the other cameras tested, but the land camera inside is small enough to fit in a shirt pocket and function as a high-quality point-and-shoot, making this unit another versatile travel camera.



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Taken with the SeaLife HD1400



Both images taken with the SeaLife MicroHD+, the one on the left on the land setting, the one on the right using the snorkel setting.

GOT THE BLUES?

The deeper you descend under water, the more color you lose, in order, of the available spectrum: red, orange, yellow, green, blue, indigo, and violet (remember that guy, ROY G. BIV, from 6th grade science class?). This is why underwater pictures taken with a camera set in a normal daylight mode have a bluish cast to them—all the colors before blue start to disappear the deeper you go. These images can be adjusted with editing software, but easy-to-toggle settings on the Nikon 1 and both SeaLife models compensate for the loss of the early spectrum colors so images appear with truer colors.