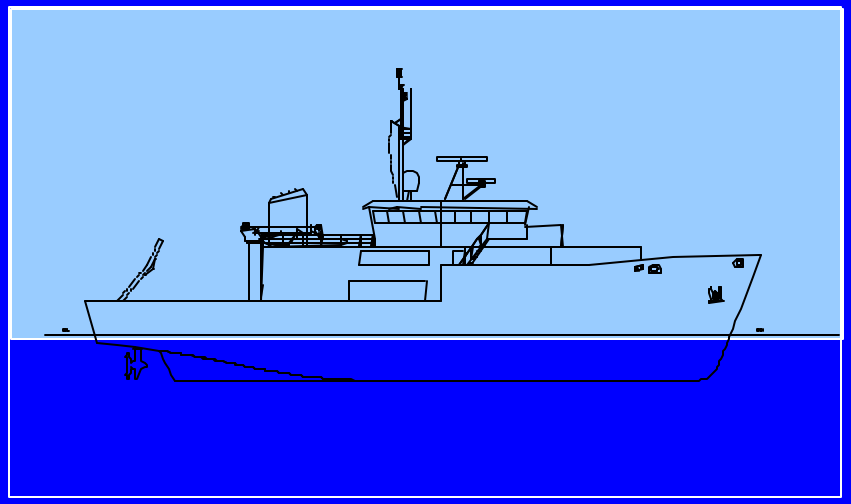
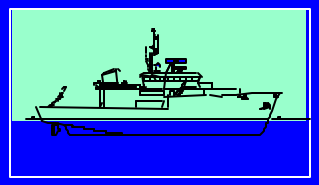
REGIONAL Research Vessel Phase III Development



Supporting Slides for

15 April UNOLS-NSF Web Conference



REGIONAL Research Vessel
Impact of SMRs on Size and Cost

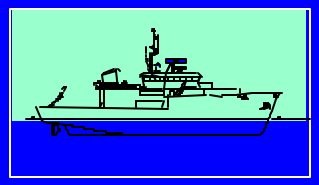
Concept Design Variants

	SMRs	CAPE Hatteras	900 LT Monohull	Min SMR Monohull	Max SMR Monohull	Min SMR SWATH	Max SMR SWATH
Dimensions:							
Length, OA ft	131 - 180	135	151	155	176	141	149
Length, BP, ft		124	141	145	165	135	141
Beam, MnDk, ft		32	32	36	36	58	61
Disp., Long Tons		640	900	1,050	1,150	1,200	1,300
Draft, ft		10	12	12	12	18.5	19.8
Manning:							
Crew	16 - 20	9	12-14 (note 1)	14	14	14	14
Science: Perm		12	16 (note 2)	16	20	16	20
w/van		n/a	20	20	20	20	20
Space:							
Van Spaces	2	0 (note 3)	2	2	2	2	2
Work Deck, ft2	1,300 min	1,100	1,000	1,365	1,800	1,500	1,900
Labs, ft2	1,000 - 1,500	700	900	1,015	1,690	1,000	1,510
Total Labs, WD, vans	2,660-3,160	1,800	2,300	2,780	3,890	2,900	3,810
Performance:							
Speed, max, kts	12-14	11.5	12.5	12.5	12.5	12.5	12.5
Speed, cruise, kts	12	10.0	11.5	11.5	11.5	11.5	11.5
Range, nm	8,000	7,000	8,100	8,100	8,100	8,100	8,100
Endurance, days	21-30	21	30	30	30	30	30
Day Rate:							
		$8,000	$11-12k	$12,730	$13,389	$13,766	$14,287

Note 1: Vessel Possibly Could Be Designed To Be Under 300UST and Be Uninspected

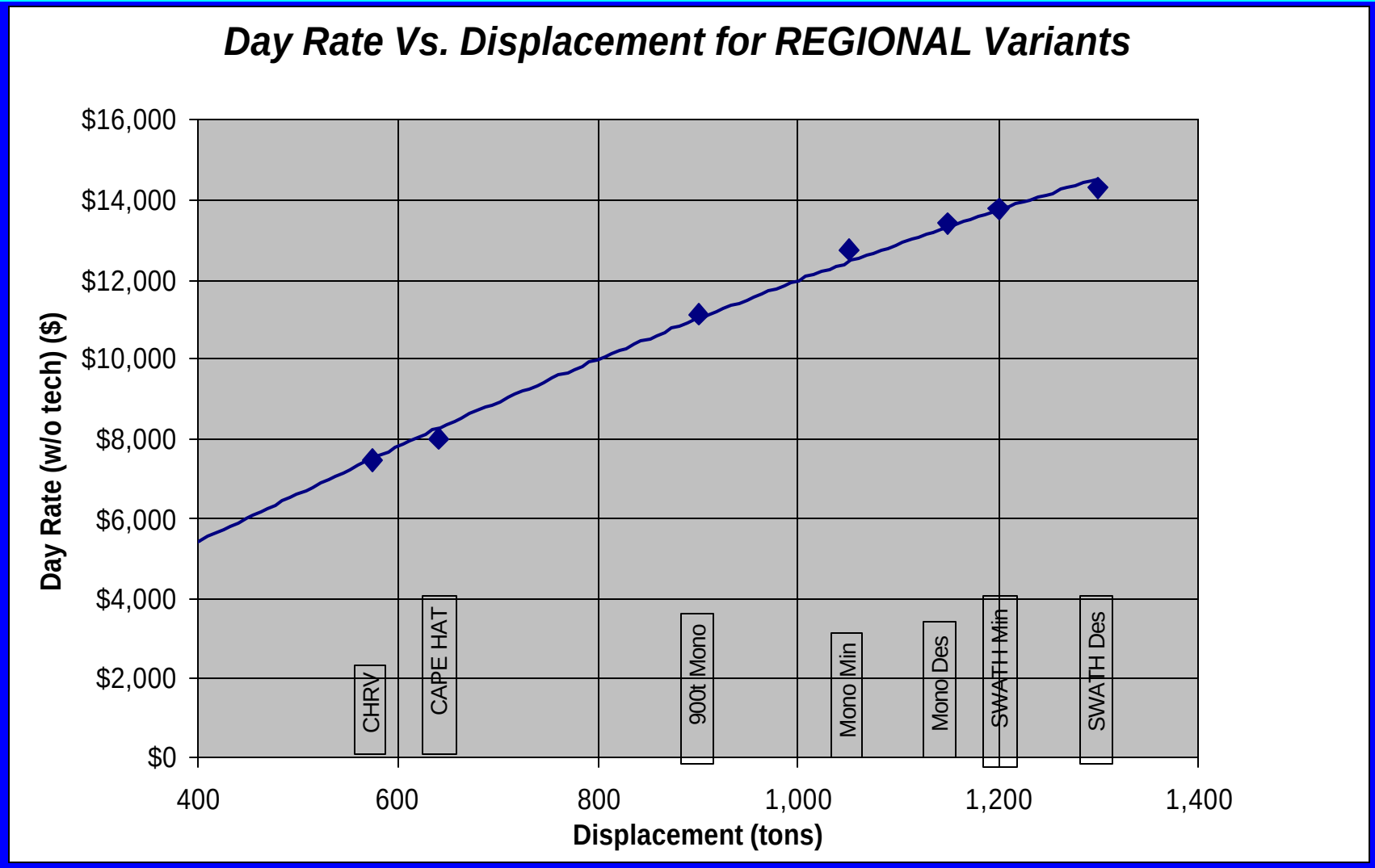
Note 2: SMR Limiting T/S To 4 Persons Per Unit Not Met

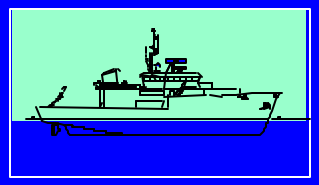
Note 3: No dedicated van area. One van can be carried on WD with significant impact to work area.



REGIONAL Research Vessel

Impact of SMRs on Size and Cost





REGIONAL Research Vessel
Impact of SMRs on Size and Cost

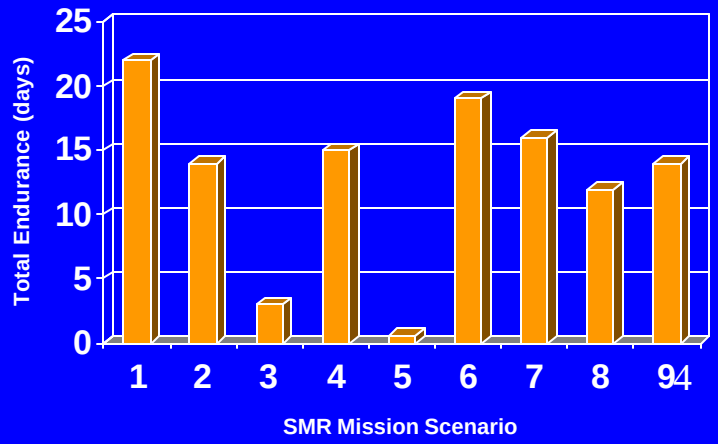
High Impact SMRs

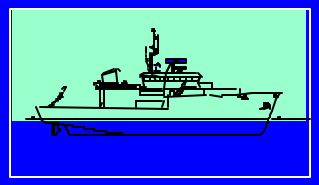
Science Berths

- SMR is 16 to 20 Berths in 2 Person SRs With 4 Persons Per T/S Max
- Convertible Space Or Vans May Be Considered
- 4 Permanent Scientist Berths Requires 2 SRs Which Adds ~5ft To Ship Length
- Higher Complement Increases Auxiliary Services
- Habitability Standards - SMR is 4 persons max per T/S Unit; requires more space than community T/S units

Endurance:

- SMR is 21 days normal; 30 days surge
- Impacts Consumable Storage
- May Impact Berthing Standards and Crew Size If Longer Endurance is Standard



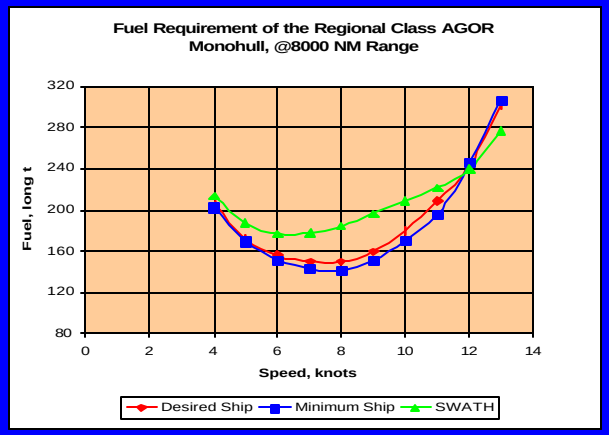


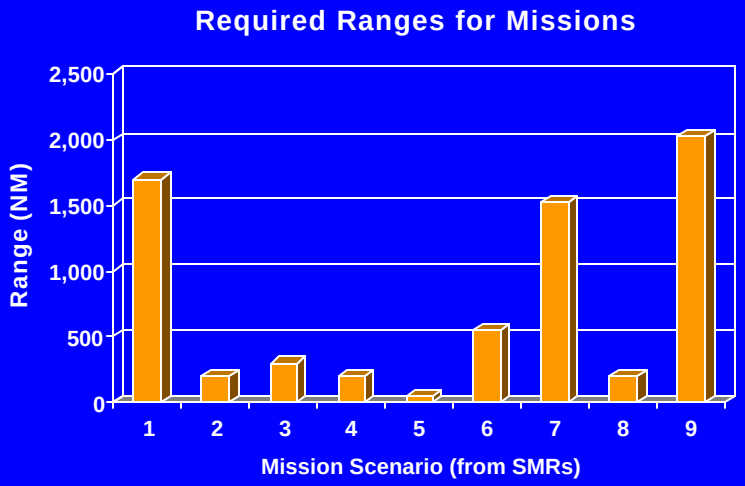
REGIONAL Research Vessel
Impact of SMRs on Size and Cost

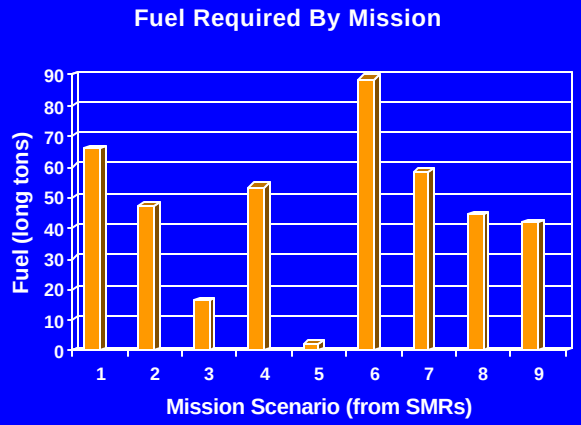
High Impact SMRs

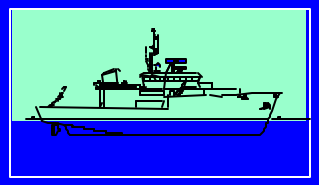
Range:

- SMR is 8,000 NM at Optimal Cruising Speed
- Longer Range Requires More Fuel Capacity (and Ballast Tankage)
- Approximately 170 Tons Fuel Required (45 NM Per Ton) @10 kts









REGIONAL Research Vessel
Impact of SMRs on Size and Cost

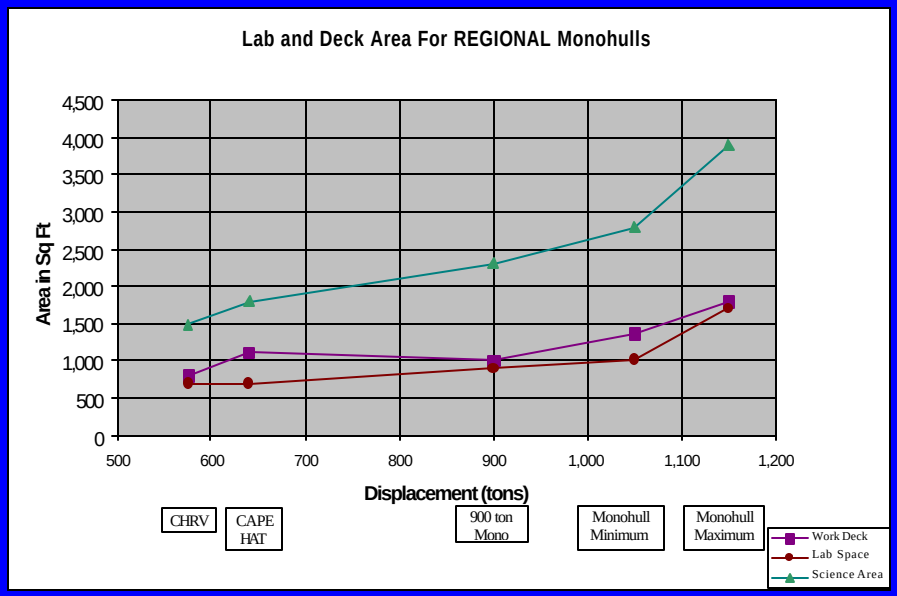
High Impact SMRs

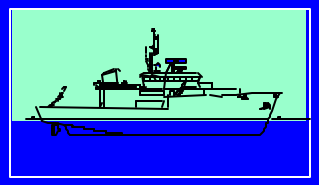
Working Deck:

- SMR Minimum of 1,300 ft^2 Including Core Laydown Area
- Required To Be On Main Deck
- Approximately One Foot of Ship Length Req'd Per 36 ft^2 of Area

Laboratories:

- SMR Minimum of 1,000 ft^2; Maximum of 1,500 ft^2
- Required To Be On Main Deck
- Approximately One Foot of Ship Length Req'd Per 36 ft^2 of Area



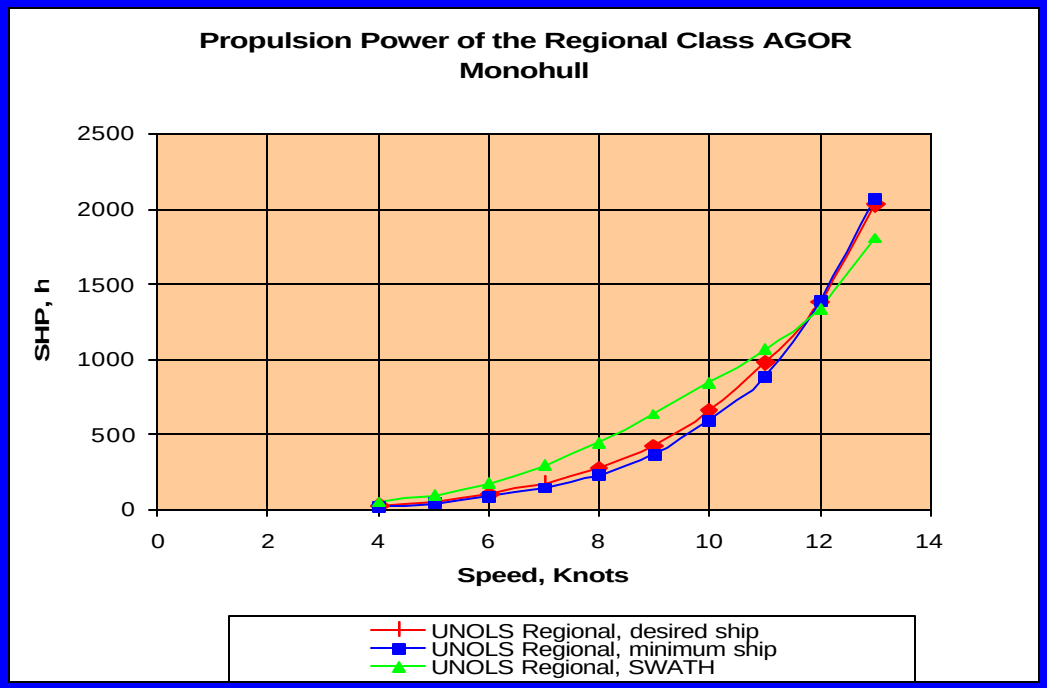


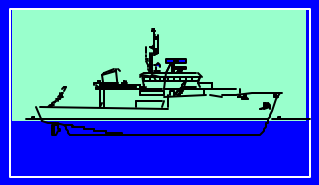
REGIONAL Research Vessel
Impact of SMRs on Size and Cost

High Impact SMRs

Speed:

- SMR is 12-14 kts Max Speed; 10-12 kts Cruise (Without Excessive Fuel Impact)
- Feasibility Study Designs: Max Speed of 12 kts with 1,500 SHP
  Cruise Speed of 11.5 kts @80%MCR
- Meeting Max SMR of 14 kts Requires 2,800 SHP (almost double)
- Reducing Max Speed To 11 kts Requires 1,000 SHP
- Speed-Power Curve Steep Above 12 kts. Hulls Could Be Optimized For Higher Speed



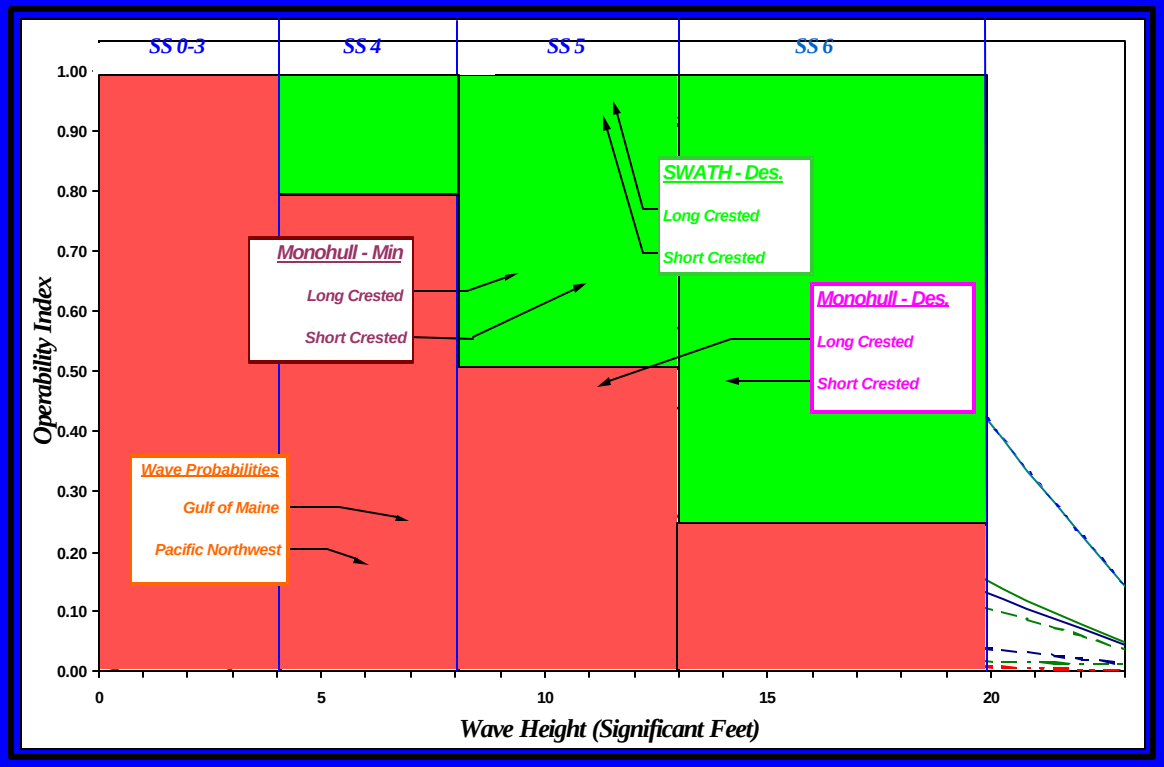


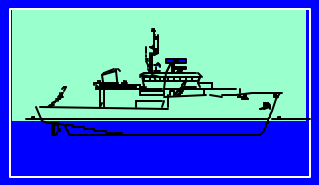
REGIONAL Research Vessel
Impact of SMRs on Size and Cost

High Impact SMRs

Seakeeping

- Strong Driver of Hull Type (SWATH vs. Monohull)
- Maximum SMR Monohull Meets SMRs
- Minimum SMR Monohull Meets in Shortcrested Seas
- Smaller (and shorter) Vessel Will Have Reduced Seakeeping Capability
- No Seakeeping Analysis Done For Smaller Size Vessel





REGIONAL Research Vessel
Impact of SMRs on Size and Cost

Medium Impact SMRs

Handling Equipment:

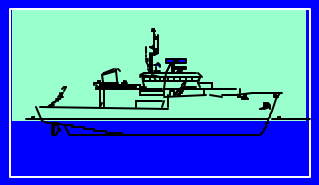
- 2 Hydro Winches; 1 Trawl Winch
- 1 Heavy Crane; 1 Articulated Crane; 1 Stern Frame
- Selection and Arrangement Critical
- Not a Big Driver of Ship Size
- UNOLS Handling Committee Provide Input

Vans:

- Two 8x20 ft
- Impacts Available Working Deck, But Flexible

Scientific Load:

- 50 Long Tons Required
- Low Relative To Displacement (Approx. 5%)



REGIONAL Research Vessel
Impact of SMRs on Size and Cost

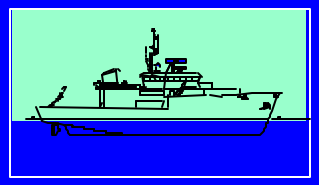
Medium Impact SMRs

Sonars:

- Shallow Water Multibeam and Other Small Transducers Have Relatively Low Impact To Hull Shape
- Ship Radiated and Self Noise Need To Be Controlled
- Bubble Sweepdown Needs Consideration

Stationkeeping:

- DPS and GPS
- Requires azimuthing propulsion and bow thruster
  - More Costly Than Shafts and Propellers
  - More Compact Arrangement



REGIONAL Research Vessel
Impact of SMRs on Size and Cost

Low Impact SMRs

Ship Control:

- 0.1 kts from 0-5 kts; 0.2 kts from 6-12 kts
- Requires AC or DC electric drive or CP Propellers

Towing:

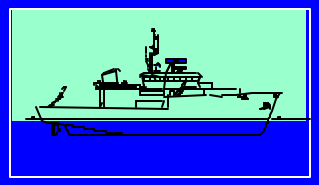
- 10,000 lbs @ 6kts; 20,000 lbs @4 kts
- Not a driver of propulsion plant power selection
- May Impact Handling System Design

Scientific Storage:

- 400-500 ft^3 convertible to work space or shop
- Competes with engineering and ship storage; never enough

Workboat:

- One 16 ft or larger workboat required (maybe 2)
- Also need SOLAS rescue boat (inspected or not)



REGIONAL Research Vessel
Impact of SMRs on Size and Cost

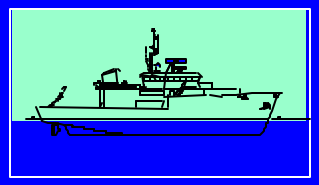
Preliminary Arrangement for 900 Ton Displacement Ship

Notes:

- Deck Sizes Scaled From Larger Concepts
- Naval Architectural Feasibility Not Yet Analyzed
- Accommodations - Singles for Officers, Doubles for Scientists, Group Toilet/Showers

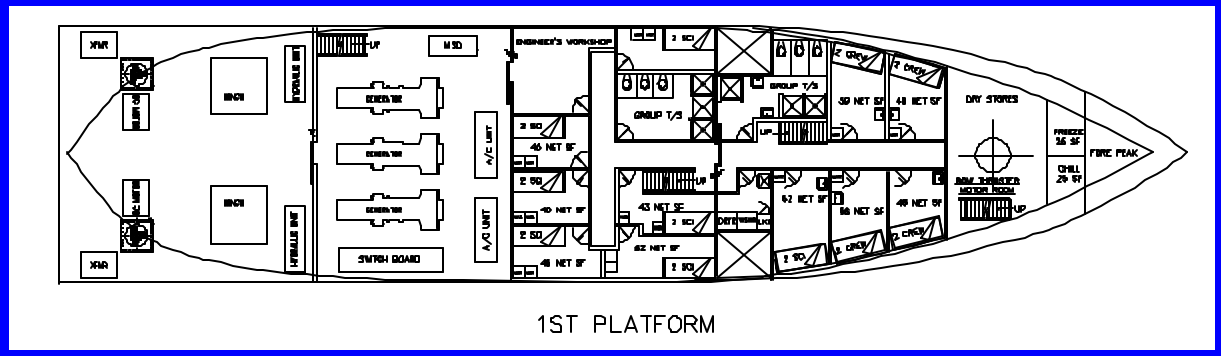
To Do:

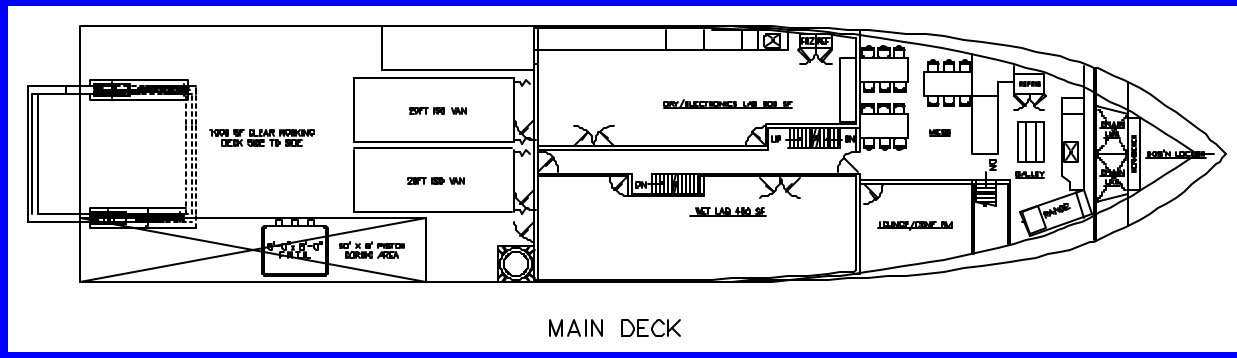
- Analyze Naval Architecture Characteristics and Feasibility
- Look at SR Sizes and Possibility of Semi Private T/S

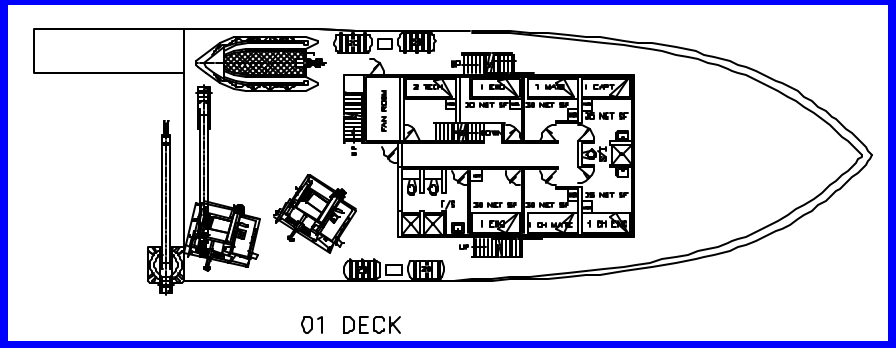


REGIONAL Research Vessel
Impact of SMRs on Size and Cost

Preliminary Arrangement for 900 Ton Ship







Regional Class SMR Prioritization Task Web/Phone conference – April 15, 2004

Started at 3 pm EDT.

Participants:
At NSF:
Mike Reeve
Dolly Dieter
Kristin Heller
John Freitag
Dan Rolland
Pete Kilroy
John Walters
Wilf Gardner

Teleconference:
Dave Hebert
Al Suchy
Terry Whitledge
Bruce Corliss
Mike Prince

Dan Rolland presenting. His slides are available in two formats at:

- http://www.unols.org/committees/fic/regional/JJMA_rc_phase3_041504.ppt (~508 kB) Note: This can be found on the Web. Only PDF version is in annual Report

- http://www.unols.org/committees/fic/regional/JJMA_rc_phase3_041504.pdf (~135 kB)

Slide with comparison of variants to SMRs
Added 900 ton vessel and the Cape Hatteras

Day rate versus displacement, shows a steady increase in day rate with increase in displacement. However, it was pointed out that a step would probably occur at the inspected vessel threshold.

High impact SMRs

Science berths: # people per T/S. Number of berths and size directly affects space for other things and indirectly affects other housekeeping requirements.

Endurance: Consumables is limiting. Chiller space for fresh produce is usually a major limiting factor for longer cruises.

Range: Discussion about the need for 15K KM or 8K NM range. Drives up the amount of fuel needed considerably. Higher speed and lower range might be more desirable. Fuel needed for 8K NM range at 10 knots = 170 tons = 53,000 gallons compared with 29,000 on Cape Class for about a 7,000 mile range at 10 knots.

Decks: Variants from 900 ton up include 400 sf for two vans.

Speed: 12 kts and 1500 SHP might be a reasonable design goal.

Seakeeping: Evaluated on short crested and long crested wave forms.
Discussed adding Cape Class to the seakeeping chart. Would require lines and offsets and loading data. This might make a good benchmark to evaluate the other designs against. NSF to decide if needed.

MEDIUM Impact SMR's

Handling Equipment
Vans, impact the working deck.
Science Load
Sonars
Stationkeeping

Low Impact SMR's
Ship control
towing, impacts handling equipment more than power.
Science stores
workboats.

Arrangements
Strawman drawing of arrangements. Used to see how big a ship is needed to fit all the space and machinery requirements. Discussed the size of staterooms and the need for semi-private T/S. JJMA will look more carefully at the arrangements to see to what extent that can be

accomplished in the 900 ton variant and still get enough berths.

TASK FOR UNOLS GROUP:
The High Impact SMRs need prioritization.

Rank how important each of the high impact SMR's are.
What can be reduced in these requirements.

- Look at reduced range and speed.
- Speed and Seakeeping compete with each other, which is more important.
- Labs, Vans, Decks vs berthing compete, need to rank order them.
- Range and Endurance and Speed compete with each other

We can seek community input on the prioritization and form a advisory community to provide input.

Timeline is to be done with our input by June 15th. Input will be through NSF.
Will use web/conferencing for communications unless otherwise needed.

Check list:
- Draw up work plan and recruit the advisory committee.
- Provide rough draft and questions.
- Put out for community review.
- Provide final draft.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM
Moss Landing Marine Laboratories 8272 Moss Landing Road, Moss Landing, CA 95039
(831)-771-4410 Fax (831) 632-4413 www.unols.org office@unols.org

July 1, 2004

Dr. Mike Reeve
Integrative Programs Section
Ocean Sciences Division
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

Dear Dr. Reeve,

At the UNOLS Council meeting in March you and Jim Yoder asked that UNOLS recommend priorities with regard to the Science Mission Requirements (SMR) for the planned Regional Class Research Vessels. On April 15 you provided further guidance regarding which requirements needed to be examined and prioritized along with background information on how the various SMR elements might affect the size and cost of the planned vessels. In particular, several SMR elements were identified as having a high impact on size and cost and in some cases it was felt that these requirements might be relaxed in order to keep the size and cost from growing unnecessarily. We were asked to get broad community input and provide our recommendations this summer.

In response, UNOLS formed a Regional Class Advisory Committee (RCAC) with regional, institutional and disciplinary balance to address the prioritization questions. A questionnaire was posted for community input, which received 90 responses. A draft report was created and circulated to the entire UNOLS community for review and comment. The final report provides UNOLS recommendations for prioritization of the "high impact" SMR elements along with recommendations regarding minimal acceptable capabilities or specifications for the Regional Class vessels.

UNOLS continues to recommend that the published Science Mission Requirements be used as the guiding document for the development of Regional Class designs. The attached report provides further guidance when choices become necessary due to cost or size constraints when developing these designs.

On behalf of the RCAC Chair, Dr. Wilford Gardner, FIC Chair Dr. Dave Hebert and UNOLS Chair Dr. Timothy Cowles, the UNOLS office submits the attached report.

Respectfully,

Mike Prince
UNOLS Executive Secretary

Attachment: UNOLS report – *Prioritization of Regional Class Science Mission Requirements (7/1/04)*

cc: Dolly Dieter, Tim Cowles, Dave Hebert, UNOLS RCAC

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Prioritization of Regional Class Science Mission Requirements

Report to the National Science Foundation, Division of Ocean Sciences, Integrated Facilities Section

By

The University-National Oceanographic Laboratory System (UNOLS)

Prepared by the Regional Class Advisory Committee (RCAC) and approved by the Fleet Improvement Committee and UNOLS Council.

Dated: July 1, 2004

Introduction

This report provides recommendations by UNOLS to the National Science Foundation (NSF) concerning relative priorities for certain elements of the Regional Class Science Mission Requirements. These recommendations were prepared by the Regional Class Advisory Committee and reviewed by the UNOLS Fleet Improvement Committee and UNOLS Council.

Charge

At the request of the National Science Foundation, UNOLS was tasked with providing relative priorities for some of the Science Mission Requirements (SMR) for new Regional Class research vessels. A report with UNOLS recommendations was requested by mid to late June 2004. A Regional Class Advisory Committee was formed to review the relevant SMR elements, seek community input and to draft a set of recommendations that would be provided to NSF by UNOLS after further community review and input. In order to accomplish this task in the short time frame provided, the use of phone and web conferencing, email and web based questionnaires was employed.

High-impact SMRs

To kick off the effort, NSF with support by the Naval Sea Systems Command (NAVSEA) and the naval architect firm, John J. McMullen Associates (JJMA), provided an assessment of the various SMR elements and ranked them as high, medium and low impact. This was based on the impact these particular elements would have on the overall size, construction cost, and operation of any Regional Class vessel design. NSF asked that UNOLS prioritize or rank order the high impact SMR elements and to indicate any areas where these requirements could be reduced below the published values. The high impact SMR elements include: science berthing, deck space, lab space, endurance, range, speed and sea-keeping.

Membership on the Regional Class Advisory Committee (RCAC)

The Chair of FIC in conjunction with the Chair and members of the previously formed Regional Class Science Mission Requirements (SMRs) Steering committee created a Regional Class Advisory Committee (RCAC) to address this issue. The goals for the makeup of this committee were to have disciplinary and regional balance as well as institutional and gender diversity. The committee should also include operational representatives. Requests for interest in participating in this effort were sent to all those scientists and operators that had contributed to the development of the Regional Class SMRs either by submitting comments and/or by attending the SMR workshop. Over thirty people expressed an interest in serving on the RCAC. The final choices of committee members were made with the above goals in mind.

Regional Class Advisory Committee (RCAC)

- Wilford Gardner, Chair, TAMU, Gulf, geo-chem
- Vernon Asper, USM, Gulf, bio-geo
- Cynthia Moore, RSMAS, East/Gulf, chem-optics
- Joan Bernhard, WHOI, East, bio
- David Townsend, U. Maine, East, bio
- John Morrison, North Carolina State Univ., East, phys oc
- Bruce Corliss, Duke, East, geo
- Curt Collins, NPS, West, phys oc
- Charles Paul, MBARI, West, geo
- Frank Sansone, U. Hawaii, West, geo-chem
- Stewart Lamerdin, MLML, West, ops-technician
- Louis Zimm, SIO, West, ops-captain
- Steve Lanoux, UT, Gulf, ops-management
- Steve Rabalais, LUMCON, Gulf, ops-management
- Also participating: Dave Hebert, FIC Chair, URI, phys oc

Process

JJMA prepared a presentation, which showed several variants of mono-hull and swath vessel designs that could meet the published Regional Class SMRs to various degrees. In addition, they showed how various SMR elements impacted the design. This report was made available to members of the RCAC and to anyone providing input to the committee. This report is attached as an appendix.

A questionnaire was prepared by the Regional Class Steering committee and posted online for input by the UNOLS community. Requests were sent to all UNOLS representatives, Council and committee members as well as all those that had participated in the creation of the Regional Class SMRs. The questionnaire was also linked from the UNOLS homepage. A total of 86 people completed the questionnaire. These responses were summarized and posted to the website and reviewed by the RCAC. A summary of these results is attached as an appendix.

A phone and web conference was held on Friday, June 4th from 1 to 4 pm EDT during which the JJMA report and questionnaire results were reviewed. The RCAC then discussed the various high impact SMR elements and identified those areas where they felt there was general consensus regarding relative priorities and acceptable values. Some areas were not quite as clear, but a sense of what might be acceptable was formed and this was articulated in the draft report and circulated for community input. Minutes of the phone conference were circulated to the RCAC and NSF and are attached as an appendix.

A draft report with recommendations by the RCAC was created and circulated to NSF and the community for comment. Input received was incorporated into a final report, which was forwarded to NSF by FIC and the UNOLS Council and published to the community on the UNOLS website.

Overall objectives of Regional Class SMR prioritization (relative to previous and current steps in the process)

FOFC Academic Fleet Renewal Plan

Vessels to replace current Cape Class and some of the intermediates

Regional Class vessels should be more capable than the vessels they replace.

Some parameters were set in the FOFC plan and needed to be refined or reduced to keep vessel size and cost within limits.

Regional differences are not addressed in the FOFC plan or in the current plans for implementation of that plan for Regional Class vessels.

Published UNOLS SMRs

Published SMRs provided a set of scientific requirements based on initial constraints set by the FOFC plan.

Some provided ranges from minimal to desired.

Relative priorities between requirements such as lab and deck space were not provided based on the assumption that all requirements could be met with the right vessel design.

NSF Phase III design prioritization effort

Although the design feasibility studies conducted for NSF by NAVSEA and JJMA showed that a design could be created that met all of the Regional Class SMR requirements, this design would be at the upper end of the size range and potentially exceed the budget for construction cost. In addition, the yearly cost to operate this vessel is projected to be greater than amounts acceptable to NSF and many other potential users of these vessels.

With constraints on overall size, construction cost and operating costs along with guidance on which SMR elements have the most impact on these parameters it is possible to set relative priorities with regards to space utilization, hull form and propulsion size.

Summary of recommendations

For the most part, the RCAC and many members of the community that provided input believe that the published SMRs remain a valid description of the scientific requirements for Regional Class vessels. Given the desire to keep the overall size, construction cost and operating cost lower, the RCAC and UNOLS recommend that the Regional Class vessel can be designed with some reductions in the published Science Mission Requirements and by giving priority to some elements over others when and if choices are necessary.

The range can be reduced to somewhere between 12,000 and 10,000 km. Endurance should be maintained at a minimum of 21 days, however extending endurance to 30 days should be given less importance. The vessel should be

designed to a maximum speed of 12 knots and a fuel-efficient cruising speed between 10 and 11 knots. Cruising speeds greater than 11 knots and maximum speeds greater than 12 knots are not a high priority. Sea-keeping remains a high priority for these vessels, but not to the extent that a SWATH vessel hull form would be preferred. A mono-hull design, optimized for sea-keeping, is preferred for flexibility in operations, payload, draft and lower cost.

For choices in the allocation of space in the Regional Class design, the RCAC and UNOLS recommend that every attempt be made to stay within the ranges provided in the published requirements by using a balanced and flexible design. While maintaining the minimal number of science berths at 16, the design should give highest priority to free and clear deck space with a well-designed capability to handle two vans. Lab space is the second priority, with the ability to use vans for added lab space providing the required flexibility. The ability to provide additional or surge berthing was the lowest priority relative to deck and lab space. The use of smaller staterooms and the careful design of toilet/shower spaces and common use spaces should be incorporated to meet space utilization goals. Although not listed as a high impact SMR, the committee felt that habitability requirements remain a high priority and that designers should make every effort to incorporate recreational and meeting space in the designs, especially if stateroom sizes are kept to a minimum.

SMRs affecting use of space

Relative priorities

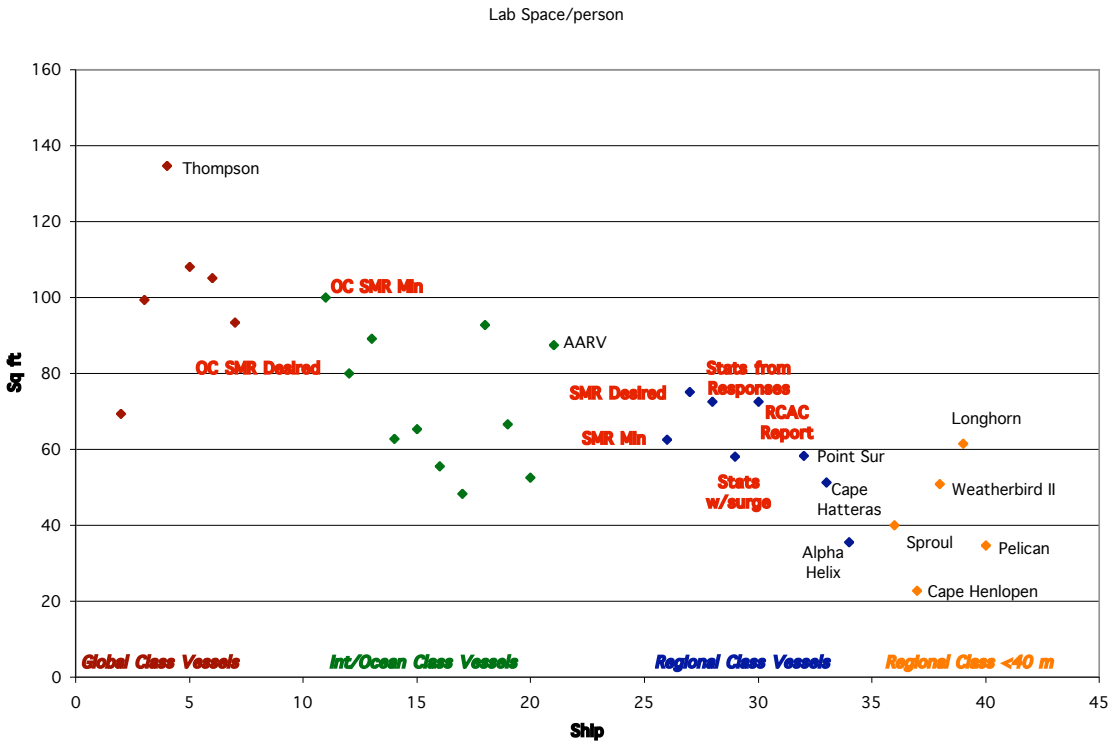
Preferences expressed in the survey for deck space, lab space or berthing were a somewhat mixed bag. Deck space was chosen as the first priority by most, with lab space second priority and berthing space the third priority.

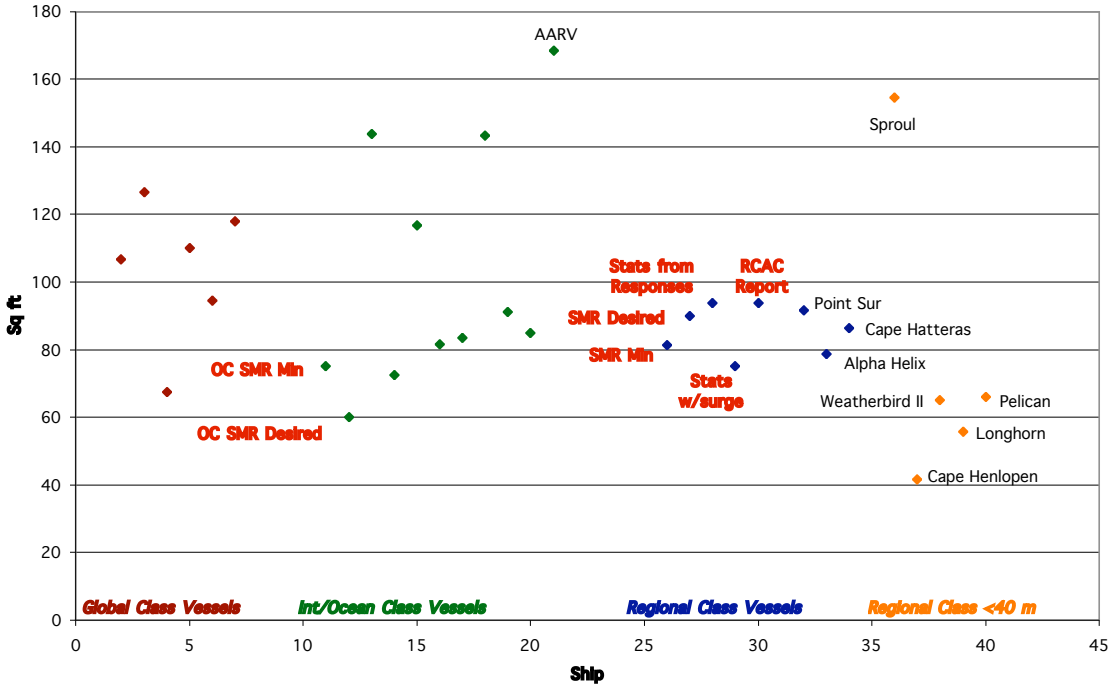
Balance and ratio between spaces

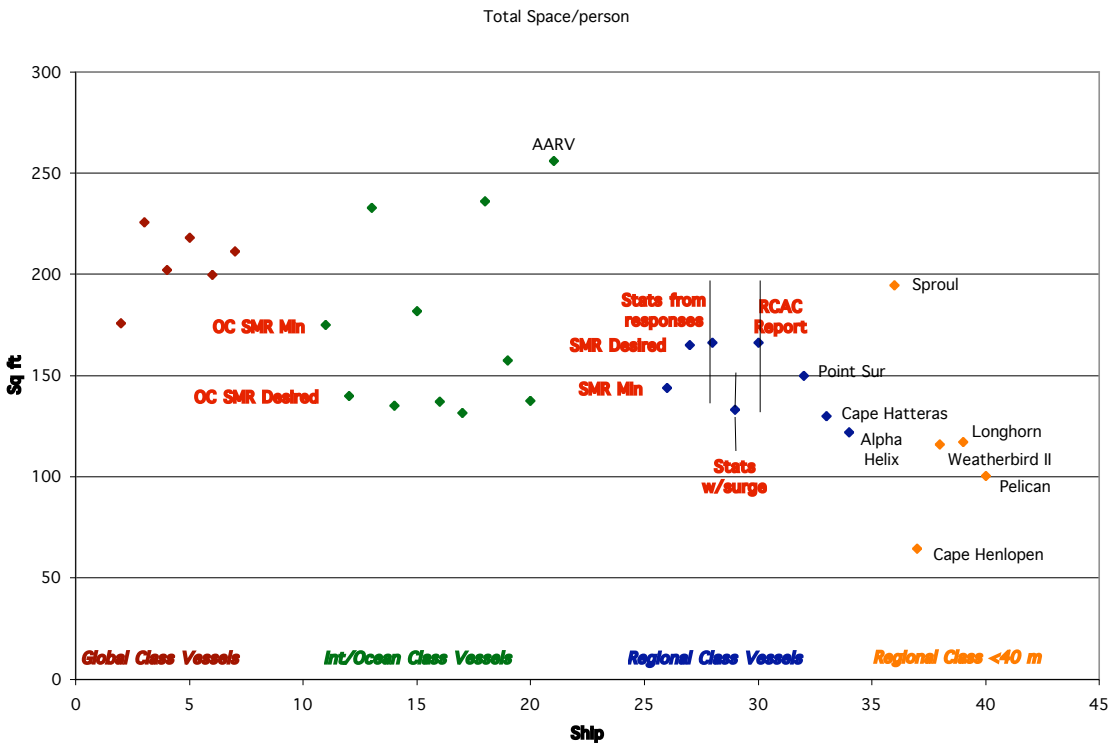
When making choices between deck, lab and berthing space, is important to maintain a logical ratio and balance. A design should not sacrifice lab space to creating berthing to the extent that there is no room for the extra scientists to work. The converse is true, creating a huge lab space for a minimal science complement would not make sense either. Lab spaces should be reduced in number as well as size, being careful not to create spaces that are largely unusable due to their small size (i.e., CAPE Class wet lab).

The following three charts show the amount of lab, deck and combined lab/deck space per science berth for the current UNOLS vessels and those contemplated by the SMRs and this report.

Prioritization of Regional Class Science Mission Requirements







Flexibility

Maintaining flexibility in the design is a very high priority. This is probably the greatest reason for giving deck space precedence over lab and berthing space. With greater deck space, it is simpler to temporarily (or even permanently) provide additional lab space through the use of vans. A well-placed and properly designed van could also be used for berthing, although this option is not recommended by many people. The published SMR gives appropriate cautions.

Berthing

Number of berths

The published requirement, calling for 16 berths at a minimum and a surge capacity of 4 additional berths, continues to be the choice of most. Some respondents continue to believe that a greater number of science berths should be provided and a few felt that less than sixteen were required on permanent basis, but that a surge capacity to at least sixteen was desired.

Total berths required will be affected by number of crew and technicians as well as total science berths. For this class vessel, the use of smaller staterooms can be used, especially in the case of private single person staterooms. It is still desirable to maintain science berthing at two-person staterooms for the normal minimal complement and single staterooms for the crew is desirable.

Surge berthing

Generally speaking, the committee is concerned that attempts to create surge berthing may result in designs that contain too many compromises or create berthing options that are not useable. If at least 16 and perhaps more science berths are provided, then the creation of surge berthing becomes a lower priority.

Use of Vans

Options for creating surge berthing could include the use of a well-designed berthing van in conjunction with a location on the O-1 deck that is mated directly to the superstructure. Any location should be capable of very secure attachment, protection from weather/seas and protected access to and from the interior of the vessel. A head/shower should be located nearby.

Multi-person staterooms and other approaches

Other options could include some staterooms that are large enough and designed to carry 3 or 4 scientists in a surge capacity or third drop down berths in several staterooms. The ability to convert other spaces, such as lounge areas do not hold much promise as these areas would be in more demand when a larger science complement was embarked.

Heads

In the JJMA report on regional class vessel hull forms, the smaller size variant was designed with community heads (toilet/shower) that were designed to accommodate more than one person at a time. These so-called “group heads” are not considered a viable option and should be avoided if at all possible. There was a preference for semi-private heads (a head shared between two cabins), however, some preferred single person units that opened into passageways and would be more of a community space. There are pluses and minuses to both approaches. It was agreed that the ratio of people per head should remain at four, except for cases where surge berthing is employed. In that case, ratios as high as six per head could be used. A creative approach to provide community and semi-private toilet shower space should be examined. In any event, at least one community toilet should be provided on the main deck.

Common spaces

The habitability SMR was not included among those presented by JJMA as having a high, medium or low impact on vessels size and cost. The RCAC, however believes that habitability issues are a high priority and some of these items may have an impact on overall size of these vessels. In particular, common use spaces such as lounges, science meeting space, mess deck and recreational spaces will compete with other space uses. The committee felt that it was important to provide for these areas on this class of vessel, especially if staterooms are kept at a minimal size. Again creative use of space and designing spaces for multiple use will help to allow for these common areas without expanding the overall size of the vessel.

Deck Space

Amount required

The published range of a desired deck space remains valid. At least 1,000 sq ft of clear deck space aft of the main house is required and when you include the contiguous waist area on the starboard side, the minimum should be 1,300 sq. ft. First priority should be given to increasing the clear deck space aft of the house to at least 1,200 sq ft and a total working area of 1,500 sq ft on the main deck.

Clear space on rail

Maintaining 50 ft of clear space along the starboard rail is considered a high priority.

Van spaces

These vessels should be capable of carrying two standard size vans. There is a preference for both van locations to be on the main deck, but the requirement is that at least one van space be located on the main deck. In all cases safe and secure access to vans by personnel should be provided for in the design.

Lab Space

Amount required

Lab space was the second priority and should be kept as close to the published SMR requirements as possible. If choices must be made, lab space should be reduced before deck space and can be kept closer to the minimum requirements if necessary (1,000 sq ft).

Location

Wet labs and main labs should be kept on the main deck, contiguous with the working decks. It may be possible to locate other labs on other decks if necessary.

SMRs affecting power and hull form/size

Relative priorities

Endurance was the first priority for most with range a second priority and speed a third priority when competing against each other. This is harder to interpret, but probably means that maintaining the ability to meet the minimum endurance and the shortened minimal range are more important than achieving greater speed.

Sea-keeping was clearly a higher priority than increased speed.

Range

There was clear consensus that the published range of 15,000 km was greater than what was required and that this value could be reduced to 12,000 km and perhaps as low as 10,000 km.

Endurance

Endurance was an important consideration and was generally given a higher priority relative to range and speed for the Regional Class vessel design. Maintaining a minimum endurance of 21 days was given a high priority, however surge endurance to 30 days was given less importance. It is still desired, but not at the risk of significant increase in cost or reduction in other requirements.

Speed

Speed at the upper end of the published SMR requirement is not a high priority. Speeds greater than 12 knots are not required and should not come at the expense of sea keeping or a large increase in daily rate. A maximum speed of 12 knots is still desired, and an optimum cruising speed in the 10 to 11 knot range is acceptable.

Sea-keeping

Sea-keeping remains a high priority and takes precedence over speed in making hull form choices. Sea-keeping does not over-ride the negative aspects of choosing a SWATH vessel hull form (e.g., draft, payload, cost). The committee believes that a mono-hull design, optimized for sea-keeping makes the most sense for a Regional Class vessel.

Conclusion

Need for creativity and multiple ideas in early design

It is clear that in order to provide maximum capability while at the same time keeping the overall size and cost of the Regional Class vessels under control it will be absolutely necessary to use creativity and to explore multiple ideas early in the design process.

Need for continued community input

At the same time community input is required at all stages to ensure that these ideas will meet their scientific requirements, especially when weighing one requirement against another.

Potential need for more than one design or variations of design for regional differences.

Regional preferences for either a slightly larger or for a less expensive smaller design remain and it may be necessary to consider options or variations of a

design that might be adapted to these varying requirements. Perhaps a scalable design could provide for regional differences with minimal additional cost if a single design cannot meet the needs of every region.

Designs under 300GRT (un-inspected vessel?)

Many people felt that designing a capable research vessel that would meet the needs of many people while maintaining an operating cost close to that of existing Regional Class vessels should be a high priority, although this question was not asked explicitly in the questionnaire. Since the size of the crew has one of the biggest impacts on the cost of operations, designing for a crew size of no more than eleven, for example, would help to keep these costs lower. It is the opinion of several members of the committee that designing the vessel so that it would be less than 300 GRT and operated as an un-inspected research vessel would be an important goal to consider in keeping the cost down. Alternatively, crew size considerations could be explored with the Coast Guard in an attempt to develop a design for an inspected vessel that had a smaller crew complement.

Summary Table of Recommendations

Parameter	Published SMR Capability or Characteristic	*RCAC*	
		Recommendations	**Comment**
Habitability			
Accommodations	16 to 20 non-crew personnel	16 minimum with Surge of 4 berths	Can use smaller staterooms
Heads	Ratio = 4 people/head	- Keep SMR ratio (4:1) - Avoid “group heads” - Semi-private preferred - 6 per head acceptable when surge berthing in use.	At least one head on Main deck
Common Spaces		High priority	
Operational characteristics			
Endurance	21 days; surge capacity 30 days (15 transit and 15 station)	- Keep 21 day minimum - Surge to 30 days less important	Highest operational priority
Range	15,000 km	12,000 km to 10,000 km	Second operational priority
Speed	12 - 14 knots; 10 knots sustainable through sea state 4; 7 knots in SS 5	Optimal cruising speed = 10 to 11 knots Max speed = 12 knots	Third operational priority
Sea keeping	Ability to work in sea states 4 (1.25 - 2.5 m wave heights); >50% operational in SS 5 (2.5 - 4 m wave heights).	High priority and takes precedence over speed	Monohull preferred over SWATH

Parameter	Published SMR Capability or Characteristic	*RCAC*	
		Recommendations	**Comment**
Science working spaces		- Balanced ratio between spaces needed - Maintain space flexibility	
Working deck area	1,000 sq ft minimum clear area **aft** of deck houses; desirable 1,500 sq ft. Additional contiguous minimum 50' x 10' area along one side for coring, etc. Total amount of clear working area available on the aft main deck should be at least 1,300 sq ft.	Keep SMR requirements. - 1st priority should be increasing clear deck space aft of the main house to 1,200 sq ft or greater. - 50 ft along STBD rail is high priority. - Space for 2 standard vans.	Highest Space priority One van can be on upper deck if necessary or for berthing.
Laboratories	Total lab space should be a minimum of 1,000 sq ft (1,500 sq ft is desirable) including: Main (dry) lab area (800 sq ft) Separate wet lab/hydro lab (400 sq ft) Electronics/computer lab; separate or part of main lab. A separate electronics repair shop/work space for resident (and visiting) technicians is desirable. High bay/hanger space Climate controlled workspace or chamber (~100 sq ft)	- Keep close to SMRs. - Labs should be reduced before deck space - Can be kept closer to the minimum SMRs if needed - Wet labs and main labs should be on main deck, but some other labs may be located on other decks if necessary.	Second space priority - Additional lab space thru use of vans

References

Federal Oceanographic Facilities Committee (FOFC), 2001, Charting the Future for the National Academic Research Fleet, A Long-Range Plan for Renewal, 32 pp

University-National Oceanographic Laboratory System (UNOLS), 2003, Regional Class Science Mission Requirements, 38 pp

Appendices

I. JJMA report on high, medium and low impact SMRs

II. Questionnaire seeking community input

III. Summary of responses to questionnaire

IV. Notes from RCAC phone/web conference

Appendix I

Report by John J. McMullen Associates (JJMA)

May 15, 2004

Regional Class Research Vessel

Impact of SMRs on Size and Cost

http://www.unols.org/committees/fic/regional/JJMA_rc_phase3_041504.pdf

Appendix II

UNOLS Questionnaire for community input
Prioritization of High Impact Regional Class SMRs

The complete questionnaire is online at the UNOLS website:

http://www.unols.org/committees/fic/regional/regional_smr_priorities.asp

Questions asked are listed below:

Berthing

- What should the minimum number of permanent berths be?
- How many surge capacity berths are needed?
- Can surge berthing be multi-occupant (more than two person)?
- Should vans be used for berthing?
- Should Toilet/Shower be semi-private (4 per unit) or community? semi-private/community
- Should smaller staterooms (minimum allowed by regulations) be used to gain more berths if needed?

Deck Space

- What is the minimum required clear deck space on the main deck?
- Is 50 ft of deck space along the rail required? (answer no if you think it can be reduced)
- What should be the minimum number of van spaces?
- Do both van spaces have to be on main deck?

Lab Space

- What is the minimum required lab space?
- Do all labs have to be on the Main Deck?

Endurance

- What should the minimum endurance be?
- Is the ability to have a surge endurance of 30 days a high priority?

Range

- Can the range be reduced below 15,000 km (8,100 nm)?
- How much range is adequate for work from a regional vessel?

Speed

- Do you require more than 12 knots maximum speed?
- What should the optimum cruising speed be?

Sea-keeping

- Is improved sea-keeping capability over the Cape Class a high priority?

Rank Ordering of High Impact SMRs

- Assumes that choices will have to be made to meet cost and size constraints.
- Within each group below, rank order the choices with 1 being the highest priority
- Berthing vs Lab Space vs Deck Space
- Range vs Endurance vs Speed
- Speed vs Sea-keeping

Comments

- Comments could be provided for each section and in general.

Appendix III

Summary of Community Input to UNOLS Questionnaire

Prioritization of Regional Class Vessel High Impact SMRs

http://www.unols.org/committees/fic/regional/regional_priorities_result.html

Appendix IV

Regional Class Advisory Committee

Phone/Web conference meeting

June 4, 2004 – Meeting Notes

http://www.unols.org/committees/fic/regional/RC_webconf_041504_notes.html

The comment period has ended. The report to NSF can be viewed at:

Regional_SMR_Priorities.html

Regional Class Research Vessel - Phase III study

Prioritization of

High Impact SMRs for Regional Class Vessels

As in the previous two phases, NSF is working with ONR and NAVSEA, with the assistance of the naval architect firm of JJMA to conduct Phase III of the Regional Class design feasibility study. A primary function of this phase is to set some priorities and limitations on SMR requirements that may have a major impact on the overall size (displacement, length, beam) and life cycle cost (acquisition and operating).

NSF has asked UNOLS (FIC and Regional Class Steering Committee) to provide community based input on the prioritization of the SMR elements that have the highest impact on size and cost. JJMA has identified these "high impact SMRs" as science berthing; lab space; deck space; endurance; range; speed and sea keeping.

We are asking for your input to help formulate the UNOLS response to NSF on setting priorities and perhaps narrowing the requirements in an effort to help meet the goals of reducing acquisition and operating costs. NSF has identified their goals in terms of a total acquisition cost of $25 million dollars and a day rate in the neighborhood of $10,000 per day ($2 million/year for 200 day operating year). This is somewhere between the cost of current Regional Class vessels and current Intermediate Class vessels.

The preliminary development of the Regional Concept Design by JJMA in Phase I & II of their feasibilty studies has shown that a mono-hull vessel of approximately 1,150 tons displacement (176 ft LOA) can

meet all of the Regional Class SMRs, as can a SWATH vessel of approximately 1,300 tons displacement (149 ft LOA). The mono-hull is estimated to cost over $13K/day and the SWATH over $14K/day. Acquisition costs for these size vessels would exceed the $25M by several million. Smaller vessels can be designed, but this may require compromise on some of the important SMRs.

Preliminary Phase III study information is contained in a report from JJMA. A link to this report is contained on the following page:

- http://www.unols.org/committees/fic/regional/phase3_discussions.html

Phase II of the Regional Class Design Study reports and background on the SMR's can be found at:

- http://www.unols.org/committees/fic/regional/regional_class.html

For a table of comparative data on these "major impacts" SMR parameters for existing ships (deck space, lab space, etc.), click here.

NSF would like to make these decisions with input from the community and we would appreciate receiving your answers to some questions, some rank ordering of certain SMRs and your comments. Please use the form below for this purpose. For each high impact SMR the published requirement is shown in the right hand column for your reference as needed. In the left column there is a summary of issues related to the SMR element from the JJMA study followed by a couple of questions and a comment block. At the end the end of the form we ask you to rank order certain SMR elements against each other. Lastly, you may provide any general comments regarding the high impact SMRs, medium and low impact SMR's identified in the JJMA report or on the Regional Class design in general.

If you do not have time to go through the entire form, please take the time to complete the rank ordering questions and provide a quick comment at the end of the form. The information in the JJMA report and below should help define the issues for you.

Science Berths	Published Requirement
Berthing related issues that directly impact vessel size and	**Accommodations: 16 to 20 non-crew personnel**

cost:

- Number of staterooms and total number of berths (16 to 20).
- The addition of 4 permanent scientist berths adds 2 staterooms and adds ~5ft to ship length.
- Number of people per toilet/shower (semi-private vs community toilet/shower spaces)
- 4 persons max per toilet/shower unit requires more space than community toilet/shower units
- Number of single person staterooms (all crew and resident techs, chief scientist, officers, or no one)
- Size of staterooms - may depend on endurance (length of cruises)
- Convertible space or vans may be considered
- Higher personnel complement increases space needed for auxiliary services.
- Berthing space competes with lab, deck and operational spaces.
- You will be asked to rank the need for additional berthing vs lab space vs deck space at the end of this form.

Questions

What should the minimum number of permanent berths be? [ ]

How many surge capacity berths are needed? [ ]

Can surge berthing be multi-occupant (more than two person)?

A minimum of 16 non-crew personnel in two-person staterooms is required and it is highly desirable to have the capacity to carry 20 or more when needed. *Total complement would include an adequate number of maritime crewmembers to support the scientific mission, meet regulatory requirements, and support the need for proper maintenance of the vessel. The ability to accommodate up to 40 non-crew personnel safely on day trips should be included in design and outfitting decisions.The non-crew personnel (often referred to as the Science Party) would consist of the personnel from the various scientific programs, the assigned marine technicians, technical support personnel for certain types of instrumentation (e.g. ROV/AUV groups, OBS groups, coring groups, etc.), foreign observers, education, and outreach personnel, and anyone else not part of the maritime crew.The vessel should be designed for optimum habitability for normal science party size with the ability to expand to larger science party sizes when needed. Supporting infrastructure would be designed around the largest possible complement.* ***Shower and toilet facilities should normally support no more than four people per unit.*** *Staterooms should be designed to optimize the available space while maximizing habitability. Providing basic storage, washbasins, and limited workspace should be attempted in the design. Additional storage and larger workstations could be provided in common space elsewhere.* ***Provisions should be made to accommodate gender imbalance.***

The concept for designing a surge capacity that can be effectively used when needed is important to the flexibility of

○ yes ○ no Should vans be used for berthing? ○ yes ○ no Should Toilet/Shower be semi-private (4 per unit) or community? ○ semi-private ○ community Should smaller staterooms (minimum allowed by regulations) be used to gain more berths if needed? ○ yes ○ no	*these vessels to support a wider range of potential projects. Making space such as a lounge or conference room convertible to bunk space or other effective use of space should be considered.* ***The use of vans could be considered as long as the resulting accommodations are integrated into normal ship services, and they can be safely utilized. Past failures involving the use of berthing vans should be avoided.*** ***The maritime crew and resident marine technicians should be berthed in single person staterooms to the maximum extent possible in order to promote crew retention and the resulting expertise for supporting the scientific mission.***

Comments on Berthing SMR

Working Deck Space	Published Requirement

Working deck related issues that directly impact vessel size and cost:

- Working deck area is required to be on the main deck.
- Approximately one foot of ship length req'd per 36 ft2 of work deck.
- At least 50 ft of clear deck space along rail.
- Space for two vans on main deck.
- Deck space competes with lab space and berthing space (rank order later)

Working deck area: 1,000 sq ft minimum clear area aft of deck houses; desirable 1,500 sq ft. Additional contiguous minimum 50' x 10' area along one side for coring, etc. Total amount of clear working area available on the aft main deck should be at least 1,300 sq ft.

Questions

What is the minimum required clear deck space on the main deck? [ ]

Is 50 ft of deck space along the rail required? (answer no if you think it can be reduced)

○ yes ○ no

What should be the minimum number of van spaces? [ ]

Do both van spaces have to be on main deck?

○ yes ○ no

A spacious stern working area with 1,000 sq ft minimum aft of deck houses open and as clear as possible from one side to the other is required. In addition, a contiguous waist work area along one side (starboard preferred) that provides a minimum of a 50 ft length of clear deck along the rail should be available. This area will allow for 10 to 15 meter piston coring and other operations. A minimum width of eight feet is needed for the coring operations and the overall width of the waist deck should be wide enough to accommodate all planned operations. The total amount of clear working area on the main deck aft should be maximized and equal at least 1,300 sq ft. It is desirable to accommodate at least a 10 meter (33 ft) core and up to 15 meter (50 ft) piston coring operations. The coring process design and design for other major operations should take place during the early design of the vessel. There should be space for up to two vans on the main deck with minimal interference with over the side operations.

A clear foredeck area should be capable of accommodating small, specialized towers,

	booms, and other sampling equipment as much as possible. Providing tie down sockets, power, water, and data connections will facilitate flexible use of this space. *Additional deck areas should be provided with the means for flexible and effective installation of incubators, vans, workboats, and temporary equipment.*

Comments on Working Deck SMR

# Lab Space	## Published Requirement
## Lab Space related issues that directly impact vessel size and cost: • Required to be on the main deck. • Approximately One Foot of Ship Length Req'd Per 36 ft2 of lab area	## Laboratories: Total lab space should be a minimum of 1,000 sq ft (1,500 sq ft is desirable) including: • **Main (dry) lab area (800 sq ft)** • **Separate wet lab/hydro lab (400 sq ft)** • **Electronics/computer lab; separate or part of main lab.** • **A separate electronics repair shop/work space for resident (and visiting) technicians is desirable.** • **High bay/hanger space for**

multiple purposes adjacent to the aft main deck is desirable; may be combined with wet lab/hydro lab.

- **Climate controlled workspace or chamber (~100 sq ft) as lab or in van.**

Questions

What is the minimum required lab space?

Do all labs have to be on the Main Deck?

○ yes ○ no

Comments on Lab Space SMR

*The majority of the **lab space should be located in one or two large lab(s) that can be reconfigured**, partitioned, and adapted to various uses to allow for maximum flexibility. This flexibility is an important design criterion.*

***To the maximum extent possible, labs should all be located on the same deck adjacent to each other and adjacent to the main working deck areas.** Labs should be designed to minimize their use as general passageways. Doors and hatches should be designed to facilitate installing large equipment, loading scientific equipment, and bringing equipment and samples to and from the deck areas. Doorsills should be temporarily removable.*

***A total of at least 1,000 sq. ft. of lab space is required and 1,500 sq. ft. is desirable** (dimensions below are approximate guidelines). On this class of vessel, the additional lab space may need to be provided in well designed and integrated laboratory vans in order to provide the flexibility in the amount of lab versus deck space available.*

*The **main (dry) lab area (up to 800 sq ft)** should be designed to be flexible with the provision for subdivision into smaller specialized labs.*

*A **separate wet lab/hydro lab (up to 400 sq ft)** is to be located contiguous to sampling areas.*

*An **electronics/computer lab should be provided as a separate lab or as a defined area in the main lab**. This space should be dry and separated as much as possible from sources of electronic noise. It may include a central watch standing space that should accommodate visiting science equipment as well as normally installed equipment. Provisions for remote displays in other labs should be part of lab designs.*

*A **separate electronics and equipment repair shop/work space for resident technicians** that includes provision for repair bench space for visiting technicians is desirable. Storage space for resident technician spares and tools should be defined in the design so that it is not taken from useable laboratory space. A small separate room or partitioned space for IT (server, telephone, and network) equipment is desirable.*

***High bay space for multiple purposes adjacent to the aft main deck is desirable**. This space could support protected set up and repair of equipment, sample sorting, and other related functions. In this size vessel this function could be combined with the wet lab/hydro lab hanger space.*

*A **climate controlled workspace or chamber (approx. 100 sq ft) is required.** This can be provided using a van or to some degree by providing a well-designed area that can be partitioned*

	from the main lab or wet lab. If the vessel size or layout allows, the space might be provided as a separate lab space that can be used for other purposes as well. This space should be capable of controlling temperature to ± 0.5°C. Lighting should be controllable and programmable. *Design of HVAC systems should be integrated with designed partitioning of laboratory spaces so that temperature control can be achieved. Access to labs should be designed to minimize effect on air-conditioning systems and climate control. Lighting control should also take into account partitioning plans* ***Space for two (20 cu ft) stand-alone refrigerator/freezer units** with similar configuration and refrigeration equipment capable of maintaining temperatures between - 15°C and 10°C (these temperature requirements should be verified during design) should be provided. Additional units (such as 80°C) could be accommodated at the expense of other uses of lab space or in van space when needed. Built in units should not be needed and should not be included unless the space could be used for alternate purposes when not needed as refrigerated space.*

Endurance	**Published Requirement**
Endurance related issues that directly impact vessel size and cost:	**Endurance: 21 days; surge capacity 30 days (15 transit and 15 station)**

- Consumable storage (fresh vegetables and frozen stores) is most significant impact on endurance.
- Science party size and maximum occupancy of staterooms will be impacted as endurance increases .
- SMR mission scenarios all required endurance of 21 days or less.
- Range, Speed and Endurance compete with each other as shown by fuel/power curves in JJMA report.

***Endurance should be twenty one (21) days with a surge capacity for thirty (30) days endurance (15 days at cruising speed and 15 days station work**, see station keeping and towing). Some mission profiles will require continuous underway survey or towing operations at speeds from 4 knots up to the normal cruising speed. It would be desirable for these vessels to have 21-day endurance for these types of cruises. The design process should consider the impacts on engines, water making capability, and other factors when on station or moving at slow speeds for extended periods of time.*

Questions

What should the minimum endurance be?

Is the ability to have a surge endurance of 30 days a high priority?

○ yes ○ no

Comments on Endurance SMR

Range

Published Requirement

Range related issues that directly impact vessel size and cost:

- 15,000 km range was specified in FOFC Renewal Plan, but may be more than needed.
- Longer range requires more fuel capacity (and ballast tankage) and larger displacement.
- Approximately 170 Tons Fuel Required (45 NM Per Ton) @10 kts for 15,000 km range.
- 170 tons = 53,000 gallons compared with 29,000 on Cape Class Vessels
- Cape Class Vessels have a range under 7,000 nm
- SMR mission scenarios all required a range under 3,000 nm.
- Range competes with speed, endurance and science load.

Range: 8,100 nautical miles at optimal transit speeds

Questions

Can the range be reduced below 15,000 km
(8,100 nm)?

○ yes ○ no

How much range is adequate for work from a regional vessel?

Choose Range

kilometers (km) / nautical miles (nm)

*An **8,100 nautical mile (15,000 km)** total range is desirable at optimal cruising speed.*

Comments on Range SMR

Speed	Published Requirement
Speed related issues that directly impact vessel size and cost: • Feasibility Study Designs: Max Speed of 12 kts with 1,500 SHP is possible • Cruise Speed of 11.5 kts @ 80% MCR (power) • Meeting Max SMR of 14 kts Requires 2,800 SHP (almost double) • Reducing Max Speed To 11 kts Requires 1,000 SHP • Speed-Power Curve Steep Above 12 kts. Hulls Could Be Optimized For Higher Speed • This might reduce sea keeping. • Speed competes with endurance and range. • Speed competes with sea keeping	**Speed 12 knots; 10 knots sustainable through sea state 4; 7 knots in SS 5** ***12 to 14 knots maximum speed at sea trial is desirable*** *and at least* ***12 knots is required****.* ***Optimum cruising speed*** *should be between* ***10 and 12 knots*** *with* ***10 knots sustainable through sea state 4*** *(1.25 - 2.5 m wave heights).* *Speed control in sea state 3 or less (< 1.25*

Questions	
Do you require more than 12 knots maximum speed? ○ yes ○ no What should the optimum cruising speed be? [ ]	*meters wave height) should be 0.1 knot in the 0-5 knot range and 0.2 knot in the 6-12 knot range.* ***Maximum speed** and fine speed control should **not** be obtained at the cost of poor acoustical system operations, excessive noise, fuel consumption, or poor sea keeping.*

Comments on Speed SMR

Seakeeping	Published Requirement
Sea Keeping related issues that directly impact vessel size and cost: • Strong Driver of Hull Type (SWATH vs. Monohull) • Maximum SMR Monohull Meets SMRs • Minimum SMR Monohull Meets in Shortcrested Seas • Smaller (and shorter) Vessel Will Have Reduced Seakeeping Capability • No Seakeeping Analysis Done For	**Sea keeping: Ability to work in sea states 4 (1.25 - 2.5 m wave heights); >50% operational in SS 5 (2.5 - 4 m wave heights).**

Smaller Size Vessel
- Seakeeping competes with speed.

Questions

Is improved sea-keeping capability over the Cape Class a high priority?

○ yes ○ no

Sea keeping is the ability to carry out the mission of the vessel while maintaining crew comfort and safety, and maintaining equipment operability. It is an important design criteria to maximize the sea-kindliness of these vessels and maximize their ability to work in sea states four and higher within the constraints of their overall size. It is desirable for these vessels to operate 50% of the time or greater in the wintertime in the Pacific Northwest and in the Northeast/Gulf of Maine. The use of bilge keels, anti-roll tanks or other methods to reduce the motions of these vessels should be incorporated in the designs.

*In **sea state four** (1.25 - 2.5 m wave heights) these vessels should be able to:*

- *Maintain underway science operations at 9 knots*
- *Maintain **on station operations 80 % of the time**, including:*
  - ***CTD** operations **90%** of the time*
  - ***Mooring deployments 75%** of the time*
  - ***Coring operations 50% to 75%** of the time*
  - ***ROV** operations **50%** of the time*
- *Limit maximum vertical accelerations to less than 0.15 g (rms)*
- *Limit maximum lateral accelerations to less than 0.05 g (rms) at lab deck level*
- *Limit maximum roll to less than 3 degrees (rms)*
- *Limit maximum pitch to less than 2*

	degrees (rms) *At **sea state five** (2.5 - 4 m wave heights), these vessels should maintain 7 knots and be capable of station operations **50% of the time**.* *At **sea state six** (4 - 6 m wave heights), these vessels should maintain 4 knots and be capable of station operations **25% of the time**.* *At **sea state seven or greater** (>6 m wave heights), these vessels should be able to **operate safely while hove** to.* *These motion criteria specifications should be verified as adequate and achievable during the earliest concept design phase. Otherwise, other motion criteria that result in ship motions that allow personnel and equipment to work effectively can be utilized during the concept design phase as long as the intent of the above sea keeping specifications is not sacrificed. Tables showing sea state and the practical effects of ship motion are included as appendices V and VI.*

Comments on Sea Keeping SMR

Rank Ordering of High Impact SMRs

Assumes that choices will have to be made to meet cost and size constraints.

Within each group below; rank order the choices with 1 being the highest priority

Berthing vs Lab Space vs Deck Space

	1	2	3
Berthing	○	○	○
Lab space	○	○	○
Deck space	○	○	○

Range vs Endurance vs Speed

	1	2	3
Range	○	○	○
Endurance	○	○	○
Speed	○	○	○

Speed vs Sea keeping

	1	2
Speed	○	○
Sea keeping	○	○

General Comments on SMR prioritization and Regional Class design priorities:

First Name: Last Name:

Institution:

Email:

Submit Thank you for your input on Regional Class SMR prioritization.

Regional Class Research Vessel - Phase III study Prioritization of High Impact SMRs for Regional Class Vessels

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Survey Results as of: July 12, 2004

To see written comments

To see final report

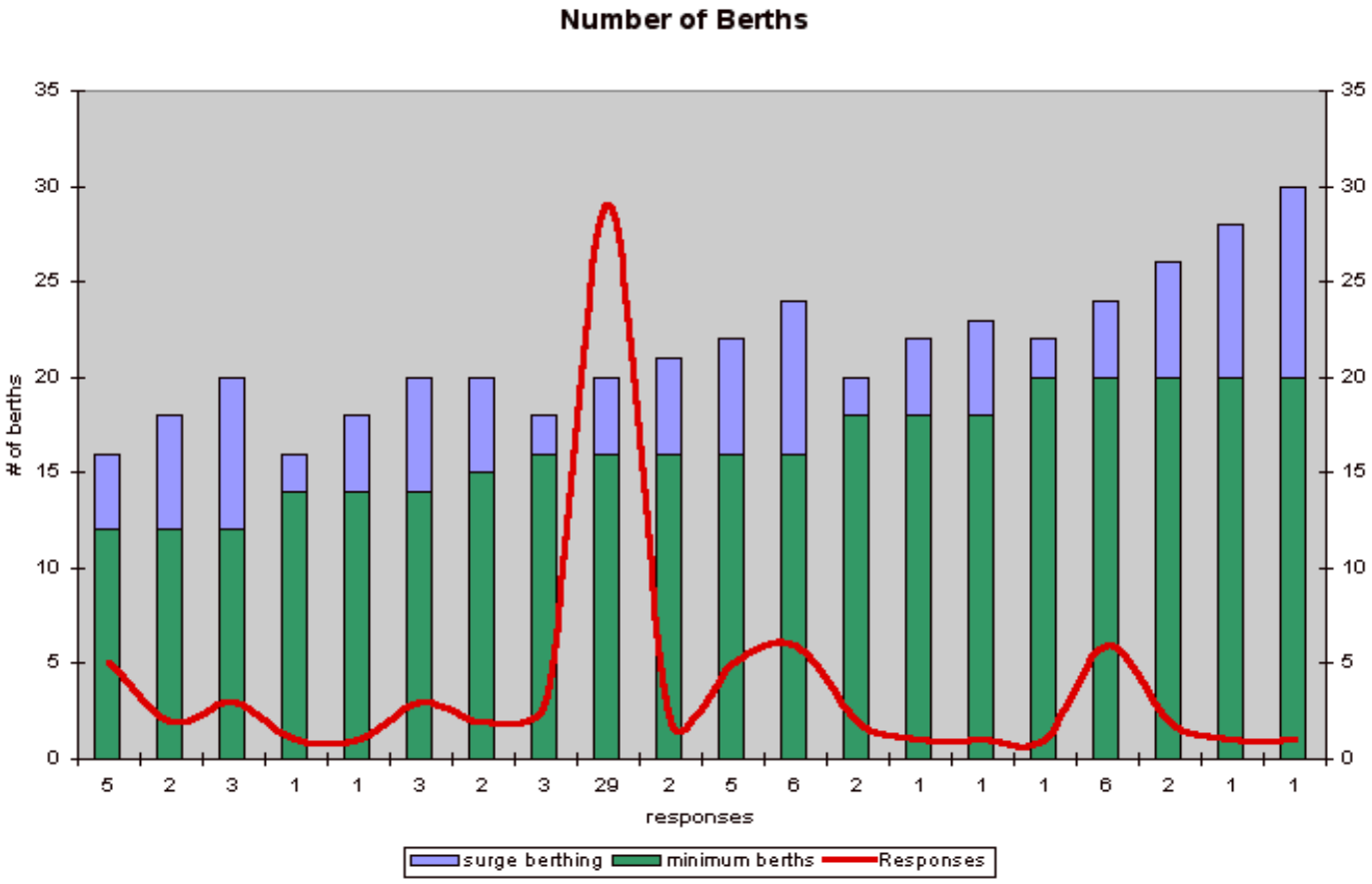
Number of Reponses by Institution

Institution	Total	Institution	Total
TAMU	23	MBARI	2
URI	10	MBA	1
RSMAS	8	UDEL	1
WHOI	5	BBSR	1
UT	5	APL/UW	1
MLML	4	NCS	1
SIO	4	SFSU	1
Duke	3	LDEO	1
NPS	3	UCSC	1
LUMCON	2	OSU	1
UH	2	FIO	1
USM	2	SUNY	1
UCD	2	Skidaway	1
		Auburn	1
		Grand Total	90

Berthing

	yes	no
Can surge berthing be multi-occupant (more than two person)?	67	16

Should vans be used for berthing?	22	63
Should smaller staterooms be used to gain more berths?	74	14
Should toilet/shower be semi-private?	65	
Should toilet/shower be community spaces?	22	



Working Deck Space

What is the minimum required clear deck space on the main deck?	Sq Ft	responses
	750	1
	800	2
	900	1
	1000	31
	1100	2
	1200	5

	1250	2
	1300	13
	1400	1
	1500	18
	2000	1
What should the minimum number of van spaces be?	One	15
	Two	70
	Yes	**No**
Is 50 feet of deck space along the rail required?	58	28
Do both van spaces have to be on main deck?	13	72

Lab Space

What is the minimum required lab space?	**Sq Ft**	**# of responses**
	≤ 900	10
	1000	37
	1100	1
	1200	14
	1250 to 1400	5
	1500	15
	2000	1
	Yes	**No**
Do all labs have to be on the Main Deck?	32	49

Endurance

	Yes	**No**

Is the ability to have a surge endurance of 30 days a high priority?	28	59
What should the minimum endurance be?	Days	# responses
	14	5
	15	2
	20	2
	21	67
	22	1
	25	3
	28	1
	30	3

Range

		Yes	**No**
Can the range be reduced below 15,000 km?		73	12
How much range is adequate for a Regional Class Research Vessel?	NM	KM	# responses
	2,700	5,000	6
	3,300	6,000	1
	3,800	7,000	2
	4,300	8,000	2
	4,900	9,000	6
	5,400	10,000	20
	5,900	11,000	6
	6,500	12,000	21
	7,000	13,000	3
	7,600	14,000	3
	8,100	15,000	5

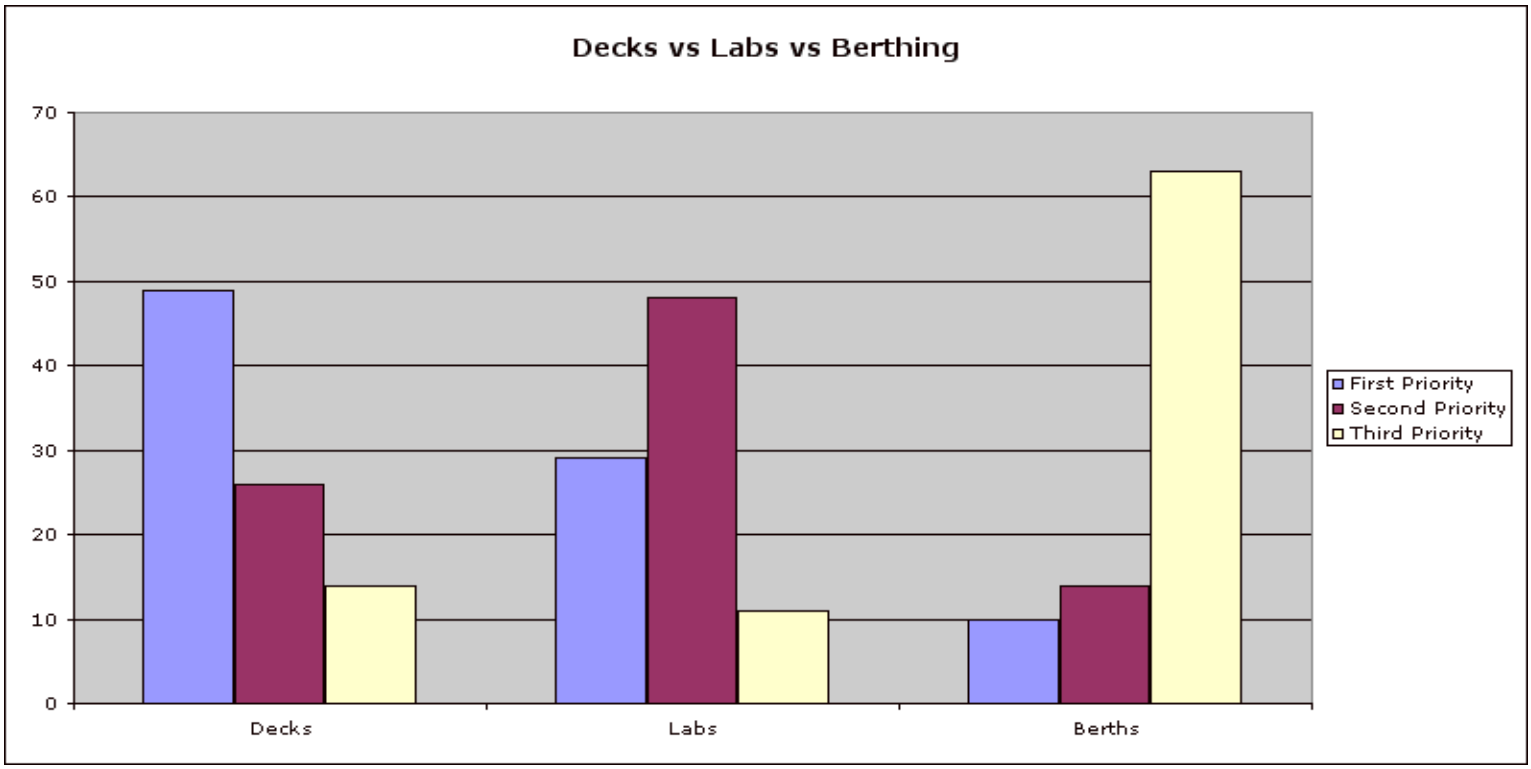
Speed

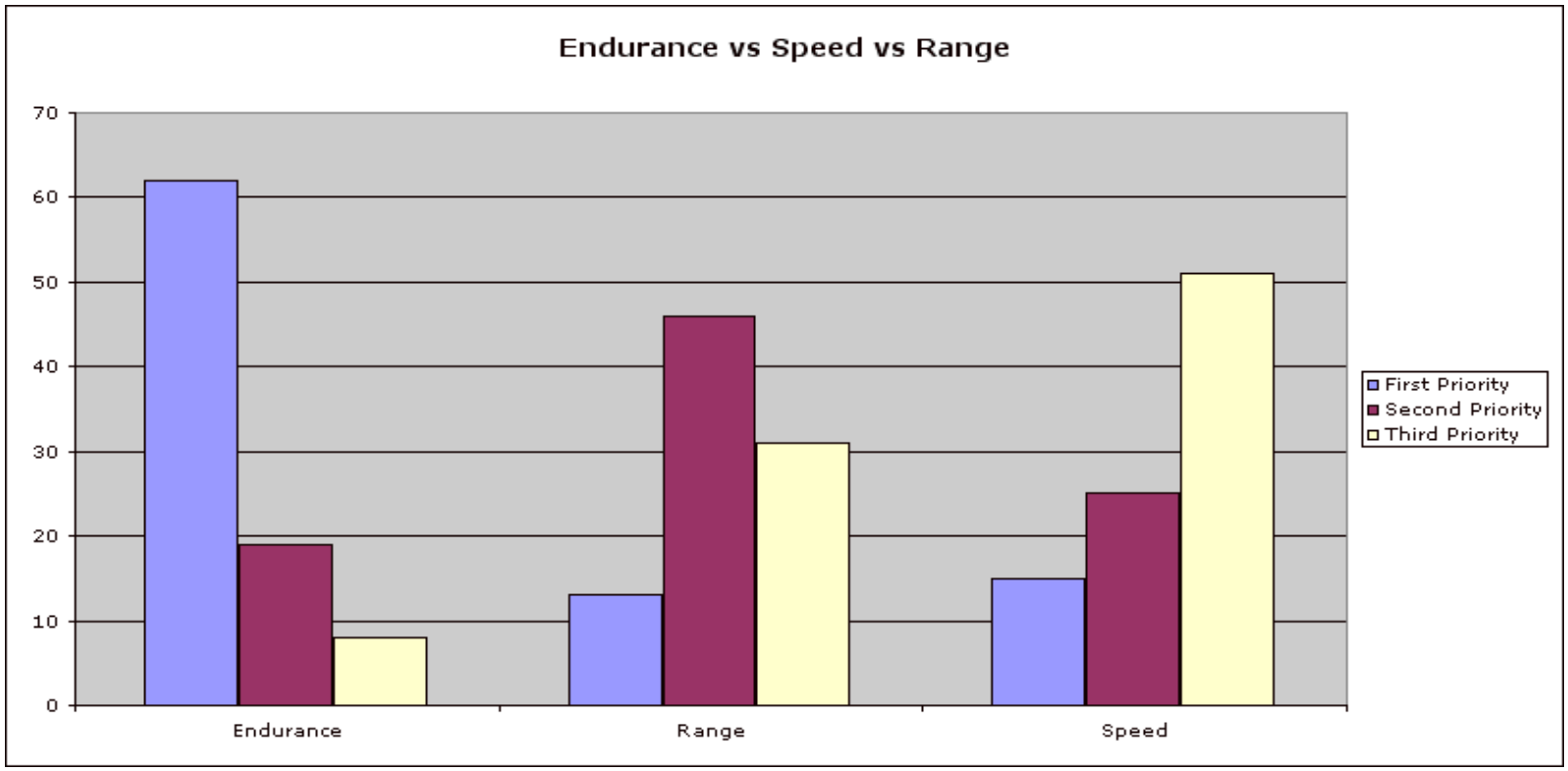
	Yes	No
Do you require more than 12 knots maximum speed?	8	80
What should the optimum cruising speed be?	Kts	# responses
	9	1
	9.5	1
	10	28
	10.5	3
	11	22
	11.5	2
	12	18
	13	1
	15	1

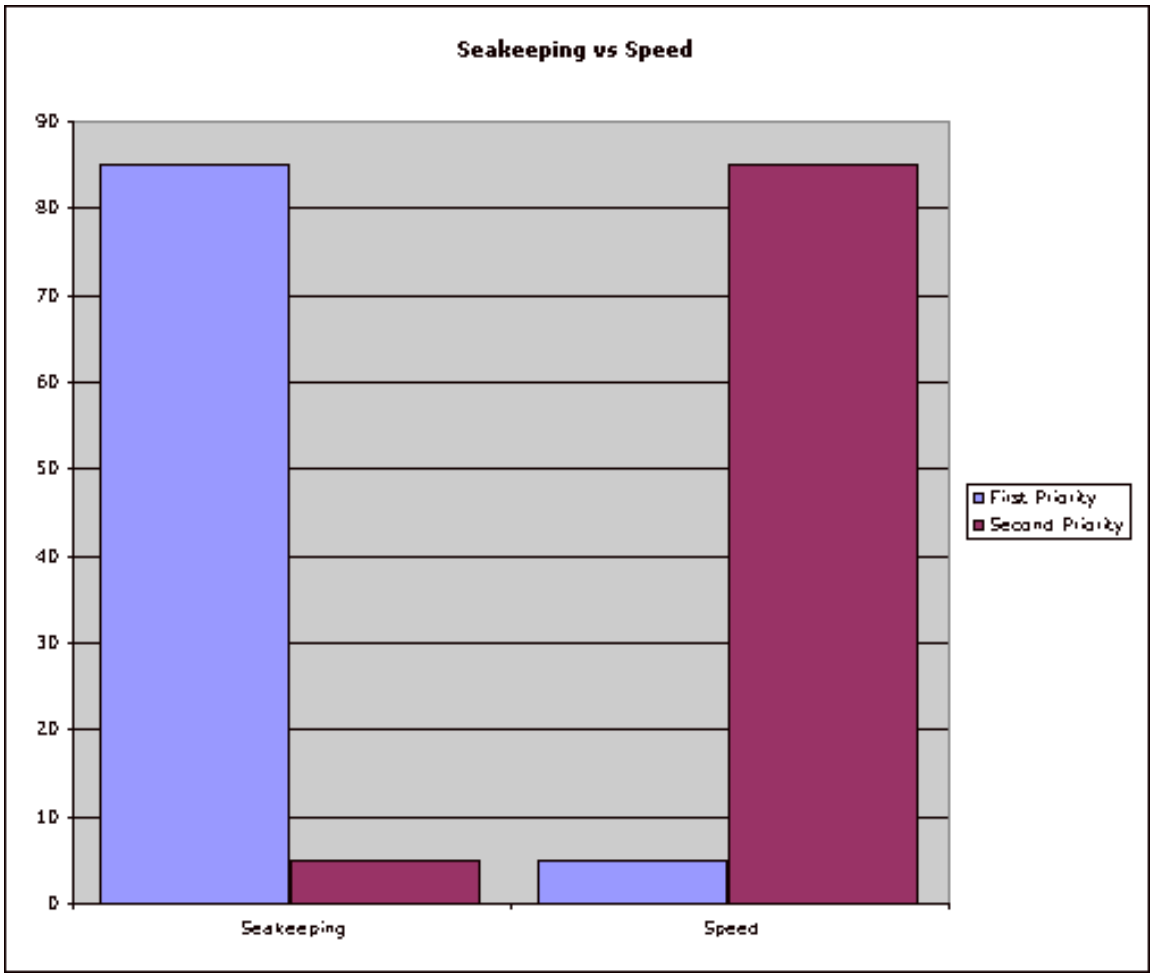
Seakeeping

	Yes	No
Is sea keeping capability improved over the Cape Class a high priority?	62	21

Rank Ordering of SMR Elements


Decks vs Labs vs Berthing
70
60
50
40
30
20
10
0
Decks
Labs
Berths
First Priority
Second Priority
Third Priority


Endurance vs Speed vs Range
70
60
50
40
30
20
10
0
Endurance
Range
Speed
First Priority
Second Priority
Third Priority



[Click here to see written comments from surveys]

[To fill out questionnaire]

[Regional Class Planning]

[Top]

Regional Class Research Vessel - Phase III study
Prioritization of
High Impact SMRs for Regional Class Vessels

Survey Comments (un-edited) as of: June 3, 2004

Comments on Berthing

I agree that single person berthing for the crew is desirable. Believe that marine techs could share a cabin as they spend less time at sea.

Multidisciplinary cruises tend to require substantial staff and for long durations. An attempt needs to be made to accomodate these people within the ship and avoid using berthing vans if at all possible. Since students will be a large part of the science parties, their introduction to research offshore should be positive and an overcrowded cramped ship will not encourage them to continue in this field

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If ship is kept under 500 tons convention tonnage and is uninspected, maritime crew size can be smaller, freeing up space for mission requirements. Berthing vans are poor solutions.

A majority of berths could be in four person staterooms with the rest in two person staterooms. Four person staterooms could accomodate a head and shower.

It is important, if manageable, for there to be as much (semi-)private space for the scientific crew. On many smaller vessels, there is no where to go other than the galley, deck or lab. Staterooms should economize on space but allow scientists a comfortable placd to go when not working.

Semi-private heads make life much more comfortable for females in male dominated environment. Individual shower rooms separate from heads and sleeping rooms might conserve space and be acceptable alternative. Living quarters can be small if adeqate storage designed in... hanging lockers, drawers, bookshelves. Personal small (nder the counter) refrigerators desirable. Ship's marine or electronic technicians should not be counted against science personnel. They should have permanent berthing assignments.

This depends a lot on how long the vessel is deployed. Short cruises can accommodate smaller living space but cruises beyond 10 days cannot.

Accomodations should be efficient - not necessarily large. This is a work vessel, not a cruise ship.

Pullman upper berths should be used for extra capacity that way on the majority of cruises most people will have lower berths. Community heads give much more flexibility of berth assignments, allows heads to be serviced during a cruise and limits the number required. All rooms should have a sink, this will cut down head usage. I have found that privicy is more important than large rooms.

Smaller staterooms are OK, as long as there is good access to lounge areas. If lounge areas (ideally, one library-type, quiet area and one AV area) are not provided, then larger staterooms would be needed.

I don't know if community shower/toilets would save much space. It would depend on the design. Minimum sized staterooms should not be a problem, based on my experience on regional vessels. Staterooms serve as sleeping and reading areas primarily. If watches are set up wisely, then the state rooms almost become like private rooms.

Staterooms for crew should be larger than staterooms for scientists. Space can be gained by employing a combination of semi-private and community heads & showers. Although admittedly designed for a shorter mission, should look at the R/V Savannah that has 24 permanent berths in a 92 ft vessel.

Single-person staterooms for vessel Master and Chief Scientist only. Permanent crew two per stateroom (same standard used by Navy and Coast Guard for officers). The compromise is the semi-private toilet/shower rather than community. This is also easier for mixed-gender crews and scientific parties.

The berthing van on the R/V OCEANUS seemed to work OK. Multi-occupant surge berthing might take more space than necessary when surge capacity is not needed.

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16 is sufficient, 20 is nice but not critical. Certainly the additional 4 should be temporary - well-rigged vans, or easy conversion/reconversion of spaces with other uses. It should be recognized that the extra berthing is a temporary, project-driven change that subtracts from something else - deck space for vans,

library/lounge space, whatever. Cannot have the extra berthing and also sustain these non-berthing attributes. Either/or. Minimal-size crew singles are important.
Intermediates, which are larger than regionals, cannot accomodate this many (required by SMRs) non-crew. It does not seem feasible to me that this much smaller ship have more berths than the current Intermediates.

A regional vessel can get by with smaller staterooms if the duration is limited to generally two weeks and maximum three. For a smaller vessel beyond 16 scientists, the ship gets very crowded, but the ability to carry up to 20 would help some projects. The tendency is to fill every berth, so 20 on every cruise would be cosy.

I understand the desire for 2 person berths. However, I have found it quite possible to work effectively in 6 person berths with community heads aboard the R/V Sproul. If it is necessary to get the cost of the ship to reasonable numbers, I think 12 personnel with surge capability of 16 is adequate as is community heads and up to 4 persons per stateroom.

Current rules are that even with small seismic sources, such as can be provided by portable systems of SIO and L-DEO, marine mammal observers (min. 2) are required.

I think it is important for crew retention and comfort that berthing for crew have semi-private toilet/showers and single person rooms, even if the crew staterooms have to be smaller. A different setup for science berths could be used, with community toilet/showers available. I don't think vans are a good idea for berthing. I don't see a problem with having an area for surge berthing accomodating up to 4 people in a room.

I do not understand why we would wish "surge capacity" berths. . Van berthing not acceptable. . Because of multidisciplinary nature that our science is evolving into, we must be able to carry relatively large scientific parties.

How do we design for surge berthing capacity without vans? Staterooms should be 2-person rooms with sink and semi-private toilet/shower. They can be small if there is a lounge on the ship separate from the Video entertainment area.

Techs, since on call for most part, should have same bunking priveledges as Chief Mate in terms of bunking. If double bunking for all crew except Captain, then double bunk Techs, if single bunking for officers & ch sci., then single bunking avail for Techs.

Smaller staterooms should only be considered for the science party.

I see no problem occasionally using vans for surge berthing, but they should not be considered as part of the "normal" complement of berthing.

I agree with the recommended SMR's and comments. The size of the staterooms should be similar to the Cape Class with semi-private toilets/showers, again similar to the Cape Class. The idea of having

community areas is a bad one; it is inconvenient running back and forth from the stateroom and is awkward with men and women on board. Have the architects tried this on a ship? I like the idea of converting space in a lounge or conference room for short (1-2 day trips). Vans are going to be awkward to use- coming and going- and take up space when not in use, so I think it is better to have staterooms planned. Perhaps a van for surge space for short(1-2) cruises would be ok.

I think minimum 16 science party berths is overkill. 12 should be plenty as a minimum, particularly if there are 2 bunks per cabin. Surge capacity could be accomodated with fold-down bunks, either in the cabins or in the conference room. I personally wouldn't use vans for berthing, but I wouldn't object if someone else wanted to.

Smaller state roooms than on some current ships are acceptable...but there still needs to be a deck (with Intranet jack) and chair for sitting. It seems 4 person staterooms could easily be employed. While it is desirable to treat all equally, I do not see problems with putting grad students (the occasional undergrad) in a 4 person room. Berthing vans are not really adequate except on the shortest of trips (less than a week).

Berthing for non maritime crew should be kept to minimum space requirements- washbasins in rooms and shared facilities. Rather than size- attention to noise control and comfortable bunks with small storage areas and good lighting are much more important for habitatibility and comfort. Removeable upper bunks to convert 2 man to 4 man staterooms allow flexibility for larger science parties while maximizing comfort on cruises with smaller parties. In my experience, an inviting "homey" common lounge area for "downtime"reading and socializing (NOT shared by computers and videos!) is a far better use of space to create and maintain a positive and cooperative working environment.

Vans should not be used for accommodation, if accommodation vans are offered as an option they tend to stay on board permanantly. Accommodation vans also require additional plumbing to handle sewage and grey water, increasing construction costs. The same would apply to any surge berthing capacity.

Vans could be used for berthing when unusual numbers of scientists are needed, as in interdisciplinary research. But this would be the only exception.

Vans should not be used as a berthing facility. It is usually uncomfortable and takes up useful deck space on a regional class vessel.

The regional class ship should be able to accommodate 16 non-crew on a routine basis. Surge berthing can put more than 2 people in a room since it should not be a roputine occurrance. I think that berthing vans should be avoided at all costs, es[pecially on a very small ship. While semi-private heads are desirable, using 4 people per head would require 8 heads with a possible maximum of 34 people. This could be reduced to 4 - 6 heads with little problem. While endurance is a factor, Regional ships will conduct shorter cruises and smaller rooms are acceptable.

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27 berths would allow for 11 crew and 16 scientists. The crew would consist of 3 mates, 2 engineers, 2 deckhands, 2 cooks and 2 technicians. I do not feel there is a need for surge capacity on a regional class

vessel. The layout of the staterooms and heads should take into account a number of private heads (i.e. dedicated to one stateroom). This helps to address any male/female issues with respect to sharing heads.

I've sailed on a regional class vessel only twice (Cape Hatteras). The science party was maybe 6 or 8. having a dozen aboard such a ship seems too much, whereas on an intermediate class ship such as Oceanus a dozen is too little. I think every ship I've sailed on had a metal desk that I hardly used and file cabinets that I never used. Could space be saved by eliminating some of this office furniture? I strongly agree that the ships crew and resident techs should have single rooms.

My comments are all based on my experience operating the Pelican in the GOM. The Pelican has berths for 22 people (5 crew, 1 Mar Tech, 16 scientists. There are 2-4 person staterooms and 7-2 person staterooms, 3 shower/heads, and 1 head only (about 7 person/shower). We very seldom have all of the science berths full, except when we have multi-investigator, multi-disciplinary programs. The crew stand port/stbd watches so dual occupancy berths are not a problem for them. I have never heard any complaints from anyone about the number of berths or heads/showers on the vessel. While our average cruise is relatively short (I haven't done the math but I suspect it would be around 5-6 days, we have allot of 1-3 days cruise during our typical operating year and this skews the average) but we routinely do cruise of 10-15 days. The GOM is a relatively small enclosed region, with acceptable ports and havens, within a few days steam, on all 4 sides (counting Mex.). , and I believe this is a significant driver for a vessel in the GOM. The daily rate for the vessel is the other major consideration for a new vessel for Gulf. As long as the majority of the users in this region are PI funded through sources other than NSF and ONR, there will always be a preference for a capable vessel with a low daily rate.

The van berthing concept is difficult to implement effectively (unhappy scientific party) and, importantly, would have higher maintenance time and cost that in practice would negate the advantages of circumventing/coming under ship size limits . Van for berthing might be problematic if a large scientific party is required to operate equipment that requires vans or significant deck space, too (ROV/AUV, towed geophysical instruments, etc).

Comments on Deck Space

Any kind of deployment whether it be current meter moorings, buoy systems, net trawls etc require clear open areas in order to be safe. Compromising on the size of the back deck working space should be avoided. Likewise, coring operations require clear unobstructed space for the entire length of the core. 50 feet would seem to be the minimum. The overriding concern has to be for the safe completion of operations in inclement weather so deck space should be maximized to the extent possible in this class of vessel.

Ideal would be deck space of Sproul with lab space of Pt. Sur. Vans would be important to provide

flexibility in lab/deck usage.

My answers are colored by geography because of my Gulf of Mexico focus and since this boat will have to suffice for most Gulf of Mexico work. The boat should be capable of taking a 30 ft piston core.

Since I always use radioactive materials on ships, there is a need for ample space for safe use of a rad van with power and water hook-ups. Often lab space inside the ship is at a premium and other specialized vans allow for increased scientific capacity. I especially enjoyed all of the open deck space that the New Horizon has. That is the ideal way to desing deck space for a vessel.

Again this depends on region. A vessel employed in the shallow Gulf of Mexico can live with less deck space than one working and setting moorings in deeper water. The danger with regional vessel's is how we us them. If they will remain in a region totally they should be tailored to that region; if they will deploy outside then a standard vessel makes sense.

Lab vans on the 0-1 deck should be avoided - not convenient to science and acesss space limited. Lab vans should not be allowed on the fordeck due to the UNOLS Van Standard requirement for "Sheltered Location". Lab van mating arrangement should be able to accept ANY lab van - not ones specifically designed to mate to the ship like on current AGOR vessels - vans have to be too specific. The 1500 should be "gross" square footage - i.e. not inculding space taken up by vans and frames. If these are fingured in, the remaining space could be smaller - say 1000 sqft. If there is a side load handling appliance, it should be removable to allow 50 feet of clear rail space only if needed.

The 50 ft. of deck space along the rail should be available if the CTD recovery area is usable for coring. For multidisciplinary cruises, it's more likely that two vans, incubators, towed vehicles, and large nets all need to fit on the aft deck. More is better!

If there will be any piston coring done (as in the past), there will have to be 50 ft decck space along the rail. Ideally, 2 vans would be great, but for smaller vessels, one should be adequate. Where to put a second van, if needed, is a big problem. Wold there be room with the winches on the 01 deck? Up foreward? It depends on what the van is being used for.

If a 50' piston core is desired, 56' of deck space along rail is needed to accomodate the core weight at one end and to allow access for inserting the piston at the other end.

A contiguous waist work area along one side with sufficient space to deploy, for example, a CTD/rossette should be available.

At least two vans required for ROV/AUV operations, an increasing demand. Ocean class ships need to have relief on the needs for their time for ROV/AUV. Lab space takes precedence over berthing since cruise length is typically shorter than larger vessels.

Make sure that area does not get taken up with permanent ship equipment like a deep-sea trawl winch and thus reducing the 'real' working deck area What was the argument made to have two vans on the main

deck? ROV ops?
Deck space to be construed as open space OR van space; cannot expect van space AND 1000 sq ft open deck. Vans on main deck would be nice, but not a firm requirement.

Working deck should be high enough above water line so that it is not easily awash widening the window of weather conditions under which it can be utilized and preventing van flooding. A rear "ramp" to water should be provided for "slide" launching and recoverey of equipment.

The working area needs to be as large and as flexible as possible to accomodate multiple requirements, including need for rad vans, clean vans, etc...

Portable winches take up a critical amount of space. If they are mounted on the working deck, the provision has to be made for locating the winches where they still allow over the side and stern operations.
sufficient deck space is necessary for both coring and instrument deployments (mooring and tripods).
I think the published deck space requirement is reasonable. However, I think if space for only 1 full size van on the main deck reduces costs, this is a reasonable sacrifice as long as there is space for another van away from the main deck.

I think deck space on the current Cape class vessels has been a constant issue. I think a significant increase in deck space is needed and 1300 sq ft is the minimum. I think at least one van should be able to fit on the main deck with minimal interference. Other locations should be considered for van storage in addition to the main deck.

This vessel must be able to handle large mooring deployments, interdisciplinary cruises, ROVs, deeply-towed instruments, large nets, piston cores, etc. for deep water work in the Gulf as well as shelf work and requires adequate deck space.

Options need to be avail for placing 1 or 2 vans on deck but not necessarily at same time. Provision for a van on 01 level (with pwr,water,network,etc) as an option.

One of the vans should be on the main deck.

The deck space on the Cape Class is 1000-1100 sq.ft with a 40' long waist area. I think it is important to increase the deck space and go to 1300 as recommended or preferably 1500 sq. ft. In terms of the width of the waist area, I think something between the Cape and Oceanus class would be desirable.

The 50ft seems like a lot (but the type of biological sampling I do does not require it. I would say a minimum is 40ft

---

Vans should not interfere with deck intensive operations like moorings not should they interfere with the bridges visibility of deck area. Reliance on cameras etc should be minimized. Foredeck flexibility important for atmospheric sampling and specialized clean water sampling apparatus

---

Working deck space can be better utilized if the main winch and machinery can be located below decks. This would also increase deck load capabilities, by several thousand pounds. The fifty foot open space along the side rail would be a minimum, a forty foot core requires at least that length when rigged over the side.

I indicated one 20-foot van as being a minimum. This is based on experience sailing on and managing the R/V Point Sur for these past 10 years. We have only carried vans on rare occasion and they have been between 10 and 12 feet long.

1,000 sq ft of working deck aft is desirable but should not be a hard requirement nor should the 50 foot along the rail. The size and weight of a full piston coring setup makes routine use on a small ship impractical. 10 meter core capability is sufficient. There should be capability of carring at least 1 van and still have th e working deck available for over the side work.

I would not expect to do much piston coring on such a small ship. For one thing, the size of the science party goes up real fast, especially if two teams were to core around the clock. (You would need ten dedicated coring pers). Secondly, I don't think there is much demand for 10 or 15 m cores.

The Pelican (116') has slightly over 1,100 sq. ft. of back deck and can carry 2 vans 1-20' and 1-16' so it should be no problem for a larger regional class vessel to carry 2 20' vans. We also have about 50' of "relatively" clear rail so this shouldn't be a problem either. We have done 10m piston corers without any problems, but they were worked on the deck and not over the rails. I think that the minimum regional class vessel could meet all the published requirements for deck space.

For this ship to be able to recover piston cores it is necessary that sufficient deck space along the rail be available. Cores of the current minimum SMR length are essential for the climate change studies, for standard geological work, and for ground-truthing geophysical data. Attempting to get these cores without proper space is inefficient/cumbersome and, importantly, potentially dangerous. Shorter cores are in many instances can not meet scientific requirements. Note: If the ship layout is thoughtful, coring needs do not strongly compete with total deck space. For mooring and geological/geophysical studies sufficient open deck area is a key consideration (and the van concept for labs/berthing requires it). ROV's and AUV's will be used with increasing frequency and these require van space.

Comments on Lab Space

Lab space can be arranged on more than 1 deck level. Dumbwaiters are a relatively cheap method for moving samples quickly and safely between decks. Specialty cruises can use lab vans if the typical lab space is not large enough. An electronics/computer lab should be located away from the main dry lab perhaps on a different level. This lab should be in a relatively quiet area of the ship to allow operators to

concentrate without a lot of distraction.

Lab vans provide flexibility.

Dry lab areas - electronics, CTD and other instrument labs do not have to be on the main deck. Main deck labs should have a higher priority given to wet lab space. All counters should be designed so that equipment can be secured easily and there should be adequate power outlets for efficient utilization of counter spaces.

Permanent adequate refrigerator and freezer space for samples is important. Shelving and/or bench tops make the space more usable. Sample storage and temperature controlled experiment space could be compatible if sample storage is organized. Flowing "clean" seawater available in wet and dry labs, at multiple points for sampling and inline instrumentation. Ship's marine or electronic technicians should have own space for ships electronic equipment and computer servers. UPS should be provided for science with adequate capacity beyound the ship's electronics. Configurable lab benches, shelves and equipment ties downs (on deck and bench)

Lab space, layout and capability should be the same for all the same class vessels. It should also be as close as possible to the same on larger ship's. This will ease he scientist's move between vessels. We also need to publish the capabilities that are standard across all vessels nd lacking based on a vessel's class.

The wet lab could be smaller than originally specified, more like 400 to 600 sq ft. The electronic tech's shop and perhaps a computer lab could be on a separate deck.

High Bay/hanger unreasonable for a coastal ship. Figure above is total including vans. Special purpose (like temp controlled) should be done with vans - thus requirement for 2 van spaces on main deck.

Use vans for surge.

There should be at least 2 fume hoods, located in separate labs, as well as capacity for temporary areas for preservatives, etc in the high bay. Clean power is essential throughout the labs, and I would highly recommend reconfigurable benches with replacable wood tops.

Combine multi-purpose high bay w/wet lab hanger. Use van for climate controlled work space.

A built-in cold room is required (minimum size of 8x10 feet internal dimensions); functions down to 4 degrees C.

A large fume hood/sink in the wet lab with sea water for sorting and preservation is essential and should be included during the design process. A climate-controlled chamber/workspace is important. I think the SMR means a minus 80 °C freezer.

Reconfigurable wet/dry labs escalate cost too much and make complete insulation of electronics from sea water difficult. 800/400 appears to be good ratio with freezers permanently installed with wet lab access.

High bay raises vessel's center of gravity and creates large volume enclosed space--if air conditioned, this can be a large HVAC load; if not, potential to become a "rain forest" is high. Recommend trade-off with additional deck space and ability to rig awning and side curtains. Electrical isolation (conditioned power) for electronics repair is crucial, but main dry lab space should be adequate with dedicated electronic workbench. Recommend commit to van for climate controlled room if required (estimate rarely).

I find the lab space on the R/V ENDEAVOR (and sister ships) OK which is listed as 1000 sq ft. However, the R/V Seward Johnson lab space is listed at 1080 sq ft and that space was inadequate due to layout. The actual workable lab space was about 1/3rd of the OCEANUS class.

All labs on one deck is nice, but not an absolute requirement. Make use of the alternatives noted in SMRs, to keep ship from being too large/costly - i.e., electronics/computer space inside lab instead of separate, high-bay integral with wet lab, climate chamber in a van and brought on (using deck area) when needed, etc.

A special area for radioisotope work should be provided as this is now very common & usually gets relegated to a van which isn't a great way to do it. Also increased usage of complex and highly sensitive analytical instruments is a problem. They need vibration, tmeprature and electrical protection (e.g., every time someone uses the radio or bow thrusters my microelectrodes go crazy! A special lab should be provided for them. There is almost always (even on newer ships like the the Walton Smith) a major shortage o "clean" uninterupted power outlets. The wet lab should have high purity flowing seawater system.

As much effort as possible should be directed to storage areas within the main lab. These should accomodate consumables and equipment in a range of sizes. Also, need for as many power outlets as possible with surge etc... protection.

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wet lab space is essential for coring operations
I think the published requirements are good. I think electronics labs can be located off the main deck as necessary. I don't think a separate repair shop for resident technicians is necessary.

Labs do not need to be on the Main Deck but MUST be of easy access.

I think one large main lab, and two smaller areas (wet lab and ET repair shop/workspace) would be an excellent setup. The main lab could be 800-900 sq ft and be used primarily by scientists. There could be an area for computers, as well as other partitioned spaces for various purposes. I think a wetlab in the 200-300 sq ft range would be sufficient. An ET repair shop and workspace for technicians is essential. All of the ships installed equipment could be setup here in racks that you can actually walk behind and work on. This would also be the central data acquisition center (ADCP, CTD, underway system, echosounders, shipboard network hub, servers, etc) and control room. Shipboard tools could be safely stored here, as well as spares. There could be some possible spillover of scientists into this room. I think this space should be no smaller than 300 sq ft. I don't think a high bay is absolutely necessary. A climate controlled room of 100 sq ft would be nice. I agree that the HVAC considerations are of very high importance.

Stay with published requirements of 800 sq ft main lab and 400 sq ft of wet lab.

Lab and deck area are exchanged with the use of vans for labs. Ample space for instruments placed in-line with clean seawater and adequate drainage overboard (not in bilge tanks) is increasingly important.

There should not be more than two adjacent power receptacles on 1 15/20amp circuit breaker.So in a distance of twelve feet along a workbench there could be 6 double outlet receptacles but the 6 fed from 3 diff circuit breakers - so power to adjacent equipment is staggered on diff breakers. Only comment about lab space ALL on main deck - is that this misses point of having small lab or closets or space for MET work or skyward looking equip or the need for forward air sampling and running into nearest lab. Should be some small lab space up above wheel house (10x10ft)

Instrumentation and sampling labs must be on main deck, however electronic, computer, and analysis labs could be one deck up.

Prefer all labs on main deck, but if necessary computer labs could be separate

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Marine Techs/ Electronics Techs should have there own space, and not take over science space. Ample clean uninterupted power should be available. For cold weather operations, an enclosed area to sample rosette should be provided. Walk in freezer and refrigerator should be provided.

The recommended SMR's seem to have this right and are significant increases from the Cape Class (488 sq.ft for main lab; 120 sq. ft. for electronics lab; 96 sq.ft. for wet lab). Good access from the deck to the wet lab and from the wet lab to the dry lab are obvious needs.

I think the published minimum lab space requirements are overkill for a regional vessel. A dry lab space of 500 sf is rather generous (that's the size of my own communal lab here, and it amply holds many work station sites, two large map tables and many book shelves), as would half of that for a wet lab.

All the labs must be on the main desk with the possible exception of an electronics lab. The published report looks pretty good

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To maximize working deck area and hi bay/wet lab ops, putting part of the lab space on another deck should be considered as many operations do not critically require main deck access. Good access from deck to hi bay equipment area is essential. User equipment place there should be easily transportable back and forth from deck to hi bay area The hi bay/equipment staging area should be separate from the wet lab area. Many staging operations are incompatible with the more demanding wet lab operations and contamination sensitve

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The main lab and wet lab should be on the main deck level. Navigation, and electronics seem to work out OK on other decks. A lab with close tolerance environmental controls would be a worthwhile consideraton, for temperature sensitive operations. The main labs typically have a lot of through traffic, making it hard to maintain stable conditions.

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separated lab space (e.g. on another deck) is always under-used due to need for monitoring of underway instrumentation and real-time communication between scientists on watch.

I agree with smr's to right

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separation should be in the form of bulkheads and isolated by a door. It would be impossible to maintain and or operate certain equipment from the main lab while sharing it with the science party. This lab can also be used as an electronics lab that would house mail serves; data acquisition computers and other permanently installed shared use equipment.

Lab space is important and every effort should be made to have 1,000 ft2. It need not all be on the main deck.

While a seperate computer lab would be ideal, I don't think there is enough space to facilitate this on a regional class ship. There should be a seperate electronics and equipment repair shop that could serve as a computer lab and the primary CTD data acqusition area. There is no room for a highbay or climate controled workspace of a regional class vessel.

Electronics shop can be up or down.

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lab space and berthing space are linked. If you try to stuff too many berths on the ship, then the labs will be crowded. Simple as that. with recent emphasis on vans that function as labs, maybe we should have smaller labs and larger decks.

Published requirements look good - I think you mean -80 C in the freezer description, not 80C.

Lab space should be a high priority. 1,000 sq ft should be considered the bare minimum (the Pelican has about 700 sq ft of wet space not counting tech lab,etc.). There is a dry lab available on the 01 deck but it has been used only once or twice during the last 19 years, therefore, all wet labs should be on the main deck. Large convenient to use passage ways into the main deck labs are a must. Climate controlled spaces should be in vans.

Given that the the main/dry lab space must include space not only for working with samples and gear, charting, but also for scientific party and permanent ship computer/electronic/geophysical facilities, freezers, readily accessable storage, etc, and the wet lab includes high bay/hanger the minimum total lab space is reasonable (the 2

Comments on Endurance

I see needs for longer cruises being accomodated by the Ocean Class.

There will be many factors involved in determining cruise endurance, not the least of which will be the size of the science party and the ability of the ship to accomodate them with food and fresh water. A 21 day maximum endurance would seem reasonable for most missions. Longer missions will have to include a port stop for fuel, water and provisions.

Again, my response is colored by geography. A Gulf of Mexico boat should be capable of missions to the Caribbean Sea. Adding foreign port calls increases cost and lowers efficiency. Since this will be the largest vessel available in the Gulf of Mexico.

If we have different class vessels and know their capabilities instead of surging you provide the size vessel needed. Scientist also need to understand that asking for a large vessel may easily postpone or delay their project until a large vessel can fit their work area economically into its schedule.

I think the surge capacity of 15 days steaming followed by 15 days sampling is unrealistic for this class of vessels. I don't think the intent is or should be to send these ships across the ocean the engage in programs without a chance for resupply. These are US coastal vessels with an offshore range of ~1000 mi.

Old CAPE class Regionals carry more fuel aboard then they normally use. This is wasted space. Only advantage is less fuel stops for the operator, but fuel stops every 21 days are normally fine for science ops (coastal cruises generally shorter) and ports readily available. Fixed ballast should be used if needed - not carry more fuel around.

These are Regional Vessels.

Most of these vessels should be operating in areas close to port facilities where they can re-stock food, fuel, and other supplies as needed. On cruises longer than 21 days most of the science party welcome a break for re-supply, especially after being on a small vessel for 21 days. Endurance should not be a driving factor in design

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On vessels of this size, productivity declines after 14 days at sea. On voyages lasting much longer than this, the ch. sci. should consider a port call, at which time the vessel could be re-provisioned.

Although not optimal, occassional long expedition requirements near continental margins can be accommodated by splitting into two legs and replenishing critical stores in the middle.

With designed 21 day, a surge of 30 is inherently there. Submarine forces have learned many tricks on stretching endurance that are applicable (use of canned, freeze dried, or other non-perishable foods to augment frozen supplies after fresh have been consumed).

A capability of 30 days endurance should be encorporated as long as it doesn't override the range limitation of the ship size.

These vessels will mostly be near ports; long endurance is not a high priority.

With increasing use of instrument packages in survey mode, scientists require longer stints to push these instruments capacities.

Two weeks is the optimum cruise time for a regional class vessel. Beyond that, the size of the vessel begins to affect the efficiency of the scientific crew. I would strongly urge that the regional vessels not try to mimic the ocean class capabilities. A two week cruise, suge to three, is ample for a regional class vessel.

I think costs can be reduced by keeping the endurance at 21 days and carefully scheduling port calls or breaks in the cruise if necessary. We are a regional class vessel, and in most instances we aren't too far from a port.

Surge endurance should be built in.

A Regional Class vessel is not likely to be so far from a port that it can't stop for supplies/fuel. While this may not be efficient for a single expedition, it is more efficient than using space on the ship that will rerely be used (fuel tanks and food storage).

Perhaps some comparison to Endurance and staffing. More endurance with less science party??

The Cape Class is listed as 24 days on some documents that I have. If this is correct, the new class needs to be higher.

No one should spend more than 3 weeks on a regional class vessel.

I am wondering if endurance should not be higher ...say 28 days

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If freezer space is the issue for endurance, it can be accomodated by a greater reliance on dry good stores. Perhaps a discussion with the Sea Education Association on how they feed so many people on a sailing vessel might be instructive...

Most regional ships will operate near logistics ports - 30 day endurance is not required

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I'm not excited about long cruises on small ships.

In my experience, few regional cruises require even 21 days and 30 days is certainly not necessary.

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15 days endurance should be the average maximum endurance. Cruises of 21 days could be maximum if underway days are low (save on fuel) and total number of crew is light. I see no need for a vessel with fuel capacities (at max. draw down), and etc. for more than 21 days

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The ability to stay at sea for 2-3 weeks (working for at least 2 weeks) is reasonable.

Comments on Range

Longer range cruises can be accomodated with Ocean Class

If the ship cruises at 10 knots for 24 hours/day and has a 21 day endurance limit, that totals a little ove 5000 nmi. If you surge to 30 days it is 7200 nmi. A more likely scenario would be 15 days of transit or 3600 nmi. Fuel capacity is more likely going to be the limiting factor here.

Boat should have range to cross the Atlantic and transit California to Hawaii

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We work in Alaska and fueling stops are few. I doubt any other regional vessel has such limitations. You may have to stop for fuel but you do get a smaller more economical vessel. 8100 miles is over a third of the earth's circumference at the equator. That seems very excessive to me.

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15 days at 10kt with a 50% margin is about 5500 nautical miles, that should be plenty

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The 3000nm (I think he meant 8,000nm) is steaming non-stop from Maine to Florida three times at cruising speed! Science operations do not normally require anywhere near this given time on station, towing, etc. Range calculation should be based on a reasonable SCIENCE scenario - NOT a typical navy or commercial container vessel definition. Historical records should be looked at to see how often the CAPE class vessels have used (or been asked to use) all 29,000 gallons w/o having to come into port for other reasons. I would expect it is virtually never. The SMR scenarios appear to confirm this as suggested above. The new regionals should not make the same mistake of designing the vessel around range or endurance. The space and weight used in carrying around fuel can be much better utilized in other areas.

These are regional vessels and a range of 7,000 nm will cover almost any area of the East, West, and Gulf regions. As with endurance, these operate near port facilities so range should not be a driving factor also. At 10 kts a vessel will travel 5760 nm in 24 days; that's far enough for a regional vessel.

Tendency is to overkill. If the vessel is not going to make an ocean transit, it should not be required to have the capability. A 5000 NM range is very close to being able to support the 30 day surge of 15 days transit (total 3600 NM at 10 knots) plus 15 days on station at slow working speeds. Deck-loaded fuel bladders can be used if long transits are demanded. Compensated fuel tanks are alternative to ballasting, but fuel guaging and potential for pollution offset.

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30 days @ 10 kts = 7200 nm. 21 days @ 12 kts = 6048 nm.

6000 n mi should do nicely. These vessels can make port calls generally without inordinate transit penalties.

Range is directly related to endurance. The regional class vessel doesn't need extended range. Two weeks of 24 hour steaming is only 4000 nautical miles

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I agree 15000 km is excessive.

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12 kt for 20 days is around 10,670 kilometers, according to my math. How fast is this ship going to go?

I think current Cape Class ranges are adequate.

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10 kts x 24 hrs/day x 21 days = 5040 nm 12 kts x 24 hrs/day x 21 days = 6048 nm Therefore 6000 nm is sufficient safety factor.

8100 km in 28 days averages to 12 kts continously. Is there a mission that requires continuous sustained top speed?

The vessel should have the capability of crossing the ocean basins comfortably if needed.

A greater range gives more flexibility to the vessel and an 8100 nm range is a significant increase over the 7000 n.m. of the Cape Class.

8100 nm is way out of bounds for what will be expected of a regional vessel. The SMR mission scenarios should be the deciding factor here.

OK I am missing something here. given a surge endurance of 30 days the ships ranges if it ran constantly at 10 kts is 7200 miles (10*24*30). This assumes the ship is never stopping to work...So a 8000 mile range is not in scale with the endurance

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Reducing the range should free up some the space used for fuel, for other requirements. Perhaps allowing some of the deck machinery to be placed below deck. A space with exercise equipment is usually better off below deck, due to noise generated by some of the activities. The great range of some of the older ships may not be fully utilized as much, not many projects can afford to pay for long transits.

Regional Class, doesn't need to cross oceans

10,000KM is more than a round trip from the west coast to Hawaii - that is sufficient.

The fact that these are regional class vessels implies that they are focused on a particular coastal region. These vessels should not be routinely used more than 1000 miles from their home ports. I do not recall ever hearing of a problem associated with the range capabilities of either the R/V Point Sur or the Cape Hatteras (current range = 7,000nm).

With a 2-3 week cruise and a reasonable safety margin, the range could be reduced.

Comments on Speed

SMR seems reasonable

Using a max cruise speed of 12 knots and a normal cruise speed of 10 knots should be used as criteria in determining optimum propulsion type/design. Speed between stations will have a direct impact on cruise duration. Optimum cruising speed should be the fallout from studying different propulsion systems which are available to maximize fuel efficiency, acoustics, station keeping ability and horsepower.

Ship handling at very slow (on station) speed very important, often more important than cruise or top speed.

Two knots gains a whole 44 miles per day or 4 hours steaming. I find it hard to accept the increase to 14KTs. After personnel costs, fuel costs are the most expensive item in the budget. Doubling its costs for the sake of 2 KTS is silly.

Never design a "fast attack" research vessel. Cruising should be 11-12 knots.

Many cruise ops limit speeds to less than 12 knots anyway; faster is nice, but not essential.

Speed has not been an overly important factor in CAPE HATTERAS's operations. Ten knots has been fine for almost all operations. An increaase in two or three knots will not make any noticeable difference. This should not be a decisive factor.

Sea keeping and safe working deck over ride high speed.

A cruise speed above 10 kts usually affects the acoustical system operations.

High speed costs in terms of fuel capacity, installed horsepower, space/weight of installed horsepower, and on and on.

More and more science is done using towed sensors. In my understanding most sensors are towed at speeds less than 10 knots.

Obviously, speed, endurance, range are linked.

Given the steep increase in fuel consumption at higher speeds, 12 kts max is sufficient with 11 kts optimal.

These vessels would be more apt to be used for quick events that need to be addressed. So speed would be a premium for getting to the event and sampling in real time. To minimize the impact on routinely or pre scheduled cruises and to squeeze in a special event trigger sampling leg would require higher speed - less range. Optimize hull for higher speeds. When one considers the undersea network of fiber bringing daily events back into the research lab - this then warrants for the regional a quick way of getting out and sampling.

However, at these relatively low rates, a small increase in speed can result in a significant decrease in time. Increasing from 12 to 14 knots over 4000 km saves 2 days. Speed is only required during transit or between largely separated stations.

It would be good to go up a notch from the Cape Class, which has a cruising speed around 10.

What good is speed if you can't work when you get to the site? Days at sea lost to weather are expensive. Seakeeping is much more important than speed.

Eleven knots for a cruising speed would be nice to have, getting to the next station as quickly as possible is always a priority. However on a day rate that inludes the fuel cost, the ship operator has to bear the increase in fuel consumption during the rush to the next locaton. If you publish a cruising speed of twelve knots, you had better be prepared to do twelve, or have a lot of heated discussions with the PI.

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12 knots can be a goal but should not be a hard absolute requirement.

Given the large expense associated with increased speed, I would consider speed less of a priority. The cost of larger engines and increase fuel consumption do not outweigh the benefits of an additonal 2 knots.

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good speed control (published requirement) is a priority for many towed instruments

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Comments on Seakeeping

The current Cape Class does a good job with sea keeping but would like to see some method employed to reduce rolling in beam seas.

The published requirements are reasonable goals and should be kept as they are now.

Extremely important on Pacific Coast. Should have priority over speed, range and endurance.

It is quite often necessary for effective use of ship time to be able to stay on station for the amount of time necessary to deploy complicated instrumented arrays over the side.

A smooth predictible motion is more important than limiting the maximum roll to 3 degrees. Safety railings,good housekeeping, positive latching drawers and cabinets, tiedowns for equipment in lab and storage areas make higher sea states more endurable. Anti-roll tanks can be very noisy and should not be adjacent to stateroom bunkheads.

This should be decided based on a review of the cruise reports. How many days does each vessel lose per year. I operate the Alpha Helix and it does ride rough but I doubt I lose many sea days more than other vessels. We have larger supposedly better riding ship's up here working and they shut down frequently before we do. I think a review of sea days lost due to weather would surprise us. I doubt there is much difference between vessels. If so then a radical increase is needed in sea keeping and we probably can't afford it. I know the Kilo Mona shut down operations in less wind than the Helix does. I think we are assuming large means less weather days. I suspect we would really be surprised at the answer. More comfortable riding I will agree to but I think that does not relate to productivity. I may be wrong but from what I see in Alaska I do not believe that I am.

Put space in hull length and not cabin space if need be to help with sea keeping and speed.

On existing regional-class vessels on the US West coast, we have been extremely limited in what we can achieve. Improved sea-keeping is a very high priority for this region.

This is an important criterion. The new vessels should be able to operate in SS 5 as indicated in the requirements. Above SS5, not too much is going to get done on ships of this size anyway.

Effect of high sea states on suspended loads and equipment over the side is significant. Although the deck may be safe for working, the surge on cables and stress on handling equipment remains high. These can be beefed up to accommodate these type of operations, but this has an adverse impact on vessel outfitting cost and could impact overall safety.
I have not been on the Cape Class. I find the sea keeping of the OCEANUS class fine so if the design can come close to that, I would be happy. I would put sea keeping over speed if the crusing speed doesn't drop below 10 kts.

Good seakeeping is more important than range or speed.

For buoy operations, this is a very high priority.

This is very important when mapping regions. It is important to continue deploying CTDs etc...

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dynamic positioning is mandatory

I have found that the Cape class operates very well in the Atlantic. Off the Pacific coast a significant amount of time is lost when trying to work occupy lines perpendicular to the coastline. The reduction of steaming speed and the need to tack across the waves significantly impedes survey missions.

Sea keeping should follow the published requirement to reduce days lost to weather.

I think improved sea keeping is a high priority.

Many kinds of work are impractical with a SWATH vessel.

I believe the sea-keeping ability of the Point Sur is excellent. If a new ship could equal or better that ability, it would be great. I don't think the Point Sur has any problems doing the work described under the published requirements at each of the different sea states.

Maintain published requirements.

It is maximizing dollars and scheduling and is planning for worst case data collection. Sea keeping is important since if these vessels do many shorter trips - one doesn't have time to orient in terms of 'roll' pitch etc for the scientist on board. Sea keeping also helps in handling data post cruise - less editing , less drop outs and so on. The issue should also address deck handling equipment that can tolerate higher sea state conditions on more stable platforms.

The current Cape Class ships are limited when working in waters north of 40 degrees north. Although a SWATH vessel can overcome these limitations the SWATH presents other problems. The new regional class ships should be mono-hull and capable of operating in sea state 4 or greater

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Roll characteristics may be unreasonable. Two meter waves hitting a vessel broadside while on station and expecting on a 3 degree roll on the main deck. It seems to me that what is more important is that the roll is predictable. On some vessels, a 10 deg roll is very comfortable, while on others the start of the roll is fine then the ship seems to "snap" back, producing a very uncomfortable motion. The goal should be predictable gentile behavior.

A larger and longer vessel should in part accomplish this.

My type of research is not as sensitive as others...so I will abstain from commenting

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Generally the smaller the ship the more uncomfortable the ride, and consequently the less productive. We had a very interesting speaker on this subject at the last RVOC meeting. Dr.Thomas G. Dobie, Director, Natonal Biodynamics Laboratory, University of New Orleans. Dr. Dobie's handout contained a lot of information on the subject of sea-keeping,also its effect on efficiancy, and is worth a look. The R/V Gyre is about 183ft low. and has a very good ride. The good ride however, is due in part to the fact that the crew, keep the ship fully ballasted down to the marks. While this is good it has the drawback of making for wet decks. With the water temperatures encountered in the Gulf of Mexico it's not much of a problem. Not so good in colder climates though. The resulting low freeboard, also makes some deployment and retrievals go a lot smooother.

Sea Keeping should be a high priority.

Hull design of the present Cape Class vessel is good. Being able to do work in sea state 4 is possible and we often work in worse conditions. However, this is hard to quantify as the ability to work often depends on swell direction as compared to wind direction. It also depends on wave period as well as wave height. A slightly longer hull with more displacement would probably improve sea-keeping ability in sea states that are more than 4.

No experience with Cape Class so hard to relate.

This is a vague SMR and difficult to really quantify under the "sea state" scale as it does not take into account wave period. It should not be heavily weighted in the determination of the over-all length of the vessel.. The next regional class vessel should be a proven, monohull design not a SWATH vessel.

Good sea-keeping abilities is a significant consideration, but not important enough to make the Regional Class vessel a SWATH design. The Regional Class vessel should not be a SWATH. Bilge keels were added to the Pelican as part of the mid-life refit which resulted in a very noticeable improvement to the ride of the ship. The Pelican approaches the published sea-keeping requirements except for the ROV ops. With stern thrusters we may be able to meet this criteria.

Sea keeping is a very high priority. To cut back on this capability to save money would be short sighted because projects would require more ship time (and personel time) to make up for days lost due to weather/sea state

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General Comments

My number one rank is day rate....these ships should not cost more to operate than the current Cape Class vessels.

There are obvious tradeoffs with each of the SMR's that affect each other. The choice of propulsion system will affect range, endurance, speed and seakeeping ability. It will also affect acoustic capabilities, operating/maintenance cost and resulting dayrate requirements. Choosing the proper propulsion system has to be a high priority and should be thouroughly investigated.

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150 foot ship with good sea-keeping qualities and limited convention tonnage would give good service under projected budget.

I think it is dangerous to assume all regions are the same. I am not sure one type vessel can meet the needs of each region. The science demands for each is different. Some places require a lot of shallow water work, others sea keeping, others endurance, etc. I think these need to be accounted for when building a regional vessel. I strongly support standard capabilities and standard labs etc. I believe

however a flexible design that optimizes the vessel operations for the region is needed.

There needs to be a balance on ranking berthing, lab space and deck space. Each should have some amount of surge, but with enough deck space vans should give that surge capacity.

Spaces - laboratory and deck - are probably the most important factors followed by number of science personnel. Cabin sizes can be smaller than the current Cape Class Cabins and not draw nasty comments from the science users, I think. Range, speed, and endurance should not be driving forces for these vessels. Sea keeping should take priority over speed. In our operations an increase in CAPE HATTERAS's speed by a knot or two would make little difference in transit times or science days.

These vessels need to be able to operate in the Pacific Northwest and the NE/Gulf of Maine during winter.

If NSF has an absolute limit of $25M for the vessel, the "answer" to the problem is known. Working backwards to a design is a relatively simple matter of trade-offs. We cannot cram ocean class capabilities into a regional vessel. The process will have to sort between what we WANT to do and what we MUST do.

I think we need to stress the possibility that two 'sizes' of a Regional Class ship might be needed, especially if the OCEAN Class ships are looking like they will be >227 ft for a monohull. If the new Regional Class are on the order of 135', there would be a gap in ship size of nearly 100'. Likewise, if the new Regional Class ships are on the order of 150' (uninspected), they would be approximately 40' longer than the Local Class.

It is very important that a regional class vessel in the Gulf of Mexico be in the 150 to 200' range for work in deep water. There are already 3 small coastal vessels available, plus a Mexican ship belonging to the Nat. Univ. of Mexico. When GYRE is retired there will be no vessel in the 175 to 185' range capable of doing the deepwater work associated with seep communities, the impact of oil exploration and production, the deep ocean carbon cycle, biodiversity studies and collaborative work with Mexico. The Gulf of Mexico needs a vessel that can handle all types of sampling in deep water, including deep piston coring, AUV and ROV work, box coring and large trawling. Multidisciplinary studies will require full ships of scientists, technicians and students at all levels. In on-going studies for MMS and NOAA the GYRE is always full, with a waiting list of interested students.

It is critical that both small (135 ft LOA) and large (176 ft LOA) regional class vessels be built to meet the scientific needs of the oceanographic community. Timely replacement of the Intermediate Class ships should be of the highest priority in the revitalization of the academic fleet.

A ship on the order of 180 ft is badly needed in the Gulf of Mexico in order to cover deeper water work.

I enjoy using the R/V Pelican because it is well designed and extremely functional. This is not the case for the R/V Gyre, but the Gyre makes up for other reduncies with having much more deck space. What is the possibility of having ships with more freezer and/or storage space ? and or -80'C freezer capabilities? For

those deploying instruments, more space on deck as well as in the dry labs are needed for preparation and repair of instruments. On deck, it would be useful to have power outlets for computers and other instruments to be plugged in safely to check on instruments. I would like to see MIDAS and MIDAS like instrumentation on all ships so that scientists can monitor a range of basic parameters such as salinity, temperature etc... and keep an eye on deployed instruments such as fluorometers while the ship is underway. This way we know more instanteously when instruments are no working (and so holes in mapping) and so the instruments can be switched over. Scientists should also have access to satellite images of the areas they are working in in a timely manner so that decisions can be made as they are working in an area. This is particularly important if you are trying to follow eg. plume dynamics.

The Cape class is a good starting point, but these vessels are smaller than ideal. Increased berthing to 16, and increased sea keeping abilty are to me the primary improvements needed.

One thing to consider with Regional Class vessels with respect to monohull vs swath is their draft. A regional class swath vessel drawing 19ft would exclude us from entering most of the ports we currently work out of, including our home port.

Should these vessels be built to include some form of Dynamic Positioning. This is a tremendously advantageous capability for a lot of work if economically feasible.

It does not make sense to build our future fleet using vessels of very limited capabilities.

On the east and west coast there are medium to large vessels nearby to call on for help with mooring deployments, interdisciplinary cruises, ROVs, deeply-towed instruments, large nets, piston cores, etc. Working in the western Gulf of Mexico and bringing in a ship from the east coast is like working off of New England and relying on ships from Florida. The US community needs a vessel in the Gulf region that can work on the seafloor at the base of the continental slope and in the open Gulf. Expanding ocean observatories in the Gulf require this. There are already three local class vessels in the Gulf that meet shelf and off-shore surface needs very well. There is no point in bringing in another coastal vessel to the Gulf region.

These relatively small boats should not be jammed with scientific crew (numerous berths) at the expense of work space; nor should the endurance exceed a reasonable amount of time to spend on this size vessel (21 days max).

I strongly believe there is a need for both the large and smaller Regional Class ship. The larger of this class would be capable of doing the work of the aging Intermediate Class. With the Ocean Class funding problematical the best way to meet the needs of science would be building five Regional Class ships, two small and three large (176')in this class. When funding is identified for the Ocean Class they can off set the work currently on Global ships such as ROV operations.

I don't think that the ranking above is a good idea. Based on the Cape Class, it should be possible to accomplish the major SMR's without sacrificing others. Overall, I think it is important to use the Cape and Oceanus classes as reference points in future discussions. We are going to end up with something that

will be between these two classes and we should use our knowledge of these vessels in our planning.

Overall I see the following minimum specifications as most in need of reduction: (1) range, (2) berthing capacity, and (3) lab space - in that order

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The report seemed for the most part to represent my needs. My concerns on cost would also relate to the scientific capabilities of the vessel not including in this questionary. Winches, Sonars, other equipment

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It would appear the main problems related to any new ship that is planned, is you will never keep everyone happy, so it's all a bit of a compromise. Since most of the time these vessels will not be venturing far from their home ports, the area of operaton would seem to be a major factor to consider. For a regional vessel a deep draft would be desirable, most areas have smaller ships that can handle the shallow draft requirements.The deeper draft should make for more usable space below deck, freeing up the main deck for other things. Sea-keeping should also improve with the deeper draft. The range capabilities are not so critical, as being able to maintain a fair cruising speed in about sea state six. Low freeboard is not a problem for a ship operating in warmer climates,and is usually an asset, but would not be desirable in colder waters of the north. The number of scientists carried will likely not be as many as we are used to, there should be a way to relate the number of scientists to the area of lab space required. I have no idea what this is, but there must be someone out there that does. The ratio of scientists to lab space could have quite an impact on the final design, since it influences almost every aspect of the ship. The type of work that is to be accomplished is hard to pin down, so flexibility should be at the top of the list. All of the deck mounted gear should be bolted down for easy relocation or removal. Labs need to be somewhat modular to allow for different configurations, sometimes benches need to be removed in favor of electronic racks, etc. The running cost of any inspected vessel will be far higher than an uninspected vessel. With the increase in the number of crew required, there will be less space for the scientific complement. Payroll of course will be up considerably, making the day rate higher. Looking at the design concepts anything over 150ft will be an inspected vessel, I would have thought we could do a little better than that. In some ways a 150 footer unispected would be a better bet than a 170 foot inspected. The number of scientists carried would be about the same, and the day rate could be less. Something of note, the Gyre is about 183ft, under 300 tons and unispected, with a crew of nine, and 24 science spaces. Were the Gyre an inspected vessel the crew would almost double in size, with a corresponding drop in the science berths, and a jump in the day rate. I realize the funding is tight for the three proposed vessels, and had a thought which will likely not be well received. Perhaps it would be better to take the funding and build two first class ships, rather than three, that could maybe get short changed in the budget crunch.

I am in general agreement with the 'published requirements' listed above. My answers would pretty much mirror those.

My concerns are that we should be cautious and make sure we don't design a regional class vessel as an oceans class vessel in disguise. There are many institutions along the West coast that have found the R/V Point Sur useful not only because of her physical ability to do the work but because many institutions can afford her. If we push the size of the next regional class vessel to something that is much larger than the Cape Class vessels then we will be faced with substantial cost increases to run the ship. It is generally agreed that the new vessels should be larger but we must find a balance between increased size and

capability and affordability.
These vessels should not exceed the basic size or operating costs of the Cape Class vessels. Size creep has been a mistake with most previous class replacements and should not occur here. The ability to operate in shallow water and to work from small harbors is very important.

Ranking assumes that the in-hull traction winch detailed in the SMR is installed.

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