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MEEN 401-502 Project Proposal
Race Canoe Fabrication from Fiber-Epoxy Composite – estimated approx. \$1k

Problem Motivation:

The sport of canoe racing has begun to enjoy some attention in recent years, with articles in the *Texas Monthly*¹ and *Austin Monthly*², among others, featuring stories about the hallmark *Texas Water Safari*. Ultra-marathon canoe races like this demand sleek, yet rugged boats that can survive severe impacts, without sacrificing speed and weight.

Problem:

Over the last 59 years since the first Texas Water Safari in 1963, an impressive array of boat designs have been tested against the Safari, eventually converging on the current scull-style composite canoes that dominate the race today. The materials and commercial vacuum fabrication process of these boats are expensive and time consuming, driving prices up to over \$10k for the larger boats. The limited supply of these performance boats further drives up the price and toughens the barrier to entry for paddlers interested in canoe racing.

Market:

Although small, the growing network of canoe paddlers is strong in the state of Texas, especially around the San Marcos and Guadalupe rivers. Although designed for racing, canoeing is popular year-round in Texas, and some paddlers begin training for races many months in advance. Furthermore, composite canoes last many years, with some still being raced from over 20 years ago. These benefits and growing interest for composite canoes ensure market demand.

Budget Estimate (for a solo unlimited style canoe, very small):

As a baseline, solo unlimited canoes retail for approximately \$4k from commercial manufacturers like *Diller*³, with exceptionally good deals to be found secondhand at about \$2k. I have seen several *articles*⁴ online that claim a cost of approximately \$1k is possible when building it by hand.

The following are rough cost estimates:

- Matrix
 - Carbon Fiber $\frac{\$40}{yd} \times 20yd = \800
 - Or Kevlar $\frac{\$30}{yd} \times 20yd = \600
- Epoxy
 - Resin $\$35/gal \times 2gal = \70
 - Hardener $\$35/gal \times 2gal = \70
- Mold
 - Rental – estimated \$100

- Or Materials – estimated \$100
- Fabrication supplies (brushes, stands, gloves, mask, sanding, release agent/wax, ...) \$75

Total: \$915 - \$1115

Personal Connection:

I have completed the 265mi Texas Water Safari twice and trained for it for the last three years (it was cancelled in 2020 due to COVID). I have paddled approximately 1500mi in these composite boats and was considering building one myself for competition in 2022. When I saw the email from Ashley Schmitt, I thought this could be an excellent way to document my research and fabrication process, while also building something that I (or another paddler) could actually use in the race!

In addition to the materials research and fabrication, I am interested in canoe dynamics.

I have done some preliminary fabrication research, compiled here:

<https://github.com/XDwightsBeetsX/canoe>

A Texas Water Safari legend and Texas A&M Alum, John Bugge, currently fabricates many of the top competition boats using this composite approach. I have yet to contact him, but he could be a great resource for this project.

The Texas Water Safari site: <https://www.texaswatersafari.org/home/>

References:

[<https://www.texasmonthly.com/list/lets-go-wild/no-14-texas-water-safari/>]¹

[<https://www.austinmonthly.com/this-all-female-team-is-revolutionizing-the-texas-water-safari/>]²

[<https://www.savageriver.com/canoes/usca-competition-cruiser-c-1>]³

[<https://skyaboveus.com/water-sports/Building-a-Cedar-Strip-Canoe-Estimating-the-Costs>]⁴

[<https://www.robbiemallett.com/carboncanoe>] – DIY carbon fiber canoe