

NEW FINNS

BY ION HARDY

In the second part of its report on new fins, Scubalab tests show that SPLIT FINNS win again.

The new millennium has certainly arrived for scuba fins. Nature's Wing split-fin propeller technology has again proven its superiority where it counts the most—efficiency. Put simply, the split-fin technology requires less effort than conventional paddle technology, and the diver uses less air.

From these tests and past fin tests, 10 Tester's Choice fins are presented here. Six are of the split-fin technology; two are budget fins based on the classic Jet Fin (JDI) and Scubapro; and two are the best of the paddle fin technology—Aqua Lung Blades and Mares Quattro. Also worth consideration are four other budget paddle fins that have done well in recent tests: the Genesis Aquaflex, JDI Frog Foot, Ocean Reef X-press and TUSA Cetus.

Testing for Efficiency

For the purposes of this and past testing, we defined the most efficient fins as those that allowed a diver to swim a measured course at a constant speed with the smallest expenditure of energy. The test protocol included:

- ▶ A 300-foot, out-and-back course running parallel to shore in 20 to 25 feet of water. Each 150-foot leg was laid out with a surveyor's tape and marked with checkpoints.
- ▶ Divers were issued fins in random order and completed eight to 10 timed runs per day, with a 10-minute surface interval between runs. This regimen was repeated on another day with divers using the fins in a different order.
- ▶ Divers first warmed up with the fins while becoming neutral at 15 feet, then swam the course at 1 mph, holding a depth of 15 feet.
- ▶ The random order of fins on each test day helped cancel out the "learning" and "fatigue" factors of testing fins. Using a variety of testers (in this case, 13 test divers) helped reduce bias carried over from the tester's prior experience. The two-direction course running parallel to shore canceled out the effects of current.
- ▶ During surface periods, each diver reported time, amount of air used and subjective scores.
- ▶ Drag forces (resistance to movement through the water) were controlled by having all divers swim at the same speed,

over the same distance, at the same depth, with the same dive gear. These procedures limited variables to the fin being tested and—as a measure of work—the air that was consumed.

▶ Using human testers is difficult because their fitness, energy and accuracy vary from day to day. But by compiling hundreds of test runs, anomalies can be eliminated and clear trends can be established.

Testing for Ergonomics

For the ergonomic testing, each evaluator was again issued the fins in random order and used a control slate with nine different aspects to be scored, both numerically and with written comments. Each tester used the same scoring scale and order of testing. The individual tests covered:

- ▶ Sizing, fit and comfort (of the foot pocket)—evaluated both out of the water and in.
- ▶ Attaching buckles and adjusting straps—also tested in and out of the water.
- ▶ Surface swimming—evaluated face-down and face-up.
- ▶ Changing speeds—done during an underwater swim, repeatedly speeding up and slowing down.
- ▶ Changing direction—done repeatedly during an underwater swim, quickly reversing direction.
- ▶ Different kicks—effectiveness of flutter, scissors, frog, dolphin and sculling kicks.
- ▶ Stability—how much the fins wobbled, sliced from side to side or hit each other during the kick cycle.
- ▶ Power vs. stress—the testers' perception of power produced vs. effort required.
- ▶ Stiffness—the testers' perception of flexibility.



PART TWO

TESTERS

For the 12 fins evaluated here, these 13 test divers made 350 separate evaluations, providing 1,304 data points and over eight hours of videotape for additional analysis.

HEATHER BROWN, VICKI DUNST, ERIK ERIKSON, ION HARDY, MIKE JONES, NATE LINS, JASON MANIX, CATHY McBRIDE, BILL MERCADANTE, RON MOORE, PETE PEHL, LORRAINE SADLER, CYD YONKER

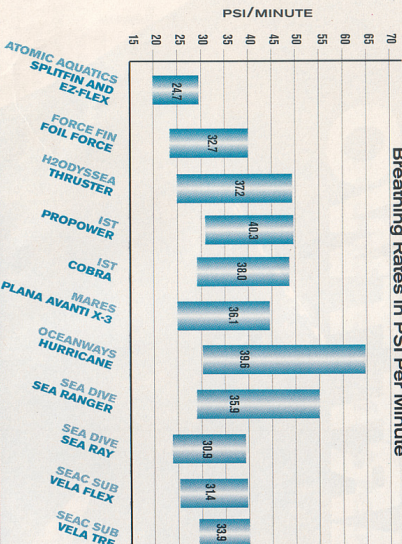
Fin Efficiency: By the Numbers

From the hundreds of course test runs (see "Testing for Efficiency," p. 50), the nine best runs for each fin were used to evaluate efficiency and overall performance. The graph reports three numbers for each fin:

- The bold number on each bar is the average for the nine best test runs.
- The lower end of each bar represents the best air consumption (in psi/minute) that any tester had for that fin.
- The higher end of each bar represents the worst air consumption any tester had for that fin.

The four best fins in last month's review were also of the new split-fin design (two fins from Apollo and two from Scubapro). These four averaged between 24 and 30 psi/minute, while the worst fin in that test had averaged over 46 psi/minute.

Breathing Rates in PSI Per Minute



FINS AND SPEED

As experienced divers realize, speed is not a priority of underwater swimming, as increasing your speed costs you dearly in energy and air consumption. To double your speed, you have to at least quadruple your effort.

Based on our testing, divers using full scuba equipment in the ocean can only sustain top speeds of 1 to 2 mph. We have tested fins that barely allowed divers to reach 1 mph, while, at the other extreme end of the scale, the best course runs we have ever recorded were well over 3 mph, by a top athlete using the most efficient fins. But most of us will max out at 1 to 2 mph with good fins. And, it takes excellent respiratory and circulatory fitness, strong muscles and well-designed fins to sustain top speeds for more than a few minutes. Most good paddle fins will peak out at 1.5 to 1.9 mph, with a very few, such as Mares Quattro, reaching speeds in the 2 to 2.5 mph range. The newer propeller fins also peak out in the range of 2 to 2.5 mph, but they are able to allow the diver to sustain these higher speeds for longer periods of time.

FEATURES

PERFORMANCE

MANUFACTURER & MODEL	SUGGESTED RETAIL PRICE	BUOYANCY IN SALT WATER	FOOT POCKET DRAINS	STIFFNESS	SIZES	COLORS	OVERALL ERGONOMIC SCORE	COURSE SUBJECTIVE	COURSE EFFICIENCY	TOTAL SCORE
ATOMIC AQUATICS SPLITFIN	\$189	SMALL	LESS STIFF	3	3	3	1	1	1	3
ATOMIC AQUATICS EZ-FLEX	\$180	SMALL	LESS STIFF	3	3	3	1	1	1	3
FORCE FIN FOIL FORCE	\$180	SMALL	LESS STIFF	4	5	3	2	2	7	7
H2ODYSSEA THRUSTER	\$72	SMALL	AVERAGE	3	4	3	3	3	3	9
IST PROPOWER	\$85	SMALL	STIFFER	4	5	4	4	4	3	11
IST COBRA	\$85	SMALL	AVERAGE	3	2	3	2	3	8	7
MARES PLANA AVANTI X-3	\$119	SMALL	AVERAGE	4	6	3	2	2	7	9
OCEANWAYS HURRICANE	\$85	SMALL	STIFFER	4	2	3	3	3	3	9
SEA DIVE SEA RANGER	\$75	SMALL	AVERAGE	3	3	3	3	2	8	7
SEA DIVE SEA RAY	\$90	SMALL	LESS STIFF	3	3	3	3	2	7	7
SEAC SUB VELA FLEX	\$110	SMALL	AVERAGE	3	4	4	2	2	8	8
SEAC SUB VELA TRE	\$129	SMALL	AVERAGE	3	1	3	2	2	7	7
PAST TOP PERFORMERS										
APOLLO SPORTS EX	\$180	SMALL	LESS STIFF	3	3	3	1	1	1	3
APOLLO SPORTS PRO	\$180	SMALL	LESS STIFF	5	1	1	1	1	3	3
AQUA LUNG BLADES	\$170	MEDIUM	AVERAGE	5	4	1	2	2	5	5
IDJ POWER FIN	\$85	SMALL	LESS STIFF	4	1	1	2	2	5	5
MARES QUATRO	\$149.95	SMALL	AVERAGE	3	6	1	2	2	5	5
SCUBAPRO JET	\$90	SMALL	LESS STIFF	3	1	1	2	2	5	5
SCUBAPRO TWIN JET	\$189	SMALL	LESS STIFF	4	1	1	1	1	3	3
SCUBAPRO TWIN JET GRAPHITE	\$189	SMALL	LESS STIFF	4	1	1	1	1	3	3

RATING SYSTEM

1 = Outstanding 2 = Good to Excellent 3 = Average 4 = Marginal 5 = Unacceptable

FINS IN REVIEW

ATOMIC AQUATICS SPLITFIN AND EZ-FLEX

Atomic Aquatics has become the latest of the manufacturers to embrace propeller technology with their Splitfin designs. Of the two, the Ez-Flex is slightly less stiff and has an easier "feel" to it, but performance scores were so close—both outstanding—that it was not possible to discern a difference.

The main differences between the Atomic and other split fins are:

- Atomic fins are longer and wider, requiring a slower and wider kick;
- They use inserts of a stiffer, more brightly colored material in the blades, giving them a more finished appearance but not any appreciable difference in performance;
- They have a new, innovative buckle system that is easy to adjust and remove. We will be conducting durability tests on these and other new buckle systems from other manufacturers this year.

Again, as with several other fins in recent tests, the open-toe design of these fins improves their overall ergonomics. The foot pockets of these Atomic fins run larger than average, and the company is planning to offer a dry suit version of the fins that will provide even more room for dry suit boots. The only fins available in time for our testing were size large, so we would expect even better scores from the testers with a smaller feet if they were able to use a size medium.

As with all the other propeller fins, the Atomic fins were outstanding overall, with best scores in:

- Course efficiency—less air used
- Course subjective—ease of use
- Human perception of power vs. stress

The fins' weakest scores (although still in the outstanding range) were:

- Different or alternate kicks
- Changing direction

But the scores for human perception of changing speed was better than other propeller fins, perhaps due to longer, wider blade size.

FORCE FIN FOIL FORCE

Force Fin, by Bob Evans, has produced more innovations and new design concepts than any other fin manufacturer. These designs have clearly addressed the need to reduce the turbulence caused by moving fins through the water, the need to increase kick frequency and not kick size, plus the value of using fin materials that have a "memory" and, therefore, snap back to their original position, thus aiding the diver's kick. But, as these tests and our past tests have shown, these efforts have produced good fins that are kicked differently, but have not produced superior fins.

Force Fin did not provide fins for this test, so we purchased a pair of the new Foil Force fins that use a split-fin design, but are not licensed under the Nature's Wing patent. The Foil Force's scores were next best overall in this test group to the split fins that use the Nature's Wing technology, but they were not able to perform at the level of the new propeller technology, nor were they able to perform with the best of the traditional paddle fins. Video analysis shows much of this difference to be due to the lack of rails on the fins, the smaller surface area of the blades and the extent of wobble during the kick cycle.

The innovative open-toe design, flexibility of blade material, simple buckles and easy adjustment, good sizing and

fit all enhanced the performance of the Foil Force fins. However, the "Vortex Generators"—bumps on the underside of the fins—did nothing to improve the fins' in-water performance and made them slippery on deck. The Foil Force fins bend at the foot pocket more than other fins, thus putting undue strain on the ankles. The fins' poorest performance aspect was their lack of stability, but they also scored poorly on using different kicks, changing speed, surface swimming and changing direction.

H2ODYSSEA THRUSTER

This new version of a budget priced fin from H2Odyssey is an average performer. It is a positively buoyant fin with small drain holes and average stiffness. Design features include a single vent, flexible barrens, a scalloped tip, and rails on the blades. The Thruster also features a pull tab on the fin straps, swivel buckles and good, non-skid traction on the foot pockets. The fin received its best subjective scores for buckles and adjustment, while the weakest scores were in the testers' perception of power vs. stress.

IST COBRA AND PROPOWER

These two budget fins from IST are quite different in design and produced significant differences in their scores. The Cobra is a non-floating fin of average stiffness with a short blade, extra-large foot pocket, side rails, and a beaver-tail-shaped blade. This would be an easy fin to pack for traveling. The Cobra runs large, so you will probably need to buy it in one size smaller than you usually use. Best subjective scores were in changing direction, stability and power vs. stress.

