



They Made It!

David and Alex Borton, father and son, traveled 1400 miles strictly on the sun.

20 Days in a Solar Powered Boat through the Inside Passage from Bellingham, WA to Ketchikan, Alaska.

Excerpts from the blog by **Harriet Borton**

Visit the complete blog at: www.solarsajourney.squarespace.com

The Dixon Entrance: Entering U.S. Waters

June 12

David and Alex left Clam inlet around 6 am in the rain, but that lasted only a couple of hours. They crossed the border today from Canada to the U.S., which they noted when the time on their phones shifted back an hour! Thankfully they had a safe crossing of the potentially troublesome Dixon Entrance. I (Harriet) talked to David about 9:30 pm eastern time and they were headed for Ham Island, about 5 miles away. I'm assuming they made it. It's only 15 miles SE of Ketchikan! Long day today: about 15 hours of travel and approximately 50 miles. The GPS tracker stopped working around 7 pm EDT; no word on when it might be fixed. They

think it may be a hardware problem with their satellite equipment. I assume that also means no satellite phone, and they probably won't have cell again until close to Ketchikan.

I plan to fly to Ketchikan and meet them Monday evening, so I'm not sure when the next blog entry will be.

After visiting Ketchikan and Thorne Bay (where David spent a summer logging when he was in college), they will head north again to Juneau and hopefully Glacier Bay.

For those who are wondering, Wayward Sun will come home on the Alaska Ferry from Juneau to Bellingham.



**Main Waypoints
Between
Bellingham and
Ketchikan**

June 13

Alex and David arrived in Ketchikan late afternoon on Sunday, June 13! It took 20 days after leaving Bellingham. During that time they never went ashore due to Canadian Covid restrictions.

In general the weather was cool, overcast and rainy with short breaks of sun now and then. They are happy to be here, and they're enjoying using their legs to get around. I (Harriet) joined them Monday evening, and we will spend a few

days exploring Ketchikan and Thorne Bay. Wayward Sun is docked, soaking up any sunlight, and ready to set forth again.

Good news is that, by taking apart the satellite equipment and adjusting the battery connections, Alex fixed the problem. So the satellite phone and the GPS tracker are now working again. Yay!

The next part of the voyage, north to Juneau and then to Glacier Bay, will hopefully be more relaxed with frequent trips ashore.

Onward From Ketchikan

June 14-21

After spending a few days with Harriet both in Ketchikan and across the water in Thorne Bay, David and Alex are now on Part 2 of the voyage, heading north to Juneau and then Glacier Bay.

Prince of Wales Island is the longest island in the U.S. Thorne Bay, where David spent a summer logging in 1963, was the island's major population center and the world's largest logging camp at the time. Now the logging camp is gone and Thorne Bay is a "city"—the place with a dock where barges can unload containers of goods. Besides the marina, the city includes a library, a bait and tackle shop, café, post office, town office, and a wonderful B&B where we spent one night. David, Alex and Harriet enjoyed walking around, finding one building David recognized, the large machine shop, and a variety of large and really large logging equipment. David enjoyed the library with its great collections of books and pictures of his time there, and he had fun talking to several old-timers who remembered the logging camp.

On Friday morning, June 18, Harriet got a float plane back to Ketchikan to begin her trip home. (Float planes are a way of life out there, bringing mail and tons of stuff from Amazon, in addition to passengers.) The guys left around midday, heading across Clarence Strait.

After crossing Clarence Strait and then Ernest Sound, they anchored that night in Zimovia Cove at the south end of Zimovia Strait. Skies cleared at the end of the day for a beautiful evening. Saturday was a gorgeous sunny day from beginning to end, which they thoroughly appreciated! It was the first (and hopefully not the only) one on the trip. The scenery was beautiful as they passed Wrangell before anchoring at Deception Point on Woevodski Island at the south end of Wrangell Narrows. On Sunday they left in the drizzle again, traveled through Petersburg narrows, and docked around midday at the Petersburg Marina where they spent a little time on land. On Monday morning David explored the town while Alex hiked up the Raven Trail, just outside town.



Breakfast on the Ocean (June 12)

Arrival at Juneau

June 26

After spending Thursday, June 25, hunkered down in stormy weather, David and Alex were able to travel on Friday even though conditions were still rainy and windy. They made it to Taku Harbor, where they anchored for the night.

Saturday was better, although still cloudy, and they arrived at Juneau about 3:30 PM-- one month and one day after leaving Bellingham on May 25. They expect to see several people there who have expressed interested in the trip and the boat. They have cell service again and sent a few photos and videos of the past couple of days.

Heading to Glacier Bay

June 27 - 30

The guys had a very good time in Juneau. Through various contacts, they enjoyed socializing with several people, including a friend of Troy friends and a new friend they met in Thorne Bay who even invited them home for dinner!

Late Monday afternoon, June 28, they left Juneau to head towards Gustavus, the entrance to Glacier Bay. After an evening of great sunshine and beautiful views, they anchored in Admiralty Cove.

The next day they traveled to Couverden Island Cove, where they anchored overnight while awaiting word of admission to Glacier Bay. Permits are limited and hard to get. They finally succeeded in getting a pass from July 2-8. The plan now is to stay put tonight and travel tomorrow (July 1) to Pleasant Island Cove on the northeast side of Pleasant Island, just south of Gustavus. They will then be well positioned to enter Glacier Bay on July 2.

Future Schedule: On July 5 Alex's son Kai and his sitter Ruby will fly to Gustavus. And right after their arrival David will get on that same plane and begin his travel home to Troy. Kai and Ruby will remain with Alex and the boat, and after some additional time in Glacier Bay, they will cruise with Alex back to Juneau for their flight home to Seattle on July 10. Alex and Wayward Sun will hang out in the Juneau area until the boat gets on the ferry to Bellingham on July 18 and Alex flies home.

Exploring Glacier Bay

July 1-4

Alex and David arrived at Pleasant Island Cove on July 1 as planned, and they left that anchorage around 1:30 am on July 2 (the first day of their permit) to head into Glacier Bay. After checking in via radio and traveling for about 8 hours, they stopped to anchor and rest in the

south end of Fingers Bay, on the west shore. They then resumed their travel north, getting to Blue Mouse Cove on the SE corner of Gilbert Peninsula for the night.

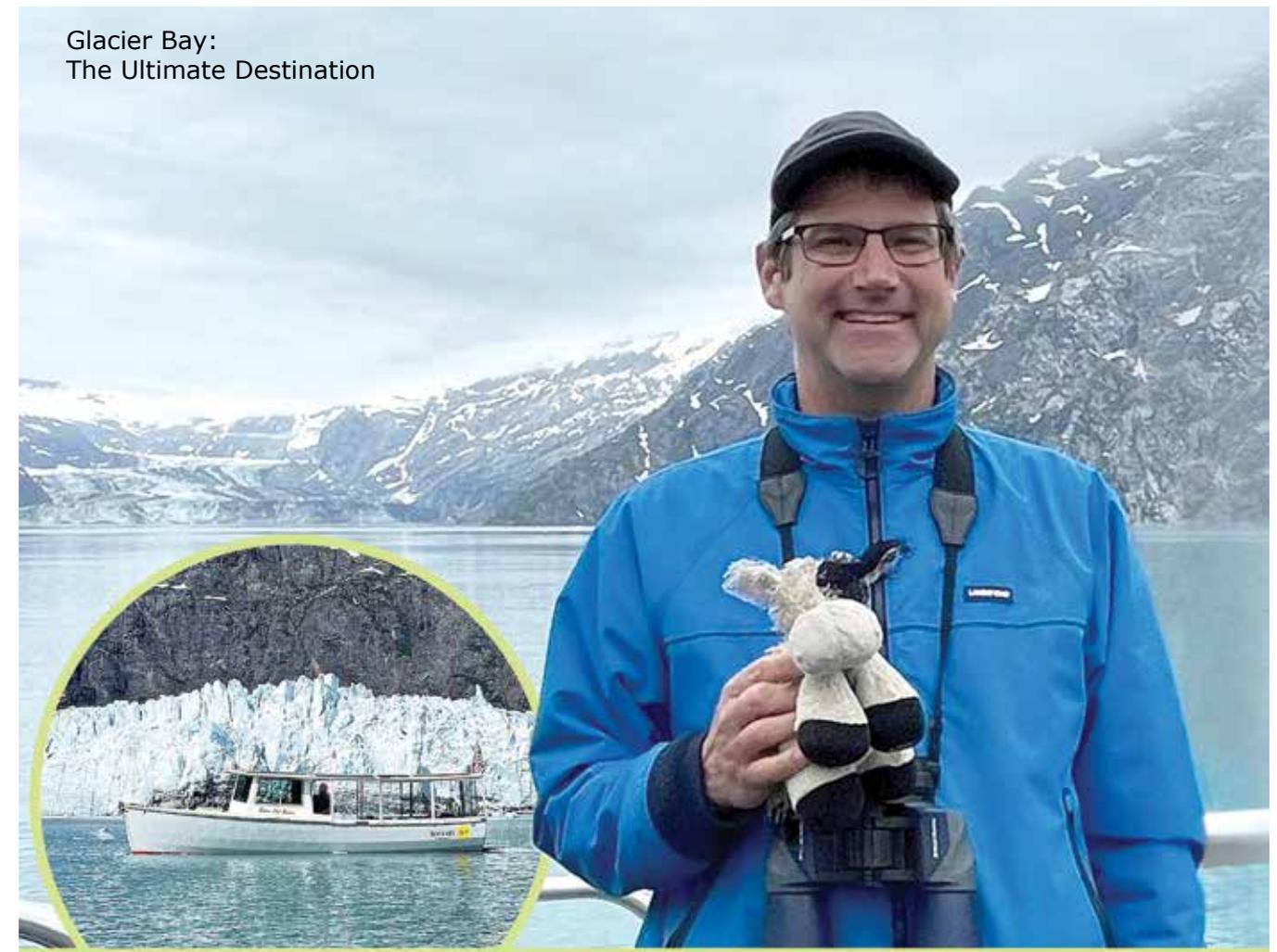
"So far yesterday and today weather has been overcast, with a ceiling at about 4000 feet, so we can't see the tops of the big mountains. But the valleys are spectacular. This place is filled with steep fjords and steep granite walls and U shaped valleys. Lots of sea otters lying on their backs and sticking their heads up to peer at us. We also saw several small groups of humpback whales yesterday. Some closer than others. One was about 25 yards from us when we anchored last night."

They started out about 4:30 am on July 3, heading to Tarr inlet and the Margerie and Grand Pacific glaciers. The reason for the early start was to ride whatever

er flood there might be. It's a Long way to the glacier, about 24 miles. They reported spending a long lunch at the glaciers, and the sun came out while they were there—"it is glorious!" For the night of July 3, they returned to Blue Mouse Cove where they spent the previous night.

July 4 they headed to Bartlett Cove where they need to be the next day for getting to the Gustavus airport to meet Kai and Ruby and to take David to his flight to Seattle. Bartlett Cove has the park visitor center as well as a hotel, where they can get showers, and taxis to the airport. Alex said they would have spent another night in the wilderness but, because of currents, it made sense to get there a day ahead. Otherwise they would have had to leave at 2 am on the 5th.

Glacier Bay: The Ultimate Destination



Solar Boating 101

by Alex Borton

answer to the “how far” question is that Wayward Sun will go 80-100 nautical miles on a full charge – that is if we threw our solar panels overboard. But practically this number is not really relevant because we are always getting solar input. Empty batteries will charge in 2 sunny days, or overnight on shore power. Again, this is not the most important consideration because on a cruise we almost never drain the batteries all the way.

The relevant question for solar boats is “how fast can you go?” The unsurprising answer is faster when it is sunny and slower when it is cloudy. Let’s say we threw our batteries overboard. On a sunny day we collect enough power to move our boat between 4.5 and 5 knots. On an overcast day we get enough power to go between 2-3 knots, depending on the thickness of the clouds. Now if we assume both the batteries and solar panels manage to stay onboard - we can adjust our speed and daily distance travelled to match the conditions. Indefinitely. This is what solar boating expert Joe Grez calls solar sailing.

Below are some data and graphs that further explain how this works.

On any electric boat it is easy to measure the exact power the motor is producing in Watts. Light bulbs are also measured in Watts. The graph below is actual collected data for Wayward Sun averaged over several repetitions in waters without wind or current. All electric boats have a similar curve. (All power boats also have a similar curve; it is just harder to measure the exact power of a gasoline or diesel motor at an exact speed).

As you can see, (chart bottom left) Wayward Sun will go 4.5 knots at 1000 Watts and 5 knots at 1500 Watts. Doubling the power from 1500 Watts to 3000 Watts will gain just over an additional knot of speed.

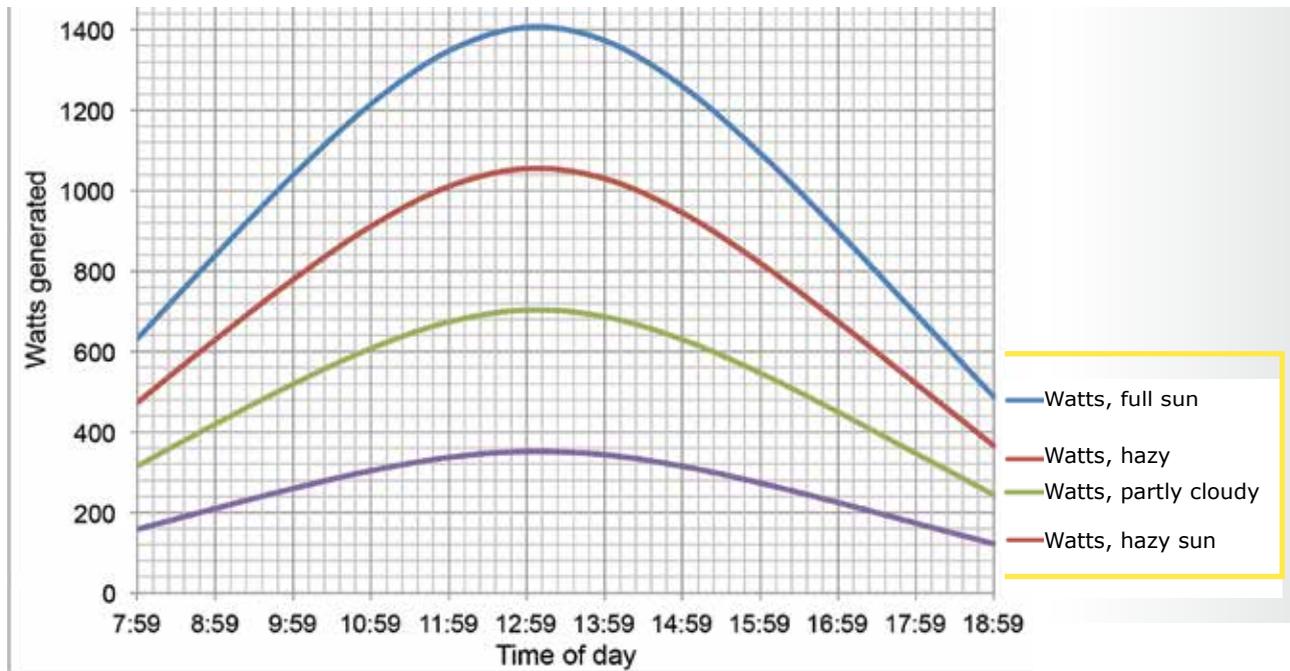
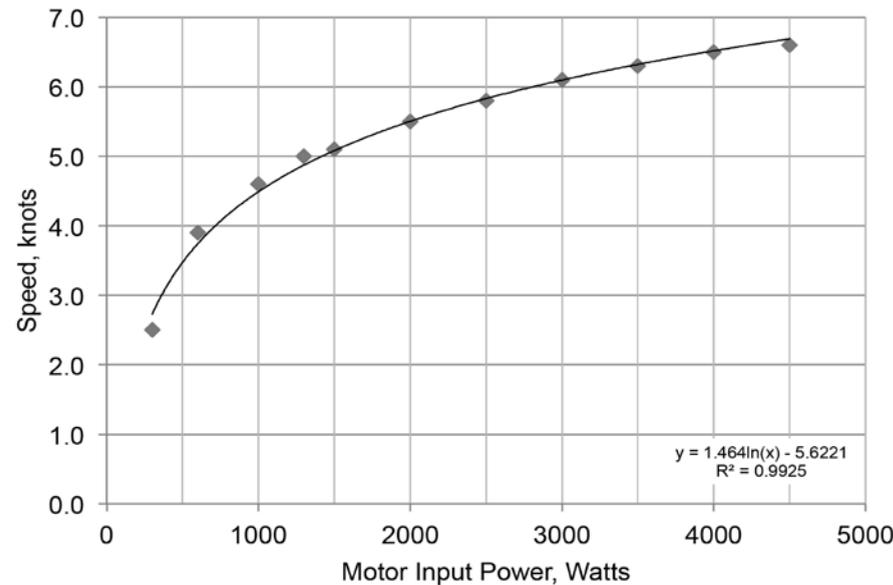
Add another 1500 Watts gets you only get another half knot to max out our top speed of 6.5 knots at 4500 Watts of power. For Wayward Sun, the sweet spot on the curve is around 4.5 knots. Notice that it takes only 300 Watts to move our boat at 2.5 knots.

These next graphs are predictions of insolation (incoming energy from the sun) for a given location at a given time, with a given percentage of cloud cover. These graphs are specific to Ketchikan Alaska on June 20, 2021, about the time we will arrive there. It is calibrated to the number of solar panels we have on Wayward Sun. This tool,

People always ask us “how far can your boats go?” For true solar boats, this is the wrong question. But understandable, because that is how regular electric boats work. Regular electric boats are inherently limited by their battery capacity and their efficiency. They have to return to shore power to charge. Until recently, solar was not capable of severing the tie to shore power, so it was only functional for extending range, or for partial charging. But it’s now possible to produce a solar boat with reasonable speeds and accommodation that can continuously cruise without ever charging from the shore. Ever. Sustainable Energy Systems has been producing boats like this since 2012. As long as it is daylight our boats get enough energy from the sun to go, even on overcast and rainy days.

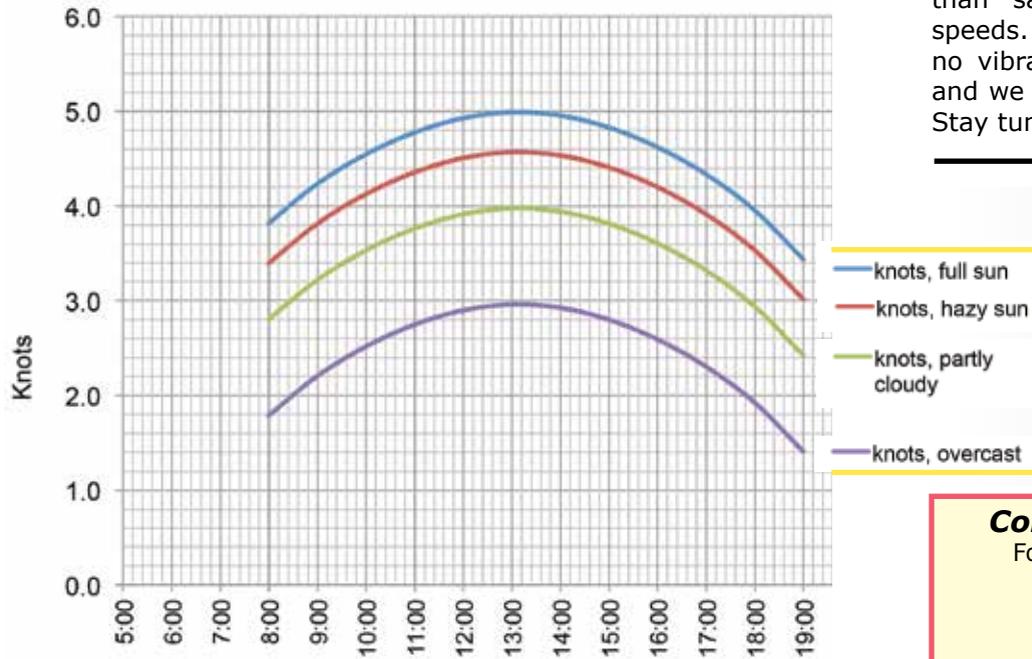
This article uses Wayward Sun as an example. “Solar Sal 27 model conceived by David Borton and built by Devlin Boat in Olympia, WA.” One incomplete

Wayward Sun’s Speed vs. Power Curve



created by Joe Grez at EP Carry, predicts the power our panels will produce.

Note that there can be a 4:1 difference in power generated under various conditions and time of the day. While this would seem to suggest poor performance on a cloudy day, remember it only takes 300 Watts to move Wayward Sun at 2.5 knots. It is the nature of our solar boats that they have a reasonable progress rate even in cloudy conditions.



for 9 hours without any battery use. In reality, we use our batteries to suit our needs by adjusting the throttle. Maintaining around 50% state of charge is good practice. This will get us to Alaska. In the summertime, sailboats traversing this route will typically motor more than sail, at somewhat similar speeds. But Wayward Sun makes no vibration or exhaust, is quiet, and we will spend nothing on fuel. Stay tuned for regular reports.”

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