Gweduck Part II

THIS IS A BIG DEAL

PHOTO BY MARK BUNZEL

By Burke Mees

One of the first real displays of American seaplane innovation in more than a half-century

In the July/August 2013 Water Flying, *Burke Mees wrote about flying the Gweduck, an Experimental Amateur-Built multiengine amphib.* *(See "Flying the Gweduck," page 16.)* *Here he follows up the flying with some interesting background on the airplane, and the people and ideas behind it.*

Seattle has always had a healthy aviation scene. Boeing jets fresh from the production lines are part of the local landscape, normal life in the city includes urban commercial seaplane operations, and a lot of aviation history has been made there. This past winter I had occasion to spend some time getting to know one of the latest developments to come out of the Seattle area: the new, all-composite, twin-engine amphib called the Gweduck.

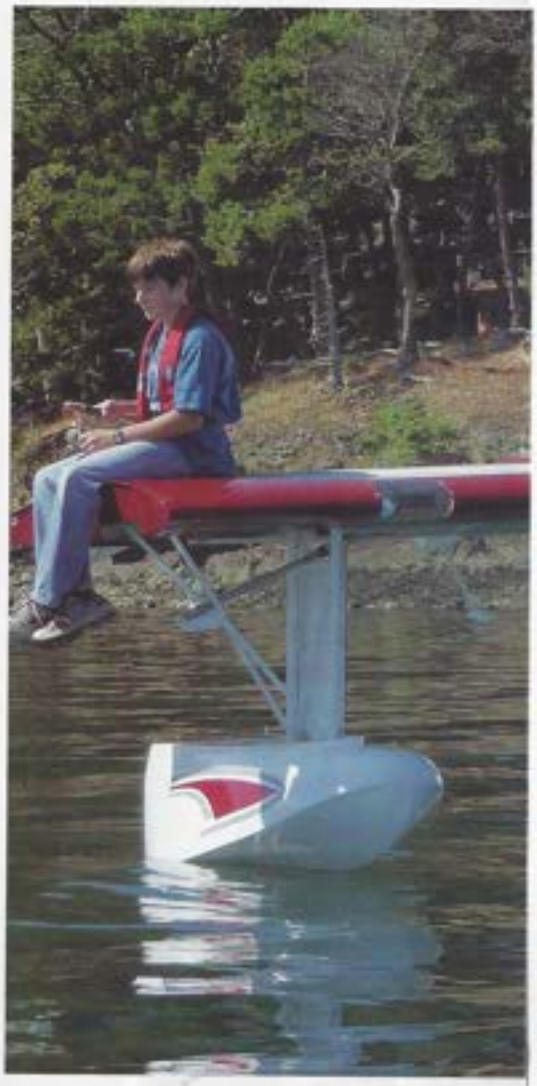
There is a good story behind the Gweduck that began nearly two decades ago when Ben Ellison and Ross Mahon were driving around the Renton airport and had the idea to build a composite version of the Grumman Widgeon. We all have the occasional good idea at the airport, but not many of us spend the next two decades following through with it.

At first the plan was to just copy the G44 design, but if you're going to build a Widgeon from scratch, you might as well improve on it because it does have some quirks. Before long, the project expanded to incorporate every innovative development in boat and seaplane design since World War II. In the end it became an all-new seaplane loosely based on the original Grumman design. At this point, the project has taken shape as a flying prototype that is on the verge of going into production as an experimental kit plane.

Word about the Gweduck has been getting out, it has been making appearances at the airshows and getting onto the pages of the aviation magazines, but I don't think people realize just what a big development this is in the seaplane world. It is a hull amphib that is immune to salt-water corrosion and one of the first real displays of American seaplane innovation in more than a half-century. As someone who has spent a seaplane career in airplanes that were made before I was born, this is a big deal.

When I first walked into the hangar at Ellison-Mahon Aircraft at the Renton Airport, I noticed the distinctive collection of papers and books that you see in engineering offices, but I also noticed the social feel that you find in small airport hangars. I think that combination characterizes the Gweduck project; there is serious engineering taking place here, but it's also driven by the enthusiasm of regular guys who just like airplanes.

Ben's engineering background, financial resources, and stubborn determination were the backbone of the project, but it also became a collaborative effort with a lot of serious talent behind it. Seattle is a place where you can't walk to the nearest Starbucks without passing a Boeing engi-



The Gweduck is more than a redesigned Widgeon. It has spray channels on the chines, drooping flaperons, reservable props, and retractable floats, among other innovative features.

The all-composite Gweduck has no hull plugs for the simple reason that it just doesn't leak.

PHOTO BY BELL ELLISON

neer on the street, and an impressive list of some pretty big names have contributed to the Gweduck project including some of the engineers who brought us into the jet age and others who date back to the era of the old flying boats.

In a way, the Gweduck is the last project to benefit from the knowledge and experience of the big-seaplane engineers while they were still alive. Even though the project has proceeded according to the American tradition of clever ingenuity in a backyard setting, there is nothing amateur about it.

FIX, BORROW, ADD

So what did they do with the basic G44 design? First they fixed some of the Widgeon's weaknesses, then borrowed proven features from other airplanes to improve it, and finally added some of their own ideas that haven't been seen before in the seaplane world.

The obvious starting point in a Widgeon redesign is to give the airplane a better hull. When not properly supervised the Widgeon can produce a particularly mean porpoise that has caused a lot of people grief. For guidance in coming up with an efficient and well-behaved hull, they went to the NACA 2503 report, which was a study in hull design from the late 1940s. Because this report came out at the very end of the era of the flying boat, its findings have not been widely put to use. Using research that was not available when the Widgeon was first built, they came up with a basic hull design and then conducted water tests with a quarter-scale radio-controlled model to fine-tune that design.

A good hull was just a start. Next, they looked around for other features that would improve the airplane. For example, the Grummans have a problem with spray erosion on the props, so they took the idea of the spray channel used on the Japanese Shin Meiwa flying boat. This is a fenced-off channel that runs along the chine and directs the bow spray behind the props.

Since drooping flaperons work well on the Beaver, they decided to put that exact system on the Gweduck. Since reverse thrust works so well on the Albatross, they included that on the Gweduck. Since the PBY had strong, sturdy, retractable wing floats, they used that same basic geometry on the Gweduck. The idea was to take features that had proven themselves on other airplanes and incorporate them into the Gweduck design.

NEW IDEAS

In addition to borrowing good ideas from elsewhere, they also came up with some new ones of their own. Every so often a Grumman sinks because it loses a wing float, so they made a sealed-air compartment in the outboard wing that will support the wing in the event that a float becomes detached. Collisions with floating debris have been known to sink

monohull seaplanes, so they protected the bottom of the Gweduck's hull with an impact-resistant carbon fiber-Kevlar hybrid armor plate.

Many common-sense considerations have also gone into the airplane's construction. For example, the same model electric motor is used to power each of the wing floats, the landing gear, and the flaps. This means that a single spare electric motor on the shelf can be used in six places. There is a long list of clever ideas that have gone into this airplane, but the most inspired of them all is the very idea of a corrosion-free, composite airframe.

Salt water is the natural habitat of the multiengine hull seaplane. Floatplanes are the tool of choice for inland freshwater lakes, but the hull seaplanes with multiengine reliability are the way to go when it comes to the coastal areas with rough water, windy weather, and a little bit of ocean swell making its way into the landing areas. Given the multiengine hull seaplane's coastal saltwater niche, it is the perfect match for a corrosion-free composite airframe.

Corrosion is the biggest maintenance item for metal seaplanes flying on salt water, and the composite airframe practically eliminates this problem. Anyone who has fought the never-ending battle against corrosion will understand just how revolutionary the Gweduck is in this respect.

PROTOTYPE

The design phase of the Gweduck project lasted a decade, and that led to the construction of the prototype, which first flew in 2008. Given all the careful planning, the prototype has not required any major changes, and at this point it has logged 500 hours of flight time.

When I first laid eyes on Serial Number 1 in the Renton hangar, I noticed the contrast between its glossy, sleek construction and the familiar Grumman shape. The Gweduck has no hard angles, no rivets, and a look that is simultaneously retro and futuristic.

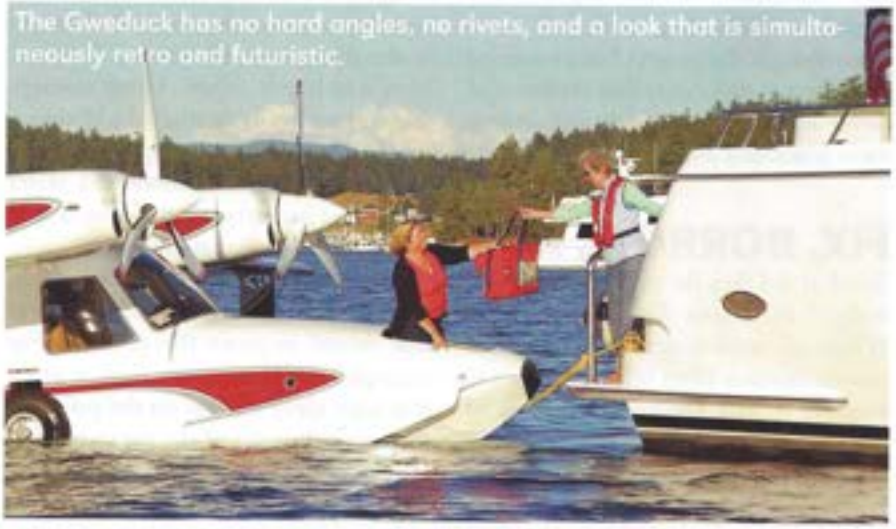
Walking around the airplane, several things caught my eye. For example, the Gweduck has no hull plugs, and I was told that this is for the simple reason that it just doesn't leak. It has the telltale exhaust vent of a combustion cabin heater, but I was assured that this is a solid-state unit that is more reliable than the old ones I'm used to.

I noticed that the wing float has a strange asymmetrical shape, and Ross explained that this allows the float to run along the water in the retracted position, giving the airplane the ability to taxi in a controlled manner while heeled over in a steep bank. This lifts a wing high enough to enable the Gweduck pilot to pull up to a dock.

DOCKING

Making the monohull design compatible with docks is a major development. The placement of the wing float and propeller prevent Grumman airplanes from pulling up to a standard dock, and traditionally these airplanes come ashore by extending the wheels and driving onto a beach or ramp. But, there are a lot of docks in the Gweduck's home territory, so they decided that it should be able to use them.

Retracting both wing floats and heeling the plane over on the right wing


The Gweduck has no hard angles, no rivets, and a look that is simultaneously retro and futuristic.

What is a Gweduck?

It wasn't until the end of my time there that I asked the question that had been on my mind throughout: Why the name Gweduck? After all, a clam-like bivalve that buries itself in the mud at the low tide line hardly calls to mind images of soaring elegance. Of course, these guys have given careful thought to every part of the project, so I should have trusted that there would be a reason for this incongruity, and sure enough there was.

Ben told me that, at first, they looked around for a water-bird name, but they had all been taken to the point that Molt Taylor had to name his airplane the Coot. Faced with this scarcity of eligible waterfowl names, Ben's wife suggested the name Gweduck as a little bit of an inside joke. To people outside the Pacific Northwest the name would call to mind the image of a water bird, maybe something vaguely exotic with a bright-colored bill. The locals, however, would be in on the joke.

Maybe I shouldn't have given that away to the people in Florida or Minnesota, but for those who do understand that a Gweduck is a mud-dwelling bivalve, this does need some explanation. The airplane's personality is, of course, distinctly un-clamlike, but it is revolutionary enough to merit a name that is unique. So, yes, I suppose the name is suitably unconventional to be appropriate to this unique airplane.

PHOTO BY ROSS MAHON

Retracting both wing floats and heeling the plane over on the right wing results in enough wing and prop clearance to make a port-side docking.

PHOTO BY MARK BUNZEL

The cockpit of the prototype has the usual assortment of round dials that you find in hands-on VFR seaplanes.

results in enough wing and prop clearance for the Gweduck to make a port-side docking. The distinctive asymmetrical float design makes controlled taxi possible in this configuration.

With the airplane banked to one side for docking, you'd hardly want a gust of wind to tilt it over on the other wing, so there is a seven-gallon ballast tank located on the outboard wing to help maintain this bank angle during taxi. A switch on the panel activates an electric pump that fills the tank to weigh down the desired wing. When the maneuver is over, the tank can be emptied with a cable-operated dump valve.

Coasting up to a dock with the engines shut down requires a water rudder, and the Gweduck has one that retracts into the bottom of the air rudder and provides sufficient steering for this purpose. This is another new development; the Grummans rely entirely on differential power for steering and don't have a water rudder.

The Gweduck's ability to dock gives the airplane access to places that have traditionally been off-limits to Grummans.

It shows that these guys have not been afraid to embrace completely new ideas, but they've also been able to stick with old things where that is appropriate.

ROUND DIALS

In particular, they've resisted the trend in new airplanes to jam the panel full of glass-cockpit gadgetry, and the prototype has the usual assortment of round dials that you find in hands-on VFR seaplanes. I've always felt that the glass panel tasks of twisting knobs, programming routes, and silencing audio alerts disrupt the natural rhythm of water flying.

Of course not everybody feels that way, and as an experimental homebuilt there is a lot of room in the Gweduck for customization. If you'd prefer to outfit it with a G1000 you can certainly do that as well. The panel is roomy enough that you can add other equipment to fit your specific needs, such as an HF radio or a marine VHF.

The interior is another place that can be customized. The prototype has a lightweight, utilitarian Zolotone boat finish, which you can get dirty and hose down. If you prefer something more comfortable, you can outfit it with leather seats and give it the feel of a corporate airplane. If you prefer something more nautical, you can outfit the interior with polished teak and brass to give it the feel of a cruising yacht. There is a lot of room for creativity in the Gweduck.

To sum it all up, I was impressed with the amount of thought and expertise that has gone into this project. I couldn't bring up a Grumman-related idea or issue that they hadn't already thought about and addressed in their design. The airplane makes radical departures from the Widgeon design where that is appropriate, but they were careful not to abandon what has made the Grumman a classic.

In the end of course, the only thing that really counts is how the airplane flies, and stormy November weather kept us on the ground during my first several visits to the Renton hangar. That worked out for the best because by the time I finally did fly it, I knew enough about it to make the most of the opportunity. ■

Burke Mees is an experienced commercial seaplane pilot, instructor, and check airman, and a pilot for a major U.S. airline. He is a frequent contributor to Water Flying.