Float Layout and Economic Modeling Program

Presentation to the

Alaska Association of Harbormasters and Port Administrators

Mike Fisher

October 13, 2005

northern economics

Presentation Agenda

northern economics

- Background of the model
- Planning for the harbor
- Harbor planning model
- Optimizing your decision
- Update on the Harbor Economic Impact Model

Background of the Model

northern economics

- **This model was developed for the City of Unalaska.**
- **The purpose:**
  - Estimate the cost and revenues associated with the Little South America harbor
  - Present the information to the City Council in an interactive manner

Planning for the Harbor

northern economics

- **Factors to consider:**
  - Space available
  - Types and sizes of vessels served
  - Identify subsidy levels for certain vessel classes
  - Objectives:
    - Maximize revenue
    - Accommodate the waiting list
    - Provide slips for specific vessels (local, etc.)

Harbor Planning Model

northern economics

City of Unalaska LSA Harbor Revenue Model

Model Summary

Harbor Area		
Area	16.803	acres

Vessel characteristics					
Length Range (ft)	100-150	80-99	60-79	40-59	0-40
Length Midpoint (ft)	125	90	70	50	30
Design slip length (ft)	150	99	79	59	40
Vessels/acre	2.00	4.39	6.74	11.81	25.12
Capital cost per vessel for floats/piles	172,500	81,471	51,878	28,936	13,300
Daily revenue per vessel	91.30	45.65	6.30	4.45	2.59
Average number of days in use	365	365	365	365	365
Percent with prepayment	0%	0%	50%	75%	100%
Prepayment discount	50%	50%	10%	10%	10%

Number of Vessels						
Length Midpoint (ft)	125'	90'	70'	50'	30'	
Design slip length (ft)	150'	99'	79'	59'	40'	Total
Number	25	10	9	5	5	54
Maximum (Full Allocation)	33	73	113	198	422	
Area required	12.523	2.277	1.336	0.423	0.199	16.758
			Area remaining (*must be greater than zero!*)			0.045

Harbor Planning Model

northern economics

- **The output then looks like this:**

Cost and Revenue Estimates						
	125'	90'	70'	50'	30'	Total
Capital Cost (floats and piles)	4,313,000	815,000	467,000	145,000	67,000	5,807,000
Annual Revenues	833,000	167,000	20,000	8,000	4,000	1,032,000
Capital cost/revenues	5.178	4.880	23.350	18.125	16.750	5.627

Harbor Planning Model

northern economics

- **Underlying assumptions are:**

City of Unalaska LSA Harbor Revenue Model
Assumptions

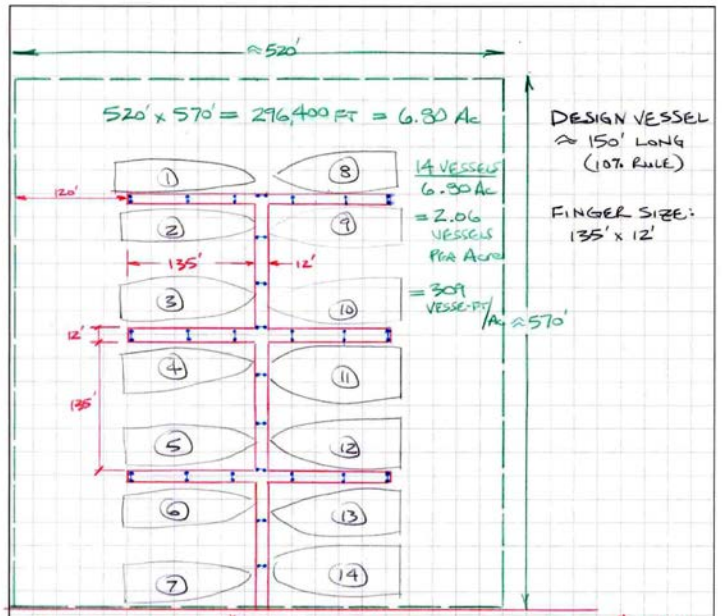
	Midpoint Length (ft)						
Characteristics	**150**	**125**	**90**	**70**	**50**	**40**	**30**
Acre/vessel	0.485437					0.03937	
Space/length^2 (calc)	2.16E-05					2.46E-05	
Space/length^2 (est)	2.16E-05	2.23E-05	2.32E-05	2.38E-05	2.43E-05	2.46E-05	2.49E-05
Design slip length	150	150	99	79	59	40	40
Acre/vessel (est)	0.485437	0.500938	0.227662	0.148408	0.084695	0.03937	0.039811
Cost per vessel	172,500					13,300	
Cost/length^2 (calc)	7.667					8.313	
Cost (est)	172,500	172,500	81,471	51,878	28,936	13,300	13,300
Construction Type	Concrete	Concrete	Timber	Timber	Timber	Timber	Timber

Harbor Planning Model

northern economics

P | N | D
1506 West 36th Avenue
Anchorage, Alaska 99503
phone 907.561.1011
fax 907.563.4220

Project: LSA HARBOR / NE
Sheet Number: 1 Of: 2
Calculated by: EF Date: 8/16/05
Checked by: Date:



CONCRETE FLOATS: $115/FT² INSTALLED ∴ 15,120 FT² → $1.74M

PILE BENTS: 20" DIA STEEL PILES W/ TOP BRACING ∴ $25,000/BENT → 27 BENTS → $675,000

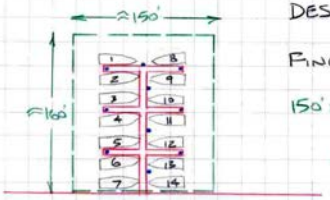
TOTAL = $2.415M ∴

CONSTRUCTION COST PER VESSEL ≈ $172,500*

*(DOES NOT INCLUDE MOB/DEMOB OR UTILITIES)

P | N | D
1506 West 36th Avenue
Anchorage, Alaska 99503
phone 907.561.1011
fax 907.563.4220

Project: LSA HARBOR / NE
Sheet Number: 2 Of: 2
Calculated by: EF Date: 8/16/05
Checked by: Date:



DESIGN VESSEL ≈ 40' LONG (10% RULE)

FINGER FLOAT SIZE: 36' x 5'

150' x 160' = 24,000 FT² = 0.55 Ac.

14 VESSELS / 0.55 Ac = 25.4 VESSELS/Ac.

= 1016 VESSEL-FT/Ac

TIMBER FLOATS: $60/FT² INSTALLED ∴ 2310 FT² → $139,600

PILES: 12.75" DIA STEEL INSTALLED ∴ $4,700 EACH, 10 PILES → $47000

TOTAL = $186,000

CONSTRUCTION COST PER VESSEL ≈ $13,300*

*(DOES NOT INCLUDE MOB/DEMOB OR UTILITIES)

Harbor Planning Model

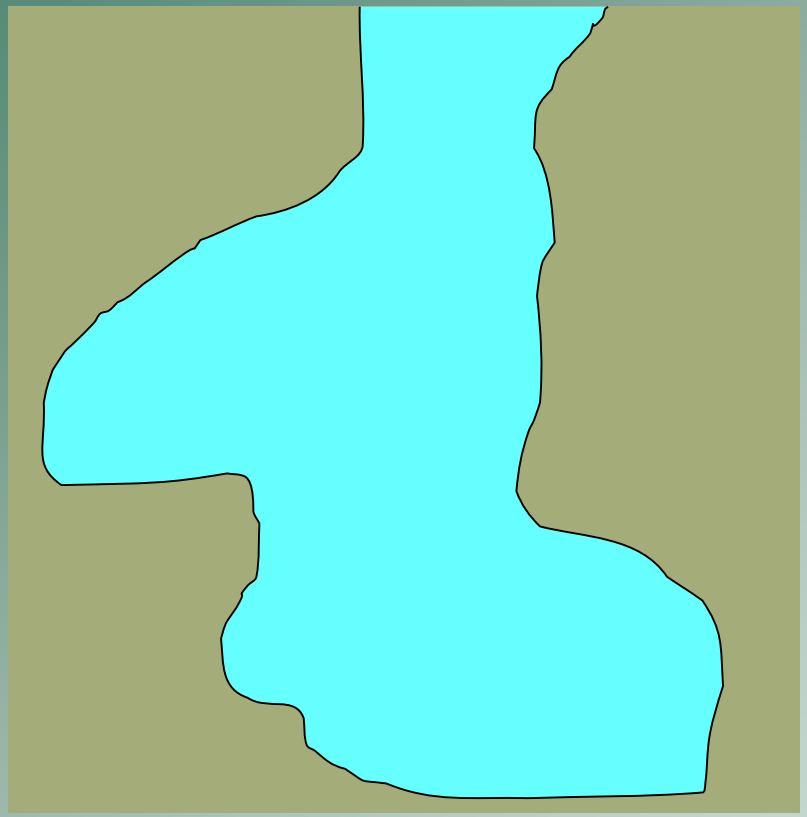
northern economics

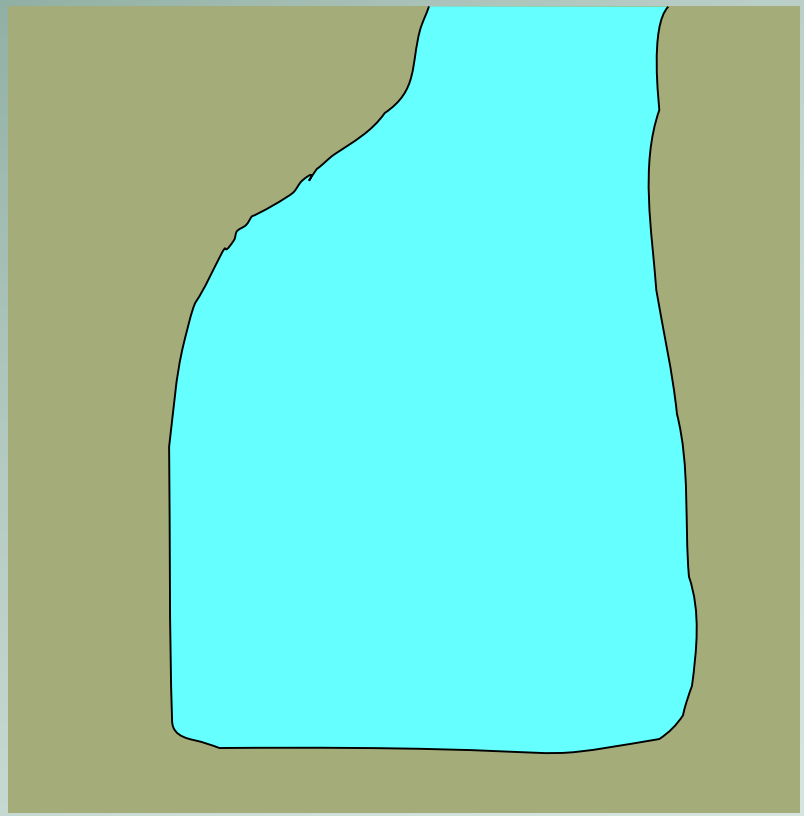
- **Caveats:**
  - The model is intended to provide only a **rough estimate** of how many vessels can fit in an area. Vessel allocations developed with the model **may not layout properly**. The model uses **average areas required** for vessels to fit into the harbor and floats. However, these areas may not provide **sufficient space for navigating and nesting**.

Harbor Planning Model

northern economics

Harbor shape affects the design:





Harbor Planning Model

northern economics

- **Caveats:**
  - The spacing and construction methods and materials are general and **do not account for wind, waves, and other factors** that influence design. The model provides estimates for informational purposes only, and the actual harbor needs to be designed properly.

Optimizing Your Decision

northern economics

- **Advantages of spreadsheet models:**
  - Ability to change inputs and see the result
  - Solver or other tools to optimize decision

Optimizing Your Decision

northern economics

- **Solver can be used to optimize the decision.**
- **Examples:**
  - Maximize revenues
  - Minimize capital cost
  - Minimize leftover space*
  - All of the above, with constraints

* careful!

Availability of the Model

northern economics

- **http://www.harbormodel.info**
  - Features the harbor economic impact model
  - Will see about providing a basic planning model at that location

Harbor Economic Impact Model

northern economics

- **There has been renewed interest in the Harbor Economic Impact Model (HEIM).**
- **Are you interested in helping to update the data for your area?**
- **If so, please contact:**
  - ADOT&PF: Ruth Carter or Vic Winters
  - John Stone, City of Juneau Port Director

Questions

northern economics

Questions?

Acknowledgements:

Alvin Osterback

Port Director, City of Unalaska

for allowing us to develop the model and granting the permission for us to share it

Eric Fontaine, PND

for developing the planning-level drawings

Contact information:

Mike Fisher

Northern Economics, Inc.

michael.fisher@norecon.com

http://www.northerneconomics.com/

Harbor Model:
http://www.harbormodel.info/