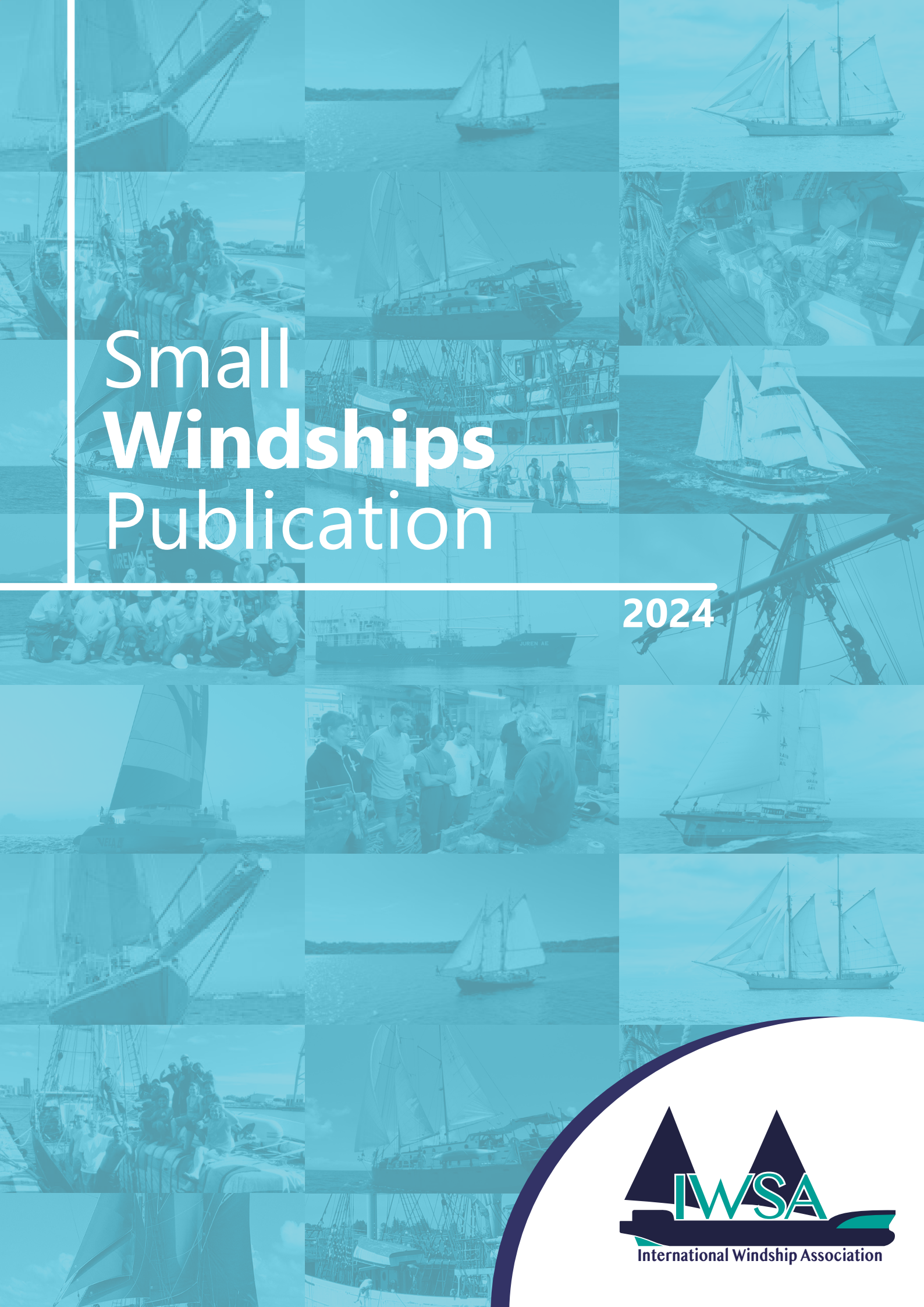

Small **Windships** Publication

2024

IWSA
International Windship Association

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The articles submitted and opinions offered in this edition are those of the authors and not of the International Windship Association (IWSA) or the Small Windship Publication's editorial team

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Questions and comments can be directed to: Editor-SVP@wind-ship.org
Submissions for inclusion in the next edition of this publication are due by 1 April 2025.
Submissions may include project overviews, book reviews, article reviews, shanties, route proposals, songs, articles, updates, poetry, short stories, or other materials relevant to the Small Windship sector.
New Material to include in the Annotated Bibliography and Directory Of Ship Plans are always appreciated as an aid to researchers and journalists.
Anyone interested in advertising in future editions should contact the editor at the email address above.
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Editor's Introduction

Welcome to the first edition of the Small Windships publication.

The main aim of this publication is to share with the small vessel industry and general public that there is in fact a small windships industry and wind powered shipping sector, and further, to enlighten those who work in it or want to in the future as to who is doing what and why, and that you are not alone and never have been.

In this regard it's worth noting that the small windship trade has been operating for thousands of years and has never stopped. However, the difference today is that in current highly industrialized economies, it is through technological improvements and possibilities that prove cost effective with competing transport modes that will ensure that this wind propelled trade can continue as a viable, relevant transport mode.

Hopefully this publication will deliver some useful hints and insights as to how all interested parties can relate to one another and this sector can move to a brighter, wholesome future using wind and everything that can come from harnessing this genuinely clean and renewable energy source.

The articles submitted and opinions offered in this edition are those of the authors and not of the International Windship Association (IWSA) or the Small Windship Publication's editorial team, but we do hope that these articles will stimulate debate that will test theories, ideas and values using this annual publication as one of the platforms to move the sector forward.

Captain Geoff Boerne
Editor
IWSA Small Windships Publication.

"Sail technology, which was based on hundreds, even thousands of years of experience, was at its zenith when sail was replaced by steam. This situation is particularly significant and central to the argument for the reintroduction of wind powered ships. Steam propulsion was not encouraged because sail was failing as a mode of transport. To the contrary, sailing ships were continually improving. Steam was simply a different technology which proved itself superior by virtue of the difference. This new type of marine propulsion surpassed sail by reason of speed, maneuverability, and increase in potential ship size. The qualities of sail were never disproved, only challenged."

-- Bruce George Koltz, . "The reintroduction of sail for marine commerce," 1980.

Assistant Editor's Introduction

In a world where ships of 45,000 tons displacement are not uncommon, it can sometimes be very unclear how the small vessel fleet could possibly make a difference to world trade. However, since most of the non-sailing public interacts only with small vessels in the form of vacation cruises, historic ships, recreational boats, environmental education programs, and occasionally goods delivered by sail freight, it is easy to argue that small windjammers are the ideal platform for showing the power of wind propulsion and the path to rapidly decarbonizing transportation the world over.

There is a significant market segment which can only gain from the shift to wind power for decarbonization. By bringing together the disparate windship fleets which dedicate themselves to historical interpretation, youth education, sail training, cargo transport, pleasure cruising, and scientific pursuits, a large chorus can be raised to call not only for surpassing the recently agreed IMO decarbonization targets, but for recognising and caring for those who have been ahead of the curve for decades in all the same market segments as conventional ships, just at a slightly smaller scale.

Small Working Sail vessels are a major growth market, with multiple projects and liner services opening in the next few years, alongside a growing fleet. This is good news for shipyards, sailmakers, riggers, shipwrights, and steel mills, and heralds a near-doubling of the sub-500 GT windship fleet in just the last 12 months. The construction and launch of half a dozen newly built vessels in the Atlantic and Pacific is a cause to celebrate; a victory for both wind propulsion and the climate. If all goes well with current developments, there is a possibility for open-source sail freighter designs to be published in the near future, reducing the cost and decision making time required to get a fleet into service.

These vessels will need skilled crew and trained officers, which can only be provided in sufficient number by the global fleet of sail training vessels, and shore-side professional development courses. The rationalization of training and standards for sailing vessel officers and crew is underway as we publish this work, with hopes for results reportable in the 2025 edition of this publication. With a growing fleet, there must be a growing body of skilled crew, who can handle sail in fierce weather, stow cargo safely, and complete other tasks not common for a century in conventional shipping. Alongside training programs, handbooks and manuals are being assembled and published, many freely available, to assist in the revival of small working windjammers.

This publication is the first of many set to be published annually by the IWSA. Hopefully it will contain more stories, ship profiles, book reviews, and articles each year, heralding new services and ships as well as historical insights and technical notes of importance to all. Please think about submitting a story or profile of your project to the publication for next year's edition by 1 April 2025. By supporting a wider view of the small vessels sector, we can more effectively support each other's efforts, increase our impact on the climate crisis, and have an excuse to go sailing while we do.

Fair Winds,
Steven Woods
Assistant Editor
IWSA Small Windships Publication

Secretary General's Introduction

When it comes to Wind Propulsion and Commercial Shipping - Small is indeed Beautiful!

Gavin Allwright,
Secretary General of the International Windship Association

The development of the wind propulsion segment in general over the last couple of years has been one of an upsurge in interest and engagement, especially with the deployment of wind-assist systems on larger vessels where it can be argued the vast majority of cargo is transported and the lion's share of emissions are generated. However, that isn't the whole story, and the small vessel sector holds great potential for moving large amounts of cargo and making a significant contribution to both lowering emissions from our trading activities at sea but also reducing land based emissions by getting closer to the farm gate/dinner plate, first and last mile impacts of moving goods by truck. Small vessel activity is also vital on certain routes and in vast maritime regions, such as small island/large ocean developing states etc., thus reducing fuel dependency adds significant levels of resilience to these areas.

If we are serious about delivering a robust, clean and profitable fleet fit for the 2030's and beyond, then expanding and incentivising the small vessel segment is an important element. On a more personal note, I am particularly delighted to be making a small contribution to this publication as the development of a small wind-powered vessel network was the theme of my Master's degree thesis over a decade ago too.

The definition of the small vessel segment is a challenge in itself: does this cover vessels below 1000 GT, under 400 GT or below mandatory SOLAS requirements of 23m and 300GT?. For the purpose of this publication the editors haven't been too prescriptive and the publication also doesn't presume to function as a definitive 'guide' to the sector, but rather a collection of thought provoking essays, interviews, survey results and musings that I hope will help to catalyze further discussion and study of this segment and will grow as an annual publication into an important resource in it's own right.

As with all pioneering developments that also build on centuries of tradition, there is a whole spectrum of strong opinions, differing approaches, business structures and operational plans in play, varied vessel applications and geographical emphasis. However, as we plot these there is also a collective imperative too, one where 'proving that wind works' in a 21st Century setting is of paramount concern. If we are serious about taking this segment forward and delivering on the potential then a clearer understanding of what works, what doesn't and the continued barriers confronting vessel operators, obstacles for cargo owners to come onboard, perceptions and pinch points when it comes to ports and harbors or the challenges that seafarers have in accessing training and securing gainful employment are all vital components.

It is clearly not enough to prove 'wind works' on a technological basis: we know that it does, especially at a small vessel level. What we need to do is to answer a myriad of other questions, and these are just a handful of the bigger picture ones:

- Are our vessels and business models robust enough only for certain routes or can they be applied across the board?
- Are regulations fit for purpose when commercial sail cargo and passenger services are starting to be scaled?
- Are the schedules, services and prices offered robust and competitive enough to attract sufficient levels of cargo and/or passengers to sustain the growth of the sector?
- Do ports recognise and are then able to adapt to the specific needs of wind propelled commercial craft?
- Can the segment sustain adequate wage structures and turn a profit without resorting to volunteer crew and trainees?
- Will these wages and conditions be enough to attract a well-trained and motivated workforce both in developed and lesser developed regions? Will that training be widely available and accessible?

Over the years, I have been particularly interested in how the expansion of a small wind propulsion vessel network carrying cargo and passengers can impact lesser developed regions, especially small island/large ocean developing states. We do of course still have limited fleets and pockets of traditional vessel activity from the dhows still in operation in the Indian ocean, a small number of Makassar and Pinisi schooners plying the waters of the Indonesian archipelago, along with a scattering of outrigger boats in the Pacific and traditional rigged fishing vessels in other areas. However, the potential in once again reinvigorating and expanding these fleets, co-designing new vessels and trade networks and bringing newly designed and modern vessels into the mix is an exciting prospect.

Where are we currently on this journey? On top of these already mentioned surviving indigenous sail fleets, there are a dozen or so traditional sail cargo vessels operating mainly in the Atlantic and North Sea regions along, with the *SV Kwai* operating in the Pacific for example. As we will see from the numerous articles in this publication, there are a growing number of projects, and over the past year we have seen the launch or preparations for the launch of modern purpose-built ships including;

1. Grain de Sail 2 - 52m, 350dwt [North Atlantic]
2. Juren Ae – 48m, 290dwt [Pacific / Marshall Islands]
3. Artemis and Anemos (delivery summer 2024) – 81m, 1,000dwt [North/South Atlantic]
4. Lo Entropy (refitting 2024) – 24m, 100dwt [North Sea/Baltic]

How can small vessels be competitive in the current maritime trading system? One pathway in developed markets is to offer a premium service that is priced accordingly but offers ESG and marketing benefits. Another pathway services a very specific route that is not well serviced by conventional shipping due to high costs, long waiting times or inconvenient logistics. However, in my opinion the widespread scaling of these activities requires three key overarching developments. Firstly, the market price of both conventional fuel and new alternatives have to reflect their true cost (pollutants, full logistic costs, removal of subsidies etc.) and the long-awaited carbon pricing will go some way to balancing that. Secondly, the need for a large enough number of small wind propelled vessels that create a fleet that can deliver a sustainable, flexible, efficient and integrated service handling transhipments and offering a joined up low emissions service. Finally, cargo owners need to step up to the plate, as we know 'cargo is king' and the offer of substantial long-term cargo contracts that enable shipowners to invest in growing the fleet and subsequently lowering costs and improving services will facilitate the virtuous cycle required and we are starting to see increased interest in this field.

The Pacific region is an important case in point. Capital is scarce to build vessels as many routes are transporting lower value products or are servicing communities that can't offer guarantees that are acceptable to standard commercial financial institutions. The current use of costly conventional fuel on these maritime routes therefore soaks up the very financial resources that could be deployed to build a wind powered fleet through government subsidies for those routes. We see very high fuel costs in the Pacific islands and the need to pay for that fuel on international markets paid for in foreign currency multiply those costs further. When this is coupled with vast distances and relatively low income from servicing those routes, utilizing a free energy source makes a lot of sense, however this requires positioning the capital to build the fleet. There are of course many other benefits that this region gains from a wind-powered fleet, all of which have been well researched by our colleagues at the Micronesian Centre for Sustainable Transport based in the Marshall Islands, these include but are not restricted to;

- **Costs** – lowering fuel costs once ships are built and delivered, including the reduction of the need for ongoing operational subsidies.
- **Resilience** – ships that can operate outside of fuel supply and price volatility shocks. This is especially pertinent for periods following natural (and man-made) disasters including typhoons, flooding, earthquakes, volcanic activity etc.
- **Ownership** – if ownership of vessels is based on a cooperative or shared ownership model this adds assets to the community and enhances the feedback of benefits through wages and profits being recycled into those communities.
- **Revitalisation** – all ships require maintenance, refitting and building, some of which can be dealt with in the region, thus spurring investment into larger islands/ports. Enhanced and profitable trading systems enable specialization and generate both capacity and investment funds. Reliable transport links give dependable access to markets and in turn can spur investment in agriculture and the development of value-added activities from island communities.
- **Employment** – all of the above activities generate local employment, increase training activities and also generate aspirational opportunities for individuals and communities.
- **New Routes** – while servicing existing routes is an important issue, there is also the opportunity to open or reopen routes that are economically non viable when fuel cost is the deciding factor.

During COP28, in Dubai in November 2023, the International Windship Association (IWSA) called for an 'SDG17 Delivery' fleet of small wind powered vessels for LDCs and SIDS and we will continue to champion that cause. Click here to read the open letter to delegates: https://www.wind-ship.org/wp-content/uploads/2023/12/IWSA-Letter_COP28.pdf

The future of the small wind propulsion vessel segment is a bright one if the capital can be secured, enough demonstrator vessels are in operation proving the model to cargo owners and the network can be scaled sufficiently to harness the appropriate economies of scale in the next few years. Many stakeholders are now joining the voyage with E.F. Schumacher's resounding call that 'Small is Beautiful'.

Abbreviations:

Alu: Aluminum Construction	**Lgr:** Lugger Rigged
ASA: American Sailing Association	**LOA:** Length Over All
Bg: Brig Rigged	**Mar:** Marconi Rigged
Bgn: Brigantine Rigged	
Bk: Barque Rigged	**NRT:** Net Register Tons of 100 Cubic Feet each.
Bkn: Barkentine Rigged	**NT:** Net Tonnage under ICT Rules.
BMr: Bermuda Rigged	
	Pax: Passenger Vessel
Cat: Unstayed/Cat Rigged	**Plw:** Plywood Construction
CC: Container Capable	
CDWT: Cargo Deadweight Tonnage	**RORO:** Roll On/Roll Off
Cmp: Composite Construction	**RMT:** Review of Maritime Transport, an annual publication of UNCTAD
Cr: Crew Requirement	
Ctr: Cutter Rigged	**Sch:** Schooner
	Shp: Ship Rigged
DWT: Deadweight Ton	**Slp:** Sloop Rigged
Dyn: Dynarig sails.	**SOLAS:** Safety Of Life At Sea Convention.
	Spt: Spritsail Rigged
Fsh: Fishing Vessel	**STCW:** Standards of Training and Certification for Watchkeeping.
	Stl: Steel Construction
GC: General Cargo Vessel	
Gf: Gaff Rigged	**T- :** Topsail (Square) Rigged
GRT: Gross Register Tons of 100 cubic feet each.	
GT: Gross Tonnage under ICT Rules.	**UNCTAD:** UN Conference on Trade And Development
ICT: International Convention on Tonnage Measurement of Ships, 1969. Also: A ship's tonnage under these rules.	**Wd:** Wood Construction
IMO: International Maritime Organization	
IWSA: International Windship Association	**X-:** A number prefixed to a rig indicates the number of masts where necessary.
Jnk: Junk Rigged	**Ywl:** Yawl Rigged
Kch: Ketch Rigged	

Windjammer's Dictionary

Sail Cargo. Principally European variation of the term "Sail Freight." Syn. Sail Freight.

Sail Freight. Sail Freight is the ecologically motivated maritime movement of cargo by primarily wind power with little, if any, engine use. The term is primarily used in North America. Syn: Sail Cargo.

Small Vessel. For the purposes of this publication, a vessel under roughly 500 GT. The definition is debated widely in regulatory, industry, and informal settings, including this publication.

Working Sail. Wind Propulsion Vessels used for purposes other than leisure, such as fishing, cargo or passenger transportation, etc. Working Sail has a marked tendency to be associated with traditional rigs and vessels, but this is not a definitional factor.

Developments of Note

WORLD

IWSA Creating Small Vessel Database

The International Windship Association (IWSA) is looking to create a database of active windships under 500 GT. With a focus on commercial vessels in the fishing, cargo, sail training, research, and other fields, this database will mostly be looking at working sail, but not to the absolute exclusion of racing and leisure vessels.

Information gathered from this database will be used for research, advocacy, and creating collaborative efforts in the near future. Especially important is establishing an average age for the fleet, as well as an average crew requirement and tonnage: These can tell researchers and policy makers a lot about trends in the small vessel sector, as well as pointing to trends in new and old construction which might be important. Since there is little collated data on this sector of the windship fleet at this time, there is little to present in terms of policy and regulatory information which might benefit the working sail fleet.

Further, having more information about the industry distribution of the small windship fleet will also be useful. Knowing more about how many vessels are involved in only sail training, or fishing, or carrying cargo will allow for a better policy mix and advocacy work on many fronts.

We encourage every ship and fleet operator to participate in this survey as soon as possible. The survey should take less than 10 minutes to complete, and consists of only 14 simple questions.

The survey can be found here: https://forms.gle/hiTVxt1FtAtx3o8WA Entries will be open until the publication of the next IWSA Small Windships Publication in 2025. Results and analysis will be published in the next IWSA Small Windships Publication, and the database will be made available on the IWSA Website.

IMO Decarbonization Timelines A Good Opportunity For The Windjammer Cruise Fleet

The debate about greenhouse gas emissions and other pollution from super-large cruise vessels gives a good marketing and PR opportunity for small windjammers offering leisure cruises. These mostly traditional vessels can not only demonstrate in real time the reality of an effectively carbon-neutral cruise industry, but take the lead in responsible recreation on the world's oceans.

With Carbon Dioxide emissions per cruise vessel averaging around 75,000 tonnes in 2020, according to the UNCTAD Review Of Maritime Transport (pp 93), and no critical need to generate these emissions, there is a significant debate around whether conventional cruise vessels should be allowed to continue operating. Time Magazine ran an article in June 2023 highlighting the climate, environmental, and social impacts of mega cruise liners. With many scandals about dumping waste and other problems, as well as the impacts of over-capacity tourism on many communities, the cruise industry is in rough waters. While there are plans on the board for zero-emissions cruise ships in the future, the first of them are still many years off. Even if the emissions from operations are nullified, the social impacts of these vessels can only be reduced by having fewer people on each vessel, and fewer vessels in circulation.

Small windjammers operating cruises rarely have the capacity to cause any of these problems, and most operate under primary wind propulsion, thus reducing operational emissions to near zero. While they are part of the tourist infrastructure of their regions, they are also engines of local employment and generally cannot carry enough people aboard to overwhelm an environmentally interesting site or small harbor town. The fact that most crews are also locals interested in preserving their region's character and environment only adds to this more sustainable outlook on waterborne recreation.

The IMO wishes to decarbonize oceangoing vessels in only 27 years. While this is perhaps possible, it would be far better to decarbonise faster. For mega-vessels, this is a significant challenge, and one which may well upend the economics of the cruise industry as we know it. For the small windjammer fleet, it is as good as done, and has been for 50 years or more.

Such a campaign can only be effective if these small, independent businesses work together under the umbrella of a larger organization. The fact of the matter is that the large cruise industry has significant political power which cannot be countered by any one schooner operator. However, a concerted public campaign could inspire a change in cruising patterns for the public. As these smaller operators are normally windjammers, there is a natural tendency to advise the use of the International Windship Association in such an effort, under the head of a committee and policy working group. The only obstacle to this is the remarkably low membership rate of small windjammer cruise operators in the IWSA, which can be easily solved, in most cases by a simple email. With a concerted organization and an international advocacy body to bring weight to bear, this project is far better positioned to succeed than the current pattern of independent operation and advocacy.

Revival Of Sail Freight Fleet Offers Opportunities For Sail Training Vessels And Students

The revival and proliferation of sailing cargo vessels such as Avontuur, Apollonia, and Tres Hombres presents a major development for sail training programs the world over. With traditional sail now branching out across more than the museum and sail racing sectors, the demand for seafarers with time under sail will likely increase significantly. If the New York Coastal Fleet is built up as has been projected to thousands of vessels all operating under sail, there could be demand for over 65,000 sailors by 2050, requiring every sail training program in the world to work at capacity year round for the foreseeable future. Then the capacity will also be needed for other cities and routes which will need ships and crew.

Until now, most sail training has revolved around skill preservation as opposed to skill proliferation. In a new environment with more vessels and a high demand for crew, proliferation will be as or more important than individual mastery in each element of seafaring under sail. This changes from an experiential education at sea model to one of trades training for seafaring under sail, which requires a different approach and mindset to the training.

In such an environment, sail training programs have the opportunity to lead the way forward through the development of specific certifications and formalization of training within tall ships. A form of Basic Training which can be passed, paired with certifications for handling specific rigs, roles, and positions will be in order. Skillset certifications in rigging, sailmaking, and other associated crafts should be investigated. Additional attention should be paid to existing courses by sailing organizations like ASA in Celestial Navigation, Coastal Navigation, Marine Weather, and Radar, as all of these have developed curriculums and syllabi for skills which will be needed in the sail freight fleet. The addition of Radio Operator training for all hands would also be a welcome part of these training systems, with First Aid, CPR, and other STCW type skills (and possibly certifications) included in the training plans.

Additional thought should be given to creating a uniform, industry-wide method of recording such certifications for crew and officers outside their regular Seafarer's Discharge Book, to make matters easier when moving between vessels. All this and more will be added to higher demand for class berths as the sail freight industry grows in the coming decades, and it will be far better to be ahead of the rush for these matters than behind. For those in the sail training field, this should be an important matter of discussion for the entire fleet, from instructor to captain to trainee.

Open-Access Toolkit For Sail Freight Start-Ups And Dreamers Available

A Sail Freight Enthusiast working on their MBA has recently put together a few tools to assist those planning for or dreaming of a sail freight operation. The toolkit includes the always-handy Sail Freight Handbook from the Center for Post Carbon Logistics, which serves as a general reference, as well as a read-me file for the full package. A formalized Open Source Intelligence style report template is included with sections on the ports, cargos, supporting organizations, and other challenges you may face. Designed to encourage systematic information gathering and trade mapping as part of the project development phase, these items are useful to varying degrees depending on the vessel and route involved.

Where this system shines is in the spreadsheet included in the packet. You start by entering just 20 data points on the first sheet, many of which are highly intuitive and basic information such as vessel cost, crew requirements, vessel length, cargo capacity, sailor pay per day, and so on. Once these are entered, the second sheet populates this data into a text-book pro forma financial statement, giving two years of revenue and expense statements for the route and vessel pairing. This makes cost-benefit analysis far simpler and faster than many other methods, meaning you can save time while checking out multiple options per route.

The first sheet will also calculate a Required Freight Rate based on the desired time to pay back the initial investment cost. This can be compared to similar services in the region, which you should have gathered data on while researching your market. This lets you make both your business case and economic impact clear to potential investors and supporters such as cargo owners.

While this kit has so far been used only on very small vessel projects, it should hold up to analyzing larger vessels on long routes as well. There are some other artifacts which can be considered flaws in the spreadsheet, but they can be worked around: For example, if you have a seasonal project, it will still calculate all your off-season days as incurring port fees. These flaws are easily recognisable, however, and can be adjusted as needed for a specific project simply and easily. Fields which need user inputs are highlighted blue throughout, with red fields giving a number of outputs calculated from the blue fields.

You can access the Start-Up Toolkit here. There is no fee for use of these materials, though they are not sufficient for the entire planning process of a sail freight operation. If this package helps you get a few investors or community members to back your project, it has done its job and more. The rest of the work will be up to you.

PACIFIC

The Small Vessel Sector In The Pacific: A Situation Report

The Pacific small windship sector has the longest uninterrupted history of any other, dating back thousands of years in the traditions spanning the East coast of Africa, the Indian Ocean, and Small Island Nations alike. This fleet of traditional vessels, difficult to document and even more difficult to quantify, are still an important part of the local transport systems in their respective regions. While a small amount of research has been done on this fleet in the last 25 years, much about it remains unknown to outsiders. Therefore, this article won't be able to give a realistic assessment of the Pacific Fleet situation because of this potentially large, unquantifiable fleet. However, we will try to give a decent amount of information on what is known and recent updates on more prominent developments.

The more modern and accessible history of working sail in the Pacific starts about 20 years ago with the deployment of Vega and SV Kwai, a restoration and retrofit, respectively, which began serving routes which had been neglected for some time. Both are still in operation. Since these small windships started their services, the sector has only grown, driven by the threats of climate change and high fuel prices.

More recent developments include the launch of the JUREN AE, a three-masted indosail rigged 300+ dwt island supply vessel for the Marshall Islands, supported by German organizations and built in South Korea. Related to this through the international partnership with Germany is the proliferation of small catamarans for inside-lagoon transportation powered by a traditional crab-claw type rig. More than half a dozen of these little windjammers have been launched and are now in service with island communities.

The small windship sector in the Pacific is rapidly expanding, with research into retrofitting wind propulsion to island supply vessels well underway, and the construction and delivery of small inside-lagoon craft is accelerating, especially in the Marshall Islands. Other island nations seem to be taking note, and will likely start adapting these designs and research to their own waters in the near future. With high fuel prices and an absolute necessity for water transport, there is little wonder that the solutions from the last Oil Crisis 50 years ago are coming back into focus now, for the same reasons, and made ever more urgent by the effects of Climate Change and sea level rise in some of the most vulnerable islands on the planet.

ATLANTIC

The Small Vessel Sector In The Atlantic: A Situation Report

The small windship situation in the Atlantic has been growing steadily since 2007 with the launch of Bgn Tres Hombres by FairTransport. Now a much larger fleet plies the Atlantic, moving all sorts of cargo under sail, principally from the tropical islands and Central and South America, to Europe. Interest is slowly expanding in the North America-Europe trade, and South America to North American trade as well, especially with Sail Cargo Inc looking to ship coffee to Canada.

The launch and first voyage of the Grain de Sail II adds another 350 tonnes to the Atlantic Small Windship Sector, nearly doubling the existing fleet capacity spread over more than half a dozen schooners, brigantines, and ketches. With more vessels in the Grain de Sail fleet to come over the next few years, this could see a significant spike in capacity from just one fleet, while others expand somewhat more slowly.

There are several vessels in refit or reconstruction which promise to launch in the next few seasons. These vessels will bring yet more sorely needed zero-carbon fleet capacity into service, though their launch dates are not yet clear. As these vessels come into service, the areas reached by sail freight will be expanded significantly, including the Baltic, and a major expansion of the Mediterranean fleet.

The Western regions of the Atlantic remain generally visited by sail freighters from the Eastern shores, but there remains one sail freighter solidly operating strictly in American waters: Schooner Apollonia on the Hudson River. Otherwise, there is a distinct lack of operational vessels based in the West Atlantic, though this situation may change in the near future. Caribbean sail freight and fishing operations seem especially well suited to near-term launches, and should be encouraged where possible through the use of government policy.

Outside of Working Sail, the Atlantic is home to many of the racing teams and racing events which annually circle the globe, which serve to bring attention to both the small vessel sector and wind propulsion in general. Multiple major races in all sorts of vessels, from traditional tall ships to the IMOCA Class hydrofoil sloops will pass back and forth across the Atlantic this year, bringing an air of more competitive adventuring to the otherwise working-class, if adventurous, windshipping world.

The situation in the Atlantic will likely see a range of changes in the next few years as more and more vessels of increasing size are launched in this sub-500 tonne sector, in both cargo and other industries. The IWSA Small Windships Publication editorial staff looks forward to watching and covering a dynamic field over the coming years.

Documentary Published On Sail Freight In The Hudson Valley

The documentary "Windshipped" about the Schooner Apollonia on the Hudson River was made in 2022, and is now available on youtube.

The 40 minute film by Ocean's 8 Films traces a slightly fictionalized (by including a few things from Season Two) first sail freight voyage on the Hudson River by Apollonia, and the 5-year effort to restore the vessel and build a customer base which predated the sailing. At just under 40 minutes, the documentary is a good overview of not only Apollonia's mission, but the benefit and case for coastal Sail Freight in general.

With beautiful cinematography and great shots of sailing, the film is worth a watch, and has successfully assisted in raising awareness and business for Schooner Apollonia over the last two years. Similar success can hopefully be translated into a wider deployment of sail freight operations in the US over the next few years.

For those in the New York Area, there are occasional showings on the big screen with the Apollonia crew in attendance, which can be a good opportunity to get your questions about sail freight answered in person by those actually doing it in the US. Other showings can be arranged with Ocean's 8 Films via their website.

MEDITERRANEAN & BLACK SEA

The Small Vessel Sector In The Mediterranean: A Situation Report

Sail Freight in the Mediterranean Sea has been going for some time, but the fleet has been static for the last few years. There hasn't been much expansion, but there have been interesting developments in the fleet and prospective vessels and sail freight projects which are worthy of notice.

The mainstay Mediterranean sail freight project is SailMed, which operates the fully decarbonized 10 meter sloop Pelago, with a mere 2 ton capacity. Pelago sails between Aegean islands, moving primarily artisanal foods and passengers who pay to sail along. They have been sailing for over seven years at varying levels of intensity, and have gained some notice in the process. Especially interesting is the use of a stock fiberglass yacht with an electric power conversion for moving cargo, which has not been seen elsewhere in the sail freight movement.

Brigantes has not posted much to their social media recently, and did not respond to emails sent by the editorial staff. The exact status of their operation is unclear at the time of publication, but there has been no clear news of their timeline to launch. Their 100 tonnes capacity will be a very large increase in the current Mediterranean fleet, though their cargos will be mostly importing goods from the Atlantic and Caribbean basins.

In Corsica, there is currently a project sailing once per quarter to Marseilles, under the name Bourlingue et Pacotille. They have purchased a hull and are working to restore this 23 ton capacity vessel to get underway with a regular service on a wide range of routes, some annually, others 2-3 times per year. This ambitious project plans to have their new vessel up and running in the next year, but is currently shipping about a ton at a time using borrowed fiberglass yachts.

While there is not much chatter on the subject, the Mediterranean basin is well suited to sail freight operations, especially supplying Corsica, Sardinia, Malta, and the Balearic Islands, as well as in the Aegean archipelago. Cross-Adriatic routes may also be profitable for similar cargo pursuits, but no news about such a service has been seen by our editors.

With so much potential for a rapid expansion in small windship activity, the editors at the IWSA Small Windships Publication are looking forward to much more news about this region's expansion of small windships in the coming years.

April 12, 2024

To: The International Windship Association Small Windships Publication

Re: Embracing Sustainable Shipping with Our Shipyard

We are pleased to be included in the inaugural trade publication for windships under 500 GT. At Lunenburg Shipyard, we recognize the urgent need for sustainable solutions in the shipping industry.

Indeed, we stand ready to collaborate with shipowners, designers, and operators to bring windship concepts to life and contribute to industry growth.

Whether it's retrofitting or construction, our shipyard offers the expertise and resources needed to turn vision into reality. Our facility and services include: 1,200- and 1,600-ton marine railways, a skilled workforce experienced with working with larger sailing vessels, and a dedication to the pursuit of innovation.

We would be pleased to welcome you to the Town of Lunenburg, a UNESCO World Heritage site, and to join the charge towards a greater, more sustainable future for maritime transportation.

We look forward to an opportunity to explore potential collaborations in the future.

Sincerely,

Capt. Bradison Boutilier, Founder and CEO
Lunenburg Shipyard Ltd.
52 Burma Road, Lunenburg, Nova Scotia, Canada, B0J 2C0
https://www.lunenburgshipyard.com

SCHOONER APOLLONIA KICKS OFF FIFTH SAIL FREIGHT SEASON IN U.S.

Brad Vogel, Supercargo, Schooner Apollonia
15 April 2024



America's only active sail freight vessel operating solely within U.S. waters starts another season of regional maritime trade this spring. Captain Sam Merrett and crew continue the work of breaking path.

Schooner Apollonia comes into the new season having completed her 4th full season of sail freight operations on the Hudson River and New York Harbor in October of 2023. Across four years and 16 round trip voyages of 10 days or more, the Apollonia and crew have moved over 100 tons of cargo while using its engine less than 4% of the time underway. Even on a short packet route, with few docks facilitating engine-less docking, 2021 saw only 19 gallons of diesel fuel used, and each year since then has improved significantly. When fully loaded with 10 tons of cargo, Apollonia is more than 25% more fuel efficient than the railroad which runs parallel to her route.

Calling at a network of over 20 regional ports that it has developed in New York and New Jersey since 2020, Apollonia transports a varied load of cargo, including but not limited to: green coffee, lumber, malted barley, whiskey, beer, cider, flour, pumpkins, equipment, soap, corn, paper, salt, boats, kelp, sunflower oil, composted soil, pasta, maple syrup, plateware, apparel, wine, chocolate, jam, nuts, cheese, books, barrels, hot sauce, cosmetics, apples, peppers, and more. One of the Apollonia's customers, Sing Sing Kill Brewery in Ossining, NY, is the only brewer in the US supplied with malt entirely provided via windshipping. Up to the end of 2023, Apollonia has moved more than five times what all the other sail freight projects moved exclusively within the United States this century, combined.

Over the last four seasons, Apollonia and her crew have forged community with a whole new set of connections between the region's people and the waterways: A run to a food pantry (Pp 34 here) in September of 2022 connected Hudson Valley food producers to city residents who could not afford their products otherwise. Sail Freight-specific beers such as Flotsam now connect not only the local malthouse to the brewery by sail; the beer is then sailed from the brewery to partners downriver to be served aboard New York Harbor tour schooners, creating a "double sail freight" product where carbon is removed from two legs of the overall production and distribution chain. A special blend of coffee made from beans shipped by Apollonia, named after the Schooner emerged as another double sail freight product; the relationship started there continues with a strengthening trade route and port partnerships between Carteret, New Jersey and Tarrytown, New York. A barrel of local rye whisky from The Spirits Lab in Newburgh ages just abaft the foremast every summer from May to October, before being bottled. A local cider maker from Hudson sends her cider south to customers as far abroad as the City by sail on every run. Many of my efforts in expanding Apollonia's cargo operations and range, such as these, have been made possible over the past year with the assistance of the Center for Post Carbon Logistics, where I serve as the Andrus Sustainable Logistics Fellow, and The J.M. Kaplan Fund.

Apollonia has drawn people to the water in a "new" way, and won several awards for doing so. By tying communities together across the valley in a sustainable and interesting way, Apollonia brings more than simply cargo from dock to dock. The combined message of ecological, economic, and community-based action, as well as the simple beauty of a classic fore-and-after sailing down the Hudson has gained unique attention in the region which is having a real effect on how people see and think about the water in a similar way to the now classic Hudson River sloop Clearwater. In the summer, the boat spurs a recurring concert series in Red Hook Brooklyn at the RETI Barge, "Sail Freight Friday" which invites people to the docks for music by The Barge Rat Band, socialization, sustainable shipping, and regional food. Networks of "Shore Angels" - who help extend first- and last-mile range with electric and biodiesel vehicles - and the "Vulture Carting Collective" - who help extend shoreside operations with cargo bikes and trailers - have emerged in Apollonia's orbit and continue to point the way to a broader alternate green network in the New York region.

Sail freight in the U.S. is making headway, with the holds getting more and more full with each voyage on the Hudson. With only 700 cubic feet (about 20 cubic meters) of hold space, bulky cargo such as malted grains have a tendency to fill it up quickly. The October 2023 voyage saw the hold completely full, a challenge we look forward to in future runs. Since this effort is about more than simply moving cargo, the connection between local producers and their customers builds community, resilience, and goodwill across the Hudson Valley, while working in harmony with the forces of nature which have defined our region since the last ice age. Apollonia has also managed to tie into the global sail freight network via coordination with Grain de Sail in New York Harbor. While sail freight is a strike against the climate crisis in itself, building community and alternate ways of living is just as important to the climate fight as sails and a skilled crew. It inspires. But as with any new venture writing a guidebook for an alternate path, it is always in need of more nurturing and tangible economic and systems support.

If you're interested in moving cargo in the Hudson Valley or adjacent waterways, get in touch with me, Brad Vogel, Supercargo for the vessel, and we will work to get your cargo underway. We are also seeking Voyage Sponsors, Boat Box subscribers, and shipping partners. If you are in the Hudson Valley or New York City, get in touch or find us at the docks on our next voyage. Anyone interested in supporting our sail training program should contact me or the Center for Post Carbon Logistics.

To learn more, track the Apollonia, see our sailing schedule, support our sail training program, or ship cargo aboard, visit www.SchoonerApollonia.com, follow us at @schooner_apollonia on Instagram or see you along the waterfront!

Image Credit: "Coffee run from Carteret, heading for the Narrows in New York Harbor." Steven Woods on the foredeck. Taken aboard Schooner Apollonia off Staten Island, New York. October 2023. Courtesy of Brad Vogel.

130-YEAR-OLD HISTORIC VESSEL VEGA STILL CARRYING CARGO IN SOUTH EAST ASIA

Cpt. Shane Granger
11 April 2024



Built in 1892, the 130-year-old Norwegian sailing vessel Vega is among the oldest wooden sailing vessels still carrying cargo. Every year for the past twenty years Vega sailed over 5,000 nautical miles delivering more than fifteen tons annually of new, donated educational and medical supplies to some of the world's most remote island communities. Many of those islands are so secluded they do not see another outside face between visits from Vega. Often they are so isolated money no longer matters, there being no shops to spend it in.

I believe we all dream of escaping the hectic rat race of today's highly accelerated world. A retreat into the leisurely ways of those glorious long-ago days now sacrificed to the twin gods of efficiency and profit. Back to a time when travel was an art form in itself. A time of discovery, adventure, exotic island destinations and of course romance. Of freely roaming the world enjoying a carefree lifestyle. For some, that means the wind powered freedom of a sailing vessel.

Yet most harbor a selfish vision of visiting far away places as a perpetual tourist. Taking, but never partaking in, or contributing to, local life. Their dream is to arrive, rubberneck the islanders, consume limited local resources, dump their rubbish and leave. But it doesn't need to be that way. We will be more than happy to advise how you can create your own mission of mercy.

At first, Meggi and me had our hands full restoring Vega to a seaworthy and liveable condition. As the project progressed we soon realized there is more to owning an old boat than possession. A boat like Vega must keep working if she is to continue in seaworthy condition for another 100 years. We needed an objective in our lives. That purpose came to us just after the great tsunami of 2004, when we learned how a small vessel like Vega can make a huge difference in the lives of remote communities. Places where simple things we take for granted are often more cherished than gold.

Here is how it works: Half of each year we gather the supplies needed for our deliveries and the other half are out delivering them. We ask teachers, midwives and community leaders what they need to do their jobs. Then bring those lists back to our supporters who fill them for next year's deliveries. That means every item we load has been requested by someone who is waiting for and needs it to do his or her job. This "directly from someone who wants to help into the hands of those who need help" system is both efficient and effective.

When we discovered the islands we assist have the highest maternal and natal mortality rates in the world, we concentrated our medical help on traditional midwives who deliver roughly 80% to 100% of all babies on those islands. At the time a traditional midwife's entire medical kit consisted of one sharp knife and a piece of coconut string. Women were bleeding to death and babies suffocating simply because those midwives did not have the equipment, supplies, and training to prevent it happening. We now provide comprehensive kits to over 100 traditional midwives, resupplying/upgrading those kits every year. The result has been spectacular. In some areas maternal and natal mortality fell by over 50% in just 3 years.

"Kits-4-Kids" is a simple program where individual students in wealthy schools each prepare a backpack stuffed with school supplies from a list we provide, then add a toy or stuffed animal along with a note about themselves, where they live and perhaps a photograph. We deliver those bags to students in the poorest schools we assist. When we provide a child with the tools to learn, their happy little faces glow and I wonder if one of those children might grow up to change the world?

We also target the needs of teachers and the school itself. Often a community uses local materials and volunteer labor to constructed a school building, tables and chairs. The teachers are volunteers who take time off from farming or fishing to teach. These are things the community can provide. Problems arise when school supplies must be purchased. On some islands there are no shops at all. So, even if the money could be found, acquiring school supplies is impossible. We take simple reading glasses for granted, but for many people in remote island communities when their eyes begin to fail from age, it affects not only their quality of life and ability to earn a living, but also the important skills they bring to the community. Carpenters, weavers, seamstresses, people with a host of skills requiring good eyesight, are valuable assets to their family and community. According to WHO over 500 million people in the developing world could have their vision restored with a simple pair of reading glasses.

If you are planning a great adventure why not add your own mission of mercy? One thousand reading glasses cost almost nothing wholesale and take up no room at all, yet make an enormous difference to those whose sight they help restore. We would love to share the how to, what works best, and other details from our extensive experience with you.

Running costs are our biggest worry. We have often been at a stand-still, looking for our next fuel top up or some small spare part. There are no big companies paying Vega's bills. Although several companies do generously contribute educational and medical supplies and basic medical equipment for our deliveries. We are totally dependent on donations. If you wish to join the Vega team, either as an individual or through your company's CSR program, there are many ways you can assist our work.

To learn more, or contact us, please visit our website at Vega1892.com or Google "Historic Vessel Vega" to learn what others say about Vega and her annual Mission.

Capt. Shane Granger

Historic Vessel Vega

BARQUE PICTON CASTLE OFFERS TRAINING ABOARD & ASHORE

Maggie Ostler

11 April 2024

The Bosun School is a land-based seamanship skills development and enrichment program based in Lunenburg, Nova Scotia, Canada. It was founded in 2009 by Captain Daniel Moreland (unlimited master mariner), who is the founder, Senior Captain and CEO of the sail training ship Picton Castle, best known for her world circumnavigation voyages under square sail.

In hiring new professional crew members for Picton Castle, including mates and lead seamen with advanced certificates, we realized that while they were well credentialed and qualified in many ways, there were significant skill sets missing. This inspired us to found the Bosun School.

In recent years, and for good reasons, so much emphasis has been placed on earning licenses and taking emergency duty training courses required for certification, that actual practical seamanship training has suffered. Teaching how to actually do things seems to have taken a back seat. Of course, it is critical for marine crew to be well trained in all possible emergency situations, such as how to fight fires, launch a life raft, provide first aid, and more, but it is good seamanship, simply knowing how to do things well and problem solve that go a long way towards reducing those emergency skills being called upon in the first place. It is good to know how to set a broken leg, so learn that, but it is better not to break a leg in the first place.

This evident gap in practical skills is what caused us to start the Bosun School. The mission of the Bosun School is to teach critical practical seamanship skills, hands-on, but without the demands of being at sea. The best way to learn how to do something is by actually doing it, then repeating it a lot. If a student does one wire splice, they will do five or more. As Captain Moreland often says, "practice makes permanent."

Currently Bosun School is offered intermittently, usually during periods where Picton Castle is at her home base in Lunenburg. We have plans to make it a fixed institution. A typical session is three to four months long. Students are accommodated aboard a ship in Lunenburg Harbour, living and working together like they would as crew on board a vessel.

We have now offered 13 sessions of the Bosun School, with a 14th coming up in the summer of 2024. Some sessions have had a specific area of focus, whether that's small boat handling, rigging, or sailmaking. Most sessions are general and touch on all of those topics, as well as carpentry, basic engineering, and various aspects of ship maintenance and repair including coatings for wood and steel, damage control and repair, basic fibreglass work, tool maintenance and ship supply organization.

In order to apply to attend Bosun School, students need to have at least some basic, entry level experience on the water as crew. Some students have been trainee crew members aboard Picton Castle or other sail training ships, some have been students in school-at-sea vessels, some have worked professionally in traditional sail, some have worked aboard other vessels, everything from tugs to motor yachts to research vessels to Navy vessels. Some own their own boats and sail recreationally. The idea here is that they have enough experience to know that this is what they want to do.

Bosun School prepares its students for their next ship. The first couple of weeks are spent building a common foundation with skills such as basic ropework, outfitting and rigging small boats, and use and care of hand tools. Beyond that, the skills that are covered vary depending on opportunities available for practice. In previous sessions we've sent yards and topmasts up and down using the ship's own rigging, handled small boats under sail, oar and motor on Lunenburg harbor (small boat handling being a critical skill for any mariner), caulked and pitched decks, rigged blocks and tackles, used bosun's chairs, seized and spliced wire and rope of all kinds, applied various coatings and mixtures and learned which ones are right in which situation, repaired wooden boats, sewn ditty bags and sea bags, repaired sails both the quick and temporary way and the permanent and proper way, and lifted heavy things using a variety of techniques. While many of these skills may seem to be sailing ship focused, we find that so much of what the students take away from Bosun School is readily transferable to a wide range of marine and leadership applications, including aboard tugboats, fishing vessels, commercial vessels and yachts of all sorts, yacht deliveries, maritime museums, marinas, shipyards and boat yards, sail lofts, rigging outfits and more.

The hard skills, whether that's splicing a wire or setting up rigging for mechanical advantage, are the main focus. Through practicing those technical skills and working together, students learn soft skills as well. They take turns leading projects which teaches them how to manage people, resources and time. They learn to communicate, to think ahead and plan. There is even a lesson in every Bosun School session on tuning up your resume and cover letter to help students land their next job.

Bosun School's reputation as an effective training program is growing. As our graduates sign aboard their next vessels, they are better equipped to deal with the various situations they may find themselves in, both with their technical skills and their level of confidence. Whether they're returning to vessels they have crewed in before or they're moving on to new vessels, captains and mates are telling us that Bosun School graduates are more skilled, more knowledgeable, and they take on leadership roles amongst the crew. We're also told that Bosun School graduates have better attitudes and enjoy their work more, contributing to a better working environment.

For more details please visit https://picton-castle.com/bosun-school/









LAUNCH OF GRAIN DE SAIL II

Stefan Gallard
March 2024



Grain de Sail II Sets Sail: The biggest modern primary sailing cargo ship

In the latest accomplishment for wind propulsion, the maritime community witnessed a significant milestone with the departure of Grain de Sail II from Saint-Malo on its inaugural transatlantic journey in March 2024. This event marks a pivotal moment in our collective pursuit of sustainable shipping solutions, underscoring the tangible progress we are making towards harnessing the power of wind in modern maritime logistics.

The Evolution of Grain de Sail: A New Chapter

The launch of Grain de Sail II is not merely the addition of a new vessel to the fleet of an innovative company; it represents a leap forward in the application of wind propulsion technology. Built in Ho-Chi-Minh, Vietnam, by the Piriou shipyard, this 52-meter cargo sailboat is a testament to the evolution of sustainable maritime transport. With the capability to carry over 350 tonnes of cargo, Grain de Sail II represents a significant increase in both size and capacity compared to its predecessor, highlighting the scalability of wind-powered transport.

Technical Advances and Sustainable Solutions

Equipped with a minimalistic thermic engine for port maneuvers, Grain de Sail II exclusively relies on the wind for propulsion once at sea. The integration of photovoltaic panels and hydrogenerators for electricity production exemplifies the innovative approach to sustainability, ensuring the vessel's operations leave a minimal environmental footprint. This blend of traditional sailing with cutting-edge technology sets a new standard in the industry.

Crew: The Heart of Wind Propulsion

The crew of Grain de Sail II embodies the spirit of innovation and shared commitment to sustainability. Comprising marine merchant officers and experienced sailors passionate about eco-friendly transport, the 8-person crew of French men and women hired under French maritime contract regulation exemplifies the necessity of combining both environmental and social responsibility.

Looking Ahead: Pioneering the Future of Sustainable Shipping

The ambition of Grain de Sail does not end with Grain de Sail II. Plans for constructing sister ships signal a bold vision for the future, aiming to establish a fleet that can offer regular, efficient, and sustainable transatlantic shipping services. This forward-looking approach not only enhances the operational capabilities of wind-powered transport but also sets a course for the wider adoption and development of wind propulsion in the maritime industry.

Conclusion: Commercial Viability

In its maiden voyage, Grain de Sail II not only carries the banner for sustainable maritime transport but also a diverse and eco-conscious cargo. With over 200 pallets of goods nestled in its holds, the vessel has transported to New York City a selection of fine organic chocolates produced in Brittany, an assortment of French wines, leather goods, cosmetics, perfumes, and industrial products. Grain de Sail has convinced a number of cargo-owners from both sides of the Atlantic to transport in a more responsible way.

This cargo, while a small part in the global trade, represents a significant leap towards proving that sustainable shipping practices can go hand-in-hand with commercial viability, paving the way for a new paradigm in global logistics.

Beat up to the wind: A plea for traditional nautical (sailing) education.

Cosmo Wassenaar,
Director, Enkhuizer Zeevaartschool

During an ocean crossing on a merchant vessel working as a mate, I was approached by the captain when standing outside of the wheelhouse, fumbling around with my sextant. I had taken my sextant with me, as I always did. Three years before I had graduated from the Nautical Institute I now work for and had always felt the need to bring all that I had learned into practice.

My previous experience was on sailing vessels only, this was one of my first journeys on a purely motorized vessel. To be honest: there wasn't much to do for me when my watch had ended.

During the ocean crossing I was making sun, -moon and star sightings daily.

My calculations were far from perfect, but that did not keep me from trying. My captain was skeptical of my endless efforts to perfection, he asked why I was bothering with the matter, as the GPS could give me all the information I needed in a fraction of the time used to make the calculation with the tables.

I started explaining about craftsmanship and fun and 'art of navigation' and satellite signals that could be tampered with, when he shrugged and went back into the wheelhouse.

I didn't give up on my efforts that journey and, due to this daily exercise, even got a bit better over the coming days. I could however not stop wondering about the skepticism of the captain (and other officers).

In the Netherlands, Celestial navigation does not form part of the regular curriculum for professional sailors anymore (with the positive exception of the Enkhuizen Nautical College). This of course has to do with developments in electronic navigation, communications, and a strong urge to make the sector accessible to less laborious and cheaper labor.

This has taken its toll: the nautical colleges in the Netherlands are suffering a steady decrease in students, and the average student that does finish her or his study, usually spends less time on board than the years spent at school. One of the reasons being: the lack of challenge.

In the merchant navy the focus is mainly on getting from A to B in an efficient and safe way, where trust is laid in electronics and more and more of the ship's autonomy is being transferred to the company ashore. There is no need to step outside of the wheelhouse, all the necessary information can be found inside.How different this is with an other, more 'traditional' group of sailors: those who want to become mate or captain on a sailing vessel, they make different choices.

Now this is no coincidence, and almost certainly not due to a revival of 'old-fashioned' skills: it has to do with the way that sailors value traveling over the world's oceans and being closer to the elements. To state a cliche: for them the "Journey is the destination."

Apart from that, I believe there is a stronger urge with people on sailing vessels to be master of their own fate; they are dependent on the elements surrounding them and want to make sure that they have a backup for when something goes wrong, or when satellites malfunction.

What we don't know, we fear. If we dispose of or minimize essential skills like judging the weather or using alternative navigational equipment, we start losing our connection with the sea.

A colleague of mine recently was invited to visit a ship which was newly fitted with Wind Assistance technology as a means of secondary propulsion.

Being a true sailor, his attention was fully drawn to the spectacular 'masts' which were placed on the deck and, burning with curiosity, he began asking around on the bridge. Unfortunately, the enthusiasm for the subject was not shared by those who were supposed to work with it. The officers were not convinced of the purpose of the secondary means of propulsion that just got installed, they were not trained in how to use it and, this is where it gets critical in my opinion, they had no 'say' in the use of the technology, as it was mostly being controlled by a computer.

I think there is a place for new technologies on board, but the people that need to work with them should always stay in control. Keeping the 'real' autonomy on board, something that has largely gotten lost on our merchant vessels, is paramount when it comes to making good and efficient use of technical developments. When we transfer responsibilities and control over to the office ashore or to a machine, we lose the interest to be able to sail a ship to its maximum performance, by creating an absence of understanding and appreciation. In 'new' technologies like Wind Assisted Ship Propulsion, we need to hand the controls of these technologies to the people who are going to work with it, so they can develop the right skillset to use it to its maximum potential.

In my opinion, nautical education should stay focused on 'challenging' a mariner how to think and act independently from all that has been installed on vessels in the last decades. A career as officer or captain could and should be a rewarding one for those who choose to go to sea, especially in times like these where shipping plays a big role in the energy transition.

Cosmo Wassenaar,

Director Enkhuizer Zeevaartschool

Enkhuizen Nautical College

Kuipersdijk 15, 1601 CL, Enkhuizen

www.ezs.nl



Pelago; Autonomous Wind & Solar Cargo Sailing

SailMed and Aegean Sail Cargo

9 April 2024

ABSTRACT. Wind cargo sailing in the Aegean Sea: AEGEAN CARGO SAILING and connection to the ports of western Mediterranean: SAILMED was developed over the last 8 years around the "seed" Pelago sloop of 9.5 m. The condensed history of this project is presented along with achievements in networking of producers, consumers and passengers and the development of the first in the world solar / electric autonomous cargo sailboat.

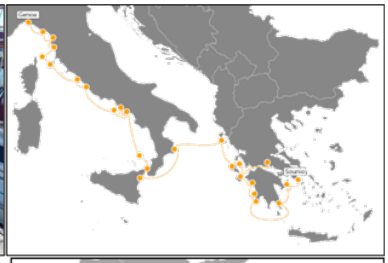
INTRODUCTION. Cargo Wind Sailing in our times was revived around 2010 in the Atlantic with old refitted sailboats such as Très Hombres, Avontuur, De Galant and more recently with modern purpose built sailboats such as the Grain de Sail and Grain de Sail II. Bigger sailboats are under construction.



Jan Lundberg, who participated in the development phase of wind cargo sailing in the Atlantic, decided to move to Greece around 2015, where he had personal connections, to attempt reviving the old commercial wind sailing practice. The old "karavokyrides" who were building wealth and historic fame for the "small" Greece in the 19th century sustained the maritime skills and tradition that further flourished using the industrial times, power driven boats in the 20th century. Unfortunately this development also meant the loss of the wind sailing skills, of the wind sailing boat building skills and more recently the compensated destruction of traditional wooden boats. Thus after two years of efforts to find and use traditional Greek boats for wind sailing transport it was decided in 2016 to start the first AEGEAN CARGO SAILING tour of 6 islands with the small sloop Pelago in the summer of 2017.

SUSTAINABLE CARGO OPERATION.







As it was successful in raising interest and support by the serviced communities it was followed by repeated and expanded tours of 18 to 23 islands. Export cargo trips were also organized every year to the ports of Italy: Civitanova, Porto di Roma, La Spezia and the French port of Nice. The Greek healthy, traditional products of Mediterranean diet such as olive oil reached by electric transport Zurich. They were also transported for the Friends of Ikaria and Slow Food friends to Lugano and wine reached Germany once for friends of the project.

A network of 60 producers and 20 stores, restaurants and hotels has been established and it is served regularly. It can be greatly extended and better served with a flotilla of more and larger sailboats docking more frequently at the islands and sailing several times per year to west Mediterranean ports.



Eco minded travelers embarked on larger 15 m sailboats to experience the wind sailing transport and taste the products of the Greek islands at their source i.e. the local producers and the local select restaurants and healthy food stores. This activity has been repeated uninterrupted from 2018 to 2022. In 2019 the Social Cooperative Enterprise ΚΟΙΝ.Σ.ΕΠ. ΙΣΤΙΑ ΑΙΓΑΙΟΥ (translated Aegean Sails) was created as the legal entity managing the SAILMED and AEGEAN CARGO SAILING projects.

SOLAR ELECTRIC DEVELOPMENT. The idea of sea cargo with zero carbon print was the aim from the very beginning. The Aegean Sea is rich in high wind and solar potentials in the Mediterranean, thus it was obvious that autonomous zero carbon print cargo sailing should be experimented. The financial support by the GREEK GREEN FUND for the conversion of Pelago to electric / solar auxiliary propulsion became available in 2021 and the conversion was physically carried out in the winter of 2022 at the island of Trizonia in the Korinth gulf while the sailboat was in the water.

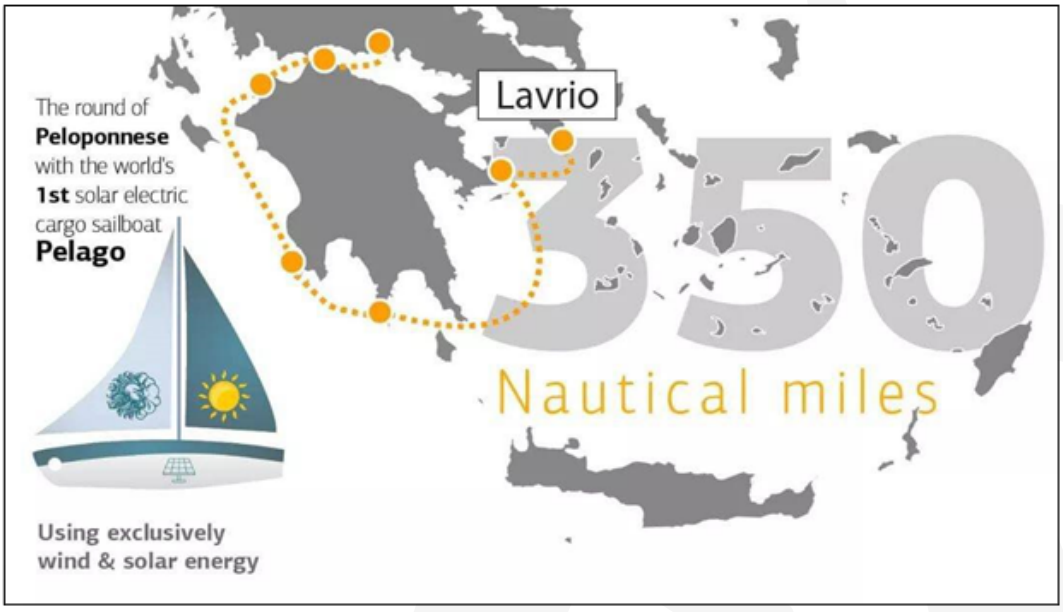


The original conversion design consisted of replacing the diesel engine of 19 Hp with a 10 kW electric motor, keeping the existing reverse gearbox and mechanical speed control for ecological reasons. The energy storage was originally designed for 11.5 kWh LiFePo batteries but it was reinforced to 23 kWh during the conversion aiming for 60 NM autonomous travel at 3 kt without any wind. This was meant to satisfy the need to cross the Ionian Sea on the way to west European ports.

The energy input was purely solar using 4 x 24 V, 380 W dual face panels. Two of the panels were physically fitted over the cockpit, in place of the bimini while the other two were mounted on a special, light structure design, behind the boat. This structure was experimental and needed three phases of improvement in three years to guarantee solidity in heavy seas.



Pelago started sailing in April 2022 first around the Peloponnese*7. *8. Then in July and August touring the Aegean Sea and sailing to Italy in September and back in October using solar energy almost exclusively but for one recharge at the Messina Strait before the trip back to Greece for security purposes. During these first year trips the energy autonomy in the summer months was confirmed while it was obvious that it was not achieved in the winter months from October to March. For this reason the enhancement of the power input and storage were planned for subsequent investment.



In 2023 solar / electric Pelago was the only vessel that carried out the zero carbon transport project to Italy in the spring and toured the Aegean Sea three times in the summer months and until November. The need for higher solar power input was confirmed.

WINTER AUTONOMY. The GREEK GREEN FUND awarded a second autonomy enhancement project in 2023 involving the increased solar panel input by 900 W to 1.4 kW total and storage to 34.5 kWh. The lack of space to install more solar panels on a sailboat was a problem solved using the dual face semi flexible solar panels vertically placed on the guardrails that have just on time become commercially available. The third battery that was installed is of Plug & Play type that also just arrived on the market. Further improvements will possibly be available with thin transparent organic solar panels under development that can be placed on the winterising tent and on the sails. ISTIA AIGAIOU is in discussions on this subsequent experimentation.

Scaling up is considered feasible for sailboats up to 15 m. For longer boats their increased cruising speed creates conditions for hydro-generation that will be added and better adapted to less sunny conditions.



The autonomy enhancement conversion was completed at Lavrion Port in the winter months of 2024 and the augmented capacity Pelago sailed off to the Aegean sea on February 27. The testing of the added autonomy is essentially concluded. The graphic data from the energy control systems show clearly the dramatic increase of solar energy input as of February 24 when the temporary use of only 2 solar panels was replaced by the new system of 10 solar panels connected in a way providing a total of 72 V, 1.4 kW nominal output. The data show that 10 out of 16 days of operation the batteries were charged at saturation level despite wintery conditions of frequent rain and cloudiness They never were discharged below the 90% level. On March 10 at night with almost zero wind conditions it was possible to measure speed and power consumption and calculate that approximately 90 NM autonomy has been achieved.

CONCLUSION. As a conclusion, zero carbon print wind / solar sea transport has just been proven feasible at small scale. The results show that there is still excess solar energy that can be used for cooking, heating and air-conditioning. Scaling up awaits investment in this climate adaptation testing times.

Lo Entropy, an overview of our sail cargo project to date.

Capt. Geoff Boerne
8 August 2024

The Lo Entropy project began many years ago, in the last century in fact. So, both boat and myself have been around for some time.

After sailing as crew on the 81/82 Whitbread round the world race, and achieving the wanna-be sailors dream of rounding Cape Horn at a youthful age, racing began to lose its charm. Yet the love of sailing, seafaring and both the associated joys and hardships definitely had not diminished one bit, but this passion needed a focus, a reason, and racing was just not enough, it had to be something that gave not just took.

Luckily I met an interesting German sailor named Horst, who was trading with a small yacht between Brazil, St Helena and South Africa. I never got to know him well, but being a Moitessier fan and although having rubbed shoulders with some of the sailing greats, I was in awe of this seemingly unremarkable person despite only speaking to him once or twice in two minute conversations. Soon after I got to know of Horst he commissioned and had built a Lavranos designed cargo sailing vessel which he proceeded to use to move cargo between South Africa and South America via St Helena. I caught up with his sailing cargo vessel in 1986, anchored in St Helena, looking forlorn and sad, no sign of Horst: apparently he had fallen foul of the St Helena authorities. This, however, did not diminish my admiration for the man, and what he had been doing, far from it, as I knew that this was the purpose I needed to fulfill my sailing passions. My future lay in moving cargo using the wind for propulsion, utilizing this incredible energy source for both transport and energy creation and whatever else this could lead to. By this time, Schumacher's book (Small is Beautiful) and shortly after, CAT (Centre for Alternative Technology) in Machynlleth, Wales (https://cat.org.uk/), had become beacons of insight and hope for myself and my growing sail cargo plans. At this stage environmentalism and green transport were still considered the sphere of "tree hugging crazies," which affected my "yachtie" relationships.

In 1992, a friend loaned me the money to build Lo Entropy. He knew of my aims as I was continuously collecting and researching information about it and had in fact had rudimentary plans drawn by a Lavranos associate, a sailing mate, of a similar sail cargo vessel to Horst's. The differences in Horst's vessel and my constraints lay in the amount of cargo I wanted to carry and a shallow draft with the ability to dry out for loading and maintenance. The design was heavily influenced by Digby Taylor's Outward Bound which I had raced against in the Whitbread race. The result was a very simple, fairly flat bottomed, dagger board, ketch rigged 60 ton cargo capacity sailing vessel of steel and slightly less than 24 meters, cost effective to build and operate. I took this design to a naval architect in Wales, who created the building plans and insured that the vessel would float.

In 1993, my business partner and myself started building Lo Entropy in Bristol, but after a month we moved lock stock and barrel to Portishead where for three years we built the boat with the help of numerous good souls, lots of trials and tribulations, and arranged a cargo for Cuba. In 1996 we set sail with a volunteer crew, there was a movie about it on ITV: the Cuba connection. In retrospect it's amazing that we had got this far, as it was done on a shoestring and with an incredible amount of luck and goodwill from the many people we came into contact with.

So we set sail to Cuba, and became a Caribbean tramp. It was tough, I did not fully comprehend the trade and its intricacies. Luckily, I met Paul Whalen from Avontuur, and he kindly gave me some good advice from his years of experience, as valid today as it was then. Bottom line is that in order to run a successful sail cargo business one has to keep costs to a minimum and have regular cargo. The first aspect I understood all too well. Achieving the second was a lot harder than anyone of us imagined. Through luck and hard work we survived financially, but it was close and I realized there was a lot I had to learn.

Fortunately, I was contracted to do some research on the trades we were working in, which resulted in one of the few early publications (1) regarding what I then termed the "informal maritime sector", due to the lack of regulation as well as the avoidance of what legislation there was at that time in the Caribbean. Yet, this informal maritime sector was, as the research documented, an integral and important transport sector for the islands, mainly as most island markets were not economically viable for the formal shipping sector. The informal sector was also a far more honest and legally straight forward transport sector than the formal shipping sector was and is presently. The research further looked at the East African sailing dhow trades, which is still alive today and has been operational since Roman times, and probably before, so it was clear we were the newbies to this trade; again, I learnt a lot.

Early in the 21st century we brought Lo Entropy back to the UK, formed a company, Celtic Cruises Ltd and changed her into a coded 12 passenger six en-suite cabin charter sailing vessel as there was no other use for her at that time in Europe. We worked the Bristol Channel and in 2009 headed to East Africa as a passenger charter sailing vessel, but by now, there was a growing public recognition in Europe of the environmental and carbon issues facing the world and developed economies roles in this problem. At last we could see that there might be a chance Lo Entropy could be used for her original design and purpose, a sailing cargo vessel operating and competing in developed economies. It had been a long and interesting voyage to get to this point where tree hugging and green transport had become more mainstream even if only in thought.

In 2015 we sailed round the Cape of Storms back to Europe with the idea of converting Lo Entropy to her original purpose once more, but this time armed with a lot more realism of the challenge this would pose. On this voyage we successfully trialed some simple and extremely effective hydro energy options that show huge promise for the future.

By now we had acquired a large residue of knowledge and experience about cargo transport using the wind for propulsion, had built and commissioned a modern dedicated low cost sailing cargo vessel and its performance had been tweaked to a more than satisfactory standard, (this does take time and effort for any new design of sailing vessel, the difference between design promises and the reality of actual sailing performance can be quite a shock, especially when on a tight budget despite what the computer or naval architect says!). However, the vessel did need internal changes to increase its cargo capacity for the cargo pallet transport trade we envisaged to fulfill our broadly stated operational, environmental and social goals below:

1) competing within the industrialized transport industry as a cost competitive, reliable and regular efficient multimodal green general cargo transport option with road, rail and short sea transport options to prove the viability of wind propulsion to this transport industry

2) utilize modern technologies to achieve the above and importantly to become as energy independent as possible using the wind as our primary energy source to enable the onboard production of green fuels for domestic and when necessary, propulsion use

3) offering genuine living wage crew employment options to sailors as well as the possibility of small family sized and run businesses

4) be part of the regeneration of smaller ports (and local periphery economies) before they are forever lost to property developers and yacht marinas, which is part of a decentralization argument

5) be part of a small vessel network of green cargo transport by opening and operating various routes in and around Europe, one needs trade, wind and water, which means there are many such options.

Easy enough one would think with today's environmental awareness, and expensive electric vehicles? Not so straight forward in our case unfortunately.

Although we have been part of an EU project, and have raised funds with new shareholders, thereby creating a bigger team to move the Lo Entropy project forward, we remain short of funds to complete our needed changes and new technology goals. Interestingly, we will have a carrying capacity of more than two large EU trucks, and yet we are finding it difficult to raise the needed funds, approximately the equivalent cost of an electric truck (2).

It seems that banks are unwilling to accept the vessel as security for a loan, despite our ability to pay back the loan with ease within 5 years (and having an exemplary record in this regard), mainly as they claim they have no idea of the resale value of our one-off vessel. This would probably change if, like inland waterways and shipping, there were many similar vessels on the market, but as this is not the case, some other form of financing, basically out of our own pockets, must take place. We are it seems either too small to finance, lack the security for finance institutions to consider us, and we have yet to find green finance (we are wondering if it even exists!). Further, as it is clear that in our case, despite all the sailing seafaring, sail cargo experience and knowledge, as well as actually having a mortgage free vessel, we lack a high profile online marketing ability; we have, perhaps naively, thought the walk rather than the talk would attract investment in the project.

As important, finding European cargo owners willing to use our unproven transport services is also a major challenge despite these entities desiring green transport options. The transport industry is conservative by nature, it wants security, demands reliability and regularity with everything revolving around cost effectiveness. We are able to offer this and compete on a cost basis with all multimodal transport options but until we prove this, we remain "tree huggers" and the industry remains very skeptical despite backing ourselves with mechanical propulsion. Unfortunately, past experience of using wind propulsion has not proved beneficial due to the pre-operation claims and actual performance of sail cargo operations for cargo owners. This remains a major issue, and until wind propelled cargo transport is proven to the wider transport and logistics industry as cost competitive, regular and reliable, this view continues to restrict the development of the maritime wind propelled cargo sector in developed economies with industrialized transport infrastructures.

Another issue is finding and opening routes. Sadly, it's not as simple as arriving and loading or discharging cargo, there are many things to consider; finding suitable interested ports with viable weather patterns and tidal conditions that will enable the high number of voyage frequencies needed, logistics partners for sourcing the cargo, formalities, insurance liabilities, contracts, cranage, warehousing and dock space, onward transport arrangements, the list is long and it takes time and effort to build relationships between all the involved parties and get everything in place, which too costs money with no return possible until the freight operation physically begins. Due to the costs and benefits involved these negotiations are usually quite sensitive and NDA's are now unfortunately common if not obligatory until a route is up and running. Safe to say we are presently involved in such negotiations and contracts with all maritime matters planned as per our advice and recommendations, but I am afraid I can't say more as I want to keep my head!

That said, there are many possibilities for routes throughout Europe (and the world), but sailing cargo vessels that are capable to efficiently operate these routes will need to be of a modern simple design using innovative technologies in order to ensure that their sailing attributes, cargo capacities and low running costs allow them to compete with the present route's transport operations in spite of the uneven "playing field" weighted against them. We know this can be done as the formal shipping sector cannot afford to work in many areas where the informal sector operates on an absolute mercantile basis and our goal of proving that sailing cargo vessels are viable to the industrialized transport industry on a cost and reliability basis once proven will open a very large market for those that want to work in it. Hopefully, as more routes are utilized in the future, people/sail cargo operators will become more willing to collaborate and build mutually beneficial networks which will be crucial for the development and growth of this green transport option on an even wider scale, allowing for both longer voyages and greater decentralization of developed economies.

This concludes my short and broad overview of the Lo Entropy project to date. We continue as we are at heart sailor seafarers, and being familiar with the sea, which does not care, we remain optimistic and resourceful, cause that is our nature as well as knowing what we want to achieve is worth the effort, a bit like planting trees.

Should you want more information or wish to discuss how we can work together and share in the next stage of this sail cargo voyage or you would like to understand how investing in this exciting opportunity would work then please contact me at Loentropy@gmail.com.

Capt. Geoff Boerne

References:

1) Boerne, G. (1999) Filling the gap: small inter-island Caribbean trading ships and their crews. Seafarer's International Research Centre. Cardiff, Wales.

2)https://www.ecgassociation.eu/wp-content/uploads/2022/04/ECG-Business-Intelligence-22.04-Cost-of-going-electric.pdf

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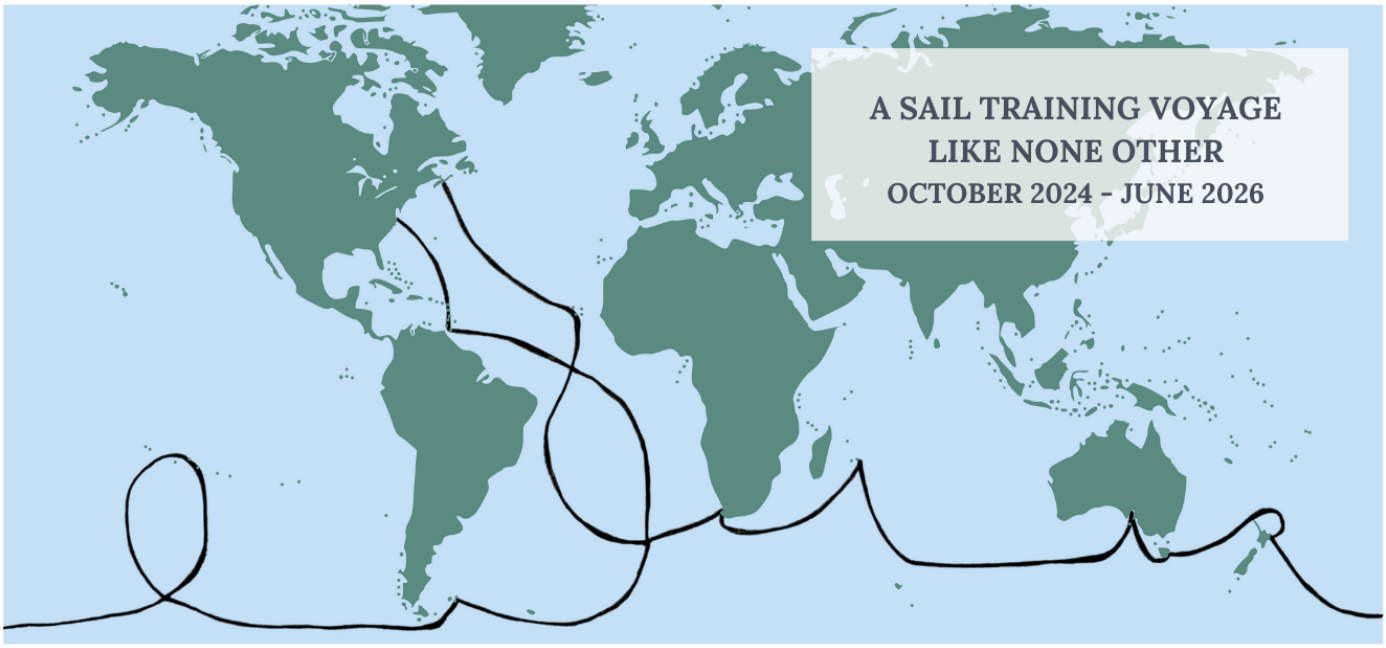







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Iokiokwe: Welcoming the SV Juren Ae to the Global Wind Propulsion Fleet

Gavin Allwright, Secretary General,
International Windship Association
01 June 2024



In late April, I had the great opportunity and honor to visit the Asia Shipbuilding yard in time for the sea trials of the new SV Juren Ae, the 48 meter, 481 GT, 318 dwt primary wind freighter that was being delivered for use both domestically in the Marshall Islands and flagged and compliant for international service, too.

The ship has been delivered under the auspices of a German government funded project with the design team at Hamburg based SDC and a project team headed by Raffael Held from the German International Cooperation (GIZ) and technical head Professor/Captain Michael Vahs from the University of Applied Sciences Emden-Leer (HEL)

As I watched the ship slip into the late April mist, I pondered the importance of this ship's delivery to the Marshall Islands and to the wider region. She will be fitting into a relatively small domestic fleet contributing a significant capacity to domestic cargo operations especially copra and also serving as a passenger vessel between islands and will be operated by the Marshall Islands Shipping Corporation (MISC).

There is of course a need to reduce emissions in the region however, as with all large ocean (small island) developing states the dependency on imported energy, and especially fuel for maritime activities means there is a lack of reliable shipping and the costs of running ships and many routes often require substantial subsidies from central government primarily to cover the high cost of fuel, which must be paid in foreign currency which further magnifies these costs.

The Republic of the Marshall Islands Minister for Transportation, Communication & Information Technology, Hon. Hilton Kendall delivered a strong message and a wider call for action when commenting on the project for this article saying;

"The Marshall Islands and our partners have proven that what was once a dream, has now become a tangible reality. If we can do this to reduce our extremely minute carbon footprints, what is the excuse for the largest and emerging emitters?"

During the launching ceremony back in November 2023, Republic of the Marshall Islands Ambassador to Korea, Hon. Albon Ishoda, who is also the Special Envoy for Maritime Decarbonization on behalf of the Marshall Islands also stated;

"We need to move away from fossil fuels. The vessel which launched today symbolizes the larger change we are fighting for: a transition from technologies that are outdated in times where we face daily challenges with rising sea levels, the acidification of our oceans leading to coral bleaching, taking away our resources that we all need to survive."

The Juren Ae, named after elements of the traditional outrigger vessels still used in the Marshall Islands, will serve as a sustainable shipping flagship in the region and the team behind delivering the project hopes that it will be the first of many new sail cargo vessels operating in the region.

Raffael Held, the GIZ project lead comments;

"After working closely with multiple stakeholders in the Marshall Islands, the Pacific Region and internationally over many years, GIZ can happily announce that gradually the construction of this prototype-like low emission Pacific Island Supply Vessel, named after the main steering paddle of the traditional Marshallese Canoe, SV Juren Ae is coming to an end.

The delivery of the ship in June and the handing over to the new owner, the state-owned enterprise, Marshall Islands Shipping Corporation, now marks a pivotal point in the maritime arena in the Micronesian and larger Pacific region. We hope we can continue working closely with regional stakeholders on transforming the shipping sector. The results of the trialing phase of SV Juren Ae in day to day operations in the Marshall Islands and their bordering states will help us learn and improve further in this cooperation project."

The ship will be delivered to the Marshall Island by an international crew. Prof. Capt. Michael Vahs who has been heavily involved with the technical aspects of the project adds;

"The ship design and chosen technologies are tailor-made for the supply and trade of small island countries with a good wind potential, such as the Marshall Islands. Different design targets, e.g. good sailing performance, robustness, safe and easy handling, and cost-effectiveness had to be followed and kept in balance. A thorough needs analysis and close cooperation between R&D, designers and ship operators was essential for the development. We see the "Juren Ae" as an important milestone for the Marshall Islands to achieve the ambitious climate targets for shipping. Our University R&D team has learned a lot from this challenging project. We are looking forward to seeing the ship in service for the Marshall Islands Shipping Corporation."



The vessel designers opted for an upgraded 'Indosail' system developed in the early 1990s by German sail cargo specialist Peter Schenzle at that time an HSVA engineer which has particular signature of a top gaff on the sails creating a wing sail form using soft sail materials. The Indosail system was in regular use on board the SV Murata Jaya 900 (Mighty Wind) vessel, launched in 1990 and operated throughout the 1990s and 2000s in Indonesia, hence the name 'Indosail' but later in life she was operated mainly as a wind-assist vessel as the original engine was replaced with a larger version and operated on cheap fossil fuel available at the time and deployed as a crew training vessel until coming out of service in 2012. The Murata Jaya was a vessel slightly larger than the Juren Ae at 68m, 1024 GT, and 900 dwt with 3 masts and a sail area of 1050 m2 (11,300ft2)

The Indo Sail rig was also most famously installed on the Rainbow Warrior 2, which was a 55m (after extending) vessel built in 1957 but then outfitted with 3 masts and a sail area of 650 m2 (7,000ft2) sail system in 1989 and operated by Greenpeace for over 20 years until 2011. The Rainbow Warrior II was then sold to Bangladesh-based NGO, Friendship and served a hospital ship under the 'Rongdhonu' (Bengali for 'Rainbow') until she was finally decommissioned in 2018

These vessels, just as the Juren Ae, had the capacity to operate as full wind propelled vessels with auxiliary engines deployed for maneuvering on certain routes or during periods of light winds or no wind at all and enabling a higher than 7 knot service speed for the Juren Ae with a maximum speed around 13 knots.

The Juren Ae also sports two work boats that will be used to ferry cargo and passengers to and from the larger vessel enabling it to service many islands that don't have deep enough harbors or jetty facilities. This first vessel will be something of a flagship for the Marshall Islands and for the region and will operate alongside the older 36m, 179 GT, 280 dwt freighter the SV Kwai which was acquired by the Marshall Islands in 2021, after the ship had serviced the Hawai'i to the Cook Islands and Kiribati route for the previous 15 years.

There is also the opportunity to operate a hub and spoke network with smaller locally designed, built and operated wind and solar vessels that can operate among the small island groups and as lagoon transport transferring or trans-shipping cargoes to the larger vessel.

The training of local crew members and local engagement will also be critical to the success of any type of vessel but in this case understanding the benefits and the challenges of wind propelled vessels links to the great seafaring traditions of the Marshallese and other Pacific seafaring island people. The Low Carbon Sea Transport Project could initiate with national stakeholders the establishment of a Maritime Training Center. The new training hub, named "Jela Meto", is operated by the College of the Marshall Islands and has already started to deliver courses in both areas of engineering and navigation with a focus on low emissions shipping technologies in August 2023. A new generation of Marshallese sailors is taught in efficient and eco-friendly ship operations.

The Low Carbon Sea Transport Project is implemented with the Marshall Islands Ministry of Transport, Communication and Information Technologies. It is funded through the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV).

The launching ceremony took place in November 2023 and the naming ceremony in May 2024 on Geoje Island, South Korea. The innovative sailing cargo ship was developed through the collaborative efforts of Asia Shipbuilding and Kostec along with Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) GmbH.

Launching Ceremony:

changing-transport.org/launching-ceremony-for-the-pacific-island-supply-vessel-on-geoje-island

Naming Ceremony: https://www.giz.de/en/worldwide/151066.html

Report Marshall Islands Journal, May 2024:

marshallislandsjournal.com

Main Particulars

Name: Juren Ae
IMO Number: 1021245
- Length overall: 48m
- Breadth: 8.7m
- Depth: 4.1m
- Draft (Baseline): Design 2.70m, Scantling 3.20m
- Gross tonnage: 481 gt
- Deadweight (on scantling draft): 318 dwt
- Cargo volume capacity: 600m^3
- Fuel consumption: periodically Zero Fuel/Emissions, weather depending
- Service speed: minimum 7 knots (at 90% MCR, design draft 2.7m)

Main Engine: DOOSAN L126TI, 265kW @ 2000rpm, with reduction gear
Auxiliary: 2 Hyundai D4DA-G, 45kW, Leroy Somer generators
Hybrid Electric Package: PTO Generator 50kW, PTI E-Drive 50 kW for Maneuvering at slow Speed, Recuperation mode of Propeller when ship is under sail
Sailing Rig system: INDOSAIL Rig – about 500m^2
Photovoltaic panels: supply capacity 11kWp for Battery charging (LFP, 44kWh)
Multi-purpose Cargo: general cargo, palletized goods, copra in bags, fuel oil in barrels on the open deck, fresh water in FW tank for island supply
Additional Equipment: 2 x Cargo gear : One double derrick 2 ton SWL, 2 winches providing 15m/min
2 x Workboats : FRP structure providing 30kW outboard engine.



RESULTS OF THE SMALL VESSEL SECTOR SURVEY 2024

In May 2024, we opened a window for a snap survey of the small wind propulsion vessel segment with six categories aimed at small wind propulsion vessel operators, seafarers, cargo owners, advocacy or research organizations and other maritime stakeholders with an interest in the segment. We would like to take this opportunity to thank all of the respondents and in this article, we will be releasing the headline results in the four categories that we received enough responses to adequately reflect attitudes and raise questions that need to be answered.

We aim to turn this survey into a more comprehensive and wider reaching annual survey that will build on these results. As expected, there was less feedback from ports/harbors and cargo owners in this iteration, however these will feature more prominently in the survey next year with more targeted outreach in those segments.

Thus, this article focuses mainly on the vessel operators, seafarers, advocacy and research organizations and other maritime stakeholders.

Sailing Vessel Operators (15 respondents)

An overview of respondents found that the majority of operators were operating 1-3 vessels, however over 70% planned to add ships to their fleet in the next 2-3 years. Figure 1 gives a breakdown of the respondents' operational sectors.

Operational areas differed as was expected, with an even spread between Coastal/River (40%), Short Sea (50%) and Ocean Going (50%) with the question allowing more than one answer and the spread of ownership models also followed a similarly wide spread, however out of eight freight operators, seven operated on a for-profit basis and one on a cooperative model, whereas for passenger services there was a mix of non-profit, for profit and owner-operator.

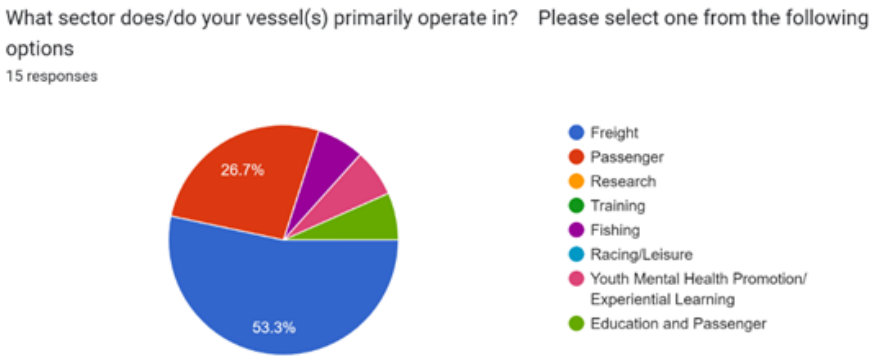


Figure 1: Vessel Operators Operational Sectors

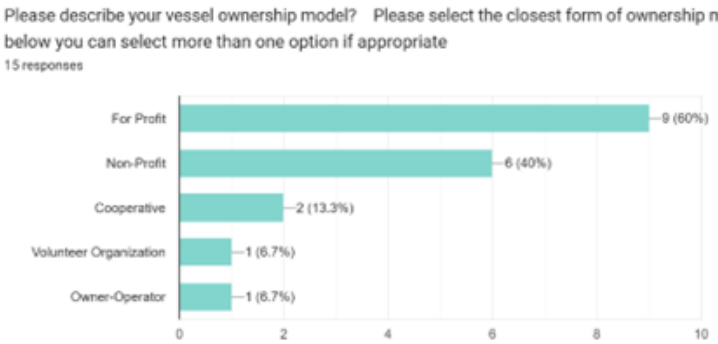


Figure 2: Vessel Operators - Ownership models

RESULTS OF THE SMALL VESSEL SECTOR SURVEY

The key question asked around challenges faced by operators is significant in that it confirms some of the anecdotal evidence from discussions with operators. Finance is by far the most important issue for the majority of respondents, but especially ranking highest among freight and passenger segments, and for the freight sector that was tied to cargo availability by a third of that group.

While not specifying exactly which regulations are challenging, this segment was also flagged across the segments as a concern and warrants further investigation and a more granular survey question in the next iteration of the survey.

Crew/Officer availability was also a key concern across all of the segments but especially among freight operators, as can be seen in Figure 4 and this ties into the results received from seafarers, whereas non-freight/passenger operators had few issues with harbors, these were significant as can be seen in Figure 5 below, with the vast majority having a less than favorable view on how ports and harbors are adapting to small wind powered vessels, which warrants further investigation in subsequent outreach and next years.

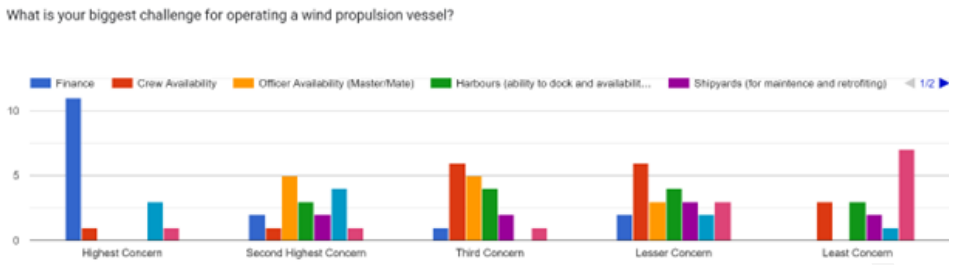


Figure 3 – Vessel Operators - Challenges

RESULTS OF THE SMALL VESSEL SECTOR SURVEY

While the challenges were fairly clear cut, there was a far wider spread of solutions, although these did coalesce around a number of themes:

- Collaboration – teamwork, sharing ideas and solution, conversation.
- Network development - More boats, more cargo, working model, engagement, keep going.
- Marketing - building the market, spreading the word, investor awareness.
- Practical elements - system of systems approach, carbon tax, applicable regulations for small ships, reduced harbor fees, pay properly for cargo.

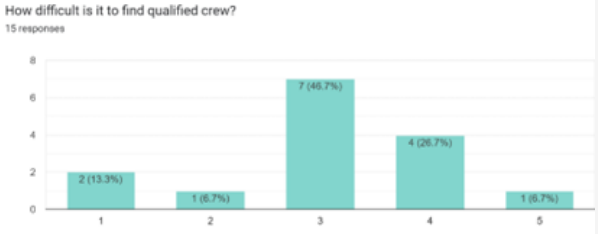


Figure 4: Vessel Operators – Qualified Crew Challenge

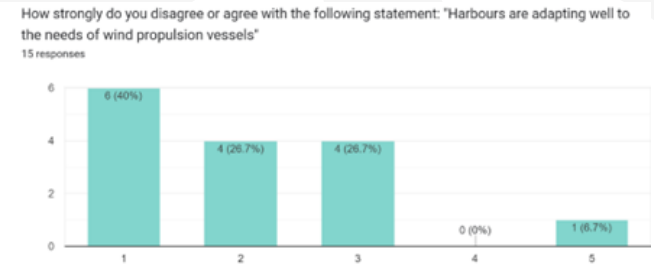


Figure 5: Vessel Operators – Harbors

From a comment point of view, small vessel operators expressed their optimism quite clearly, with comments laced with words such as "exciting, growing, increasing demand, great opportunity and immense potential."

This is a selection of comments taken from the survey:

"It is great to see an effort to identify and organize this group of vessels within the industry. There is much to be learned by students, passengers, crew members and officers from the operation of wind propelled vessels and the benefits they can bring to the environment."

"There are many opportunities if they are innovative and adopt innovations whilst maintaining transparently low emissions on a life cycle basis."

"As long as the playing field is tilted towards large ships that can pollute, it will remain a challenge to reach financial viability for smaller vessels."

"The next five years will be exceptionally interesting. Looking forward to the 'critical mass' type moment when it is no longer seen as a niche idea."

"I believe there is a huge market, but nobody wants to be the first to invest in it."

"Companies need to step up and order cargo. Or non-profits or think tanks need to induce demand by ordering test cargoes. Grants, indirect help, etc are not enough."

"…those of us engaged in this field are actively advocating and exerting pressure on major shipping companies to take tangible steps towards cleaner shipping practices, recognizing the advantageous potential of harnessing wind power."

Seafarers (5 respondents)

The Seafarers category attracted a small sample of five respondents, and we will endeavor to do more outreach in this segment. The respondents were all in the 40-50+ age bracket and an even split between male and female with the four with sailing experience which had a fairly widespread with two respondents having 0-1 years' experience, one with 7 years' experience and the other with 11+ years, split evenly between Europe and US.

While this sample is limited, the answers regarding availability of berths, wages and training do speak to an early stage of development in the segment. As shown in Figure 6, there is quite a wide experience of finding berths on small working wind propulsion vessels, which aligns with the similar spread of findings in Figure 4 which lists the responses from vessel operators, and likely indicates the need for more coordination to identify opportunities and match qualified crew to those positions.

Wage levels are always an issue in an emerging sector, this will be an important issue and area that will need to improve as the demand for qualified crew grows. While some of the respondents indicated sufficient wage levels (though not good), there were also feedback comments stating:

"While wages are currently low on sail freight vessels, this is understandable due to low operation budgets. Wages should rise as the boats start to do better financially."

"It is often a minimum salary, and only for the time on board."

"£100 (c$/€120) per day for a very physical job which isn't a 9-5 job doesn't earn you enough to afford a house, nor is it stable enough to get a mortgage."

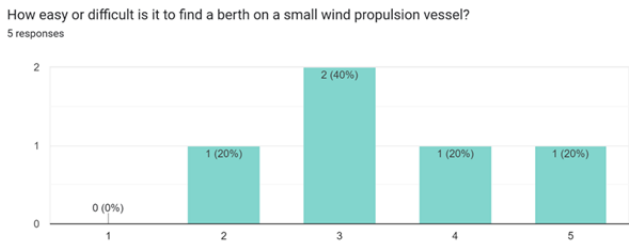


Figure 6 – Seafarers – Finding a Berth

The final question that was put to the seafarers was the availability and access to training. This was deemed on the whole to be fairly good in Europe with the Enkhuizen Maritime College however there are less opportunities elsewhere and the expense and access to training will rank alongside salaries as the sector grows.

Advocacy or Research Organizations (6 respondents)

Once again, we received a small sample in this segment, but these six responses led to some interesting observations, nonetheless. The respondents were all small research organizations from an arc of countries and operational areas from Chile to the US East Coast, Austria and Australia.

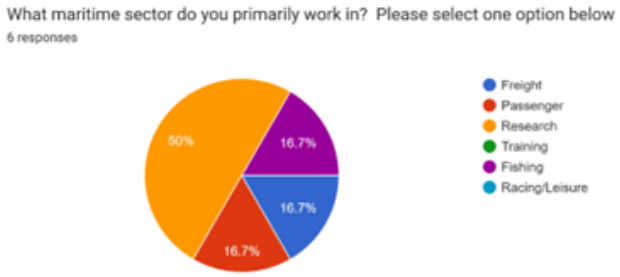


Figure 7: Advocacy or Research Organizations – Maritime Sector



Figure 8: Advocacy or Research Organizations – Primary Mission

While certainly not a definitive sample, all of the respondents stated that they were either optimistic or very optimistic about the sector, and all of them are quite strongly focused on the sector, however there was a spread of responses concerning how well informed they are about the small wind propulsion vessels, as shown in Figure 9. This indicates that there is certainly still work to be done with outreach and the amount and quality of information made available. As one respondent stated; "We cannot keep up with all developments but stay abreast of most details and ongoing imaginations."

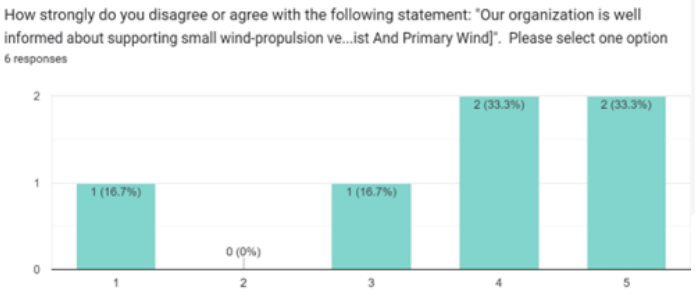


Figure 9: Advocacy or Research Organizations – Level of Information

Other Stakeholders (14 respondents)

With the final category of respondents, we had a wide spread of experience and engagement across the board from wind solutions providers and naval architects to academics, researchers, investors or simply those interested in the field. Responses were received from eight countries (in Europe plus US, Australia, Israel and China)

It is always encouraging to see that this group of interested parties are all, for the most part, very optimistic about the sector as we can see in Figure 10

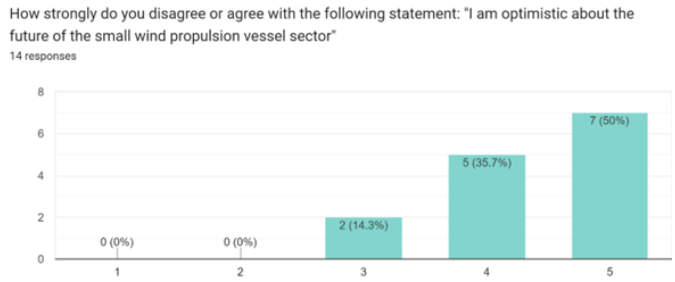


Figure 10: Other Stakeholders – Optimism Levels

This sentiment was backed by comments such as these;

"It will always be a small market in terms of emissions but will be a vital element of trading systems all over the world."

"A lot depends on regulations that will develop for small vessels."

"We believe more in decarbonation of small ships than big ships."

"I see it being part of a wider social shift necessary to put the world on a sustainable course."

"The sector is growing rapidly, especially in France as the tide of global opinion has turned in favor of positive environmental action. I perceive that the greater percentage of Humankind now understands that we have no choice but to (make) meaningful changes across the board."

Conclusion

The survey results are not conclusive or definitive however they do provide a window into the thinking in the sector which is optimistic but also not shying away from the work that needs to be down both within the sector to build the network but also externally to help facilitate and provide the finance and the level playing field and trained crew to make this sector build on this growing momentum.

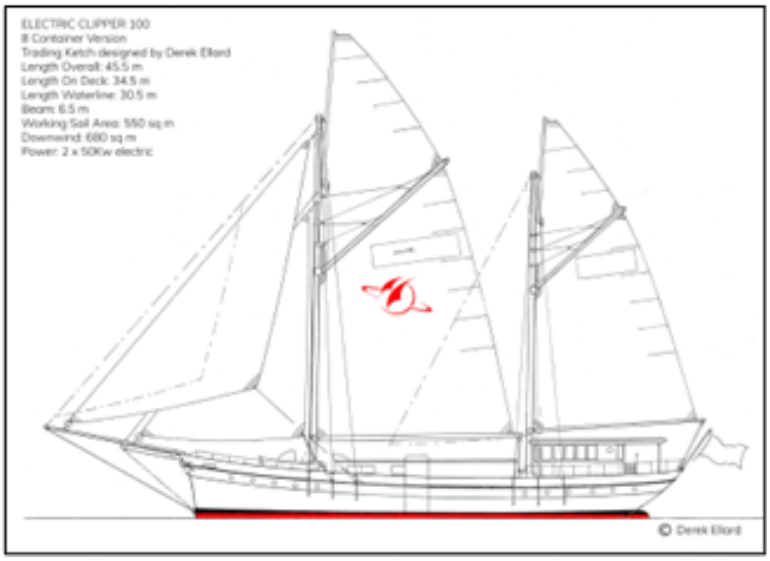
We will be looking to build on these initial findings next year and also take these learning and incorporate them into the IWSA actions and advocacy work going forward.

Thank you again to all of the survey participants and as more detailed analysis comes available, we will share that in due course.

THE NEW EC100-8: THE EVOLUTION OF A ZERO-EMISSION CARGO SHIP

Derek Ellard

02 May 2024



The International Wind Ship Association was founded on the irrefutable principle that ships powered by the wind are logical and cost-effective solutions which reduce the destruction wrought by fossil-fuelled vessels.

We at Go Sail Cargo take that assumption further, we say yes, absolutely, so let's get sailing right now, we have created a range of logical transitional traders and we present the latest (with more to come) – the Electric Clipper 100 8 - eight containers that is.

We take a 19th century trading ketch or schooner and rework it from the keel up. We build in steel because it's tough, scalable, recyclable and easily repaired. We optimize the hull, halve the weight aloft, put solar on everything except the ship's cat, and use every techno-trick in the book to build better boats. The result? A sailing cargo ship for the future, coming soon to a shipyard near you!

We aim for standardization and mass production - and we don't take risks. Sails work, modern sails work much better. Diesels work, electric engines work way better and solar fuel is free. We will fully integrate into established freight logistics. Our manning levels are comparable and our technology is proven, not speculative.

Our key offering in the sub 500 tonne sector, the Electric Clipper 100, has steadily evolved and adapted to feedback and expert consultancy. Rotors, kites, and wings are all excellent innovations but they are better suited to larger ships, ours are small but vital cogs in the big wheels of commerce. Upgraded traditional sails, tried and tested over several millennia, are best for us.

The lines for our new generation gaff ketch are close to optimum for maximum cargo capacity and minimum energy consumption. They build on the earlier EC – 100 4 with revisions major and minor, plus further optimisation. The new ship retains the heritage aesthetics – vital in attracting sustainable business and savvy passengers - a beautiful ship will be cherished, a floating box will not.

We offer practical options including our container-footprint accommodation pods, performance-enhancing square sails, electric pontoon lighters and ultra long -range battery banks.

The rig is the same tried and tested gaff ketch but with greater sail area for increased cargo and tropical operations. The main gaff doubles as a crane for accommodation pods, palletised or break-bulk cargo, up to five tonnes per swing. Downwind canvas is boomed out via carbon fiber poles. We will power everything but back it up with fail-safe manual options.

Construction is mostly steel – soon to be green - with the goal of efficient mass production, standardization with sustainable, recyclable materials. The aim is to keep build and operational costs as low as possible without compromising safety, profitability or speed along with the ability to seamlessly adopt new technology during the prolonged service life of the ship.

The accommodation has been carefully considered to provide maximum comfort and wellbeing for the discriminating and environmentally-aware passenger. Building on low noise and low pollution foundations; the cabins offer flexible yet stylish design with effective insulation, extensive use of natural materials, near silent heating and fresh air ventilation, ample hot water and premium fresh food catering and of course wi-fi. We think of everything!

Passengers will be able to help set the sails and enjoy the use of the ship's sailing boat when circumstances allow. Flexibility is the key with voyagers able to customize their travel plans around any changes in the ship's schedule or switch to other Go Sail Cargo vessels, just like flights.

Key Points:

* Full-time zero emission transport will eventually be mandatory yet this is an achievable reality right now. Mass production and kits are the key to low build costs and high profitability. Welcome to the future, Go Sail Cargo's future.

* Cargo is king! 8 containers. umpteen pallets, bulk timber, bio-dynamic wine, portable clinics, fresh water, film crews, animals, eco-tourists and more. Delivery to remote islands is easy with our lightering pontoon, and yet an EC – 100 can be in and out of bigger ports as fast as anyone.

* Our streamlined hulls with friction reduction systems reduce energy consumption, lower emissions, and improve performance. Take out diesel propulsion and there's no fuel bills, no fuel tanks, no bunkering and no oil spills, plus reduced fire risk, low noise and vibration, low maintenance and no pollution of air or water.

* We have adopted new rim-drive electric pods which save valuable space in the hull. Batteries to power them are getting better all the time. Charging is by solar, propeller regeneration and wind.

* The sails are billboards! In the age of the selfie, social media and instant information, videos of the billowing sails of our ships will be a good reason to celebrate a new era in planet-friendly sea transport while promoting the future-focussed businesses that work with us.

* And talking about promotion, we plan to enter a smaller Go Sail cargo Ship – with cargo – in a major international yacht race like the Sydney Hobart. Global publicity anyone?

* Electronically-assisted monitoring, navigation and maneuvering will be standardized. Today's systems will avoid the roughest weather and help the captain and crew make the best use of the abundant free fuel of sun and wind.

* Pitch and roll stabilizers are fitted for passenger and crew comfort, reduced hull and rig stresses with efficiency gains. Externally mounted dagger boards will enhance upwind performance, ease rolling and eliminate the need for deeper keels.

* A good ship needs a happy crew! We aim to provide for their wellbeing in every possible way and ensure that their safety, remuneration and work environment is as good as we can make it.

* Flexibility is a key element of the EC – 100 with the ability to rapidly adapt to changing conditions, future legislation and accelerating market opportunities including verifiable carbon-neutral shipping, green charters, pure eco-tourism, access to zero emission subsidies, non-scam carbon offsets and disaster relief.

* Rainwater is collected, filtered and free. Reduced meat and organic fresh food are on the menu with some produce grown on board and local suppliers favored. Single use plastic wrapping is avoided and where possible, all organic waste recycled or composted. In the future all ships will do this.

* Washing machines, dryers and fresh air-drying racks help reduce expensive shore-based reliance. Refrigeration, pumps and fans will all use low power draw equipment.

* Two container-sized, lightweight self-contained passenger cabins can be carried on the EC 100, each with up to four berths or 20 in aircraft-style seating.

* We aim for excellence. We do reliable solutions, beginning tomorrow, first thing.

Derek Ellard designer, founder, Go Sail Cargo

www.gosailcargo.com email derek@scruffie.com

AN EXISTING ROUTE LOOKING FOR A SHIP:
Hawaii to the Line Islands and Cook Islands

Brad Ives

01 November 2023

The trade route from Honolulu to the Line Islands of Kiribati and on to the Cook Islands is currently available for a commercial wind powered small vessel. There is a real opportunity to test a sailing ship on a viable sea route.

From 2006 until 2020, the Sailing Vessel Kwai plied this route, with over 50 voyages accomplished. Eighty percent of these trips were fully booked with cargo out of Honolulu and the ship often loaded full again with general cargo and copra between the Line Islands or out of Rarotonga bound for the Northern Cooks and Kiribati Line Islands. During COVID times, with the Line Islands closed to Hawaii shipping, Kwai moved on to ocean plastic recovery and then a charter in the Republic of Marshall Islands. This led to her purchase by Marshall Islands Shipping Corporation and she thrives in RMI on voyages from Majuro to the Outer Islands.

THE ROUTE- Christmas Island (CXI) is mostly supplied by container ships out of Fiji or local ships from Tarawa. The distance to Tarawa is 1800 miles almost straight up wind, Fiji is over 2000 miles away. Honolulu is 1150 miles almost due north and across the trade winds in both directions. Tabuaeran (Fanning Island) lies 160 miles NW of Christmas and Teraina (Washington Island) another 80 miles further on. This is another good sail, mostly on a broad reach. The return to CXI is straight upwind or on a port tack beat when the breeze hauls north of east. The route on to the Cook Islands is again a beam reach with shorter runs or beats between the islands. Our experience was 40% under sail alone, 40% motor sailing (with significant fuel savings) and 20% under power alone (upwind and calms).

DEMAND - Hawaii offers products unavailable in Fiji and New Zealand at competitive prices in both Kiribati and Cook Islands. SV Kwai sailed full out of Honolulu on 80% of her voyages, loading 300m3 below and another 200m3 on deck. Between the Line Islands, we often loaded full of general cargo from CXI shippers to Outer Islands and again full with 120 tons of copra on the return trips to CXI. We also loaded full of dried seaweed from Fanning to Honolulu, while that trade flourished.

PERMITS AND LICENSES – Each nation requires a Shipping License to land cargoes. Within the country's islands a Permit from the local Ministry is required to conduct business to lift cargo and passengers within each nation's islands. These are currently either still in place or renewable on short notice. This trade is thoroughly supported by both public and private sectors in each country. In fact, it is the response to the demands of the local people that allows the business to flourish.

COMPETITION – As of now there is no other ship operating on this route. Following the 10 years of success of our ship, Matson jumped in with container service between Honolulu and Christmas Island in 2017. While many of our customers followed them to make use of the convenience of containers, the service was not sustainable and Matson canceled the service the next year. There has been occasional talk to charter a ship out of Hawaii to CXI, but the charter rates (over $20,000 per day) make this impossible. One reason is the cost of fuel. An analysis shows that the conventional ships available in Hawaii burn over 10 times the fuel/ton as a sailing vessel. The opportunity for another wind powered vessel is wide open.

BUSINESS MODEL – During the 16 years of operation our model was a for-profit company, working without subsidy. The real world offers the best proving ground for sail powered commercial ships. With the high cost of construction and registration of a new vessel, a strong business model is required.

TRAINING SAILING CREWS – With a viable route such as we propose, the continued training of sailors and operators can continue. In the end, SV Kwai had a cadre of over 30 crew members from the island communities of Kiribati. Many have served over 10 years aboard and this team has operated and maintained SV Kwai in her service in RMI.

EXPANSION – This model is directly transferable to other Pacific Island nations. Two major required physical factors account for this – (1) a route that crosses the trade winds, and (2) direct service to outer islands that do not have container service. The success of SV Kwai was always supported by the smaller islands that lacked service. The ship afforded direct access to commercial goods from Hawaii. This assures a strong market and continued demand. Research shows that a service from Fiji north as far as the Marshall Islands, through all of the Gilbert Islands of Kiribati and including Tuvalu meet this criteria. A sailing ship could also perform well between Port Vila and the outer islands of Vanuatu and on to the eastern Solomon Islands.

CHALLENGES – Through many of the Pacific Islands, port facilities are poor or non-existent. A sailing ship working here must be able to land cargo at islands with no dock or no harbour at all. Often a small vessel of under 200 Gross Tons can meet this challenge more easily than a larger ship. In this modern world there are and will continue to be geopolitical concerns in the Pacific region. While these are important, again, it the small ships with a small footprint and real local support that can survive.

The existing route in this proposal has proven successful and remains a great opportunity for testing and proving of a commercial sailing vessel in real world conditions. Island Ventures holds all the operational, commercial and financial data for the years of operation. The records and our existing team are available to support any sail ship able to take on this route.

Island Ventures Ltd

Clean Voyages Inc

Brad Ives, Hawaii, November 2023

Contact: bradives@clean.voyage

Tack to the future? A new generation of sailing vessels is highlighting the challenge of reducing shipping emissions

Originally Published by "INSIDER" 8 Feb 2023
Written By Christiaan De Beukelaer
Author of "Trade Winds: A Voyage to a Sustainable future for Shipping"

On 23 July 2020, in the midst of the first year of the pandemic, I sailed into the Hanseatic port of Hamburg aboard the Avontuur, a forty-four-meter two-masted schooner built in 1920. We had traveled across the Atlantic Ocean and back to pick up sixty-five tonnes of coffee, cacao, rum and gin.

The vessel's fifteen-strong crew had completed the trans-Atlantic round trip in six months, of which I had spent five months aboard. Throughout its virus-disrupted odyssey via the Canaries, the Caribbean, Mexico and the Azores, the Avontuur had made her way almost entirely under sail.

A week after we arrived in Hamburg the International Maritime Organization released its fourth report on the climate impact of ships. This long, highly technical document looks at how emissions from international shipping are likely to evolve over the next few decades. Despite actions already taken to reduce greenhouse emissions, the report concludes, rather frighteningly, that emissions in 2050 will be between 90 and 130 per cent of what they were in 2008. That's a 10 per cent drop at best, a 30 per cent increase at worst.

The IMO, the United Nations agency that regulates shipping, was a late starter in the carbon-reduction stakes. Only in 2018 did it set its first-ever target to reduce the billion tonnes of emissions produced annually by shipping. That's two decades after the Kyoto Protocol mandated the IMO to regulate the industry. Much like large ships, the industry takes a long time — far too long — to maneuver.

Well before the IMO accepted that ships, too, would have to ditch fossil fuels and find other means of propulsion, several people thought they'd already found the solution: sails. Surely, they thought, if colonialism, the slave trade and empires could be built with sailing ships, the technology could serve global trade today.

Captain Paul Wahlen, a previous owner of the Avontuur, kept wind-propelled cargo transport alive during the last decades of the twentieth century, well after nearly everyone — including Melbourne-born sailor Alan Villiers — had given up on it. In the late 1990s, businesswoman Di Gilpin developed a modern ship that would incorporate the century of technological progress since the heyday of sail. In 2004, sailor Brad Ives took on the challenge of providing a reliable (although not necessarily punctual) shipping route between Hawai'i, Kiribati and the Marshall Islands.

The quest continued. In 2007, the Dutch shipping company Fairtransport's Tres Hombres, a 1943 brigantine, began carting up to fifty tonnes of cargo across the Atlantic and the North Sea in its hold. Since 2015, the Avontuur has operated as a sailing cargo ship again — this time under the ownership of Cornelius Bockermann, who runs the German shipping company Timbercoast.

Can sailing vessels like the Avontuur, the Tres Hombres and the Kwai really decarbonise the shipping industry? The short answer is no.

These wind-propelled cargo vessels are so small that the potential emissions savings for the planet are negligible. If the entire shipping industry is to make up the difference between its projected emissions (90–130 per cent of 2008 levels) and its current target (50 per cent of 2008 levels) by 2050, far more than a handful of small sailing cargo ships will be needed. Never mind that a 50 per cent reduction won't keep global warming below 1.5 degrees Celsius, which the IPCC thinks vital for human life on earth.

But does that mean the work of the "sail cargo movement" is futile? I think not.

Sailing vessels like the Avontuur may not be capable of carrying eleven billion tonnes of cargo a year emission-free. But they do have an important role: they highlight the need to rethink how we ship things and how much of those things we need to consume.

Timbercoast, the German shipping company that runs the Avontuur, aims to accomplish "mission zero" — to entirely eliminate the pollution it causes — in five steps: raise awareness about the environmental destruction caused by the shipping industry; model a clean shipping future with Avontuur; sell premium Avontuur products to support the project; establish a demand for products shipped by sail; and build a modern sail cargo fleet.

Their message echoes what Patagonia, an outdoor clothing retailer, has long advocated: buy less, because excessive consumption harms the environment. This isn't entirely selfless, of course: Patagonia and "sail cargo" companies like Timbercoast want to increase their own sales by providing an ethical alternative that appeals to consumers who buy into their anti-consumerist pleas.

On the Pacific coast of Costa Rica, meanwhile, Sail Cargo Inc. is building the Ceiba, a new wooden ship. This vessel is designed specifically to operate as a wind-propelled cargo ship. The company "envisions a future where the demands of a global supply chain are dictated by conscious and responsible consumerism, employing a web of carbon-neutral delivery services."

The French company Grain de Sail operates one ship by that name between Brittany, New York and the Dominican Republic. They carry French wine to New York, humanitarian goods to the Caribbean, and cacao mass back to France. A second ship with a far greater cargo capacity is now under construction.

To date, the most ambitious wind-propelled cargo project based on a traditional design is EcoClipper. The company is raising funds to build the first EcoClipper 500, a steel replica of the Dutch clipper ship Noach, originally built in 1857. The true ambition of EcoClipper lies in the scale at which the company aims to operate. It plans a fleet of clippers on Atlantic, Pacific and global routes, following the trade winds of yesteryear.

These "sail cargo" initiatives do more than proposing an alternative propulsion technology. They engage in hands-on climate activism. By expressing their ethics in a practical manner, these companies aim to show that downsizing and slowing down is not only an abstract ideal advocated for by "degrowth" environmentalists but also a practical possibility.

I joined the Avontuur in 2020 to find out what exactly that world could look like. My plan was to spend three weeks aboard, crossing the Atlantic Ocean from Tenerife to Guadeloupe. Afterwards, I would visit the Astillero Verde, the "green shipyard" where the Ceiba is under construction, in Costa Rica. But that was in 2020, so none of my travels worked out as planned.

These small-scale traditionally rigged sailing ships are not the only ones turning to wind propulsion. More ambitious still, but of a very different ilk, are the modern sailing ships currently under construction or design. The Canopée will transport parts for the Ariane 6 launcher from France to French Guyana. The Oceanbird will transport cars for Wallenius. Neoline will operate between France and North America, while Veer and Windcoop vie to operate the first wind-propelled containerships.

Di Gilpin is now working on Smart Green Shipping, a new venture that combines hardware (sails that shipowners install on existing vessels) and software (to help crews find the best routes to harness wind). The Kwai, meanwhile, is now owned and operated by the Marshallese government, which is committed to reducing domestic shipping emissions by 40 per cent between 2010 and 2030.

Even so, emissions keep increasing year after year. The Avontuur's mission remains as important as ever: the shipping industry urgently needs to stop using fossil fuels. In July 2023, three years after I arrived in Hamburg, the IMO is expected to decide on a "revised strategy." We can only hope this will bring their plans in line with a 1.5-degree future; if we can't swiftly decarbonise shipping, we can't solve the climate crisis.

Now I'm about to travel to the Marshall Islands for more fieldwork. This Pacific nation has the third-largest shipping sector in the world, but also pushes for the highest levels of ambition at the IMO. It's at risk of losing many of its islands to rising seas, but it can't afford more expensive shipping. That's why the islanders are pushing for an energy transition that isn't only environmentally ambitious, but is also equitable. So far, that's proving easier said than done.

Later this year, I'm joining the Tecla to sail the Northwest Passage from Dutch Harbor in Alaska to Ilulissat in Greenland. We will be exploring a faultline in climate action: melting Arctic ice means the region is fast becoming a shipping shortcut between Asia and the Atlantic, saving on fuel, cargo vessels' black carbon emissions speed up the ice melt and their underwater noise disturbs marine life. The region is already warming at a faster pace than almost anywhere on the planet.

Meanwhile, the Avontuur keeps sailing laps around the Atlantic. While it can't compete on scale or speed, maybe it and the other "sail cargo" companies have a point. Slowing down and trading less might just be what the planet needs.



HOW DID I GET HERE & WHAT AM I DOING?!
A very short autobiography of an accidental windjammer.

Steven Woods
Assistant Editor, IWSA Small Windships Publication

I had an ill-spent youth working in museums (I'm kidding, I had a blast), which included surviving a History BA from the Jesuits at LeMoyne College in Syracuse, NY. I mostly worked in 18th and 19th century historic military sites in the northeastern US and many of them involved defending important maritime routes (Forts Ontario and Ticonderoga), settlements based on water resources for travel and agricultural benefits (Fort at Number 4), or General's houses situated at the intersections of important waterways (Schuyler Mansion). In most cases, the water for transport was a critical element, and some even interrelated: Schuyler of mansion fame commanded the building of a fleet on Lake Champlain which was based out of Ticonderoga in a spectacularly failed attempt to control Lake Champlain in the American Revolution. Schuyler had also been in charge of a unit one war previous (the Seven Years' War) which supplied Fort Ontario by water so it could contest French control of the North American Great Lakes. Schulyer was also the first person to put a schooner into service on the Hudson River, the Saratoga built in 1768, while most everyone else was using Sloops. The primacy of sailing vessels in making these places important was hard to miss.

While listening to a radio news broadcast about the problems of renewable energy one day, I realized they were Bullshit: We solved almost all of those problems a thousand years ago or more! Thousands of windmills had been made of 90% renewable materials for over 1000 years; you just had to swap out the millstone or saw blade for a generator to suit modern uses. I had part of one in my hand right then! It reminded me a lot of Issac Asimov's Foundations Trilogy, and I started looking into applying ancient technology to modern problems in my spare time. The Pre-Carbon Past clearly holds the answers for a Post-Carbon Future.

After 12 years of museum work, I got sick of being poor and searching for a new job every 6 months in the Museum field. I'd been playing fake soldier long enough, I thought I'd do the real thing while my knees still worked, and joined the Air Force. I should have joined the Navy, as a third generation sailor, but the Navy would only take me for Nuclear Propulsion. That wasn't going to work: I'm terrible at Math. I was "in" for 6 years, fixing telephones and computer networks in a malarial swamp. I used the GI Bill to go to graduate school when I got "out," and this is where my Sail Freight Story really begins.

While I was still in "Uncle Sam's Arrogant Flyboys" (USAF/ US Air Force) the Vermont Sail Freight Project started sailing Champlain Valley produce to New York City right past two of the places I used to work (Ticonderoga and Schuyler Mansion) aboard the scow Ketch Ceres. They were putting ancient technology to work solving modern problems in real time, and succeeding. About 7 years later, I had to pick a topic for a thesis to finish my Master's degree in Resilient and Sustainable Communities. I wrote to Erik Andrus, the leader of the Vermont Sail Freight Project, and he came out of Sail Freight retirement to advise on my thesis.

The focus of my thesis was supplying New York City with food using only sailing vessels, and applied foodshed analysis and historic military models for feeding twenty million people. The idea was to calculate not only how many tons of shipping would be required, but labor requirements, fleet construction times, costs, and the carbon emissions saved from the shift of transport. In the process of research, I ended up talking with Captain Sam Merrett of Schooner Apollonia, and Andrew Willner, the founding Director of the Center for Post Carbon Logistics, along with Gavin Allwright of the IWSA. That landed me solidly in the field of Sail Freight from there out. When I started writing, I expected my thesis to collect dust on a shelf somewhere like most others. It hasn't.

Since I finished my thesis, I've sailed on Schooner Apollonia a few times, worked the docks when necessary, published multiple peer-reviewed papers on sail freight, presented at conferences in the US and Europe, created and lead a conference, lead the creation of a museum exhibit, edited the Sail Freight Handbook, ran the 2022 Northeast Grain Race, and I'm working on getting an Open Source Sail Freight Vessel Design group working on making a set of plans for the next generation of sail freighters. I've also become the Operations Assistant at the Center for Post Carbon Logistics, as well as Assistant Editor on this publication. It has been quite busy, but I get to go sailing as part of the job.

We have to imagine some other world is possible if we are going to make a change. Lack of imagination is just as dangerous to a sustainable future as fossil fuels and a religious devotion to Economics (Trust the theologians on this: It's a cult not a science). So, keep imagining a better future, grab a pen or halyard, and we can make the future you're thinking of come true. If we put our hearts, hands, and heads into this, we can make a big difference for the better, and enjoy the wind in our faces while we do. Sail freight may not be the only answer to all our problems, but it is part of the bigger picture of what a Sustainable and Just future looks like.

VELA



VELA, is a designer and operator of new-generation sailing cargo vessels. VELA offers international freight 100% powered by the wind for a highly decarbonized, fast and reliable service. Specialized in high added-value products, VELA positions itself as a sustainable alternative to conventional air or sea freight solutions to enable shippers to reduce their environmental footprint. By focusing first on the Europe-USA route, VELA is able to connect both continents in less than 15 days, and will later open new seaways to scale its mission: lower massively the impact of global transportation.

Logistics for a Retrofuture

By Jorne Langelaan,
Maritime consultant and founder of EcoClipper
11 March 2024

In times of stark change and transition different ways to organize societies take form. These new ways of organizing can be new and as never seen before. Or when old ways which worked, are remembered, they can come in the way of the revival of technologies from the past. This is what we see happening now, in the use of wind technology in the field of maritime logistics. Obviously, one of the advantages is not having to reinvent the wheel again. EcoClipper has been on the forefront of this retrofuture movement.

A few years ago, just after the climate accords in Paris were signed, while Greta Thunberg and her fellow activists were loudly advocating for "flight shame" and the Western world was still living in the fantasy of eternal world peace, I signed the deed of incorporation to establish EcoClipper. In those days, my girlfriend, and I, had just returned to the Netherlands from a few years of homesteading in Ireland. We chose the Netherlands over Ireland, because of our existing network in the maritime and business world in the lowlands of Holland. And we were very optimistic about setting up a new sustainable shipping company. It felt obvious that sailing ships would make a swift comeback, and it could be felt already by the rising number of retrofitted sailing cargo vessels starting to ply the European and Atlantic waters.

Now those days feel like a hundred years ago. There is a stark divide between corporations, where some are shouting more and more unbelievable promises about net-zero emissions, and others are preparing lawsuits against shareholders who are lobbying for a strategy of environmental protection. Flying is as popular as if there is no tomorrow, and activists have moved their tactics to blocking roads. All thoughts about peace seem to be shattered by a general rejection of talks between opponents, and in a relentless flood of investments to the military industrial complex. Dreams of sustainable development, clean abundant energy and high-tech solutions are kept only by a shrinking group of the salary and investor class, clinging to their faith in relentless progress on a finite planet.

In the meantime it became obvious that we do live in a time where a perfect storm of very large transitions is taking shape. I am not talking about the transitions, media and science have been advocating the past decades, but about the following large shifts:

- First: we are witnessing a change in population demographics which started 50 years ago with a declining population in Japan, but is now accelerating in most other countries and entire regions, with Africa as the only continent still growing in population.
- Second: the obvious diminishing in return on investments, on innovations over the entire industrial field becomes very noticeable.
- And last but not least: the volatility and ragged trend in the rise of energy prices.

In short: we arrived at the peak of civilization where complexity starts to give way again, a point where it becomes viable to look at the past to be economical. To be realistic we ought to think in retrofuture terms.

To quote from "The Retrofuture" by John Michael Greer, the widely read author of more than 70 books on ecology, economy and societal transition: "...the only thing that made tall ships obsolete as a transport technology was cheap abundant petroleum… Nonetheless, as the price of bunker oil keeps rising, it's eventually going to cross the line at which sail becomes the more profitable option, and when that happens, those firms that invest in tall ships will profit at the expense of their old-fashioned, oil-burning rivals." (Find, John Michael Greer's, article published as "Captain Erikson's Equation" here).

Timing the tide of change.

The reason for starting EcoClipper was: to offer sustainable transport by continuing the successes of existing retrofit sailing cargo ventures, with the difference of designing a sailing cargo vessel which could be newly built in steel. Steel, for speed of building, and with the possibility to be built in larger series, to be able to really offer widespread clean logistics between the continents.

To save development costs and time, I went to the library of the Maritime Museum in Rotterdam and asked the curator, Ron Brand, if there were any designs of highly successful Dutch sailing cargo vessels. Ron was of great help and presented the beautiful drawings, plan of lines and half model of the clippership Noah. A vessel known for her quick, and emission free voyages between Indonesia and the Netherlands. It still took a lot of work by an international team of naval engineers to draw up the design and make the 300 pages of specifications.

I would have wished we could have continued right away with the newly designed vessel, but we were forced, due to the amount of financing we could gather, to go with a smaller retrofitted vessel first. This was the 1913 built steel coastal trading ketch De Tukker. After a year of retrofitting, EcoClipper started operating the vessel in the wine and olive oil trade, between Portugal, France, England and the Netherlands. Ship, master and crew showed that it was possible to operate a century-old vessel amongst conventional trade. Unfortunately we did not have the financing in place to invest in reaching enough market traction. The vessel had to be sold to one of her investors, fortunately she will continue operations, however now under Fairtransport as cargo brokers.

Serving the post-carbon pioneers.

The pilot project of: financing, retrofitting and operating, the small sailing cargo vessel De Tukker, offered a huge learning experience for EcoClipper. Apart from the realization of the importance of investing in a solid communication team, the need for right timing of finance, investments and chartering, it also brought a deeper understanding of the market for green shipping.

After five years of pioneering, we reached a new stage, and it made sense to hand over my role as CEO to a new leader: Jeremy Fouriaux. To be honest, due to a burnout, I could not have continued anyway. With Jeremy came a new elan and a totally different approach than before. Instead of talking about ships, we started talking about connecting producers, merchants and customers. A new vision was born, where the charterer was invited on stage and EcoClipper was becoming less about green ships, more about offering the service of green shipping.

With this shift, an immediate change was visible, all of a sudden charterers felt more heard and many conversations were started. This led in the autumn of 2023 to talks to several operators and charterers in the sailing cargo ecosystem. All of a sudden Jeremy was talking to Captain Cornelius Bockerman of Timbercoast, Lynx Guimond of Sailcargo and Andrew Simons of Sailink. Also talks with charterers started to be fruitful, and especially with Antoine Dragon of the France based brokers: Oree, meant a serious long term partnership. All of a sudden we needed a vessel again, but no time for the entire new build process, or even a retrofit…

Fortunately sometimes the stars do align in favor, and Lynx of Sailcargo offered a partnership to EcoClipper for operating their newly acquired vessel the Vega. This three masted sailing cargo vessel, although slightly older than De Tukker and still small in size, has twice the cargo carrying capacity of that vessel. Thus we can look into a new cooperation, starting this summer, between Oree as charterers, Sailcargo as shipowners and EcoClipper as operators on a weekly cross channel liner service between France and the United Kingdom.

Cooperation in the blue economy.

Just after we finished the first designs of our new prototype, it became clear that we needed a more social, democratic and transparent business set up. For this reason our first hour investor and advisor: Dirk Klaassen, opted for launching a cooperative business model. In the autumn of 2021, Dirk and I signed the official deeds, in great spirits in the old "Scheepvaarthuis", currently the Art Nouveau style Grand Amrath hotel, but formerly a cooperative building of several large shipping companies, in Amsterdam.

Under Jeremy's command EcoClipper is aiming to further establish the cross channel liner service by adding at least one more small vessel every year. As I write this, a new partnership in inter-island trade, with Raffaele Frontera of Aurelia Green Shipping, is forming. Also the EcoClipper500, as the prototype is called, is still in the picture, although with the new customer focussed strategy, only after true demand by charterers, further steps will be made.

As we speak, the EcoClipper cooperative has over 200 members and if you are interested to become a member, you can do so by investing in this appealing pioneering sustainable business opportunity.

The slow voyage from theory to practice in a wind power revolution for Pacific shipping.



Peter Nuttall is the Scientific and Technical Advisor to the Micronesian Centre for Sustainable Transport, a Marshal Island's government-owned and -driven research center dedicated to empowering Pacific states to decarbonized transport solutions and has published and presented widely on all aspects of this agenda. He has 40 years of development experience across the Pacific and lives with his Captain and sons on a small wooden sailing ship with a minimal carbon footprint. With his sons he built and operated the replica Fijian Drua iVola Sigavou, the first Fijian drua built this century, as a training ship to revitalize Fijian sailing heritage.

Thank you, Gavin, for the opportunity to record some thoughts. The Micronesian Centre for Sustainable Transport is immensely proud to be the Pacific hub for IWSA, as we formalized last year. The two organizations have grown up together. Although our focus at MCST is broad across land, air and sea transport and we try and cover both the needs of domestic transport decarbonization at small island scale as well as our countries responsibilities as international advocates, particularly at IMO, our roots are squarely in wind energy and maritime transport.

In 2020 the governments of the Marshall Islands and Fiji committed to a 100% decarbonization of their domestic shipping, with 40% by 2030 in their NDCs under the Paris Agreement. Our research over the last decade and more would strongly suggest the first stage of this high ambition target is easily achievable with known and mature technologies available today, much of it by changing to a better and more efficient operating environment and then adding wind and other renewables-based solutions, both as retrofit and newbuilds.

Actually, we had already reached this conclusion a decade ago. At issue for a Pacific scale transition is not the technology, it's the financing. Shipping in the Pacific is at best a highly marginal business case, in many cases it is only available through heavy state subsidization and even then, is of minimal service with old, poorly maintained ships, crew and support infrastructure. The reality is that a transition requires a shift from a very low CapEx, low OpEx model to a high CapEx, low/medium OpEx one. This requires investment capital and insurance underwriting at speed and scale that simply does not exist in the private sector of the Pacific in the great majority of cases. Simply put, the impoverished Pacific Island micro-states are already amongst the most debt laden economies on the world. They simply can't afford to take on more loans. Wind provides a critical ingredient in developing the least cost solution to many of our shipping problems.

Based as we are in the Marshall Islands, the home of the flying proa, and situated in the middle of the Pacific Ocean, where the ancestors had navigated and colonized the greatest ocean in the world under sail and without metal at a time when snakes still roamed Ireland, the trade winds are our logical ally. Sails are to Oceania as wheels are to continents. Oceanians developed the world's first blue water sailing technology. With highly advanced understanding of sail and hull form and function Oceanians created sophisticated ocean-going vessels and did so thousands of years before humans anywhere else. Centuries before continental peoples tentatively and fearfully set out to cross their first ocean, Oceanians had explored, colonized and inhabited all of theirs.

The accounts of early European explorers to our ocean record an "ocean of sail". The seas were a well-traveled highway and the Pacific had evolved custom designed vessels of speed and scale to fit all shipping scenarios, from village transport to Ocean exploration. Fast forward a few short centuries and many parts of the Pacific are today trapped in a down spiral of total dependency on imported technologies and fuels at greater cost than anywhere on earth. We have the thinnest, longest and least economical shipping routes in the world – all powered by imported fuels.

The theory of a wind powered revolution and its related business case is easily established. The trajectory of change has already been well mapped in a number of research papers. What is needed is sustainable investment in the core foundational measures (training, improved maintenance and support industry infrastructure, locally situated R&D and institutional strengthening of key government agencies) alongside a coordinated program of 'proof of concept' trials of leading designs spread over a collective of participating countries.

Much of the heavy lifting in developing the theory of change needed was done in the oil crisis of the 1980s where a range of pilot projects delivered sail-based retrofits and newbuild designs at Pacific ship scale (from village transport to government service ferries). These early examples showed that savings of over 30% were relatively easily achieved at realistic ROI investment rates. As our understanding of the technology has improved dramatically since then, the options now available to us to put into practice have also dramatically increased.

Sadly, the shift from theory to practice is proving agonizingly slow. In a region which has seen over $2 billion invested in all kinds of development projects to introduce renewable electricity generation to our region, the last decade has seen less than $20m invested into commencing a parallel transition for shipping. We still have only one working model of a WASP cargo vessel, the 60-year-old 173 GT SV Kwai, now serving as a training ship in the Marshall Islands. Our first newbuild, a German government funded 48m newbuild WASP government vessel targeting 80% fuel efficiency has only just slid down the slipway in Korea in late 2023 (See Michael Vahs article for more information on this project). That ship is the product of an aid project that we first designed in 2013, got agreement to proceed with in 2017 and has taken 6 years of development agency programming to finally deliver to full design and build stage. We have a handful of local village-scale WASP craft being built in small numbers in RMI and Fiji. While each of these projects is a positive step forward, it is equally clear a string of little projects will not add up to the paradigm shift required. The deepening climate emergency demands scaling now and only a coordinated program of work can achieve this.

The simple reality is that there is an Ocean of available technology sitting on our doorstep – almost all our small tankers and bulkers servicing our limited international trade could be fitted with Flettner rotors now, we should be planning another 10 vessels to come off the slipway in the small yard in Korea in the next two to three years and then a 100 more after that. A $500m investment of no-regrets climate finance injected into our region now could easily see the Marshall Islands, Fiji and half a dozen or more Pacific states well on the pathway to achieving their NDCs. Regrettably this simple reality still faces a mountain of development industry bureaucracy and political maneuvering to be achievable. Steady work in the policy space locally is seeing forward progress albeit still too slowly. The silver lining, if there is one, is that the disciplined diplomatic pressure the Pacific has bought to bear at the IMO looks increasingly likely to result in greatly increased revenues for this sector.

If any region deserves to be a leading beneficiary of a sail powered shipping revolution it is the Pacific. We are doing all we can to bring this to reality and invite all willing partners to lend a hand.



The Center for
Post Carbon Logistics

We are a New York, US based non-profit organization that envisions and advocates for a world of resilient, re-localized communities connected to one another through regenerative waterborne transport and logistics systems.

https://postcarbonlogistics.org/
info@postcarbonlogistics.org

THE CENTER FOR POST CARBON LOGISTICS

Andrew Willner
30 March 2024

The Center for Post Carbon Logistics (the Center) is a New York based non-profit organization working to connect communities through resilient and sustainable maritime trade. The Mission of The Center for Post Carbon Logistics is to research and assist in the implementation of appropriate post carbon maritime technology needed to keep commerce and transportation viable by responding to the interrelated connectivity, communication, equity, economic, ecological, and energy crises of the 21st Century.

By supporting the development of climate resilient small ports, sail and solar electric cargo and passenger vessels, and human-scale last-mile logistics solutions throughout the Hudson Valley and Northeast US, the Center advocates for a post-carbon future based on the technology of the pre-carbon past.

The main projects currently underway at the Center include the following:

1. Supporting Schooner Apollonia's sail freight operations along the Hudson River.

2. Developing sail and support trades professional training programs for sailors, sailmakers, riggers, dock workers, shipwrights, and cargo brokers.

3. Developing the next generation of Open-Source coastal and canal freighters for service at home and worldwide. Simple to build, simple to sail, and simply but adequately outfitted, these are designed to work hard, over long service lives. Locally built, from locally sourced and recycled materials, crewed with locally trained mariners, carrying locally grown, locally processed, and locally manufactured goods – with liberty from fossil fuels, these future proof ships will be a positive disruption to the status quo.

4. Advocating for policy and infrastructure needed to support and expand zero-carbon maritime and last-mile logistics systems in the Northeast and around the country.

5. Compile and publish free guides to make sail freight and zero carbon logistics know-how and theory accessible to everyone and pass on lessons learned as broadly and quickly as possible.

Based in Kingston, NY, once the busiest ports North of New York Harbor, the Center is engaged in a long-running campaign to bring the idea of coastal trade under sail back to the United States. The Center is currently focusing on turning the New York/New Jersey Harbor and Hudson Valley into a world-class sail freight hub for training, ship building, sailmaking, trade in small wind ships, and resilient working waterfronts. Implementation is underway; cohosting the Conference On Small Scale Inland And Coastal Sail Freight at the Hudson River Maritime Museum with Schooner Apollonia in November 2022, supporting the Northeast Grain Race of 2022, and other similar initiatives.

The Center's publications include the Sail Freight Handbook, now in its second edition, and the Rondout Riverport 2040, a detailed imagination of a working waterfront future for Kingston. Other publications, including an Apprentice Sailor's Handbook, are under development to support additional training efforts. The Center's training programs are being developed for sailmaking, working sail, cargo handling, boatbuilding, traditional rigging, designing climate adapted small ports, and other specialties. These courses are planned to be offered routinely by 2025, in cooperation with other organizations in the region.

The Center is raising funds to construct a prototype liberty ship for the 21st century, designed for canal, river, and coastal shipping in New York and regional waterways. Keep an eye on the region as this project develops. Anyone interested in assisting the work of the Center by volunteering on any of our projects or through financial support should contact Executive Director Andrew Willner at andrew@postcarbonlogistics.org. More information about the Center can be found by visiting our website at www.postcarbonlogistics.org.

Project Overview: Green Shipping Solutions with Bagwell Shipping

Brad Bagwell
2 April 2024



Mission and Objectives: Our mission is to offer sustainable and green shipping solutions, reducing pollution and providing an alternative for companies committed to sustainability. We aim to replace diesel-powered trucking with efficient sail cargo transport, capable of delivering multiple truckloads of cargo in an environmentally friendly manner.

Vessel Specifications: To kickstart operations, we plan to acquire and retrofit an older existing ship with a cargo hold capacity of 40-60 tonnes. Additionally, depending on investment levels, we aim to build a modern vessel capable of carrying 150 to 600 tonnes of containerized or palletized cargo, ensuring efficiency and scalability.

Target Markets: Our primary target markets include the East Coast of the US, serving as a Marine Highway from Boston or New York to Miami. The strategic location allows us to alleviate highway traffic while offering efficient cargo transportation. Initial cargo focus will be on commodities with longer shelf life and building materials.

Logistics and Operations: The planned vessel will be equipped with an onboard crane for offloading smaller palletized cargo. Alternative options such as hiring cranes or crane trucks will be considered based on port requirements. The shallow draught of the vessel enables access to smaller ports, contributing to local economies along the coast. These are designed somewhat similar to the liberty ships of WW2 in the sense that they can be built quickly and in almost any shipyard, which would result in a comparatively lower build cost.

Partnerships and Collaborations: While there are no current collaborations, we have potential cargo partnerships from the Caribbean and Mexico for northbound shipments. Efforts are underway to secure southbound cargo partnerships. We remain open to strategic partnerships to enhance our operations and market reach.

Timeline and Milestones: With a target to start shipping by the end of 2024, we aim to acquire a vessel by August and commence operations by November or December. This timeline aligns with our investment and operational readiness goals.

Environmental Impact: Key environmental benefits include using wind as the primary propulsion source and retrofitting electric motors and batteries to minimize diesel usage. Coastal sailing with tradewinds and electric motors for port maneuvers significantly reduces greenhouse gas emissions compared to traditional shipping methods.

Revenue Streams: Revenue streams encompass passenger fares and cargo movement. Additionally, potential partnerships for appearances at shows or events offer opportunities for advertising and marketing collaborations, leveraging the nostalgia and romance associated with sailing ships.

In conclusion, our sail cargo startup represents a green shipping revolution, offering efficient, sustainable, and environmentally friendly transport solutions. With strategic planning, partnerships, and a focus on innovation, we aim to reshape the maritime industry and contribute to a cleaner, greener future.

Brad Bagwell

Bagwell Shipping

IMAGE: Sailing ship, New York [1915-1920] George Grantham Bain Collection (Library of Congress). Public Domain.

Book Reviews

REVIEW OF: Shane Granger. Cargo Of Hope: Voyages of the Humanitarian Ship VEGA. Essex, CT: Lyons Press, 2024. 257 pages. $24.95.

Steven Woods
21 February 2024

With descriptions that put this work in the same class as Maury's Saga Of Cimba, Slocum's Sailing Alone Around The World, and similar classic tales of seafaring, not to mention Douglas Adams' Hitchhiker's Guide to The Galaxy, the book is both enjoyable and informative. The story of Vega is interesting in its own right, and the adventures since 2004 prove a worthy successor to the previous lifetime of the now 132 year old vessel. Interweaving the past and present, the story combines what could easily be classified as Creative Non-Fiction about the past with oral history, memoir, and adventure writing all into one book. There's even a few sea stories in there!

Interspersed in the narrative are insights into the world of international aid, government priorities, and what one small crew on one small boat can really undertake. There's a lot of impact a small group of people on a small vessel can have, it turns out, provided you pick your mission and supports carefully. The success of this community building and direct aid approach is remarkable, especially the direct impact in very remote places.

That no other vessel could undertake this type of work is clear: There isn't enough demand to fill a larger vessel, and anyone paying for fuel would not be able to afford such voyages. The impact of even small vessels in work which couldn't sustain itself through other means is important, and a lesson taught well by both Vega and the SV Kwai, which sailed waters southeast of Vega providing a similar link to the rest of the world. Active since 2004, the Vega is now entering the third decade of these essential services, providing medicine, books, and other essential supplies to islands left behind by everyone else.

While not a treatise on decarbonizing the entire maritime industry, this book is refreshing as a result: As described by Capt. Granger: We might not have the power to change the world, but we can do good with what we have, where we are. This is a story of a ship, a mission, and a little corner of the world where even small scale changes make a big difference to those who live there. If the Small Vessel Sector strives for and succeeds in nothing more ambitious than Vega in dozens more places, it will still have earned a place in history for doing the right thing for the right reasons.

REVIEW OF: Christiaan De Beukelaer. Trade Winds: A Voyage to a Sustainable Future for Shipping. Manchester: Manchester University Press, 2023. 376 pages. $29.95.

Steven Woods
2 February 2024

Christiaan De Beukelaer spent about seven times more days on Avontuur than he planned in 2020, because, as you might remember, there was a bit of a plague going around. Those five months were packed with interesting adventures and human strife against the sea, the winds, and each other, and a wee bit of lifesaving as well. In the highest traditions of the sea, the crew of Sch. Avontuur endured what was thrown at them by a world closed off and the elements stoically, and proved, in at least some little way, that small ships can be some of the places where humanity rises to the occasion most frequently and best. Of course, it's not like you have much of a choice; it's that or sink in a lot of cases.

The book is not only an evaluation of sail freight, but of IMO and world maritime decarbonization policy in general, skillfully woven into the narrative of five months at sea. By working in the contrasts between what has been proposed and ruled on at the IMO and elsewhere, and what the Sail Freight movement has achieved thus far, the shortcomings and successes of both are thrown into greater relief. If nothing else, this book brings home that we all have a lot of work to do.

What conclusion does De Beukelaer reach? Well, perhaps the obvious should come first: Small vessels taking on transoceanic trade cannot decarbonize shipping in anything like a reasonable timeframe. We would need tens of millions of sailors and tens of millions of ships the size of Avontuur to accomplish such a feat, and clearly we do not have the time, materials, or personnel to do so. However, these projects serve a greater purpose than a mere technical provision of services: De Beukelaer concludes these movements in small vessels are a catalyst for change and a demonstration that there are, in fact, other ways of doing things which are healthier, less damaging, and still viable in a post-carbon future. I am inclined to agree.

I recommend the book as a good read, not simply for the analysis of the global Sail Freight movement and well written critique of international maritime policy, but for the adventure and human study the book makes of 15 people stuck for 5 months on a small schooner at sea. The sea stories are worth the price of admission, and this is one book which will still be migrating between my shelf and desk many years from now.

Anecdotes & Explorations

"Sail Freight" or "Sail Cargo?" What's the difference, and who cares

Steven Woods

Even the Sail Freight Handbook admits that "Sail Freight [is] (interchangeable with the current European term "Sail Cargo")," (Pp 10) and both reflect the same definition:

Sail Freight is the ecologically motivated maritime movement of cargo by primarily wind power with little, if any, engine use.

So why the difference in US usage? Is this like avoiding the Metric System, using 110V/60Hz electricity, and retaining the Moorsom Tonnage System, where a simple insistence on being different makes the whole world less convenient for everyone? Well, maybe… but at least there's a reason for it which doesn't involve any outdated measurement systems or bucking international standards simply to be a problem.

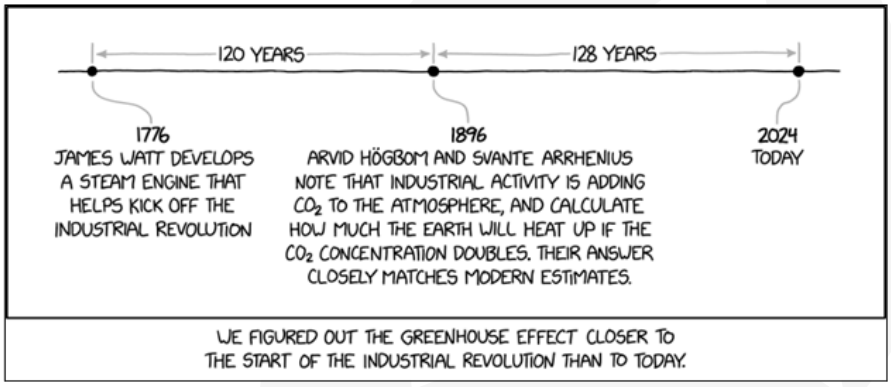
The really short answer is that the first major 21st century Sail Freight effort in the US called itself the Vermont Sail Freight Project in 2013-2014. The term had been used around 1980 to describe a project in Maine as well, but the literature on this had been forgotten at the time, meaning the term was likely re-invented as opposed to revived. That resulted in the Maine Sail Freight Project picking up the term in 2015, and the Schooner Apollonia using the term by 2020. Woods' Masters Thesis Sail Freight Revival kept the term going, and it has become solidly established here ever since.

On the other side of the Atlantic, "Sail Cargo" seems to have gotten started as a term by the same method: Being used by the first project to break out and get some press, FairTransport. While this project started in 2007, at least 5 years before planning really got underway for the VSFP, giving "Sail Cargo" a few years of seniority, it simply didn't stick over here. Curiously, though, the term does appear at least once in the US publication "Wooden Boat Magazine" in 1979, in an article discussing the return of working sail, making the intermittent use of the term more than 45 years old.

There might also be a slight distinction arising due to the types of projects which have been tried in the US as well: VSFP, MSFP, and Apollonia have all been coastal projects competing with trucks, which are normally referred to as freight vehicles here. Perhaps in a few decades as the industry solidifies and grows, the distinction between Sail Cargo and Sail Freight will be one principally focused on whether a ship sails coastally or across an ocean, with Sail Freight taking up that more coastal definition.

No matter where you are, you can use either term as it fits your fancy: They mean the same thing. If you want to make a point of your origin (or blend in while abroad), you can take advantage of whichever makes your point.

Slang and jargon are important social identifiers among various trades and groups, so the fact there is differentiated language around working sail (another, far broader definition) developing should be of interest to those studying cultural developments in the small vessel sector. Just as the language of sailing is foreign to most people ashore, this adds another working layer to that linguistic identity which sets us apart from the maritime world as a whole. That's something to be aware of and use to your advantage as you navigate the 'new' world of working sail.



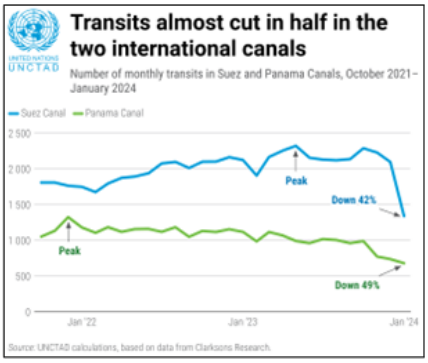
Randall Munroe. The Greenhouse Effect XKCD: 2024. CC-BY-NC 2.5 https://xkcd.com/2889/

Canals Crisis Is An Opportunity For Wind Propulsion & Small Vessels

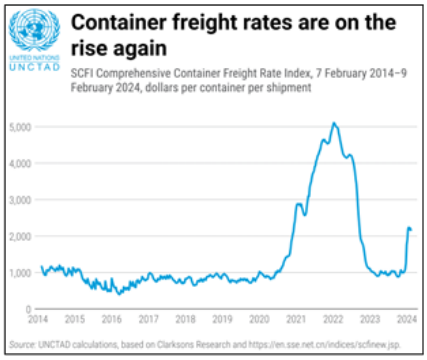
Steven Woods
12 April 2024

With climate change draining the reservoirs of the Panama Canal and the Red Sea Crisis threatening traffic through the Suez Canal, the two major shortcuts which made the massive motor vessel the prime means of long-distance marine transport are under existential threats. With the Ever Given incident only three years behind us, multiple bad bridge collisions in the last year, and maritime decarbonization a high priority at the IMO and on the world stage, there is an opportunity to promote wind propulsion in general, and small vessels in particular as a solution to both the single-road problems caused by overdependence on the Canals, safety issues caused by the giganticist impulse in conventional shipping, and increased emissions from rerouting conventional vessels.

UNCTAD's report Navigating Troubled Waters: Impact to Global Trade of Disruption of Shipping Routes in the Red Sea, Black Sea, and Panama Canal from February of 2024 makes the stakes and consequences of these disruptions clear, as the following figures from the publication illustrate.

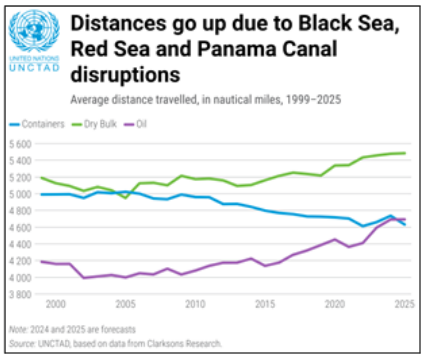


With transits halved through the Panama Canal, the ultra-large vessel sector has suffered a near- reversion to pre-1914 conditions. In the case of the Panama Canal, there were always going to be capacity limits based on the reservoirs and water supply at the top of the canal. This is a vulnerability of all canals with elevation changes, and is not unique to Panama, but has been a major challenge since the expansion of the canal in 2016. Average Delays reaching upward of a week to transit the Canal reduce average voyage speed, and can increase voyage duration by a considerable margin.



With transits down 42% through the Suez Canal, most of these vessels are transiting around the Cape of Good Hope to reduce the risk of facing hostile action. This adds thousands of nautical miles to achieve the same mission, as with the ships sailing through Punta Arenas and Cape Horn to avoid delays at the Panama Canal. With this are increasing greenhouse gas emissions, sailed distances, container rates, and fuel costs, and longer voyage durations. On top of all these, there's also a large reduction of Effective Fleet Tonnage Capacity due to the same tonnage capacity making fewer voyages per year due to longer voyage durations. If ships are committed to a task for a longer period of time, you have to have more of them to accomplish the same amount of work. In an effort to reduce this problem, some shipments to the US are using West Coast ports and rail connections across the continent, which is only moderately better in term of emissions than sailing around Cape Horn or idling the ship at anchor off the Panama Canal for a week.

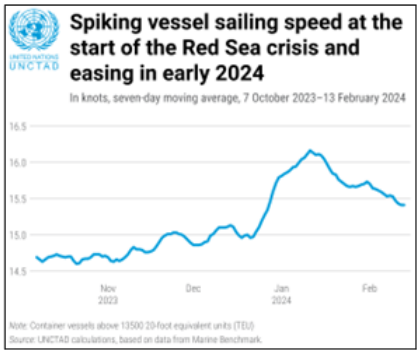
Luckily for the Wind Propulsion Industry, more energy efficient ships using wind propulsion become more competitive the longer the route they sail on, and so this is a golden opportunity for windships to economically out-perform their conventional counterparts. Even if fuel savings are marginal, over these extended distances and higher freight rates even small percentages will have an outsized effect on profitability and Required Freight Rates.



But what does this have to do with small vessels? Why does this present an opportunity for ships of 500 GT or less to shine? First, there is little disruption in schedules or routing for these ships: They weren't using the canals to begin with, even in the business plans of those not yet operating. Second, because their costs can remain constant while those of conventional shippers fluctuate wildly with the cost of fuel, fewer voyages, higher fuel demands, and other delays adding to the Freight Pain. Third, the case for decarbonization through primary wind propulsion is easier to make on small vessels, as they experience more advantage from sails than larger vessels. Fourth, while conventional ships are tied up for longer periods, tonnage demand stays relatively fixed, meaning there is more cargo sitting on the docks to be picked up at competitive prices on small vessels who can take up the slack while earning a good rate on short- and mid-range hauls.

Most importantly, the combination of high freight rates and long distances is what made the last major windjammer routes viable to begin with. While the guano trade from Chile and the grain trade from Australia to Europe bring to mind vessels such as the Herzogin Cecilie and similar 3,000-ton class windjammers in the 1930s, there were a lot of windjammers under 500 tons still working all sorts of trade world wide, including around the Horn and around the Cape as late as 1914. With the new economics of the energy transition taking effect, this will start to influence the market for shipping in favor of smaller vessels.

With the addition of spiking speeds for conventional cargo ships making their long transits, there will be an increase in fuel consumption: "For a large container ship, a 1 per cent speed increase typically results in 2.2 per cent rise in fuel consumption. An increase from 14 to 16 knots, for example, would increase ship consumption per mile by 31 per cent. In this context, longer distances traveled due to rerouting away from the Suez and through the Cape of Good Hope imply that GHG emissions for a round trip (from Singapore to Northern Europe) would rise by over 70 per cent per trip. These trends could erode the environmental gains that had been achieved through slow steaming." (Pp 13)



Windships, especially primary wind propulsion vessels, don't significantly change their emissions profile when they sail a longer route, and their speed is not associated with their emissions profile. This sudden and drastic spike in greenhouse gas emissions is an opportunity to revive proposals for IMO-imposed Shipping Speed Limits which were tabled in 2019. Speed limits will also make wind propulsion at any scale more competitive, as a slower moving ship benefits from the average wind more than one moving at higher speeds due to alterations in apparent wind.

In the wind propulsion sector, it is important to remember that conventional motor vessels only became economically superior after they have been built to astounding scales, and two continent-altering canals were dug to give them shortcuts nearly halving their voyage distances. If motor vessels are put on an equal routing with even relatively small wind propulsion vessels, the economics become far more egalitarian. With great and justifiable concern for future generations and the decarbonization of shipping worldwide, we should make these concerns clear and push for greater adoption of financing and use for small vessels on long and short routes once again.

Can you make a living as an Owner-Master? It just may be possible on the right routes.
Steven Woods
21 March 2024

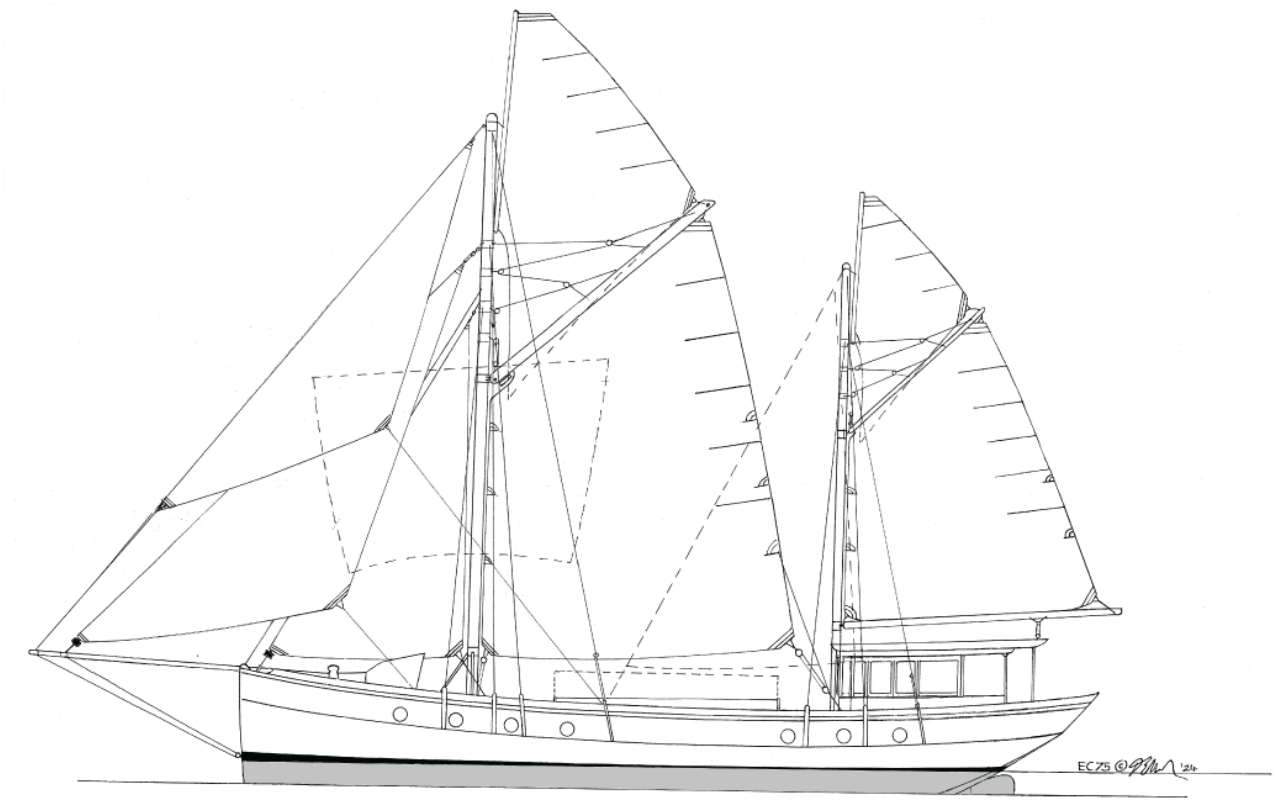
A new paper published by the Journal of Merchant Ship Wind Energy which investigates the idea for very small vessels points to cargo ferry services in some areas being a viable spot for owner-master and cooperatively owned small vessels to thrive. Where a trucking route is longer than a sea route, and there is any degree of traffic congestion, small vessels will be able to compete with trucking, so long as they don't have to pay for fuel. How do you do that? Sails, obviously.

When compared to trucking, the Required Freight Rates for vessels capable of carrying as little as 5 tonnes can be viable if the voyage time is a day or less. These routes, including to and from near-shore islands, have a large potential for displacing truck congestion on major roadways, while running at lower cost than trucks, making them the economic option for freight forwarders and cargo owners alike.

This approach is a bit unorthodox, as it does not involve crossing any oceans, but it can prove profitable even outside island chains. As shown in the paper, there are a number of routes in the northeast US which would be well suited to this coastal trade, and there are assuredly others as well. Since the initial capital investment for some of these micro-freighters could be quite low, this is certainly an open market for small scale ventures with limited funding opportunities. Cooperative arrangements and traditional corporations should be able to succeed in this sector, and even use a small vessel to fund the future purchase of a larger one in only a few years.

You can find the paper here. While you are at the JMWE website, there are other papers of interest there for the small vessel sector, especially the Proceedings of the 2022 Hudson River Maritime Museum Conference, a Case Study of Schooner Apollonia's 2021 operations, and more. You may find the reading and methods helpful in making your own plans and framing business plans for economic competitiveness, and the Journal is open-access, making the proliferation of these methods free and easy.

40 tonnes of cargo and 8 passengers in a 75-footer?
Are you serious?
“YES”



Our work begins with one clear vision – the sailing ship reborn.
The new ship evolves with sharpened pencils, a Staedtler drafting pen, digital optimisation and enhanced engineering.
At first glance, they appear to be traditional ships but look beyond that graceful sheerline, and you’ll see that they are packed to the gunnels with off the shelf intelligent technology.
We say waste not - want not, so the slightest zephyr, each solar watt, every detail is important and every single kilojoule of free energy is put to good use.
The result? Fast, efficient, reliable and cost-effective ships
Our goal? True zero emission shipping
Available worldwide soon.

Derek Ellard
Go Sail Cargo

Email: info@gosailcargo.com
Web: gosailcargo.com

Techno Tracks

Requirements For An Open-Source Sail Freighter Design Presented At SISDO 2023

Steven Woods
16 November 2023

The Sustainability In Ship Design and Operations (SISDO) 2023 conference, held at Webb Institute and the US Merchant Marine Academy on the 6-7th November included a presentation on the requirements for an open source modular sail freight vessel. Using the experience of the Schooner Apollonia's 4 operational seasons, as well as historical precedents and existing designs, the case was made for a modular design of sail freighter which maximizes the utility of both captain's licenses and crew members to move cargo with near-zero operational emissions.

Schooners of 15, 25, 50, and 100 Gross Register Tons were proposed, designed for coastal trade. Each is to have ship's gear for handling cargo, designed around breakbulk and palletized loads. Drafts under 9 feet (3m) and lengths kept under 65 feet (20m) where possible will make these vessels capable of entering almost any harbor, while the use of hard chines will simplify construction and reduce capital expenses.

Additional design projects for a modular spud-barge depot and a canal wherry were suggested as other adjuncts to ensuring vessel plans are both available and readily modified for the specific needs of a given coastal or inland trade. The paper can be found on Researchgate for those interested in further reading. Those looking to contribute to the vessel's development should contact the Center For Post Carbon Logistics.

Center for Post Carbon Logistics begins efforts to develop Open-Source Sail Freight vessel designs

Steven Woods
26 February 2024

The Center for Post Carbon Logistics is starting a program to develop and publish open source sail freight vessels of 15, 25, 50 and 100 Gross Register Tons (10, 17, 35, and 71 GT) for coastal and inland waterways, with the possibility to design larger vessels up to 200 GRT (145 GT) for transoceanic routes. This program will take known designs and the needs of modern sail freighters in mind, these small vessels will be based around working vessel requirements for simplicity, reliability, low maintenance requirements, and durability. With simple, well understood traditional rigs, steel hulls, and a view to rapid construction, these boats will be designed to operate without shoreside support, including cargo handling gear built into the rig. The hulls being considered will be single-chine to reduce construction complexity, and easily driven in all conditions.

The ideal employment of these vessels is in coastal trade replacing trucks, or inter-island trade in the Aegean, Caribbean, or South Pacific. As open source designs they will be freely available and readily adapted to specific waters and circumstances, with the fundamentals taken care of to reduce the design burden on new and existing fleets looking to acquire a vessel for their trade routes. A free set of plans on which to get estimates can be a valuable tool for pricing out the capital intensity of a given route, without having to invest thousands in an original plan or purchasing half a dozen plans from different naval architects for comparison.

These vessels will be designed to use inexpensive, potentially used internal combustion engines to keep costs down, as opposed to newer hybrid propulsion which is more expensive and lower emissions overall. All designs will incorporate the ability to be fitted with electric propulsion as an option or a future upgrade once further funds are raised by the operation.

Anyone interested in participating in this program, including naval architects, marine engineers, policy experts, donors interested in funding these developments, and potentially sail freight vessel operators interested in helping develop requirements for the next generation of small sail freighters for short routes and coastal trade, should contact the Center for Post Carbon Logistics for more information.

Sail Freight Handbook Publishes Second Edition

Steven Woods
1 November 2023

In early 2023 the Center For Post Carbon Logistics released the Second Edition of the Sail Freight Handbook. Designed for use by sailors of small vessels (generally under 500 tons) looking to move cargo, this manual compiles the lessons learned from studying historical operations and manuals and those gleaned from active operations in the 21st Century.

Divided into sections covering Preliminaries, Ships, Crew, Cargo, Business, Ports, Impacts, and Reference Tables, the handbook covers as many pertinent subjects as possible. Written for a general audience as well as those involved directly in sailing and moving cargo, the subject matter includes related subjects such as small sailport design and last-mile zero-carbon transportation. For those looking to support sail freight projects from shore, the handbook gives a crash course in how they can help, what practical barriers exist, how to overcome them, and so on. While aimed generally at the United States due to the participants involved in the handbook's writing, there is space for including summaries of other regional regulations, customs clearance processes, and other challenges which will be faced by sail freighters in other waters. Including over 30 illustrations, 12 reference tables, and the plans for the Vermont Sail Freight Project's spritsail scow ketch Ceres, most subjects are covered in sufficient detail to be well understood without further research, though all sections include additional reading resources for those interested.

The Sail Freight Handbook is an ongoing project, with a third edition slated to be published in 2025 with further information, corrections, and other improvements. Any submissions, corrections, or pertinent topics to be covered can be sent to the Center For Post Carbon Logistics, or using the link on the Notice Page of the handbook's PDF. Translators are also sought to expand the potential audience for this information beyond the Anglophone world.

The handbook is available digitally free of charge for download from the Center For Post Carbon Logistics at the Center's publications webpage. It is also available via Researchgate. It is hoped that print-on-demand copies will be available for purchase in future.

Information Sought:

- Open-Source or openly available ship plans.
- Stowage Factors of Cargos.
- Regulatory Information for other regions.
- Harbor arrangements & management systems.
- Training Program Information.
- Information pertaining to international trade.
- All other pertinent contributions.
- Translators For Any Languages.

Stowage Factors & Reference Tables Publication For Sail Cargo Operators Now Available

Steven Woods
27 February 2024

A Sail Freight Researcher has taken the time to compile some of the more useful information for small sail freighters into a small booklet you can save to your phone or print out as a hard copy booklet for use onboard your vessel. Essentially an expansion of the Reference Tables in the Sail Freight Handbook, this limited version is updated more frequently.

The major focus is on Stowage Factors, which are a rough measure of the cubic space taken up by one ton of a cargo. This is important to know, as cargo density will effect how much of a good one can take on before the ship's hold space is filled. Stowage Factors are provided in both cubic feet per short ton and cubic meters per tonne. Other reference materials are also included, which may be of use for other situations aboard or those just entering the trade.

The Sail Freight Reference Tables No1 Mk. I is available online and can be printed as a PDF, then used as a booklet with proper formatting. It is updated as information becomes available, with the latest date of modification on the copyright page. The publication is licensed under a Creative Commons license, and can be distributed without asking permission, so long as the distribution is free of charge to the end user.

Unlike the Sail Freight Handbook, this is an easily carried small booklet when printed, handily stowed in a seabag or put in a locker next to the cargo book. For creating stowage plans, determining what can and can't be carried on the next run, or used as a training aid, this publication will pull more than its weight.

Anyone with information not included in this publication can submit that data using a link on the copyright page, and this will help everyone involved in the sail freight movement. The more helpful information we have at hand, the better we can plan for route expansions, vessel designs, and other challenges facing working sail in the near future. Such a collaborative document can help us all, and create the basis of a better collaborative environment across the Sail Freight movement.

Gaps In The Research: Where to look next in developing the Sail Freight Sector

Steven Woods
30 May 2024

There are a few gaps in the research regarding the small windship sector which will need to be addressed sooner rather than later if the sector is going to advance quickly. The main subjects in need of a further treatment are:

1. Seafarer Training.
2. Harbor Adaptation.
3. Economics of Small Windships.

Seafarer Training is different from traditional "Education Under Sail" models in that the objective is to take those with little to no experience, and turning them into basically competent mariners in 8-12 weeks, with additional follow-on courses to follow. These courses would cover the STCW Basic Training requirements, as well as sail handling, sail trim, sailing safety, and the basics of being on a sailing vessel. Curriculums, requirements, examinations, and other basic work for these courses must be developed, and then they must be put into action.

Follow-Up courses should be made available for new and experienced sailors, such as Celestial Navigation, Fundamentals of Engineering, Cargo Handling, and other topics important to developing a career on working sail vessels the world over. Further, captaincy knowledge and skill requirements for an industry standard certification should be developed in the near future. The topic of seafarer training is being researched right now by several people worldwide, but it needs a major focus, wide participation, and preferably some funding to make the effort more robust.

Harbor Adaptation to small working windjammers has hardly begun, and almost no research has been found on the topic since the last major oil crisis 50 years ago. In light of the findings from our survey, it seems Windjammer operators are not terribly happy with the way ports have adapted thus far, and there is a lot of work to do on this score. Unfortunately, with no foundational information about what ship operators want and need, and what harbor operators have and can provide, there is little to bridge these gaps. Absolutely foundational research needs to be conducted for these needs, from identifying the requirements of vessels, to classification systems for port infrastructure, and everything in between. Something which can be picked up before the next Small Windships Publication is a bibliography of existing research, but that is barely a first step in this process.

The start for harbor adaptation research is likely to require a summit of some sort, which gathers the most applicable people all into one place: Civil Engineers, Ship Operators, Harbor Operators, and Maritime Historians who have worked on this subject in the past. Representatives from traditional ports which work with Dhows and other traditional networks will be absolutely critical to this work, and need to be invited to participate.

The economics of small working vessels under sail has been examined in a cursory way, but needs to be fleshed out, brought into further detail, and expanded upon for other other types of trade and routes. Competition with road, rail, and conventional short-sea shipping must be brought into the account, as well as a solid treatment of the possibility for tramping routes and trans-oceanic trade. Studies of wage structures, labor issues, the cost of regulatory compliance and other issues remain essentially unexamined, along with the effects of longshore and last-mile delivery costs on the sector.

Without a reasonable understanding of small vessel economics, it will become increasingly difficult to pitch these projects to governments, investors, and communities. Further, the increased risk of frequent commercial failures from un-economic projects can be reduced, which will contribute to a more robust and enduring sector outside the traditional small island supply role where sail is known to thrive in a fossil fueled economy.

There is much research left to do in establishing this industry, but luckily all of it can be done with known methods, and is immediately applicable on the water. The faster this is accomplished, the faster the fleet will benefit, and a wide range of talents and skills will be necessary in the coming years of working sail research.

Spun Yarns

WATER! An Australian Essay
Derek Ellard
2 April 2024

It's found in asteroids, on Mars, moons and maybe most of the universe but we still don't really understand it. Take it away and we become mere specks of dry dust on a big lump of rock.

We routinely exploit it, fight over it, pollute it and at best take it for granted, yet it remains the source of all sentient life. In countless older, wiser civilisations it is revered, respected and even worshiped – our Christian baptism is but a pale memory of that – yet we are largely ignorant of its virtues. That doesn't stop us from lusting after tropical holidays or harbourside houses by sparkling waters. We grow food and babies in it, we swim in it, fish in it, sail on it and after a stressful day there's nothing quite like languishing in a bath of it. Water, sixty percent of our bodies, one hundred percent of our lives.

Water, solid, liquid or gaseous, is three quarters of our world – Planet Earth? Planet Water is more accurate. We delight in the welcome rain on a dry paddock, the chuckle of liquid conversation between clear spring and mountain stones, the persistent mists of the rainforest, The tin roof drummers on the old homestead roof and stamping in puddles with laughing children. "Mummy! Mum! Grandad splashed me!"

But then there is water's part in nature's violent mood swings, now exacerbated by our global vandalism. That sudden rain squall that needs urgent luffing and colorful sailor language. That destructive deluge that fills rivers and rain gauges to overflowing in hours. That raging tempest, hell bent on destroying farmland, eating cliffs and wrecking holiday homes. Nature does not discriminate.

Mother Earth always has the final say.

Yet I love the waters of the world in all their majesties and mayhem, the open sea, the lakes, the rivers great and small, the backwaters and even the quiet ponds. We are drawn to water, you and I, and we cannot help ourselves, why else would we in our millions watch David Attenborough's inspiring ocean series?

Once, returning by train from a holiday in Cornwall we were gently awakened by my father and taken to the carriage window. The train had slowed, the driver was clearly moved and bugger the timetable, for there was a full moon over the channel approaches and the mighty Atlantic, dark and still, reflected the moon in a symphony of liquid silver; a magical moment in time, kept alive after seven decades.

Our bonds with the seven seas are reflected in our language which is packed to the gunnels (gunwales) with sea terms and a wondrous, watery lexicon awaits the inquisitive. Sadly, these sea phrases are slowly fading away, because just like the ocean, language is rarely still. That said, have you never asked to be given a little leeway, or to be cut some slack? Or sailed too close to the wind? Been down in the doldrums? Had to batten down the hatches? Maybe your life is run like a tight ship and there is no need to rock the boat or make waves because everything is above board and no-one needs to give you a wide berth. These days however, many lives are so chock-a-block with commitments that the temptation to cut and run can be overwhelming; but that course always leads to uncharted waters.

All this was handed down from the crews of sailing ships like the ones that transported the First Fleet to these shores. They were slow, cumbersome, uncomfortable and inefficient but they were carbon neutral! Life on board was mostly horrible, punctuated by short periods of kindly respite laced with wonder. The food was often disgusting and the toilets were bucket and chuck it. No showers, no privacy and no room service yet most endured it with admirable stoicism, they were made of sterner stuff, our ancestors. No wonder they invented their own language.

Today eighty, maybe even ninety percent of the world's trading is on the water – some fourteen trillion dollars worth, and I can't begin to imagine that. The ancient wisdom of the Polynesian navigators, they who sailed thousands of sea miles by stars, wave patterns and weather lore is mostly lost, but now we have reliable power, weather routing and hot water on tap to compensate. All well and good but the effects of the ongoing drought on the Panama Canal and rockets-R-us in the Red Sea are already impacting world trade, surely a compelling case for a civilisation rethink. And then there's Pollution on a Grand Scale; oh dear, I may have let the cat out of the bag.

Let's put this into perspective. Imagine that perfect tropical Island, temperature just so, tick, water turquoise with reflections, tick, the beach softly sanded yet shady under the sighing palms, tick, light not too dazzly and cool drinks on tap, tick. A travel agent's watery dream then.

Now take a bucket of rank, oily sludge cut with yesterday's leftovers and some plastic wrapping, wade in and dump it. Abhorrent yes and heinous certainly, but scale it up a million times and that's what our ships do, every day. Clearly this cannot continue. But there is always hope, that unquenchable light on the horizon, and while I am just one of countless thousands working to stop it, I have a plan.

I have designed a range of zero effluent – sorry emission – sailing cargo ships – - with global repair in mind. It begins with one small ship for man . . .

And they will not be steel boxes either, they may be mass-produced and have containers in their holds but they will retain their traditional grace, proper ships are female in essence and they will be beautiful, they will be welcomed. "Speed bonnie boat like a bird on the wing, over the sea to Skye"

will never serenade a car carrier and besides, we have passengers to consider.

So, here's the thing. Even a small ocean supply ship costs millions per annum to operate and most of that is bunker fuel, the lowest and dirtiest in the petro-hierarchy. No, our ships will run on free fuel, clean sail and solar, and they will bristle with discreet technology. What's more there are secret weapons on board, Legal performance enhancers no less! Good for the spreadsheets and all intelligent life.

The plan is to enter one of my smaller Australian-built sailing ships in the Sydney/Hobart – with cargo. Artisan rum would be appropriate and welcome. But think of the benefits! Think of the publicity! Think of the kudos! And all for the price of a new set of sails for the good ship Law Connect.

Derek Ellard

What Do You Do With A Blocked Up Suez?!

Steven Woods

Nearly three years after the Suezmax container vessel Ever Given took an unintentional turn in the Suez Canal, there seems to be revived reflection on the importance of this critical waterway to conventional trade patterns due to the Red Sea crisis. Even so, extremely large vessels with no margins of error continue to traverse the waterways of the world, mere meters away from similar catastrophes, every hour of the day and night. Since the resurgence of tensions in the Red Sea have started blocking up traffic there again in recent months, perhaps another version of this jaunty tune is in order?

This rewrite of the classic sea shanty "What do you do with a drunken sailor?" is dedicated to that incident, and presented here for your enjoyment.

To The Tune Of "Drunken Sailor"

What do you do with a blocked up Suez? (x3) Early in the morning?

Chorus: Weh-Hey! She ain't rising! (x3) Still stuck in the Channel!

Dredge the bank 'til she's finally floating!

Even Brother Sylvest can't budge her!

Whole damn ship is Bully in the Alley!

23 tugs with some cables on her!

Cape Town's gonna make some money!

Four Hundred Million Lost Per Hour!

Twelve Percent Of The Trade is held up!

Get a big crane and try to lift her!

Near 300 ships are held up!

When will we re-think this system?

How will we get our plastic junk now?!

Just Dig another trench around her!

Another Shanty About The M/V Ever Given

Steven Woods

Due to the large amount of COVID-induced boredom and chaos which converged in March of 2021, there were multiple shanties re-written to take stock of the Ever Given incident, which could only have occurred to a very large vessel. This is another one of them.

To The Tune Of "Bully In The Alley"

Chorus:

Help me Bob I'm grounded in the Suez, wey-hey, grounded in the Suez. Help me Bob I'm grounded in the Suez.
Grounded & I can't float off!

1. They sent me the course by G-P-S, oh
Wey-Hey, grounded in the Suez!
Turns out this run was not my best
I'm Grounded and I can't float off!

2. We sailed along in the sun so warm, oh
Wey-Hey, grounded in the Suez!
Things went bad when we hit a sandstorm
I'm Grounded and I can't float off!

3. It's been a week and we're still aground, oh
Wey-Hey, grounded in the Suez!
All the ships gotta sail around, cause
I'm Grounded and I can't float off!

4. They dredged the bank but we can't get free, oh
Wey-Hey, grounded in the Suez!
With tugs and cranes and a growing fee,
I'm Grounded and I can't float off!

5. Three Hundred ships in a growing queue
Wey-Hey, grounded in the Suez!
All just wish they could sail on through.
I'm Grounded and I can't float off!

A Shanty For Schooner Apollonia

Steven Woods

One of Apollonia's stowaways wrote a specially adapted version of "Bonnie Hieland Laddie" for the October 2022 voyage from Hudson to New York City and back, on the Hudson River. The voyage was an eventful one, and every port of call is included in the shanty with its own verse. This was the first voyage Apollonia made to Carteret, NJ, to pick up green coffee for Tarrytown, NY.

The shanty is published in its entirety here, and recordings or sheet music for the tune are readily available. The lyrics are declared public domain by their author, and any recordings should be sent in care of the IWSA Small Windships Publication editor.

To the tune of "Bonnie Hieland Laddie"

Have you worked on Hudson Pier? Bonny Sailor! Hudson Sailor! Slinging malt for hipster beer? Bonny Hudson Sailor!

CHORUS: Wey! Hey! And away we go!

Bonny Sailor! Hudson Sailor!

Wey! Hey! And away we go! Bonny Hudson Sailor!

Have you been to Newburgh bay… rolling barrels down the quay?

Have you docked at Piermont quay… where the town's a mile away?

Have you been to Brooklyn Town… bringing tons of pumpkins down?

Have you worked off RETI Barge… Red Hook warehouse looming large?

Have you worked at south street pier… tied to Schooner Pioneer?

Have you worked in Carteret… where the boats ablaze are set!

Have you worked in Tarrytown… hauling sacks of coffee down!

Have you worked at Ossinin'… where the fog will box you in!

Have you worked on Rondout Creek… where the wrecks are piled deep?

There Must Be 50 Ways To Lose Your Rudder
Steven Woods
12 April 2024

[EDITOR'S NOTE] This was submitted anonymously at the last minute, and simply goes to prove that the ancient and honorable art of re- writing folk songs to be stranger than they already were is alive and well somewhere in the english-speaking world.

TO THE TUNE OF "50 WAYS TO LEAVE YOUR LOVER" BY PAUL SIMON

"The problem starts with your rudder head,"
She said to me,
"You torqued it hard when you went aground Last week.
It was clearly broken in your struggle to get free;
There must be 50 ways to lose your rudder."
She said "It's really simple if your navigation's crude.
Furthermore, your gudgeon's bent,
hydraulics screwed.
This damage sure is not repairable by noon.
There must be 50 ways to lose your rudder.
50 ways to lose your rudder.

CHORUS: Just a bump on the Stern, Fern,
One submerged pile, Kyle,
A Killer Whale, Gail,
And you're drifting free.
Fouled in the Kelp! Help!
You don't need to mess up much,
Spring hard off the Quay, Lee,
And you're drifting free!
Yeah, a bump on the stern, Fern,
A shock on a rock, Doc,
Hit a big coy, Roy,
And the rudder's debris!
Collide with a Can, Stan,
You don't need to mess up much!
You mess with a shark, Clark,
Then you're drifting free!

She said "It grieves me so to see you so dismayed.
I wish there was something I could do,
To ease what you must pay."
I said "I appreciate that.
And would you please explain,
All these expenses?"
She said "You messed up both
your gudgeons, pins, and keel
Your tiller's bent, the blade is snapped,
And your prop's no longer tight."
And then she showed me
And I realized she was probably right.
There must be 50 ways to lose your rudder.
50 ways to lose your rudder.
[CHORUS]

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* Engineering
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"Harwood's ability to build our largest vessels undercover, their vastly experienced team and our shared business ethos convinces me that they are by far the best option to build our ships."
- Derek Ellard, founder Go Sail Cargo

Website: **harwoodmarine.com.au**

Sports & Sail Training

IMOCA Racing Sets Focus On Sustainability, But Has A Way To Go Yet.
Steven Woods
28 March 2024

The IMOCA class racing boats are making significant strides toward improving the sustainability of their sport, including reduction of boatbuilding wastes, increased recycling, and part-sharing to reduce the amount of resources needed to keep the fleet in service. Policies and studies are now underway to make everything from building boats to racing them less impactful on the marine environment, though it will take a few years for these policies and practices to permeate the entire fleet.

A new rule which requires Life Cycle Analysis (LCA) of all designs and builds for new boats shows a large amount of promise in reducing the impact of boatbuilding in IMOCA class vessels. A focus on circular economy, landfill diversion, and recycling can improve on this category significantly.

Another field which contributes to a large portion of operational emissions is transportation. Air Travel still makes up 28% of the 11th Hour team's emissions, while freighting goods makes for another 3.5%, together accounting for 861 tonnes of CO2e emissions (Pp 71). Class wide, this could amount to up to 39,606 tonnes of CO_2e per year across 46 teams. This indicates a rules change for the class could be a significant help to reducing further emissions: By limiting all racing teams to completing the race with the starting crew and parts carried onboard, a degree of self- sufficiency can be incorporated into the race. This would prevent the flying of expert technicians around the world to make repairs, and reduce carbon-intensive short-notice parts shipping.

Internal policies for individual teams would be the final portion of clamping down on travel and freight emissions in the IMOCA class races. If anyone knows how to cross an ocean with zero emissions it would be a bunch of sailors, and with some advance planning such crossings under sail could be used to position support staff, event materials, and other equipment on more conventional sailboats. If a wide inter-team collaboration was underway, multiple teams could load a set of their spare parts, experts, and materials on a pair of small combined sail powered passenger-freighters, which would sail to pre- position materials in the next stop of the race. Arriving before the racers by leap-frogging each other to stay one step ahead of the likely far faster hydrofoil racers, one would stay in the destination while the other sails the next leg at a leisurely pace with its own set of experts and equipment.

It should be remembered that racing is fundamentally a leisure activity, and in a crisis should be one of the first things abandoned when every tonne of greenhouse gas is critical to fighting the worst effects of climate change. However, if a leisure activity can show the way to a better future and guide changes in other industries which are necessary for human wellbeing, they can be excused at least some of their impacts. IMOCA is making those efforts, even if they are still at an early stage and have not yet come into full effect. These efforts show the way for other sports, as well as other marine operators who are looking to make improvements in their own endeavors, making IMOCA a leader which many other sports should look to emulate in the coming years.

The Great Cargo Race of 2024/25
Steven Woods

Back about a century ago, the last of the big windjammers would race most of the way around the world from Australia to Europe with cargoes of grain in what became known as the Great Grain Races, carried on from about 1920-1948. In the mid 19th century, the Tea Races from China to the UK enraptured audiences through newspaper accounts of daring and feats of speed by the famous Tea Clippers like Cutty Sark, Aerial, and Taeping. These stories of humanity against the forces of nature and other humans in a test of skill and endurance were, and still can be, great entertainment and drama.

Of course, these races were also a prime subject for gambling, and many people lost their shirts betting on these races, what the passage times would be, and almost anything else imaginable related to the races. We might not want to bring that aspect back to full pitch, but a few friendly wagers with low stakes might be in order.

Those types of stories brought with them awareness of transportation, something sorely needed now in the fight against climate change. Fully wind propelled Small Windships are a beacon of what future transportation could look like, to some degree. In making something like the sail freight movement more interesting, a bit of friendly competition shouldn't be anything to push aside.

This race is also an invitation to anyone with a sailboat to figure out who needs what, and where, and make that connection by sail. You could enter with your 16 foot trailer-sailer carrying home a rather large amount of groceries across a lake, or a couple bags of topsoil for your garden, and you may just win in your category. If nothing else, you got yourself on the leaderboard, and that's what counts: Taking some sort of action to make the world a better place and cut down on transportation-based greenhouse gas emissions.

The Northeast Grain Race of 2022 was a points-based race for any vehicle moving grains in the Northeast US, with one point awarded for each ton-mile of cargo moved and five points lost for every liter of fuel burned or 10 kWh of grid electricity used. The race saw two entries, but the points calculation was not easy, required significant bookkeeping, and a lot of additional effort. Therefore, a new cargo race would need to be easier to calculate, have less restrictive cargo requirements, and should incorporate some aspect of speed and skill as well. So, the ruleset below was developed for the Great Cargo Race of 2024, adding in an element of speed and focusing exclusively on primary wind propulsion vessels.

The best part about this whole race is that most sail freighters won't have to change anything at all about what they are doing: They will simply have to choose the best run they have had in each distance category for the year, and enter it on a very simple survey. The IWSA editorial staff (and a spreadsheet) will take care of the rest. Much like the Great Grain Races, we won't be able to know who the victors are until the whole cycle is completed, but that adds some suspense and drama to the situation. There's nothing stopping you from calculating your unofficial score and posting it to social media as soon as you pick which run you're entering, so there can be some good rivalry and jostling for position before the official results are published each year.

Now, the critical portion of this discussion is "What Would It Take To Make This Happen?" and I think I have a few requirements for this race to really take off. The first requirement is a Prize Purse, because this is likely to be the real driving force for participation at first. If there was a $1,000 prize for the smallest category (less than 100 GT sailing less than 1000 nautical miles), and the prize went up by $1,000 increments from there for each category (outlined in the proposed rules below), there would be real incentive for this race. The top prize for a 101+ GT vessel sailing more than 1,000 nautical miles would be $4,000, and the total investment needed for the prize pool is only $10,000, a reasonable amount to raise annually for the cause. Of course, if more could be raised, a larger set of prize purses will only encourage more entries, and of any fund raised the distribution should be weighted from largest to smallest category's prize, at 50%, 25%, 12.5%, and 12.5% respectively, unless independent funds are raised for each category.

The second requirement is awareness, which can be raised in many different departments. Critically, awareness must be raised outside the small vessel sector, and brought out of the Maritime sector as well to show that this type of climate action is not only possible, it is happening in real time, competitively. The more the narrative that we are taking real action and creating real alternatives to the status quo spreads, the more possible a meaningful energy transition becomes, and faster change can be made both possible and real. Plus, the more aware people are of the race, the more participation we can expect.

The third requirement is vessels willing to participate. This might mean encouraging more of the Sail Training vessels to carry some freight, or passenger-oriented vessels making transits between events with cargo. Racing boats could also compete, with their high speed and long passages compensating for a relatively low cargo capacity within their tonnage bracket. The initial problem will likely be high levels of competition in the less-than-100 GT category, and too few vessels in the over 100 GT category. This means we should focus on getting more ships into the larger category, by whatever means possible, and there are a number of vessels which will hopefully be able to enter this bracket in the next few years.

The last requirement is cargo to carry. I think this will likely prove to be the easiest part of this whole project to pull off. Whether you source your cargo through a service like Feral Trade, one of the listed brokers in this publication, or through a social connection, there's plenty of stuff to be moved. Getting it onto a boat may be as simple as having a bunch of yacht sailors offering "Sail Freight By The Pound/Kilo" where people can pay a buck a pound to ship their goods to the yacht's next destination under sail. However you source your cargo, for small boats without professional brokers, moving inside a single country is normally the easiest move because it will avoid customs issues, but can also pull down your mileage as a result. Just make sure you have a plan that won't land you in jail: that's not the type of publicity the Race needs in the first few years.

PROPOSED RULES:

1. Participating Vessels must be under 500 GT. There will be two categories based on tonnage: Less than and Greater than 100 GT.

2. Vessels must use primary wind propulsion.

3. There are no restrictions on cargo carried, origin ports, or destinations.

4. Must happen between 1 January and 31 December 2024, and be submitted to the editors by 31 March 2025.

5. Vessels must carry at least 100 kg of cargo. Cargoes above this minimum will be rounded to the nearest 100 kg increment.

6. One leg (any port to any port) per vessel per distance category may be entered, including only cargo picked up at port of origin and delivered at destination port. Intermediate stops are allowed, but all cargo counted must start and end at the ports indicated, and all days between these two ports must be counted.

7. Distance Categories Include: Less than 1,000 NM and Greater than 1,000 NM.

8. Passages will be measured in Days, with judges contacting involved ships for more details if identical scores occur.

9. Voyage Average Speed will be calculated based on the following formula: Passage Distance/(Passage Days*24 hours). Only where identical scores are reached under this formula will more precise speeds be calculated.

SCORING:

Tonnes Carried x Nautical Miles (calculated between ports) x Voyage Average Speed (Knots)

NOTES:

1. A leader-board will be included in the 2025 Small Windships Publication.

2. No late submissions will be accepted.

3. Submissions must use the provided Form or be sent to the Small Windships Publication editorial staff by email.

This competition will be conducted annually, with the results published in the IWSA Small Windships Publication. Any questions about the Great Cargo Race can be directed to the Small Windships Publication editorial team at svp-editor@wind-ship.org. With a potential 2024 Great Cargo Race being an inaugural event, we may learn a few things about the participants which will cause us to change the rules in 2025, but any refinements will be published with the results of the 2024 Race in the next Small Windships Publication. Any comments on rule modifications may be sent to the above email address as well.

No particular ports must be included, so each vessel will establish its own start and end points, as well as its own start and end dates within the period given in the rules. There are no restrictions on what cargo may be carried.

For those with a small boat looking to just get on the leaderboard, here's what you have to know: If you can sail 16 nautical miles with the minimum cargo, you will get 1 point. That's enough to get your entry on the board, and anything more will likely get you started up off the bottom. 22 miles will see you make your second point, and there probably won't be too much competition in that very small dingy category yet. In fact, if we get enough entries in 2025, that's a category we will consider creating, among the possibility for other distance and tonnage classifications as competition picks up.

So keep track of your cargo records, dig back into the logbook, and send us the information on your best run of the year in April of 2025 to participate. We will look forward to seeing a long leaderboard in the next Small Windships Publication.

Seafarers & Skill Development

Practical Training Programs Lacking For Small Vessel Fleet Sector

Steven Woods

While Sail Training is mostly focused on experiential and adventure education for youth, there are very few programs designed to take raw recruits with few sea days under their belts, and turn them into competent sailors in the course of a month or two. While some commercial certifications, for example Basic Keelboat courses by US Sailing or Sailing USA do offer introductory courses which last only a few days and give a certification, these are not sufficient for an industry wide certification for working sail as the number of small windships expands in coming years.

Training programs which combine the basic skills and knowledge base of sailing with celestial and coastal navigation, advanced seafaring, basic first aid, and other critical skills for the industry are sorely needed. These would need to be standardized in requirements, issue and track certifications, and be designed for rapid skill acquisition. While a one month course of study may not be sufficient to make an experienced sailor, it should be able to make a useful and promising candidate into a highly competitive one for a deckhand position. Further, these courses can be a part of a comprehensive plan to get enough skilled sailors ready in time for the fleet needs of tomorrow.

There is a similar dearth of training opportunities for other supporting trades for a small windship sector: Sailmakers, Dockers, Riggers, Shipwrights, Boatwrights, Harbormasters, and Cargo Surveyors all need to be trained for this field to flourish and for a large scale revival of small ports. Unfortunately, there are few, if any formal courses for these professions, and so knowledge is passed down haphazardly, or only through long experience. Neither of these options is ideal in a time requiring rapid expansion of all these trades.

Seafarer development needs to be taken into account in how the future of the small windship sector will develop, because the necessary skillset for sailing on Small Windships is different than for larger ships. There are fewer crew on each vessel, so everyone must be a generalist and jack-of-all-trades, but the vessels are frequently traditionally rigged, making them atypical compared to recreational or commercial sailing vessels. The sooner widely applicable standards can be developed for seafarer training, the better off the industry will be at the end of the Decade of Wind Propulsion.

Training Sailing crews in the 21st century

Capt. Matthew Bonvento
Goodwind Maritime Services

INTRODUCTION

The allure of the sea for centuries has pulled people from the comfort of their homes in the hopes of adventure and fortune. The same is still true today. Historians tell us that the age of sail began around 1550 and ended in or around 1850 (Jarvis, C., 2022, p. 397), others will argue that it lasted through WWI and ended prior to WWII (Parrott, 2004). This is not to say that cargo did not continue to move under sail. Regional and local trade has continued throughout the globe. In and around the Arabian peninsula dhows still carry cargo (Lendjel, E. & Ahmed, A., 2021) as well as small sail freight transportation in and Indonesia (Carnegie, M., 2014) and the Caribbean (Boerne, G., 1999). There is a current interest in returning to trans-Atlantic trade by sailing vessels. In this article the author hopes to highlight the importance of proper crew training and officer development if this industry is to rebound.

Historical perspective of sail freight

In order to understand sail freight, we must first define it. In essence "Sail Freight is the ecologically motivated maritime movement of cargo by primarily wind power with little, if any, engine use." (Woods, 2023, P. 4). All one has to do is to go to a maritime museum to quickly realize how ancient the art of sailing is.

The modern return to sail freight can be traced back to around 1979 (Day, Nov/Dec. 1979) with the launching of the SV John F. Leavitt. Unfortunately, with the abandonment of the SV John F. Leavitt advancement in this industry was curtailed not too long after the interest was generated (Woods, 2022).

Training Requirements

In order to look forward to creating a training program, a look aft will provide some insight. Prior to STCW there was no internationally recognized licensing/certification requirements, but there were enough standards for us to draw from to look at future training programs. In the age of sail, navigation was a topic taught, seamanship was a topic learned by practice and observation; until around 1760 where such knowledge started to see itself bound into print (Jones, E. 2023).

Reviewing traditional training material highlights that certain topics have maintained relevancy, even if the material has changed over time. In his Textbook of Seamanship (1884) Stephen Luce outlines topics such as nautical terminology, rules of the road, navigation, and marlinespike seamanship as chapters. These are topics still taught today. What the industry has lost is the knowledge of masts, spars, and what to do in various emergency situations that are exclusive to sailing vessels. Even with modern construction, the loss of a mast can be devastating. (Kozak, J., & Tarełko, W., 2011).

The United States Coast Guard has recognized the need for training for sailing vessel officers by way of the Auxiliary Sail license endorsement. Currently, this training is a four-hour program covering terminology, rules of the road, vessel operations, maneuvering, docking, heavy weather, capsizing, and man overboard. While not broad in scope, this course does provide some fundamental knowledge, however entrance to this course is usually dependent on the mariner having a year of experience on sailing vessels.

This year of experience can be obtained merely by owning a sailboat and sailing on it, not under the tutelage of an experienced mariner. According to the USCG Marine Safety Manual Volume Ⅲ, Chapter 10 mariners may self-certify sea time on vessels not more than 100 GT based upon vessel ownership. This allows for easier entrance into the realm of credentialed officers than by obtaining sea time through documented service and work. The Schooner Appolonia for example is registered at 27 tons, meaning that it could be conceivable that a recreational mariner owning a large enough vessel and taking a few courses could conceivably be qualified under the USCG to take command even though such person has no practical experience in commercial operations.

To realize what correct training can accomplish on April 25th, 2023 the East Indiaman Gothberg rescued the sailing vessel Corto in a scene that could not be imagined in the current world of oceangoing vessels. (Southern Wooden Boat Sailing, 2023). In this rescue the Gothberg towed a small 8 meter sailing vessel from offshore to a position close to the coast for another vessel to come out and finish the tow. This required the skill of being able to monitor the tow, properly trim the sails to adjust tow speed, and communicate with the disabled vessel. For such a rescue to occur, an experienced crew with proper training had to be present.

Current State Of Sail Freight

Sail freight is being utilized in lieu of trucking or larger commercial shipping, as a method of carrying ocean freight cargo as well as on near coastal routes. Current examples include the Schooner Apolonia, De Tukker, and Avontuur. Each of these vessels are sailing different routes for different ship owners and cargo interests. The commonality between these operations is that they all carry break-bulk style cargo in crates, pallets, barrels, sacks, and individually packaged items. Inter-island trade in the pacific has vessels such as the SV Kwai and SV Juren Ae are capable of carrying in addition to cargo, tanks of fresh water. There are designs for sail freight vessels to carry containerized cargo (Ellard, 2023) but the author has not yet seen vessels serving in such a role.

Current sail freight vessels are propelled by sail, and from time to time with auxiliary engines. Other tall-ships may not have such engines. Most of these vessels are equipped with solar panels to charge batteries that power navigation equipment, refrigeration equipment, communications, and other such small necessities. Some vessels are equipped with tanks for sanitary waste (Lapko et al., 2018). Under STCW this would fall well under an engineer trained to the standards of STCW table A -Ⅲ/3, for Mandatory minimum requirements for certification of chief engineer officers and second engineer officers on ships powered by main propulsion machinery of between 750 kW and 3,000 kW propulsion power.

Current training/certification requirements and manning

Looking at STCW the basic training requirements for deck officers covers knowledge of navigation, seamanship, stability, engines, and meteorology. The required knowledge is geared towards commercial, steel hulled, motorized vessels of 500 GT and over. Much of this knowledge, however, can be carried over into smaller vessels. In the United States, national license holders must be assessed in many similar fields of study but simplified as generally those smaller vessels do not conduct international transits.

Standards of training will be necessary in order for the sail freight industry to continue to grow. Some topics that are currently being considered are Cargo Handling and vessel handling (Woods, 2023, P. 75). In the United States these courses are required by the US Coast Guard for a mariner to obtain a 100-ton national license. The limitation in that particular license is that there is no distinct training on the operational differences between a power-driven vessel and a sail powered vessel, leaving the license holder to have to learn the operational differences while on the job.

Prospective Requirements And STCW

The International Convention on the Standards of Training, Certification and Watchkeeping (STCW) was first adopted in 1978. Over the years the convention has been modified to meet changes in technology, practice, and industry needs (IMO STCW). Changes over the years have included requirements for GMDSS training, environmental awareness, work/rest hour regulations, refresher training, and security training. Currently the convention is written for mariners on commercial vessels of 500 GT and over, sailing internationally.

There are currently two versions of the STCW Convention. The primary version is for use on board vessels, sailing internationally. The convention's lower limit provides for the certification of officers and seafarers on vessels of 500 GT. Alternatively, there is the STCW-F convention for fishing vessels, governing the certification of seafarers on board commercial fishing vessels. Neither contain provisions for mariners onboard sailing vessels.

As previously stated, in order to handle auxiliary machinery an engineer trained to A-III/3 would be well suited to the job, provided they are amenable to handling duties non-related to engineering.

CASE STUDIES

Much can be learned by studying the unfortunate mistakes of others. Legislation in the maritime industry is often driven by accidents and death. One case which made the news, but did not spur any change was that of the SV Bounty. The case study is not referencing the 1789 mutiny led by William Fletcher against the well-known Captain Bligh.

ON 29 October 2012 the SV Bounty sank off the coast of Cape Hatteras, North Carolina after an encounter with Hurricane Sandy. Two crew members were lost, including the Captain. Many other were injured. The vessel was lost at sea. Not considered a passenger vessel, or a cargo vessel the Bounty was an attraction as well as frequently used in cinema.

As with many case studies before and since a chain of errors occurred long before the actual sinking that led to the accident. Since the Bounty was a tourist attraction, visitors flocked to visit her while in port. However, the vessel had to receive permission from the US Coast Guard in every port prior to allowing visitors on board. The vessel was also not ~~considered safe enough to carry passengers while underway, with the watertight integrity of the vessel being a concern.~~ (NTSB, 2014).

In addition to the safety concerns by the USCG, the vessel's crew was largely composed of mariners with little experience at sea, some of the crew only having experience on board that vessel. Most of the crew with less than 2 years of sea time. Accordingly, the knowledge on how to maintain the ship was called into question by the shipyard brew the previous September when the crew used inappropriate caulking for the setting of vessel seams. Considering this information, the ability of the crew to perform in an emergency could viably be called into question. Even though this was not a sailing cargo or sailing passenger vessel, in the next section of this paper it will show that there is an insufficient training standard for these vessels past what is learned by "on the job" experience.

The Maria Assumpta is another case of poor training and leadership leading to disaster. On May 30th, 1995 she sank off the coast of England after running aground. The Master relied on engines to get him out of trouble that he had no business being in, that was the proximity to shore, while under sail alone. When the engines failed to respond in the desired manner the ship was wrecked.

In this case, just as in the Costa Concordia the Master was too close to shore, in order to show off his beautiful vessel. This grandstanding resulted in loss of life as well. Proper maintenance of the fuel tanks may have possibly prevented the fuel contamination that caused the auxiliary engines to fail. But the fact is that the master had no business being that close to shore. Proper voyage planning under SOLAS and ISM should prevent these types of accidents from occurring.

WHAT IS THE COST TO THE INDUSTRY?

As we all know, time is money. Any mariner or company investing time and money into training must understand the purpose. The cost of training will vary, but in the United States a prospective mariner with no credentials can expect to spend around $1500.00 USD on courses, course materials such as navigation tools, and exam fees. Courses vary with levels of practical, hands-on work greater in some programs than in others. This calls into mind the need for proper sea-time with experience under a sailing master for a student to be considered competent enough to act in the official capacity as an officer or crew member.

OPPORTUNITIES FOR FUTURE TRAINING GROWTH

Despite the lack of training requirements by national bodies, a growing interest in the knowledge of sailing vessel operations and handling has grown. There are various training opportunities worldwide for those who wish to develop and hone their skills. The Bosun School onboard the SV Picton Castle is an opportunity for mariners to learn about the maintenance and operations of a sailing vessel, on a sailing vessel that gets underway.

The Enkhuizen Nautical College in The Netherlands has a two year program specifically designed for the training of sailing cargo vessels. Topics include seamanship skills, sailing theory, square rig sailing, and sailing vessel stability. Additionally, candidates receive basic instruction in engineering in order to work with what machinery is found on board.

For beginners looking to enter the industry through boat ownership experience training is highly recommended. The Royal Yacht Association as well as the American Sailing Association both offer courses that take the beginner through more advanced levels of sailing smaller craft. The limitation with these programs is that they are not designed for commercial operations, and mariners will not gain the knowledge necessary to handle cargo and the associated duties.

CONCLUSION

There is a large opportunity for growth in the sail freight industry, pushed by nostalgia and the need to reduce the carbon footprint of shipping in order to meet international regulations. However, the ease of entrance for the inexperienced to obtain credentials and the low bar set by credentialing bodies is a recipe for future disaster. It is the responsibility of the industry community of shipowners, cargo interests, regulatory bodies, and other such entities to ensure that the mariners crewing these vessels are of the quality and trained to the level of other seafarers serving in capacities at sea. As Felix Reisenberg once said, "The sea is selective, slow at recognition of aptitude, but fast in sinking the unfit."

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REFERENCES

American Sailing Association (2024) https://asa.com/ Accessed on June 4, 2024.

Boerne, G. (1999) Filling the gap: small inter-island Caribbean trading ships and their crews. Seafarer's International Research Center. Cardiff, Wales.

Carnegie, M. (2013) Sailing-trading livelihoods in southeastern Indonesia: adapting to change. Asian Journal of Social Science 41. 543-579.

Day, J (November/December 1979) The return of working sail. Wooden Boat, 31

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Naming ceremony held for SV Juren Ae, a wind-powered vessel supported by GIZ for the Marshall Islands. https://www.giz.de/en/worldwide/151066.html Accessed on May 29, 2024.

Ecoclipper www.ecoclipper.org accessed on May 8, 2024

Ellard, D. (2023) www.Gosailcargo.com Accessed on May 29, 2024.

International Maritime Organization International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978. https://www.imo.org/en/ourwork/humanelement/pages/stcw-convention.aspx Accessed on April 3, 2024

Jarvis, C. (2022). Archaeological classification of Age of Sail shipwrecks based on Genever's material culture. Heritage, 6(1), 397-416.

Jones, E (2023) Stratifying seamanship: sailors' knowledge and the mechanical arts in the eighteenth-century Britain. The British Journal for the history of science, 56. 45-63. www.doi.org/10.1017/S0007087422000425

Kozak, J., & Tarełko, W. (2011). Case study of masts damage of the sail training vessel POGORIA. Engineering Failure Analysis, 18(3), 819-827.

Lapko, A., Strulak-Wojcikiewicz, R., Landowski, M., & Wieczorek, R., (2018) Management of waste collection from the perspective of sustainable water tourism. Sustainability 11 (1) 121.

Lendjel, E., & Ahmed, A. (2021) Dhows tramping in the Horn of Africa: An initial characterization of their specific services using Djibouti port data. Case Studies on Transport Policy 9 (2021) 80–94.

Luce, S. (1884) Textbook of Seamanship. The equipping and handling of vessels under sail or steam. D. Van Nostrand, New York.

National Transportation Safety Board (06 February 2014) Sinking of the Tall Ship Bounty.

Parrott, D (2004) Tall Ships Down: The last voyages of the Pamir, Albatross, Marques, Pride of Baltimore, and Maria Asumpta. Ragged Mountain Press

Picton Castle (2024) Bosun School. https://picton-castle.com/bosun-school/ Accessed on June 4, 2024.

Royal Yacht Association. https://www.rya.org.uk/training/sail-cruising Accessed on 04 August 2033.

Schooner Apollonia. www.schoonerapollonia.com accessed on May 8, 2024

Southern Wooden Boat Sailing (2023) Big wood saves a little plastic. https://southernwoodenboatsailing.com/news/sailing-boat-rescued-by-the-gtheborg Accessed on May 25, 2024.

Timbercoast cargo under sail www.timbercoast.com/en/ship accessed on May 8, 2024

The Maritime Executive (November 16, 2023) Korean yard builds sail cargo vessel for Marshall Islands. https://maritime-executive.com/article/german-korean-partnership-builds-sail-cargo-ship-for-marshall-islands Accessed on May 29, 2024.

United States Coast Guard Maritime Safety Manual Volume III. https://www.govinfo.gov/content/pkg/GOVPUB-TD-PURL-LPS30039/pdf/GOVPUB-TD-PURL-LPS30039.pdf Accessed on May 28, 2024.

Woods, Steven (2023) The Sail Freight Handbook, Center for Post Carbon Logistics, Kingston, NY.

Woods, Steven (July, 8 2022) Sail Freighter Friday- Schooner John F Leavitt. Hudson River Maritime Museum. www.hrmm.org/history-blog/sail-freighter-friday-schooner-john-f-leavitt-1979. Accessed on May 19, 2024

Cargo Broker Directory:

FairTransport: Willemsoord 73, 1781 AS Den Helder, NL.

+31 223 683 516.

www.fairtransport.eu

Active since 2007. Focused on importation into the EU, especially, rum, coffee, chocolate, gin, beer, olive oil, wine, and other goods. Works with Bgn Tres Hombres, Kch Nordlys, Sch De Gallant, Sch Avontuur. Connections span North Atlantic basin.

New Dawn Traders: Unit 5B, Waterside House. Penryn, Cornwall, UK, TR10 8BD.

+44 (0)1326 330 456.

www.newdawntraders.com

Active since 2012. Coffee, Unrefined Sugar, Olive Oil, Olives, Salt, Rice, and other sail freight goods. Primarily focused on importation to the UK. Works with multiple vessels, including Lgr Greyhound, Sch Avontuur, Sch Ide Min. Connections span the North Atlantic basin.

Schooner Apollonia: Hudson, NY 12534.

(518)303-6060.

www.SchoonerAopllonia.com

Active since 2020. Focused principally on moving cargo in the Northeastern US, and on the Hudson River in particular. Works principally with their own vessel, and occasionally some others in the region. Existing connections to the Hudson Valley and surrounding areas.

Shipped By Sail:
9 Wheatstone Court, Waterwells Business Park, Davy Way, Quedgeley, Gloucester, Gloucestershire, GL2 2AQ.

www.shippedbysail.org/ships-partners

Active since 2022. Focused on olive oil, coffee, and chocolate. Works with Kch De Tukker, Sch De Gallant, Sch Avontuur, Sch Ide Min, Bgn Tres Hombres, Kch Nordlys. Connections across Europe and to Colombia.

Sources For Vessel Plans

The following catalog of ship plans has been compiled to make sourcing vessel options easier for perspective operations. These have varying costs, tonnages, and features, and include links to specifics wherever possible. The information here is the most complete data available at the time of publication, and any naval architect interested in providing further detail is welcome to do so via the contact information at the beginning of this publication.

GoSailCargo.com: The Electric Clippers. All have aux electric Engines, fore-and-aft rigs, and automation where possible. Steel Hulls, aluminum used aloft. Passenger capable for all models over 40 ft. www.gosailcargo.com

- 110 Ft Cmp GfKch. 180 CDWT, 4 TEU/GC. 6 Cr. 6 Pax.
- 50 Ft Cmp GfKch. 20 CDWT, 1 TEU/GC. 2 Cr. 2 Pax.
- 74 Ft Cmp GfKch. 50 CDWT, 1 TEU/GC. 3 Cr. 4 Pax.
- 40 Ft Cmp GfKch. 12 CDWT, 1 TEU/GC. 15 GRT. 2 Cr.

Tad Roberts Yacht Design: Steel Gaff Schooner with Aux diesel design for cargo use in three sizes. 5 sizes of fishing schooners set up for . https://www.tadroberts.ca/

- 80 Ft Stl 3GfSch. Fsh.
- 64 Ft Stl Sch. Fsh. Set up for trolling.
- 60 Ft Stl Sch. Fsh. Longliner.
- 60 Ft Stl GfSch. 18 CDWT, GC. 29 GRT. 3 Cr.
- 52 Ft Stl GfSch. 15 CDWT, GC. 18 GRT. 3 Cr.
- 42 Ft Stl Sch. Fsh. 3 Cr. Motor-sailer.
- 39 Ft Stl MarSch. 10 CDWT, GC. 15 GRT. 2 Cr.
- 36 Ft Stl Sch. Fsh. 3 Cr.

TransTech Marine Co: ErieMax sail-electric canal and coastal cargo boat. www.shipshares.com/Eriemax%20Final%20Report.pdf.

- 80 Ft Stl Jnk Sch. 100 CDWT/GRT 100 GRT. GC.

Greenheart Vessel: Open-Source design for the South Pacific Island Trade, initially developed in 2015. www.researchgate.net/publication/359823977

- 105 Ft Stl MarCat. 70 CDWT, GC. RORO. 16 Cr.

The Center For Post Carbon Logistics: Open Source designs for Ceres-Class sailing barge available through CPCL are also included in the Sail Freight Handbook, 2nd Edition. www.postcarbonlogistics.org

- 39.5 Ft Plw SptYwl Barge. 10 CDWT, GC. 14 GRT, 3 Cr.

Triloboat: Plywood sailing or motor barges, designed for easy, fast, & cheap construction. All Plans $15. http://www.triloboats.com/

- 32 ft Plw JnkSch. GC.

Thomas Colvin Pinky Schooner Design: In the book Steel Boat Building (2 Vols) International Marine Publishing Co, 1985. Thomas Colvin's design #169 is included in the book and can be replicated from those plans. https://archive.org/details/steelboatbuildin01colv

- 42ft Stl GfSch. 7CDWT/350 Ft3. GC. 2 Cr.**Marigraph Design:** Plans for Sch Avontuur from 2016 yard work period. https://www.marigraph.com

- 143 ft Stl. GfSch, 114CDWT/4,767 ft3. GC. 6 Cr.

George Buehler Yacht Design: Multiple simple designs made for backyard builds in lumber-yard materials. Modification to the hull interior layout may be necessary to create a cargo version. All require two crew at minimum. https://georgebuehler.com/sailboats/

- 50 ft Plw Sch "Gulnar'e" GC.
- 44 ft Plw Sch "Resolute" GC.
- 39 ft Plw GfKch/GfCtr "Hera" GC/Fsh.
- 30 ft Plw/Stl Ctr "Grizzly Bear" GC.
- SEE ALSO: Buehler, George. Buehler's Backyard Boatbuilding. Camden: Int'l Marine, 1991.
- Buehler. Buehler's Backyard Boatbuilding For The 21st Century. Camden: Int'l Marine, 2014.

Design for Tonga from 1985 ADB Conference Proceedings. There is a basic design for a cargo and passenger vessel in the Proceedings of Regional Conference on Sail-Motor Propulsion Manila: Asian Development Bank, 1985. See page 147 for sketches.

- 74 ft Stl. Kch. 20 CDWT, 60 m3. GC. 25 Pas.

MERISE, Ville Linden: 2018 Master's Dissertation design for Solent University, Southampton UK. Preliminary design/study package available from the designer at ville@merise.fi

- 65 ft Wd GfSch, 20CDWT, GC. 36 GRT.

Dudley Dix Yacht Design: Steel multi-chine schooner designed for general cargo work. 25 CDWT may be optimistic. https://www.dixdesign.com/cargo50.htm

- 52ft Stl GfSch. 25 CDWT, 1520 cu ft. GC. 2 Cr.

Kasten Marine: A pair of shallow draft skipjack schooners designed for trading worldwide while being very comfortable for the crew. www.kastenmarine.com/cargo_skipjack_100.htm

- 100 ft Stl MarSch. 28 CDWT. GC.
- 120 ft Stl MarSch. 44 CDWT. GC.

Olivier Van Meer: Not a lot of detail publicly available on this design for a simple cargo vessel on the larger side for a cutter rig. www.oliviervanmeer.com/yachts/5868/91--sailing-freighter.html

- 91 ft Alu MarCtr. 91 CDWT. GC/CC. 3 Cr.

Bruce Roberts Yacht Design: Designs for steel and aluminum which have been constructed and sailed in the passenger business, though it is unclear if they have been used for cargo, despite being designed for it. Cargo volumes, capacities, and other information are not indicated. www.bruceroberts.com/public/HTML/descriptions/trader65_description.htm

- 65 ft Stl/Alu/Wd GfKch. GC.
- 76 ft Stl/Alu/Wd 3MarSch. GC.

Manta Marine Design: Plans for several vessels may be available from this company, in part or complete. www.mantamarinedesign.com/tallships

- 124 ft Wd 3TsGfSch. 250 CDWT/350 m3. GC. 12 Cr.

- 79 ft Wd Bgn. 35 CDWT/41 m3. GC. 12 Cr.

Traditional Boats Of Ireland Project: There are two sources for these designs: The larger boat is depicted in: Richard J. Scott, The Galway Hookers: Working Sailboats of Galway Bay Boyle: Ward River Press, 1996. The smaller is found in the Traditional Boats Of Ireland Project: http://tradboats.ie/projects/west/typical-galway-hooker/. The plans in Scott's work include lines and sail plan. A Ketch commissioned in 1926 for the Falkland Islands, the A K Ilen served as a working vessel there for nearly 60 years and documented and restored in the late 1990s.

- 56 ft Wd GfKch. 20 CDWT. GC.
- 40 ft Wd GfCtr. 10-12 CDWT. CG. 2 Cr.

- 35 ft Wd GfCtr. 5-8 CDWT. CG. 2 Cr.

Norfolk Wherry Plans: Plans for a Norfolk Wherry can be found in Clark's book on the subject. Designed with a counter-weighted mast designed for quick lowering and raising while shooting under low bridges, a detachable keel, and other features for use on inland waterways and canals. SEE: Clark, Roy. Black Sailed Traders: Keels and Wherries of Norfolk and Suffolk. London: David & Charles, 1972. Reprinted by Peacock Press, 2019.

- 57 ft wd GfCat. 10-20 CDWT. GC. 2 Cr.

Small Fishing Vessels: The following design was developed for use in the Philippines in the 1970s oil crisis. Designed for multiple uses as either a yacht for tourism and passenger use, a mother ship for fishing, or cargo movement over short distances with smaller loads. SEE: Brown, J. W., & National Conference on Applications of Sail-Assisted Power Technology. New working watercraft: a return to former capabilities. Virginia Institute of Marine Science, William & Mary, 1982. https://scholarworks.wm.edu/reports/1970/

- Ply MarSlp. Fsh. 1 CDWT, GC, 2 Cr. Catamaran.

Harry Proa Design: This mid-range proa design is set up for the Pacific Islands, and made specifically for supplying small villages. Shallow draft, possible to handle passengers, and designed for inexpensive manufacture. http://harryproa.com/?p=2561

- 79 ft Cmp JnkSch. 10 CDWT. GC. 2 Cr. 20 Pas. Catamaran.

Windschip Project: There are 14 designs from this Naval Architect ranging up to 15,000 tons. All Steel Hulls, using modern rigs. See www.windschip.nl for additional information. Only vessels under 500 tons are listed here.

- 112 ft Stl DynBgn. 282 CDWT, GC, 4 Cr.
- 120 ft Stl DynBg. 358 CDWT, GC, 7 Cr.
- 125 ft Stl DynBgn. 274 CDWT, GC, 5 Cr.
- 141 ft Stl DynBkn. 400 CDWT, GC, 6 Cr.

Olsen, Crane, and Ladd. "Design Overview And Economic Analysis Of The Aquaria ~ Sail Assisted Fishing Vessel." International Conference on Design, Construction, and Operation of Commercial Fishing Vessels Florida Sea Grant College, 1985. repository.library.noaa.gov/view/noaa/39696

- 38 ft Stl MarSlp. 3.25 CDWT, Fsh.

Historic American Engineering Record. This record of historic engineering in the United States is maintained by the Library of Congress, and contains a number of vessels which may be of interest to modern sail freight and working sail projects. Plans are normally very detailed, as are descriptions of specific pieces of gear used on the vessels. Tables of offsets and scantlings are frequently included as well.

- 50 ft Wd BMrSlp. 12 GRT, GC/Fsh, 5 Cr. "Kathryn" https://www.loc.gov/item/md1454/
- 52 ft Wd BMrSlp. 19 GRT, GC/Fsh, 5 Cr. "E.C.Collier" https://www.loc.gov/item/md1203/
- 59 ft Wd GfSch. 41 GRT, GC, 4 Cr. "Scow Sch Alma" https://www.loc.gov/item/ca1505/
- 75 ft Wd GfSch. 60GRT, Fsh, 6 Cr. "Lettie G Howard" https://www.loc.gov/item/ny1621/
- 112 ft Wd GfSch. 98 GT, GC/Fsh. "Ernestina" https://www.loc.gov/item/ma1719/
- 156 ft Wd 3GfSch. 468 GRT, GC, 10 Cr. "Wawona" https://www.loc.gov/item/wa0212/
- 219 ft Wd 3GfSch. 453 GRT, GC, 9 Cr. "C A Thayer" https://www.loc.gov/item/ca1506/

Marshall Islands Inter-Lagoon WAM Vessels. Developed for the inter-lagoon transport segment of the Marshall Islands-Germany collaboration, this set of vessels is designed to be built with a stitch-and-glue method out of plywood, and to be as self-sufficient as possible when serving isolated islands and atolls. Further development is scheduled for improving the designs. https:/changing-transport.org/wp-content/uploads/2020_MarshallIslandsWorkshopdocumentation.pdf

- 7.5m Ply Slp. 1.5 CDWT, GC. Proa.
- 6.5m Ply Slp. 0.73 CDWT, GC/Fsh, 1 Cr. Catamaran

Maine Maritime Museum. Two significant plans are available from the Maine Maritime Museum: a Tancook Whaler and a Pinky Schooner, both of which were built based on historic models in the late 1970s. Both were successfully used for sail freight and training operations. https://maine-maritime-museum-store.myshopify.com/collections/vessel-plans

- 34 ft Wd GfSch. 3 CDWT, GC, 2 Cr. "Vernon Langille"
- 38 ft Wd GfSch. GC "Maine"

Annotated Bibliography of Sources for Working Sail Research

Abstract: This Annotated Bibliography covers a myriad of sources on Working Sail for use of researchers across the field. Working Sail is different from Windships and Wind-Assisted propulsion, and thus needs its own set of sources to understand it outside the narrowly technical details of ship design.

Keywords: Working Sail; Sail Freight; Fisheries; Maritime Decarbonization; Coastal Trade

This annotated bibliography is not definitive or exhaustive, but a starting place for research on working sail in Small Windships. It is advised that anyone starting toward an understanding of wind propulsion in Small Windships will read not only these articles, but will use the cited references found in these articles to continue their research. Additional research materials and further reading suggestions can be found in the Sail Freight Handbook's 2nd Edition, cited below.

The bibliography is divided into the following segments: Historical Working Sail; Oil Crisis Era Research; Modern Research; Fishing and Fisheries; and Miscellaneous. These sections should be considered overlapping, and simply a means of general categorization, as opposed to rigid typologies. The last section includes journals and publications to watch for more information as it is published.

HISTORICAL WORKING SAIL:

Alvarez-Palau, Eduard, and Oliver Dunn, "Database of Historic Ports and Coastal Sailing Routes in England and Wales", Data in Brief 25 (2019), DOI: 10.1016/j.dib.2019.104188 - This database of ports and sailing routes documented over centuries can be used for understanding not only how historic networks functioned, but how moderns ones may eventually also take shape. With extensive maps and good presentation and writing throughout, this is a worthwhile study of a functioning sail freight network over a very long period.

Armstrong, John. "Management Response in British Coastal Shipping Companies to Railway Competition." The Northern Mariner / Le marin du nord (1997): n. Pag. www.cnrs-scrn.org/northern_mariner/vol07/tnm_7_1_17-28.pdf - The importance of coastal sailing and waterways trade before the advent of the railways cannot be overemphasized, and the role of competition between these two technologies must be understood to give an accurate picture of how and why coastal sailing and shipping changed over the course of the 19th century. In modern carbon-constrained economies, coastal sail freight will be competing in much the same way against trucks and trains, and thus this relationship between the two types of transport must be understood. While focused on the United Kingdom, the principles apply to all coastal trade moving parallel to rail or road transport worldwide.

Armstrong, J.. "The Role of Coastal Shipping in UK Transport: An Estimate of Comparative Traffic Movements in 1910." The Journal of Transport History, 8(2), (1987) 164–178. https://doi.org/10.1177/002252668700800204 - A treatment of the use of coastal trade in the pre-WWI era in the UK, this work reveals the significant competition which carried on between coastal carriers and railroads to move essential goods around the UK as late as 1910. With sail still contributing a large amount of tonnage for coastal trade at the time, this is a worthwhile study for those looking to understand a truly "polytechnic" (see below) transportation system can function.

Bogaars, George. "The Effect of the Opening of the Suez Canal on the Trade and Development of Singapore." Journal of the Malayan Branch of the Royal Asiatic Society 28, no. 1 (1955): 99-143. http://www.jstor.org/stable/41503171. - The trade of Singapore jumped significantly when the Suez Canal opened, and the island became a major coaling station into the middle of the 20th century. This is related to the fall of the sailing vessel from favor on the Europe-India-China route, due to the opening of the canal. By analyzing these types of changes with both technology and infrastructure, it is possible to not only learn historical lessons, but document how changing technology and trade routes will likely effect modern projects.

Bullers, Rick. ""Annie Watt": The Career of a Coastal Trading Ketch." The Great Circle 36, no. 1 (2014): 8-32. http://www.jstor.org/stable/24583016 - The Ketch Annie Watt was in service as a lighter and coastal trader in Australian waters for approximately 100 years, and was the last ketch still trading when she retired. Her long career through the transition away from sail, and the efforts to preserve her are both worth understanding: The survival of small-scale coastal and riverine trade under sail long past the decline of working transoceanic sail is a lesson applicable today to sail freight revivals, as is the cultural impulse to preserve these "last" working vessels. The main lesson is that when a ship stops working, it will eventually fall apart, but at the same time a large amount of cultural effort will be made to prevent this decline if possible. These trends can be used together successfully in sail freight projects such as Tres Hombres, Avontuur, and Nordlys, and this paper helps build an understanding of the forces at work.

Casson, Lionel. "Speed Under Sail of Ancient Ships." Transactions and Proceedings of the American Philological Association 82, (1951): 136-148. http://www.jstor.org/stable/283426 - Understanding the speed of historic ships can give a reasonable expectation of what modern performance may be like before a network of active windjammers can provide newer and more realistic figures. This paper gives a good overview of speeds at various seasons, as well as a treatment of how this effected ancient commerce in the Mediterranean basin.

Clark, Michael. "'Bound Out For Callao!' The Pacific Coal Trade 1876 To 1896: Selling Coal Or Selling Lives? Part I." The Great Circle 28, no. 2 (2006): 26–45. http://www.jstor.org/stable/41563218. - This paper covers conditions and patterns in the Pacific Coal Trade in the last quarter of the 19th century. In an era where coaling stations for steamships had to be supplied by the windjammer fleet due to steam power's inefficiency problems, this study can give insights into the later large scale trading networks which functioned almost entirely under sail. This is an especially important read for anyone focused on working sail in the Pacific, historic, contemporary, or future.

Clark, Roy. Black Sailed Traders: Keels and Wherries of Norfolk and Suffolk. London: David & Charles, 1972. - If you ever thought that you couldn't sail efficiently in a canal because of all the bridges, the Norfolk Wherries have something else to say on the subject. This book covers not only the technical adaptations of these boats to inland sailing in narrow waterways frequently crossed by low bridges, but covers the economic, social, and cultural roles these vessels served in their heyday and as converted pleasure craft as their cargo businesses declined.

Dunn, Oliver. "A Sea of Troubles? Journey Times and Coastal Shipping Routes in Seventeenth-Century England and Wales." The Journal of Transport History 41, no. 2 (August 2020): 184–207. https://doi.org/10.1177/0022526619886061.

- Understanding the time taken to move goods is essential for sail freight, as is a knowledge of what a functioning network of ports looks like. This study of England and Wales in the 17th century gives just this type of information, and how these networks fit together for coastal trade.

Foerster, Ernst. "What Results Were Obtained With The Rotorship?" Marine Engineering And Shipping Age 30:5 (1925) 275-279 books.google.com/books?id=hsIOsl7l0IAC&pg=PA275 - A contemporary account of the initial trials of a Flettner Rotor equipped schooner in 1925. Mostly of academic interest, it is an important indication of the post-Great War interest in wind propulsion which remained, despite the supposed vast superiority of steam in that interwar era.

Gould, Richard A. Archaeology and the Social History of Ships. 2nd ed. New York, NY: Cambridge University Press, 2011. - This general overview of the history of ships is a good opening work for those looking to get the basics of historic maritime trade under their belt.

Kahre, Georg. The Last Tall Ships: Gustaf Erikson and the Aland Island Sailing Fleets, 1872-1947 Basil Greenhill, Ed. London: Conway Maritime Press, 1990. - This biography and history of Gustaf Erikson's fleet of Windjammers is a solid study of the man who ran the last fleet of transoceanic windjammers in the 20th century. As a starting place for further research it is a must-read, and the analysis of economic conditions which allowed the fleet to stay in operation is helpful for current efforts to revive working sail.

Kaukiainen, Yrjö. "Baltic Timber-Trade Under Sail: An Example Of The Persistence Of Old Techniques." Sail and steam: selected maritime writings of Yrjö Kaukiainen. Research in Maritime History 27. St. John's: International Maritime Economic History Association, 2004. Pp 101-112 https://archive.org/details/sailsteamselecte0000kauk - This study of the Baltic Timber Trade under sail in the 20th century covers the economic and social forces which kept sailing vessels, many of them relatively small, in service in the Baltic timber trade even after the Second World War. This article is specific to the Baltic, but the general trends and forces involved are important to understand as they re common to other regions and fleets as well, to the present day.

Kaukiainen, Yrjö. "Coal and Canvas: Aspects of the Competition between Steam and Sail, c. 1870-1914." Sail and steam: selected maritime writings of Yrjö Kaukiainen. Research in Maritime History 27. St. John's: International Maritime Economic History Association, 2004. Pp 113-128 https://archive.org/details/sailsteamselecte0000kauk - This treatment of the pre-WWI competition between coastal windjammers and steamships in the Baltic is a vital look at what commodities shifted means of transport when, as well as the economic advantages of both steam and sail. Sail has lower capital expenses, but less intensive resource use, while steamships frequently made more voyages at higher expense per voyage. The competition and complimentary services offered by Sail and Steam up to the First World War are of interest when looking at the overall economics of small-sea shipping in an energy constrained environment.

Kaukiainen, Yrjö. "The Modernization of Finnish Coastal Shipping and Railway Competition c. 1830-1913." Sail and steam: selected maritime writings of Yrjö Kaukiainen. Research in Maritime History 27. St. John's: International Maritime Economic History Association, 2004. Pp 79-90 https://archive.org/details/sailsteamselecte0000kauk - As with Armstrong's articles listed above, coastal sailing vessels and railroads competed against each other for much of the 19th and early 20th centuries. This treatment of the subject in the Baltic is complimentary to Armstrong's studies of the UK, and brings further perspective to the land-and-sea competition of this era.

Liljegren, C. O.. "Coal, Oil Or Wind?" Transactions Of The Institution Of Engineers And Shipbuilders In Scotland 64 (1921). https://engineers.scot/resources/journals-transactions - The debate about the supremacy of internal combustion engines for ship propulsion lasted well into the 1920s, and this article is a study of a design for an auxiliary Schooner designed to gain maximal economic use of both sails and engines. Remarkable for both the economic and naval architecture analysis covered, this should be a critical read for those studying the decline of working sail, as well as a good read for those looking to design a similar type of vessel today.

Martin, J. C. "'Scows, and barges, or other vessels of box model': Comparative capital investment in the sailing scows of the Great Lakes of North America and in New Zealand." Int'l Journal of Maritime Hist, 30(1), (2018) 89–105. www.doi.org/10.1177/0843871417746290 - The Scow sloop or schooner was a boxy, normally ammature-made and ammature-operated vessels used in several locations across the globe due to their minimal capital and skill requirements for construction and operation. Not always the best sailers, these craft were, however, sturdy working craft capable of moving cargo where needed on a budget. This study is helpful not only for those making similarly low-capital sail freighters today, or researching historic trends, but those looking at how less-than-professional sailors and owner-operators can structure their other jobs around part time sailing.

Noble, D.S. "The Coastal Dhow Trade of Kenya" The Geographical Journal, Vol. 129, No. 4 (Dec., 1963), pp. 498-501. http://www.jstor.org/stable/1794664 - This snapshot of the Dhow Trade along the East African Coast is full of insights into a persistent and long-lasting traditional network of sail freight. Using mostly vessels between 6-60 tons displacement, approximately 300 dhows were operating along the Kenyan coast at the time of publication. This analysis of transport patterns, rationales, and conditions is short and easy reading, but packed with details.

Ó Sabhain, Pádraig Seosamh. "The centrality of the Galway hooker to dwelling in the island and coastal communities of south west Conamara." PHD Thesis. NUI Galway, 2019. https://aran.library.nuigalway.ie/handle/10379/15935 - The Galway Hooker is a relatively small general-purpose fishing, cargo, and passenger boat, normally gaff cutter rigged, which was absolutely central tot he lifeways of its region. This in-depth study shows how this connection continued into the 1950s-1960s, and how it effected modern lifeways by extension. Technical topics covered can also be helpful in thinking through modern challenges for small scale coastal freight projects and off-shore island supply operations worldwide.

Shaw, Earl B. "The Aland Islands." Economic Geography 15, no. 1 (1939): 27–42. https://doi.org/10.2307/141003. - A general study of the Åland Islands in Finland, this study touches on the "Farmer's Ships" community built and owned small vessels (predominantly schooners) used to move the island's farm produce, forest products, and fish to market in major Baltic ports such as Stockholm, Tallinn, and Helsinki. These ships were widely owned, with most citizens having some share in at least one vessel.Such a model is worth examining for many smaller scale ventures into working sail for fishing, freight, or other practical uses.

Shepherd, James F., and Samuel H. Williamson. "The Coastal Trade of the British North American Colonies, 1768-1772." The Journal of Economic History 32, no. 4 (1972): 783–810. http://www.jstor.org/stable/2117255. - By looking at networks along the east coast of what is now the United States, this study shows not only how social networks create trade networks, but gives an idea of what was moving and where in the period where roads were almost non-existent in the colonies, and coastal trade under sail was the rule.

Woods, Steven "Submarine Warfare and the Decline of Sailing Fleets, 1914–1918" Sea History 181, Winter 2022–23. seahistory.org/wp-content/uploads/Feature-article-SH181.pdf - It should be understood that Sail Freight did not disappear entirely on economic grounds, but was forced out by an outside influence: Submarine Warfare in the Great War. Attrition spiked significantly during the war among sailing vessels as they were unable to sail faster than U-Boats, and were also unable to take advantage of other means of avoiding predation. This resulted in a twofold effect for the decline of working sail in the Atlantic: First, few windjammers were left afloat, and these were generally on coastal routes; Second, the new objective for all new built ships during and after the war was to sail faster than 16 knots, the speed needed to successfully minimize risk of submarine attack. This led to the normalization of high speeds for ships, as well as the ultimate doom of transatlantic sailing trade in the 20th century.

Oil Crisis ERA Research:

Proceedings of Regional Conference on Sail-Motor Propulsion Manila: Asian Development Bank, 1985. www.hrmm.org/uploads/2/6/3/3/26336013/proceedings_of_regional_conference_on_sail-motor_propulsion__18-21_nov_1985_.pdf - This work, referenced several times below, is a major compilation of research and findings which should be read by everyone involved in sail freight. This is especially the case for those involved in the small vessel sector. The theory, economics, and much of the technical knowledge of the Oil Crisis era is contained in this volume, from strict sailing theory to relative performance studies, economic studies, and more. The publication can be found at the link above through the Hudson River Maritime Museum's exhibit "A New Age Of Sail" or by writing to the publications office of the Asian Development Bank.

UNK "They All Laughed When Cap't Briggs Went Sailing" Coast Watch Feb 1981. UNC Sea Grant, 1981. https://tugantine.com/wp-content/uploads/2023/02/1981-CoastWatch.pdf - An account of the "Tugantines" Steel Rebel and Norfolk Rebel (The later is still in service). Both vessels were tugboats operating under a traditional schooner rig, saving significant fuel in tugboat operations without significant safety challenges.

Bergeson, Lloyd and Christopher Greenwald. "Sail assist developments 1979–1985." Journal of Wind Engineering and Industrial Aerodynamics 19 (1985): 45-114. www.homepages.ed.ac.uk/shs/Climatechange/Flettner%20ship/Bergeson_JWindEng_1985.pdf - An overview of wind assisted propulsion efforts in the US and elsewhere to 1985, this paper covers a number of successful projects and their impact on knowledge of and interest in wind assisted propulsion in the second half of the oil crisis era.

Bradbury, W. M. S. "A Review of Commercial Wind Propulsion Projects." Journal of Navigation 37, no. 1 (1984): 24–36. doi:10.1017/S0373463300023079. - A review of projects current in its time, this paper covers some which never moved past the stage of theory and design, and some which came to fruition. While the later are more useful in a practical sense, it is helpful to be aware of what was attempted and did not succeed (as well as why these projects failed) so as to avoid the same mistakes today. While useful principally as historiography, this is worth reading for anyone about to embark on a small vessel based transoceanic sailing project.

Brown, J. W., & National Conference on Applications of Sail-Assisted Power Technology. New working watercraft: a return to former capabilities. Virginia Institute of Marine Science, William & Mary, 1982. https://scholarworks.wm.edu/reports/1970/ - A study of efforts to apply simple construction techniques and appropriate technology to local boat forms in African and Pacific fisheries during the oil crisis, this work is a practical report which could be returned to without a lot of changes for the same work today in similar regions. The focus was on making these craft inexpensive, reliable, familiar, effective, and minimally reliant on imported resources. Discussing both technological improvements, practical possibilities, and the existing situation, this is well worth a read for anyone working in decarbonizing small fisheries.

Cook, Dick. "Sail Assist: Relief From The Oil Crunch?" Marine Resource Bulletin Vol. 14, No. 3, 1982. https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=1037&context=vimsmrb - This review of a Conference held in Norfolk VA in 1982 gives a good snapshot of the wind assist movement on the East Coast of the US in its era. The widespread use of small wind-powered vessels for cargo transportation, the application of wind-assist to tugboat operations, and a rise in the use of sails for fishing are all noted, as well as a description of both regulatory and economic challenges to the readoption of working sail. Proceedings for the conference were evidentially published, but are not currently available.

Crowdy, E. P. "The economics of sail." Proceedings of the symposium on wind propulsion of commercial ships. London: RINA, 1980. - This article is a good overview of the necessities for wind propulsion to compete against motor vessels in transoceanic trade. While specific to the 1980s when it was written, the basic principles remain the same and must be considered by projects in the transition age. This can be especially helpful for those looking to make policy decisions which favor wind propulsion for current decarbonization efforts.

Davis, Andy. "The Loss Of The John F Leavitt: A Naval Architect's Opinion." Wooden Boat Magazine 159, Mar-Apr 2001. Pp 42-47. - This analysis of the design for the ill-fated sch John F Leavitt is a good treatment of the subject. By looking at the design failures of the vessel itself, the challenges faced by the crew are put into perspective and common design issues which must be considered for current coastal windships are brought into focus. Includes plans and estimated stability curves for the Leavitt.

Day, Jane. "The Return Of Working Sail: Pointing The Way To The Future."Wooden Boat Magazine 31, Nov-Dec 1979. Pp 18-23. - This overview of the Northeast US working sail situation at the time of publication covers several vessels not mentioned elsewhere, while outlining the motivations, challenges, and successes of these vessels, most of which were newly launched at the time. While focused on New England, specifically Maine and Martha's Vineyard, the issues facing the vessels are made clear, especially the lack of living skills to handle them and challenges in locating cargo. This article is worth a read for those trying to compare the working sail environment today with that of 50 years ago.

Hamada, Noboru. "Japanese Modern Sail-Assisted Ships." Proceedings of Regional Conference on Sail-Motor Propulsion. Manila: Asian Development Bank, 1985. - Another major work from the ADB's 1985 conference, this overview of Japanese sail assisted vessels covers some as small as 319 tonnes, and as large as 6,500 tonnes, mostly tankers and bulk carriers. These vessels were cutting edge in their day, and saw up to 50% fuel savings compared to conventional vessels of their type and size through a suite of efficiency measures, including computer-controlled rigid sails. While this is a general overview of the vessel's records and performance, it is a good starting point for modern examinations of similar integrated efficient ship designs in the same size range.

Khan, M. H. and M Chowdhury. "Improved Sail Propulsion For The Country Boats Of Bangladesh" Proceedings of Regional Conference on Sail-Motor Propulsion Manila: Asian Development Bank, 1985. - Important reading for anyone interested in the use of wind for inland waterways and coastal trade in a traditional network, this paper covers the sailing technology and other means of primarily human-powered propulsion used in the country boats of Bangladesh in the 1980s. The challenges of navigation, consequences of civil engineering projects for water flows, and use of tide and currents is all worth noting. The economics and technology are covered, from a micro to macro level.

Koltz, Bruce George. "The reintroduction of sail for marine commerce: and the consequent effects upon small port economy and trade routing" Master's Thesis. University of Notre Dame, 1980. https://calhoun.nps.edu/handle/10945/19039 - This Master's Thesis covers not only wind propulsion, but the likely effects and adaptations to port infrastructure needed to adapt to a wind-powered maritime economy. By differentiating between sail- and steam-ports based on the ease of entering and leaving a port under wind power alone, looking at the needs of a proliferating small vessel fleet, and the fundamental differences between motor and sail technologies for specific purposes, this thesis is a must-read for those looking at what infrastructure changes need to happen for coastal and international trade under sail.

MacAlister, R.G. "The retrofitting of sail to two existing motor ships of the Fiji Government fleet." Proceedings of Regional Conference on Sail-Motor Propulsion Manila: Asian Development Bank, 1985. - The oil crisis hit Fiji and the Pacific Island States especially hard, and wind assisted propulsion was applied to two vessels of the Fiji Fleet, both between 275-350 tonnes. This paper covers the successes and challenges to these retrofit projects, and gives a very promising view of the efficacy of applying simple soft-sail rigs to existing motor vessels to reduce fuel use and carbon emissions. This same technique has been used on the SV Kwai in more recent times, with great success, and should be imitated across the board on small vessels to rapidly decrease fossil fuel dependence and greenhouse gas emissions.

Mays, James "Power Routing: Optimal Sail-Assisted Energy Use Strategy." Proceedings of Regional Conference on Sail-Motor Propulsion Manila: Asian Development Bank, 1985 - With any motor-sailing vessel, an engine use strategy needs to be established. This can be based on economic, emissions, or speed optimization, and all aspects of this energy use strategy planning and execution are covered in this paper.

Palmer, Colin. "Measurements of the comparative performance of sailing rigs." Journal of Wind Engineering and Industrial Aerodynamics Vol 19:1, July 1985, Pp 311-333 www.doi.org/10.1016/0167-6105(85)90067-4 - While there is a long-standing debate in racing circles about the relative performance of specific rigs for high-performance sailing, there is little study about rigs for working sail. This paper is a digression from this trend, and covers a study of four types of traditional soft-sail rigs: Bermudan (Marconi), Gaff, Spritsail, and Lateen. The results are covered in this paper, for ease of use, upwind sailing ability, safety, and usefulness in light to moderate winds: Sprit and Gaff rigs performed as well or better than the Bermudan/Marconi rig, though all were relatively similar in performance.

Palmer, C. and E.M.J Corten "Preliminary Design Study Of Intraisland Transport Vessels For The Ha'apai Group Of Islands In The Kingdom Of Tonga." Pp 133-172 Proceedings of Regional Conference on Sail-Motor Propulsion. Manila: Asian Development Bank, 1985. - This early-stage design study is a look at what services were needed in the Kingdom of Tonga at the time, and develops a motor-sailing vessel for that trade specifically. This is an important paper to read and understand if working with an archipelago as the principles are quite universal, and for its target region is a good place to start from in designing a new vessel for the same trade over 40 years later.

Satchwell, C.J. "Preliminary analysis of of log data from the Fiji windship 'Cagidonu'" Ship Science Report No. 24 (University of Southampton, April 1986) https://www.wind-ship.org/en/research/ (Accessed 6 March 2022) - The Cagidonu was a Fijian motor vessel retrofitted with a simple rig in 1985 to improve fuel efficiency. This paper gives the initial results, which were promising on all routes served and overall, with an average of 30% saving,s and up to 60% at 8 knots on favorable routes.

Scott, H.F. Morin. "The Case For Traditional Sail." Journal of Wind Engineering and Industrial Aerodynamics 19:1-3, 1985, 335-349. https://doi.org/10.1016/0167-6105(85)90068-6. - This article gives a case for using well-understood and simple, inexpensive, traditional rigs for reducing fuel use in conventional shipping. Under the heading of 'Traditional Sail' is included several derivative technologies, such as Dynarig and other similar systems.

Shortall, John W. Sail Assisted Commercial Marine Vessels: Bibliography and Abstracts Technical Paper 28, Mar 1983. USF. repository.library.noaa.gov/view/noaa/35315 - This annotated bibliography from 1983 gives a directory of papers written up to that point about wind propulsion. While many of these articles are difficult to find now, the amount of research can be revealing, and this is a good place to start for anyone looking to research the oil crisis era of wind propulsion developments.

Spectre, Peter H. "North Atlantic Shakedown: The Abandonment Of The John F Leavitt." Wooden Boat Magazine 33, Mar-Apr 1980. 20-28. www.woodenboat.com/search-back-issues-woodenboat-magazine - A detailed account of the loss of the Sch John F Leavitt in December of 1979, this account tells most of the details necessary to understand how and why this iconic and much-praised schooner went down when it did. A combined lack of experience, shirking safety regulations, lack of sea trials,, poorly secured gear on deck, bad (but predictable) weather, and poor cargo loading all contributed to the sinking. The contrast between what the vessel was meant to take on and the voyage attempted are also touched upon, though not emphasized in detail. Assembled principally from first hand accounts and reliable sources, the story is a comprehensive view of the vessel's loss and the risks of amateurs taking on the North Atlantic in winter.

Wind Ship Development Corporation, Wind Propulsion For Ships Of The American Merchant Marine Norwell, MA: WSDC, 1981. books.google.com/books?id=QxVUAAAAMAAJ -This study was a landmark book for its time. A comprehensive analysis of technologies, costs, relative costs, economics, and trade routes for its time, the work is detailed while remaining highly readable. Included are chapters on engine use strategies, definitions for different types of wind propulsion, discussion of what types of ships are easily converted to wind-assist, and more. While not focused on small vessels, the principles are explained clearly, and the discussion of theory is applicable to vessels of all sizes. This is freely available on Google Books, as it is a MARAD report, and public domain.

Modern Research:

Beorne, Geoffery. Filling the Gap: Small Inter-Island Caribbean Trading Ships and their Crews. Cardiff, UK: Seafarers International Research Centre, 1999.
wind-ship.org/en/research/
This study of both Caribbean and East African small vessel trading networks is now dated for its specific findings, but general trends seem to remain intact. For those studying survival of traditional networks of windjammer trade, this is a significant work. It is also an important read for anyone looking to understand the dynamics of small vessel trade in the Caribbean, which is a prime area for re-introducing sail in the near future.

Bonvento, Matthew. "Training Requirements For Seafarers On Wind-Powered and Wind-Assist Vessels" Proceedings of the Sustainability In Ship Design and Operation Conference 2023. Glen Cove: Webb Institute, 2024.
https://www.webb.edu/2023-sustainability-in-ship-design-and-operations-conference/
A comprehensive review of what it would take to develop an industry-recognized, internationally accepted sailing master certificate to prevent further tall ship incidents and encourage crew mobility in the sail freight field, this paper is worth reading for every prospective sail freighter officer. While the actual certificate requirements are a ways off and need to be developed, the concerns presented here are paramount to maintaining safety, trust, and crew mobility during the revival of sail freight.

Boykett, Tim, and Steven Woods "Energy Security Scenarios" Proceedings Of The Conference On Small Scale Inland And Coastal Sail Freight. Kingston: Hudson River Maritime Museum, 2022.
https://www.researchgate.net/publication/365440242
Sail Freight has a distinct role to play in any Energy Security or Energy Independence consideration as fossil fuels become scarcer and geopolitical tensions further increase energy prices. The following scenarios are designed as thought experiments for the conference's participants along with those engaged in other coastal transport not involving wind propulsion. Other sail freight projects would do well to answer the same questions early and often for use in their own marketing and strategic planning efforts.

Carnagie, Michelle. "Sailing-Trading Livelihoods in Southeastern Indonesia: Adapting to Change" Asian Journal Of Social Science 41:6, 2014.
doi.org/10.1163/15685314-12341330
A good look at how sail trading lives have been made harder by modern regulations and economic circumstances in Indonesia, and how traders under sail in this surviving traditional network have adapted in recent years. While findings are specific to Indonesia and the paper is now 10 years old, the findings are important to anyone studying surviving sail freight networks.

De Beukelaer, Christiaan. "Tack to the future: is wind propulsion an ecomodernist or degrowth way to decarbonise maritime cargo transport?" Climate Policy, 22:3, 310-319,
DOI: 10.1080/14693062.2021.1989362
Examining the Sail Freight movement and wind propulsion more generally as a degrowth and ecomodernist approaches, this paper provides a well-reasoned and well informed assessment of the probabilities of change, the political economy of change, and how the issues of at-scale deployment and cultural barriers around demand influence the probability of achieving IMO decarbonization goals.

De Beukelaer, Christiaan, Trade Winds: A Voyage To Zero-Emissions Shipping Manchester: Manchester University Press, 2023
Part voyage account, and part study of the current shipping situation with a sober overview of the role of sail freight in the immediate future, this book is well worth reading by anyone interested in Sail Freight. By talking about both the regulations, problems, and practical challenges of Sail Freight and the current shipping situation, this work brings an accessible voice to the debate which can be understood by experienced sailors and landspeople alike.

De Haan, N A., Et Al. "Evaluation And Adaptions To The Greenheart Project Zero-Emission Vessel For Service In The Pacific Islands" Intl J Maritime Eng, Vol 163, Part A4, Oct-Dec 2021.
DOI: 10.5750/Ijme.V163ia4.735.
The Greenheart Vessel was an open-source zero-carbon sailing vessel design developed for deployment in the South Pacific Islands trade in 2015. This paper re-evaluates the design based on updated used requirements, gives necessary modification, and other suggestions which make it better suited to its environment. This is another step toward the vessel's construction and employment in future to reduce carbon emissions and economic dependency on imported fuels in the region.

Held, Raffael, Janina Laurent, Michael Vahs, Siegfried Wagner, Sascha Strasser, and Henrik Richter-Alten. "Transitioning to Low Carbon Sea Transport in the Marshall Islands" Proceedings of the International Academic Conference on Shipping, Sustainability, and Solutions. Hamburg: KLU, 2023.
https://www.klu.org/fileadmin/klu.org/media/faculty_and_reserach/research_collaboration/research_centres/Hapag_Lloyd_Centre/SSS2023_Conference_Proceedings.pdf
This extensive study (26 pages) of sustainable sailing cargo and passenger operations and transitions in the Marshall Islands is a fantastic study of vessel design for purpose, as well as integrated policy and support measures for those vessels. Included is information on policy efforts, training arrangements, ship design (3-masted Indosail-rigged schooner), intra-atol small boat designs and manufacture, and other information relating to routing and wind resources in the area. Well worth the time and effort to read, this is a model applicable to many similar regions, and the results of these developments in the next few years are worth keeping up with.

Kelen, Alson J., Henrik Richter-Alten. Transitioning to Low Carbon Sea Transport (LCST) - Lagoon Transport WAM Prototype Workshop 2020—Documentation Report. Berlin: GIZ GmbH, 2020.
https://changing-transport.org/publications/low-carbon-sea-transport-prototype-workshop/
A study of the inter-lagoon prototype WAM catamaran and proa designs, this publication includes design and construction information, as well as information on traditional vessels and user requirements.

Lendjel, Emeric, and Achaa Abdillahi Ahmed, "Dhows tramping in the Horn of Africa: An initial characterization of their specific services using Djibouti port data," Case Studies on Transport Policy, 9:1, 2021, pp 80-94.
https://doi.org/10.1016/j.cstp.2020.10.001
This case study of a surviving traditional sail freight network gives figures for how this network operates in competition with more modern services and technologies. Likely to be most helpful to those looking at surviving networks, this paper can also provide some insight into how sailing networks can work viably alongside more carbon intensive technologies elsewhere.

Nuttal, Peter R. "Sailing For Sustainability: The Potential Of Sail Technology As An Adaptation Tool For Oceania. A Voyage Of Inquiry And Interrogation Through The Lens Of A Fijian Case Study" Ph.D Thesis. Victoria University of Wellington, 2013.
doi.org/10.26686/wgtn.17005294.v1
This Doctoral Thesis explores the use of sail as a culturally, economically, and technologically appropriate means of reducing emissions and energy import dependence for Pacific Island States. Examined at multiple levels, this thesis is well worth a read for anyone interested in either sail freight or energy security adaptations in the Pacific. Oriented primarily around Fiji, the findings of this study are generally applicable for most areas of the Pacific, and some parts can be applied to any archipelago facing similar issues of inter-island transportation, climate change, and energy constraints.

Perez, S; Guan, C; Mesaros, A; Talay, A, "Economic Viability of bulk cargo merchant sailing vessels" Journal of Merchant Ship Wind Energy, 17 August 2021.
https://www.jmwe.org/articles
This update of a 1970s-era MARAD study found a Dynarig-equipped vessel of 45,000 CDWT with a minimum-speed engine use strategy could compete favorably or out-compete a conventional motor vessel on any route over 3,000 nm when ship construction was less than 2 times the cost of a conventional vessel. This study, aimed at larger vessels, is still a helpful study in making general points about the value of wind propulsion and many of the points which give it economic and climate advantages compared to conventional shipping.

Perez, Sergio. "Downbursts, groundings, incompetence and other hazards to 21st century merchant sailing ships" Journal Of Merchant Ship Wind Energy. 4 December 2021.
www.jmwe.org/articles
The New Age Of Sail is going to have to face the same safety hazards as the old age of sail. This paper outlines these threats, and how they can be dealt with using modern technology, training, and awareness, as well as advances in ship design.

Polacheck, Tom. "Working Watercraft of Madagascar: How traditional boats sustain a society." Wooden Boat Magazine 275, July-August 2020. 76-82.
https://www.woodenboat.com/search-back-issues-woodenboat-magazine
This short overview of the Madagascar working sail fleet is a snapshot into a variety of influences on a local fleet, ranging from South Asian, Indian, Arab, and European. It is clear the traditional fleets of Madagascar still play a vital economic and social role in the community, substituting for many of the other transport technologies commonly found elsewhere due to local conditions. Fishing and freight fleets are covered in this article, which includes good quality photographs.

Prasad, Biman, Joeli Veitayaki, Elizabeth Holland, Peter Nuttall, Alison Newell, Amelia Bola, and John Kaitu'u. "Sustainable Sea Transport Research Programme: Toward a Research-Based Programme of Investigation for Oceania." Journal of Pacific Studies 33, no. 1 (2013): 78-94.
https://www.researchgate.net/publication/261950305
This paper, among others published by the USP's Sustainable Sea Transport Research Programme, is an introduction to the centrality of inter-island transport in the South Pacific, and the importance of both reducing climate-forcing emissions, but also fuel use intensity for the region. This study gives the research agenda which is ongoing to reduce fuel use and increase economic and energy self-sufficiency in the South Pacific Island States.

Richter-Alten, Henrik. "Development of a Sail Powered Cargo and Fishing Vessel for the Marshall Islands" Master Thesis. Fachhochschule Kiel, 2022.
http://proas.is/publications/
This master's thesis evaluates the WAM design catamarans for use in the Marshall Islands, as well as tracking their development. Useful for studying the requirements and constraints of designing and building boats for the south pacific islands, it is a technically dense and well organized design study.

Simons, Andrew. Cargo Sailing: A life cycle assessment case study. Den Helder: EcoClipper, 2020.
www.researchgate.net/publication/349161871
This Life Cycle Analysis (LCA) of sail freight based on a new-build 500 CDWT steel ship was commissioned by EcoClipper, BV. This study gives figures for both absolute and relative emissions and environmental impacts for transoceanic shipping by sail and by conventional liners. These figures can be quite important for calculating saved or avoided emissions and for determining policy around wind propulsion and sail freight.

Uttmark, Geoff. Eriemax: Assessment of Green Ship Technologies and Plan for Deployment on the Erie Canal/ NYS Barge Canal System New York: NYSERDA, 2015.
https://www.shipshares.com/Eriemax%20Final%20Report.pdf
Developed for the New York State Energy Research and Development Authority in 2015, this publication contains a vessel plan as well as a business case for transporting Finger Lakes and Long Island wines on the Hudson River, Long Island Sound, and Eire Canal. The freighter design is aimed at taking the maximum advantage of canal system circumstances. This publication can be requested from the Center For Post Carbon Logistics by emailing Info@ PostCarbonLogistics.org

Van Hemmen, Rik. "Sustainable Maritime along M87; Build A Little, Test A Little, Learn A Lot." Proceedings of the Sustainability In Ship Design and Operation Conference 2023, 6-7 Nov 2023, Glen Cove and King's Point NY. Glen Cove: Webb Institute, 2024.
www.JMWE.org/articles
A review of projects on the Hudson River and Erie Canal over the last few years, this paper shows the benefit of maritime cargo experimentation and the wide array of concerns which can only be discovered by actually conducting kinetic operations. Focused on both infrastructure and the trials and tribulations of real projects, this paper is worth reading for anyone involved in opening new trade into disused ports.

Vahs, Michael, Siegfried Wagner, Thomas Peetz, Sascha Strasser, Henrik Richter-Alten, Christian Arriens. TECHNICAL AND OPERATIONAL OPTIONS CATALOG: Proposal for Technical and Operational Options to reduce Fuel Consumption and Emissions from 'Inter-Atoll Transport' and 'Inside-Lagoon Transport' Emden-Constantia: University of Applied Sciences Emden-Leer, 2019.
https://changing-transport.org/wp-content/uploads/TLCSeaT_TechnicalAndOperationalOptionsCatalog.pdf
This work is an in-depth study of options for reducing fuel use in inter-island and intra-lagoon supply vessels to reduce reliance on fossil fuels and reduce greenhouse gas emissions. Each technical case and option is treated in detail, as well as providing briefer overviews for less technically-inclined readers.

Woods, Steven, and Sam Merrett. "Operation of a sail freighter on the Hudson River: Schooner Apollonia in 2021" Journal of Merchant Ship Wind Energy, 2 March 2022.
www.researchgate.net/publication/358971392
In the discussion of sail freight worldwide, little analysis exists to illuminate the effects of sail freight vessels engaged in shipping along rivers. Even less of the literature provides meaningful, in-depth insight into the operations of such vessels. The 64-ft (19.5 m) schooner Apollonia, a small general cargo vessel and the only active, operational sail freighter in the United States, operates on the Hudson River and in New York Harbor. The ship's logs and other data from 2021, the Apollonia's first sail freight season, are examined here to gauge the performance of small sail freighters on river trade routes. The available data shows sail freight has a strong advantage over comparable trucking in fuel use per Ton-Mile.

Woods, Steven. "Sail Freight Revival: Methods of calculating fleet, labor, and cargo needs for supplying cities by sail." Master's Thesis. Prescott College, 2021.
www.researchgate.net/publication/354841970
Sail Freight has slowly worked its way into the realm of sustainability discourse as a way of reducing emissions from transportation, providing logistical solutions using the emissions free power of the wind and technologies proven effective for over 5000 years. This attitude toward Sail Freight and transportation in general has some merits, but none of these discussions seem to have examined the issue of readopting sail freight at scale. This paper proposes methods of understanding this issue of scale by calculating the needs of a city for food. Using foodshed analysis to calculate necessary fleet capacities therefrom, as well as the labor needed to support this fleet, a model is provided for the New York Metro Area. The capacity for building this fleet and training sailors with current sail freight infrastructure and operations is then examined, with recommendations and analysis for addressing these challenges over the coming decades.

Woods, Steven. "Scaling Sail Freight: An Open Access Model For Climate Crisis Response." Proceedings Of The Conference On Small Scale Inland And Coastal Sail Freight. Kingston: Hudson River Maritime Museum, 2022.
www.researchgate.net/publication/365173355
Sail Freight is only a meaningful change in economic or carbon emissions terms if it achieves statistical significance in trade volume. The key to expanding a coastal and inland "Mosquito Fleet" is spreading knowledge, building infrastructure, and inspiring people to simply do something. This can be facilitated and encouraged through engagement with a wide variety of citizens with a wide variety of motivations; ecological, political, financial, or otherwise. Creating the resources and removing barriers to starting a sail freight business and make small ports better suited to sail freight operations can be organized and accelerated using Anarcho-Communist methods such as open-source plans, open access publishing, affinity activism, mutual aid, and the creative commons.

Woods, Steven. "Strategic Materials, Maritime Trade, and the Energy Transition." Proceedings of the International Academic Conference on Shipping, Sustainability, and Solutions. Hamburg: KLU, 2023.
www.researchgate.net/publication/369032994
Sustainability in shipbuilding and the maritime economy is often discussed on a technologies basis, mostly around the avoidance of fossil fuels. In the case of a strictly technological analysis, this is acceptable. This is a poor lens for viewing sustainability at scale, however, as it does not deal with the potential effects of applying that technology to potentially hundreds of thousands of vessels worldwide. A better lens is from the perspective of Strategic Materials and Resources for the renewable energy transition. The idea of prioritizing the use of strategic materials and resources in critical roles such as land-based grid decarbonization instead of areas where substitutes exist is a primarily military viewpoint, but useful nonetheless. As there is a finite time and pool of critical resources available for the global energy transition to avoid catastrophic failures of world climate systems, this military model is worth considering. In the maritime field, this means designing ships and shipping systems to avoid or minimize the use of solar panels, lithium batteries, fossil fuels, grid power, copper, and a long list of other materials in propulsion and energy systems, in favor of replacements which use less-or non-critical materials and resources. … Historic models can point the way toward a modern ethic of critical resource conservation.

Woods, Steven, (Editor). The Sail Freight Handbook 2ed. Kingston: Center for Post Carbon Logistics, 2023.
www.researchgate.net/publication/369367255
This handbook is designed for use by sail freight operators as both practical guidance and a means of learning quickly from the experience of others. Covering all topics of interest, including theory, crew, vessels, cargo handling, business forms, ports, and more, the handbook also includes extensive illustrations and diagrams. Every section includes a further reading section, allowing for easy access to additional information for any topic needed. Reference tables are included in the back with stowage factors, a glossary, information for calculating carbon impacts from operations, and more.

Woods, Steven. "Coastal And Inland Shipping In The Northeast US: A Plan For Expanding The Fleet And Zero Carbon Shipping." Proceedings of the Sustainability In Ship Design and Operation Conference 2023. Glen Cove: Webb Institute, 2024.

www.researchgate.net/publication/375184736

This paper covers a suggested expansion plan for sail freight in the northeastern US, New England, New York and New Jersey inclusive. Stepped out through 2030, the plan gives packet routes, cargo flows, and other detailed information to aid in planning and setting up mutually supporting trade under sail in this region.

Woods, Steven. "A Service-Pattern Sail Freighter: The Need For A Scalable Open-Source Sail Freighter Design." Proceedings of the Sustainability In Ship Design and Operation Conference 2023. Glen Cove: Webb Institute, 2024.

https://www.researchgate.net/publication/375184586

This paper gives the requirements and motivations for an open-source liberty-ship type set of 4 small sail freight schooners, a canal wherry, and barge depot for design and deployment in US waters. The requirements are taken from practical experience board Schooner Apollonia and other sail freighters, as well as regulatory boundaries and other synthetic obstacles to sail freight.

Woods, Steven. "Economic Viability Of Small Sail Freighters In The US Coastal Trade." Journal Of Merchant Ship Wind Energy. 19 March 2024.

https://www.researchgate.net/publication/379073492

There is reasonable doubt in the maritime sector about the economic viability of small sail freighters in coastal trade. With relatively large crews for small tonnage capacities over long range as is typical for conventional maritime trade, this is of course a bad arrangement for profitability. However, in comparison to trucks along a congested road corridor in a coastal trading role, these small sail freighters are found to be viable on most routes. This study examines the viability question for eight routes in comparison to trucking, using available information about US trade to create Pro Forma financial statements based on each route. Breakeven Load Factors and Required Freight Rates are calculated for all vessel and route pairings. It is found that on most routes even vessels as small as 15 Gross Register Tons are economically viable if they can be kept full and down and major expenses such as insurance controlled. Additional analysis of the model's limitations is included, with financial statements appended.

Fishing and Fisheries

(Special Issue) "Skipjacks for the 21st Century" Chesapeake Quarterly 2:1 (2003)
https://www.chesapeakequarterly.net/pdfs/CQ02_1.pdf
This edition of the Chesapeake Quarterly contains 5 short articles on the state of the skipjack fleet some 20 years ago, and outlines the situation then. With a shrinking fleet and depleted oyster fields, this was entirely understandable. However, with a resurgence in climate threats and the cost of fuel, there is a potential for Skipjacks to return as a major form of fishing craft in the developed world. This snapshot of the situation two decades ago gives a good indication of past work to preserve and revive this industry, and a starting place for new efforts.

Brown, Bernard Pierce. "An evaluation of the potential use of sail power in the commercial shrimp fishery of Texas." Master's thesis. Texas A&M University, 1976.
https://oaktrust.library.tamu.edu/handle/1969.1/ETD-TAMU-1976-THESIS-B877
This study of the Texas Shrimp fishery compares sail assist and motor vessels in fishing for economic performance, and gives breakeven and overall revenue projections for both. Sail benefits when fuel prices are higher, but are expected to catch fewer shrimp.

Brown, J. W., & National Conference on Applications of Sail-Assisted Power Technology. New working watercraft: a return to former capabilities. Virginia Institute of Marine Science, William & Mary, 1982.
https://scholarworks.wm.edu/reports/1970/
A study of efforts to apply simple construction techniques and appropriate technology to local boat forms in African and Pacific fisheries during the oil crisis, this work is a practical report which could be returned to without a lot of changes for the same work today in similar regions. The focus was on making these craft inexpensive, reliable, familiar, effective, and minimally reliant on imported resources. Discussing both technological improvements, practical possibilities, and the existing situation, this is well worth a read for anyone working in decarbonizing small fisheries.

Dewees, Christopher M. "Sail-assisted commercial fishing vessel workshop summary" University of California Extension Service, 1982.
https://repository.library.noaa.gov/view/noaa/9676
This short report of a one-day workshop has valuable information about a number of projects and their findings from the oil-crisis era.

F. J. Fyson. The Use Of Sail Power In Fishing Vessels. Rome: FAO, 1981
This short report is targeted mainly to smaller vessels, but the lessons and considerations are all applicable to a variety of fleet sizes.

Goudey, Clifford A., Margaret M. Linskey. "Retrofit sail-assist on New England fishing vessels" Massachusetts Institute of Technology, Center for Fisheries Engineering Research, 1983. MITSG 83-12; Report No. 2.
https://repository.library.noaa.gov/view/noaa/9971
This report covers adaptations planned and integrated into the Massachusetts fishing fleet on 50-90 foot trawlers for sail assisted propulsion. Conclusions were generally favorable and significant savings on fuel were expected.

R Gowan MacAlister. "The Application of Sail In Fisheries Development." Proceedings of Regional Conference on Sail-Motor Propulsion Manila: Asian Development Bank, 1985.
www.hrmm.org/uploads/2/6/3/3/26336013/proceedings_of_regional_conference_on_sail-motor_propulsion__18-21_nov_1985_.pdf
Results of multiple trails for smaller fishing vessels in applying wind propulsion are covered in this article. Additional information on challenges and costs is included, with some analysis of appropriate rigs for adoption in Pacific Islands contexts.

Karl C. Samples "An Economic Appraisal of Sail-Assisted Commercial Fishing Vessels in Hawaiian Waters" Marine Fisheries Review 45:7-8-9, 1983.
https://spo.nmfs.noaa.gov/sites/default/files/pdf-content/MFR/mfr457-9/mfr457-97.pdf
This short study covers data gathered from several sail-fishing experiments in Hawaii in the late 1970s to early 1980s. Detailed financials and information is included, as well as several methods of acquiring and outfitting vessels for fishing under sail.

Rebel Marine Service, "The Reduction of Energy Needs For Fish Harvesting Through The Use of Sails On Fishing Vessels" Norfolk: National Marine Fisheries Service, 1983.
https://repository.library.noaa.gov/view/noaa/47537
Another study from the oil crisis with actual results from sail-assist sea trials and fishing. Benefits were seen as significant, safety was improved, and outlook favorable.

Sainsbury, John C., Thomas M. Leahy. International Conference on Design, Construction, and Operation of Commercial Fishing Vessels Florida Sea Grant College, 1985.
https://repository.library.noaa.gov/view/noaa/39696
Part 5 of this conference proceedings contains 10 articles on sail-assisted fishing, across a variety of topics: Economics, performance, vessel design and rig design. Additional papers in these proceedings may also have further information on safety and other aspects of sail assisted fishing.

Shortall, John W. Sail Assisted Commercial Marine Vessels: Bibliography and Abstracts Technical Paper 28, Mar 1983. USF.
repository.library.noaa.gov/view/noaa/35315
This annotated bibliography from 1983 contains an entire section on sail assisted fishing, with some analysis and figures. In the section on fishing 71 articles are included, many with proposed designs, solutions, and challenges which can be brought back to the fore for rapid development where these projects left off.

Shortall, John W. III International Conference on Sail-Assisted Commercial Fishing Vessels: Proceedings Florida Sea Grant, 1983.
https://repository.library.noaa.gov/view/noaa/35209
This set of proceedings contains 25 papers in approximately 450 pages covering results, theories, and economics of fishing under sail. The research is international in scope, and both theory and practical. This should be a required starting place for research into fishing under sail.

Shortall, John W. III International Conference on Sail-Assisted Commercial Fishing Vessels: Proceedings, Volume II Florida Sea Grant, 1983.
https://repository.library.noaa.gov/view/noaa/9841
This addendum to the first volume of proceedings contains 24 additional articles and 322 pages of information not included in the first volume cited above. Topics are varied, and both practical and theoretical.

Wilson, J.D.K. Fuel and financial savings for operators of small fishing vessels FAO Fisheries Technical Paper 383. Rome: FAO, 1999.
https://www.fao.org/3/x0487e/x0487e00.htm.
This publication contains a very short treatment of sail for fishing, but leaves out many of the specifics. Regardless, the potential 80% fuel savings claimed for smaller vessels is worthy of consideration. This and many other similar documents are an indication of how rapidly the oil-crisis research on wind propulsion in fisheries was forgotten and left aside despite the problems which spurred that research persisting.

Miscellaneous:

Andrus, Erik. "Vermont Sail Freight Project." Accessed 9 October, 2020.
https://vermontsailfreightproject.wordpress.com/
The blog of the Vermont Sail Freight Project, which was active from 2013-2014, this is a good resource for a solid overview of how the project went, its motivations, and eventual outcomes.

Boykett, Tim. "Danube Clean Cargo: Prefigurative Experiments and Arts-based Research" Proceedings Of The Conference On Small Scale Inland And Coastal Sail Freight. Kingston: Hudson River Maritime Museum, 2022.
www.jmwe.org/articles
This summary of the challenges and findings of a Time's Up project to introduce sailing and electric-motor powered freight for CSA shares to the Danube in 2020. Eventually ended by the COVID-19 Pandemic and a lack of reliable cold chain support, this article is worth reading to understand the practical and philosophical challenges of attempting riverine sail freight.

De Decker, Kris. "How to Run the Economy on the Weather." Low Tech Magazine Sept 2017.
lowtechmagazine.com/2017/09/how-to-run-the-economy-on-the-weatherhtml
Related closely to Sail Freight, this article is a general-audience article on how to use the weather to our advantage in moderating energy use. This includes the use of sailing vessels and other weather-dependent resources in both historic and modern contexts, which should be read widely to understand how sail freight can fit into a lower-energy world economy.

DeDecker, Kris. "How to design a sailing ship for the 21st century" Low Tech Magazine May 2021.
solar.lowtechmagazine.com/2021/05/how-to-design-a-sailing-ship-for-the-21st-century
A cursory look at the differences in demanded safety and comfort standards of the past and current day, this article is a good introduction to the issues for a general audience.

Fleming, Severine v. T., Rivera Sun, Charlie Macquarie, Patrick Kiley, Marada Cook, Abby Sadauckus, Lance Lee, and John Patrick. Mainifesta: An Un-Monograph Celebrating the Maiden Voyage of Maine Sail Freight. Calabasas, CA: Greenhorns, 2015.
https://greenhorns.org/maine-sail-freight/
An introduction to the Maine Sail Freight Project, based on the Vermont Sail Freight Project, this work gives the reasoning behind this one-time sail freight effort, which moved approximately 3 tons of Maine produce and foodstuffs to Boston, Massachusetts aboard Schooner Adventure. The work is Principally artist's reflections as opposed to academic work, but can be found a reasonable statement of motivations for adopting sail freight as a form of protest art against the current transportation and agricultural status quo.

Melotti, Robert. "Trading Under Sail – could you make a living from transporting cargo on board?" Practical Boat Owner Feb 2018.
www.pbo.co.uk/boats/trading-under-sail-58300
A short article covering several of the then-current sail freight efforts and examining whether sailing freight could be possible for a liveaboard, this article is a good look at some of the possibilities and practicalities of sail freight as seen from a leisure boat owner's perspective.

Journals and Publications of Note

The Journal Of Merchant Ship Wind Energy

www.JMWE.org/Articles

JMWE is committed to the free and open publication of peer-reviewed research articles dealing with all aspects of the use of wind energy on commercial ships and off-shore wind platforms. JMWE is not a money-making enterprise; our goal is to become an alliance of academics and industry professionals committed to furthering the use of wind energy. If you choose to publish an article in JMWE, you may be asked to review articles in the future. Articles are published under the Creative Commons license CC BY-NC-SA 4.0, allowing free distribution of published articles (see https://creativecommons.org/licenses/by-nc-sa/4.0/). The JMWE publishes the proceedings of the annual SISDO Conferences held at Webb Institute and the USMMA, as well as other articles. There are no fees to access or publish articles in this journal.

The Journal Of Sailing Technology:

https://www.sname.org/journals-transactions

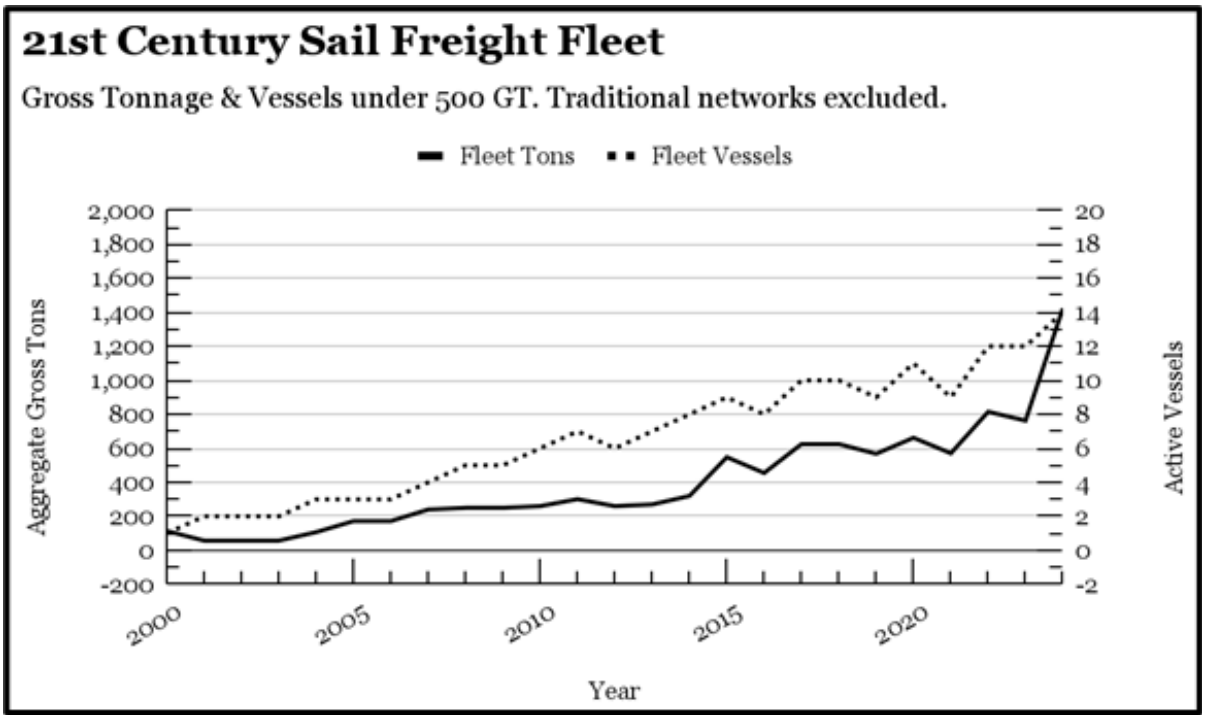
The Journal Of Sailing Technology is a publication of SNAME, an open-access, free to publish journal. Focused on more than merchant shipping, this publication includes discussion of yacht design, racing, foil design, and a wide variety of other topics related to naval architecture.

Sail Freight Fleet Growth

Steven Woods

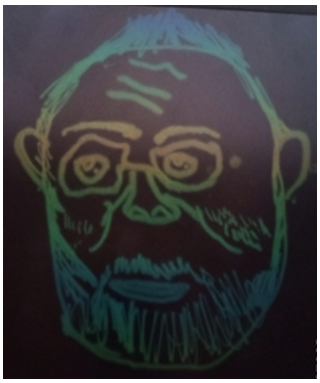
Below is a chart of the Sail Freight fleet's growth over the course of the 21st century, using available records and indications. The products shown are net changes at the fleet level, excluding traditional networks which are not trackable with the records available. As can be seen, 2015 and 2024 were both years with major spikes in the fleet capacity and strength, while there are many fluctuations throughout the chart caused by small, one-off projects such as Maine Sail Freight, Vermont Sail Freight Project, and others. Since all changes are aggregate in this chart, it should be paired with an annual directory to increase accuracy and clarify the picture over time.

This chart is being updated as more information becomes available, and any information you may have can be sent to the publication's editors. We appreciate your support in this endeavor, and hope to have a more detailed picture of the situation in the 2025 Small Windships Publication.



About the Editors

EDITOR: CAPTAIN GEOFF BOERNE:



Geoff has been sailing for over 50 years, of which the last 30 years has been dedicated to the small vessel sailing cargo sector. He has worked in this sector as a sailor, captain, vessel owner, academic, boat builder and as a marine surveyor.

ASSISTANT EDITOR: STEVEN WOODS



Steven Woods is the Operations Associate at the Center for Post Carbon Logistics. A researcher and sailor (whenever possible) in the Northeast US, he worked in museums for over 20 years before transitioning into the sustainability field in 2020. Work on his Master's thesis, "Sail Freight Revival," brought him into the sail freight world as a means of applying ancient technology to modern problems of sustainability.

Woods has organized and presented at local, regional, and international conferences, published multiple peer-reviewed papers on sail freight, sailed aboard Schooner Apollonia, coordinated cargoes, written policy briefs, engaged in advocacy work, and more over the last 4 years, in addition to work on the IWSA Small Windships Publication.

Woods earned a bachelor's degree in History from the Jesuits at LeMoyne College in 2010, and holds a Master's degree in Resilient and Sustainable Communities from Prescott College, alongside two Associate's degrees (but never graduated High School). He is returning to school in an attempt to exhaust his GI Bill benefits at the University of Vermont, as part of the Sustainable Innovations MBA cohort of 2025. He hopes to learn enough about current business practices to boost the adoption of working sail within existing constraints.