UNOLS FIC Meeting

March 9, 2003

UNOLS Office – Reports

FIC Action/Task List
September 2003 Meeting

Send Regional Class letter to NSF (form RSUAC, community feedback concerns…)	Dave Hebert	Complete
Ocean Class –Provide feedback to the Navy/JJMA Phase II study	FIC	Ongoing
Encourage the Agencies to update the FOFC plan.	Dave	Ongoing
Update the FIC website and draft a FIC version of Figure 17 of the FOFC plan.	Annette & Dave	In progess
KILO MOANA - Continue FIC Debrief Interviews	FIC	Ongoing
Send the UH a list of KM items/problems that need to be addressed.	Dave w/ FIC	

FIC Action/Task List
September 2003 Meeting (continued)

Recommend that a ship motion analysis of KILO MOANA be conducted	Dave	Complete
Review KILO MOANA debrief interviews in respect to monohull vs SWATH hull characteristics	FIC	
Continue to review and provide feedback on design and construction efforts (CHRV, AARV)	FIC	Ongoing
Send letter of endorsement in support of the EWING Replacement plan.	Dave	Complete
Provide feedback to draft Global, Seismic SMRs	FIC	
Recommend that the PCA Subcommittee provide feedback to FIC irt facility improvements.	Dave	Complete
Ocean Observatories - Review UNOLS working group recommendations.	FIC	

FIC Projects and Priorities for 2004

- Stay engaged in the Regional Class Phase III and acquisition process, and insure community input
- Evaluate and prepare response to the Ocean Commission report.
- Actively participate in the Ocean Class Phase II study
- Encourage the Agencies to update the FOFC plan.
    - •Ocean Observatories - Review UNOLS working group recommendations.
    - •Prioritize and update all SMR's using some agreed on constraints
    - •Provide feedback to draft Global Class, Seismic SMR
    - •Update Global SMRs in the same format as Ocean and Regional Class.
    - •Update the FIC website and draft a FIC version of Figure 17 of the FOFC plan.
    - •Provide recommendations to FOFC regarding update of Fleet Renewal Plan.
- KILO MOANA - Continue FIC Debrief Interviews
- Send the UH a list of KM items/problems that need to be addressed.
- Review PCAR feedback to FIC with regard to facility improvements.
- Stay engaged in ongoing design and construction efforts (ARRV, EWING replacement, CHRV, etc.)

KILO MOANA
Debrief Responses

2002 - 2004

Debriefs Conducted

1.	Doug Capone:	22 Sep – 17 Oct 2002
2.	Bob Bidigare:	23 Nov – 27 Nov 2002
3.	Tom Gregory:	16 Dec – 21 Dec 2002
4.	Karin Bjorkman	8 Mar – 10 Mar 2003
5.	Tom Gregory	20 Mar – 24 Mar 2003
6.	Christopher Kelley	1 Apr – 3 Apr 2003
7.	Nancy Kachel	4/17–5/9 & 11–29/9 2003
8.	Scott Stalin	20 May – 11 Jun 2003
9.	Brian Popp	18 June – 5 August 2003
10.	Ken Bruland	6 Aug – 8 September 2003
11.	Karin Bjorkman	30 Sep – 10 Oct 2003
12.	Gregory	13 Oct – 17 Oct 2003
13.	Jerome Aucan	3 Nov – 7 Nov 2003
14.	Fernando Santiago	08 Dec – 17 Dec 2003
15.	Ken Buesseler	7 Jan – 13 Jan 2004

1. The sea-state in which the operation was conducted,

- Up to 6ft seas
- Winds 5-10knts, long swell ~ 20 sec period
- Calm, last day 12-15 ft seas and 30 knot winds.
- Calm 10-20 knots, SS3, rain
- 6-8’ seas. One day they have 16’-20’ rollers.
- Weather was generally very good
- Gale-force winds – cease over-the-side ops.

2. The method used…

- **CTD deployments,**
- **Zooplankton tows**
- **Optical casts**
- **Underway sampling through ship's clean water system**
- **Free floating: productivity array, sediment trap array.**
- **Multibeam mapping**
- **XBT, XCTD**
- **Short mapping cruises**
- **Recovery of moorings with large surface buoys and subsurface moorings.**
- **GoFlo deployments**
- **Multi-core operations.**
- **71 MARMAP bongo tows**

3. Whether this method was done in a safer and more efficient way than would have been done on a monohull vessel,

- Current CTD deployment system considered unsafe
- No accumulator on winch
- Wire twisting caused kinks requiring re-termination.
- Difficulty because of high freeboard, users have devised handling procedures to mitigate problems, and so is no longer "worse" that monohull.
- Biggest problem is crane for CTD; pivot point is too high causing whiplash problems, also poor visibility over stern.
- Deep props prevent true sampling of upper 5m
- All were safe, freeboard cause recovery problems

4. Ways to improve the method used…

- Air pressure surges through moon pool hatch and wave slap problems during recover and launch procedures.
- Adapting procedures to constraints of the ship

5. Whether the sea-keeping characteristics of the ship made it easier or more difficult to conduct the scientific operation,

- **Liked stability of the platform**
- **Easier.**
- **Never really had bad weather**
- **Everything but CTD ops**

6. Whether the layout of the deck and lab space made it easier or more difficult to conduct the scientific operation.

- Deck space is good
- Lab space unprecedented
- Would like to have vans on upper deck
- Freezer space on ship is inadequate, need more chest and upright freezers/fridge space
- Layout is fine
- 01 and 02 decks do not have tie-downs at 2 or 4 centers – difficult to secure incubators

A. What were the most positive aspects of your research cruise with a SWATH compared to your previous experience on a monohull?

- Crew great/worked around problems
- Space
- Backing down while sampling from stern allowed our getting good clean water.
- Liked access to storage area, on working deck.
- Liked large labs.
- Accommodations
- Ship stability.
- Ship is small and compact, but rides like a much larger monohull.

B. What were the most negative aspects of your research cruise with a SWATH compared to your previous experience on a monohull?

- Going up and down between decks to go forward and aft. Ship needs an elevator.
- Positive pressure problems in accommodation makes opening doors difficult, seems to lead to breaking of door catches.
- Drainage of water from sinks in labs is a problem.
- High freeboard.
- The inability to recover surface mooring with large discus buoys other than using a small boat - limits the sea state for ops.
- Visibility of some rear deck areas from bridge needs to be improved
- CTD ops

C. Did you have difficulty loading/unloading the scientific gear from the ship?

- High freeboard, and consequently steep gangplank made loading by hand too difficult, needed to use crane.
- Cargo conveyor belt is needed.
- Crane does not reach far enough on to the dock.
- Some reported no problems

D. Were the labs adequate (location, size, accessibility) for you?

- **Yes**
- **Liked labs and the fact that they were compartmentalized – flexible layout.**
- **They need to have freezers installed, -20 and –80 C,**
- **drainage from sinks is badly affected by ship trim, and problem needs to be rectified.**
- **Plenty of space and easy access.**
- **The laboratories lacked convenient storage space.**
- **It was not easy to move the CTD package into the wet lab for sampling because the door to the wet lab was not large enough to easily accommodate the package.**
- **Should be a hood and a sink that drains to the outside in each lab.**

E. Were the underway systems (thermosalinograph, running seawater) working adequately?

- Some minor plumbing problems fixed.
- Yes
- Were O.K. but not enough flow for on underway system for multiple users.
- There was a quirk with the logging system for the fluorometer that caused it to stop logging data.
- Underway data – easy access to its data is extremely useful
- Sensors after the pump – temp change is a concern.

F. Were communications with the bridge, winch and crane operators easy to conduct?

- VHF works. But used phones. Could be better.
- Moving the CTD up one deck will be a very noisy place.
- Yes, but bridge wing operating system is inadequate when recovering over the side equipment.
- Used preplanned tracklines. Communicated with bridge after every line finished using phone in lab--this worked out easily.
- Communications with the bridge, etc. was fine; no problems.
- Big problem with communications between winch operator and CTD lab

F. (continued) Were communications with the bridge, winch and crane operators easy to conduct?

- Winch operations were conducted from the doghouse on the 02 deck during deep casts where external noise was not an issue.
- Launch and recovery was still performed from the 01 station because visibility of the back deck from the doghouse was limited. Although there is closed circuit television throughout the ship, the visibility of the back deck from the bridge was limited.
- A crewmember was stationed on the aft deck for all over-the-side operations (CTD, GoFlo, Multicore) to monitor wire angle because it was not visible to the bridge.
- An aft control station is necessary; certainly dynamic positioning would have been useful.

G. Were the accommodations adequate (e.g., size, location, accessibility)?

- Great. Some noise. 01 deck noisy. Main ok.
- Liked cabins but aft cabins by winch are too noisy
- No sound insulation between cabins
- For scientist and new people the ship is maze-like and similar looking halls, and so nice to have arrows pointing to areas of interest or "you are here" like maps
- All accommodations were easily accessible and adequate.
- Nice galley set-up

H. Was the computer network system adequate?

- **Liked system, would like wire readouts on screen.**
- **The computer network is the best in terms of number of terminals.**
- **The flat screens throughout the ship are incredibly valuable, and the various display options are getting better each cruise.**
- **There was an issue related to image quality of monitors in staterooms—this may now be resolved.**
- **Hook up was easy and quick.**
- **The computer network and the closed circuit television systems to monitor science data were excellent and enhanced the scientific exchange of information.**
- **The only improvement that might be considered is a wireless network.**
- **Never successful in printing to 2 of the 4 printers**
- **Would like >3 per day email transfers**

I. What is the habitability of the lounge, staterooms, mess deck, and fitness room?

- Lounge couch is very uncomfortable
- The lounge was extremely comfortable and of adequate size.
- The usefulness of the lounge was enhanced by the closed circuit television system.
- The lounge furniture was very comfortable and the lounge was quiet. Apparently, however, sound in the lounge could be heard in the stateroom immediately next to the lounge. Extra soundproofing should be considered.
- The staterooms were excellent.
- Fitness room a bit confined

I. What is the habitability of the lounge, staterooms, mess deck, and fitness room?

- Liked TV screens in rooms and ability to tune into cameras reporting meter wheel parameters etc.
- Habitability of staterooms was fine.
- Mess room is layout is rows of booths in long room. Several people noticed that this layout limited conversations to individual booths and was not conducive for interactions among personnel at mealtime.
- The mess deck is well located and comfortable.
- The fitness room is small but well equipped. The fitness room would be more useful is it had free weights and better ventilation.

J. Are there any noise and vibration feedback concerns?

- **None**
- **Yes noise, no vibration problems**
- **No, except for the cabin noise level**
- **Minimal noise and vibrations compared to monohulls.**
- **The staterooms numbered 01-12 and 01-14 have excessive noise and vibration when the trawl winch was operating.**
- **Waves 12 ft or greater bang on the bottom of the deck between the hulls creating an enormous racket, and raise the moon pool plate alarmingly.**

K. Were there ship vibrations or other motions that made it difficult to work and live on the ship?

- Ship was “super stable”, no vibration concerns.
- Hardly any vibrations or other motions—there was a slight sliding motion. Swath hull did not move as much as monohulls. Very pleasant to be on.
- When it was rough, the waves slapping on the deck make significant vibrations.
- Forced into hiding 3 times during Sept cruise.
- In winds 30-35 knts the SWATH design causes the ship to kite – hard to maneuver.

L. At any time, did you feel the ship was not sea-worthy at certain sea states? Were there times when you felt that you rather be on a monohull ship? A SWATH ship?

- **No.**
- **sustained winds of 25-30 knot - The ship performed well under these conditions. Ship was more stable than most monohull ships. Arguably, it was even more stable than the Revelle/Atlantis under these conditions… I would prefer a SWATH ship because it allows more detailed sampling of the upper ocean.**
- **Slapping against moon pool was unusual**

M. Were deck crane and winch operations safe and efficient? Did it take more personnel to perform the operation that you expected?

- Yes.
- CTD launching operations are not safe, needs a new approach
- More people are needed to do the CTD.
- The deep sea winch with fly block was a useless piece of c###. The fairlead along the A-frame is foolish and not working properly for mooring work.

N. Were there any weight distributions problems with heavy science payload such as vans?

- No Problems.
- Drainage of sinks in labs may be related to ship trim problems ...a potential slip risk.
- This was not an issue. Six surface moorings and some subsurface moorings were done. There was a concern of adequate space for the buoys.
- The upper deck had no 2’x2’ tie downs and there was a question of whether the deck was made for holding things. Some items were lashed to the rail.

O. Was dynamic positioning used? And was it useful?

- *Not used.*
- *Wanted to use it but it was not working.*
- *Dynamic positioning was not available on our cruise.*
- *At the time, the bow thruster and the DP were not working, but the bridge officer managed to still keep the ship in position.*

P. Were the multibeam or acoustic Doppler systems working properly under all conditions?

- *Multibeam yes, ADCP no.*
- *Not Used.*
- *Multibeam worked well.*
- *Sidescan data had streaks (people are actively working to solve the sidescan problem).*
- *The acoustic doppler system was not operational.*

Q. Were any heavy gear deployments undertaken such as moorings or sediment sampling?

- No.
- A small multicoring rig and a very light in situ array were deployed. …With the exception of visibility of the in situ recovery mentioned above, we had no difficulty deploying or recovering this equipment.
- We also deployed a light mooring (a 600 lb waverider buoy) The height of the deck above water was a worry (as well as for the CTD deployment/recovery)

R. Were there any pre-cruise planning measures and shore facility communications that were necessary and unique to the SWATH operations?

- *No.*

- *Boarding scientists need to be apprised of problems and solution to deployment procedures of gear from deck*

S. What advice would you give a colleague that was going to sail on a SWATH vessel such as the R/V KILO MOANA?

- **Think about height impact, small boat use.**
- **None really, it was a great ship.**
- **Think about freeboard and deployment issues.**
- **Rethink over the side operations. e.g. array spacing, need to submerge equipment while loading, since freeboard is higher need larger gaps.**
- **Ctd operations take longer because of handling problems.**
- **Don’t try to do mooring work from it.**
- **SWATH design vessels are not really suited for investigations in the confused sea states and stormy weather that is prevalent in the northern portions of the North Pacific.**
- **The ship needs to pump waste water tanks more often than on other ships.**

T. Any additional comments?

- *None really, a great ship, overall "A" rating*
- *Current CTD package has to be modified to safely recover it through the Moon pool. As is, there is risk for sampling bottles being damaged during recovery.*
- *Height of working deck above waterline would need to be taken into account if intended to tow seismic or other gear.*
- *Get rid of moon pool; it is dangerous.*
- *The back deck is very short; hardly enough space to try and grab something in the water. Also, the screws for the engines are also right there.*

T. Any additional comments?

- *Throughout the cruise, we seemed to have to pump the bilge at an excessive rate. Either we had a particularly active crew on board or seawater was draining into the grey water. I suspect that several drains could be configured so that uncontaminated seawater may flow directly back into the ocean rather than the holding tank. O3 deck needs more tie down points. On this cruise these were needed for incubators. It would also have been useful if the uncontaminated seawater were available on this deck to use in incubators.*
- *The captain and crew were outstanding.*
- *Not a lot of winches – CTD and trawl – no hyrdo-winch – for multiple deployments, it would be nice to have more winches.*
- *Short cycle for holding waste (24 hours) – drains for seawater go into same system, as well as flow-through system – maybe put these overboard instead of into gray water. Need longer holding capacity.*
- *Q-water has too low production rate – not good enough quality.*

T. Any additional comments?

- *Some of the labs get flooded due to water coming up through the floor drain. This appears to be only in certain ship orientations when underway. Didn't know of the cause.*
- *I was hoping the ship would be less sensitive to surface wave, with the CTD deployed way in the back the ship, the vertical movement of the package due to ship motion was significantly more than on a way long monohull ship with the CTD deployed mid ship.*
- *They had rough weather (gusts to 50 kts, 18-20 ft seas) during the cruise and couldn't work in these conditions. The ship is not very comfortable in heavy seas. The motion of the ship is jerky and hard to predict unlike that on of a monohull. Vibrations from wave slapping felt throughout the ship. Never felt that the ship was unsafe – just couldn't do any work.*

KILO MOANA 2004 Schedule and Debrief Assignments

Start	End	PI Name	Inst	Area	Purpose	Days	FIC Volunteer
1/7	1/13	Buesseler,K.	WHOI	HI	VERTIGO	7	Dave
2/23	3/2	Saito,M.	WHOI	HI	Marine Cyanobacteria	8	Terry
3/5	3/14	Verdugo,P.	UW	HI	Global Element Cycles	10	Ron
3/18	3/22	Karl,D.	UHI	HI	HOT Series	5	Chris
4/6	5/9	Martinez,F.	UHI	S Pac	East Lau Spreading Ctr	38	Niall
5/20	6/2	Kuehl,S.	VIMS	S Pac	Sediment Dispersal	17	Clare
6/21	7/11	Buesseler,K.	WHOI	N Pac	VERTIGO	21	Dave
7/15	8/24	Wells, Mark	UM	N Pac	Iron Complexing	41	Terry
9/8	10/15	Langmuir,C.	HU	S Pac	Eastern Lau Spreading Center	41	Niall
10/17	11/5	Taylor, B.	UHI	S Pac	Student Cruise	12	Chris
11/8	12/16	Silver,E.	UCSC	S Pac	Stratovolcano Collapses	42	Toby

Terry - Any

KILO MOANA – UH Letter -

- CTD ops
- Crane evaluation - visability problem.
- Establish incubator work site
- Investigate drainage problem – record ship trim and evaluate
- Additional cameras for Bridge
- Low flow for underway system.
- Take noise measurements in cabins. If needed investigate noise insulation
- Request trim measurements for evaluation of drainage and wave slapping.
- Address tank capacity problem and implement fix

Monohull vs SWATH hull

- See table created at meeting.

KILO MOANA Debriefs

- Next Steps:
  - Continue Debrief Interviews
  - Review table that provides pros and cons of SWATH hull form as compared to a monohull
  - Obtain feedback for WESTERN FLYER and KILO MOANA Captains
  - Letter to UH
  - Compile Debriefs for posting on the UNOLS website

Science Mission Requirements Development Process

- Ocean & Regional Class Model:
  - Formed Steering Committee
  - Developed mission scenarios and drafted preliminary SMR
  - Held Community Workshop
  - Revised and posted draft SMRs for Community Input
  - Finalize and Post

Global R/V with Heavy-Lift Capability (Ocean Observatory Support Platform)

Working Group Finding:

- The proposed Ocean Class vessels and the ARRV do not fulfill deep water ocean observatory needs due to their size and concomitant limitations in seakeeping, deck-space, and lift capability.
- The Fleet Renewal process needs to consider the construction or acquisition of vessels larger than the current Global Class size.
- Future ship planning is not adequately coupled to ROV operations as a standard ship mission.
- The proposed Regional Class vessels are well-suited for coastal observatory operations.

Global R/V with Heavy-Lift Capability (Ocean Observatory Support Platform)

Working Group Recommendations:

- "The UNOLS Fleet Renewal process should develop a Science Mission Requirement for a class of vessel larger than the present Global Class to support ocean observatory and other heavy-lift needs.

Ocean Observatory Support Ship Recommended Characteristics

- **At-sea refueling capability**
- **A second bow thruster at mid-life refit could open the working sea state to SS5 or more**
- **Redundant DP systems**
- **Shrouding the z-drives to improve DP efficiency and reduce the risk of cable entanglement during over-the-side operations.**
- **Substantial increase in deck space - could be facilitated by lengthening Global vessels by about 50’ at mid-life refit.**

Ocean Observatory Support Ship
Recommended Characteristics (Continued)

- Doubling the A-frame capacity and increase winch, cable, and crane capacity
- A below-deck fiber optic traction winch to simplify ROV operations.
- Specially trained and qualified crew for heavy lift ops.
- Alternative to commercial contracting – acquire one or more heavy lift vessels to carry out OOI global buoy and some submarine cable operations at sea.
- Include ROVs as a standard shipboard tool and incorporate space to support them in ship designs.

Ocean Observatory Working Group Finding: Ship Usage and Scheduling

- **Deep water OOI installation** = 480 days of Global Class ship time plus 375 days of commercial ship time **-** ~ 3/4 of the UNOLS ship days will require a deep ROV.
- **Coastal OOI Installation -** 150 days of Regional to Intermediate class ship time, plus 7 days of contracted cable-ship time.
- **Annual Operations and Maintenance (O&M) of the OOI global buoy systems** – 2 ship-years of Global Class vessels, about 3/4 of which will require a deep ROV.
- **Annual O&M of the OOI regional cabled observatory =** ½ Global ship-year
- **Annual O&M of the OOI coastal observatories** = ~ 1 virtual ship
- **Coastal Observatory -** Ten additional small Regional to large Local Class vessels.
- Rapid Response Capability

Global Class Vessel with Seismic Capabilities - Community feedback:

- **Science party of 40 seems excessive**

- **Accommodations & Habitability:** The mix of single rooms for crew vs non-crew seems a bit skewed -- 12 vs 2 or 16 vs 4 with crew then having priority to spread out may not be desirable. This will surely result in all crew having single rooms as a "standard", with much complaining when a larger science party comes on board.

- **Data Network and on board computing:**
  - Shouldn't there be some minimum specs for the computer/network systems?
  - Should wireless also be available in the living spaces? Will the range of the lab hubs be sufficient to carry into the living areas?

General Purpose Global Vessel SMR – Mid Life Refit considerations

2006 - *THOMPSON*

2011 – *REVELLE*

2012 – *ATLANTIS*

General Purpose Global Vessel SMR – Mid Life Refit considerations

Should Ocean Observatory support needs be considered?

- Enhanced seakeeping through bow thruster improvement, z-drive shrouding, and vessel lengthening.
- Redundant DP
- Doubling of the heavy lift capability through A-frame,winch, wire, and crane enhancements
- Equip with a below-deck fiber optic traction winch.

Ocean Class Steering Committee

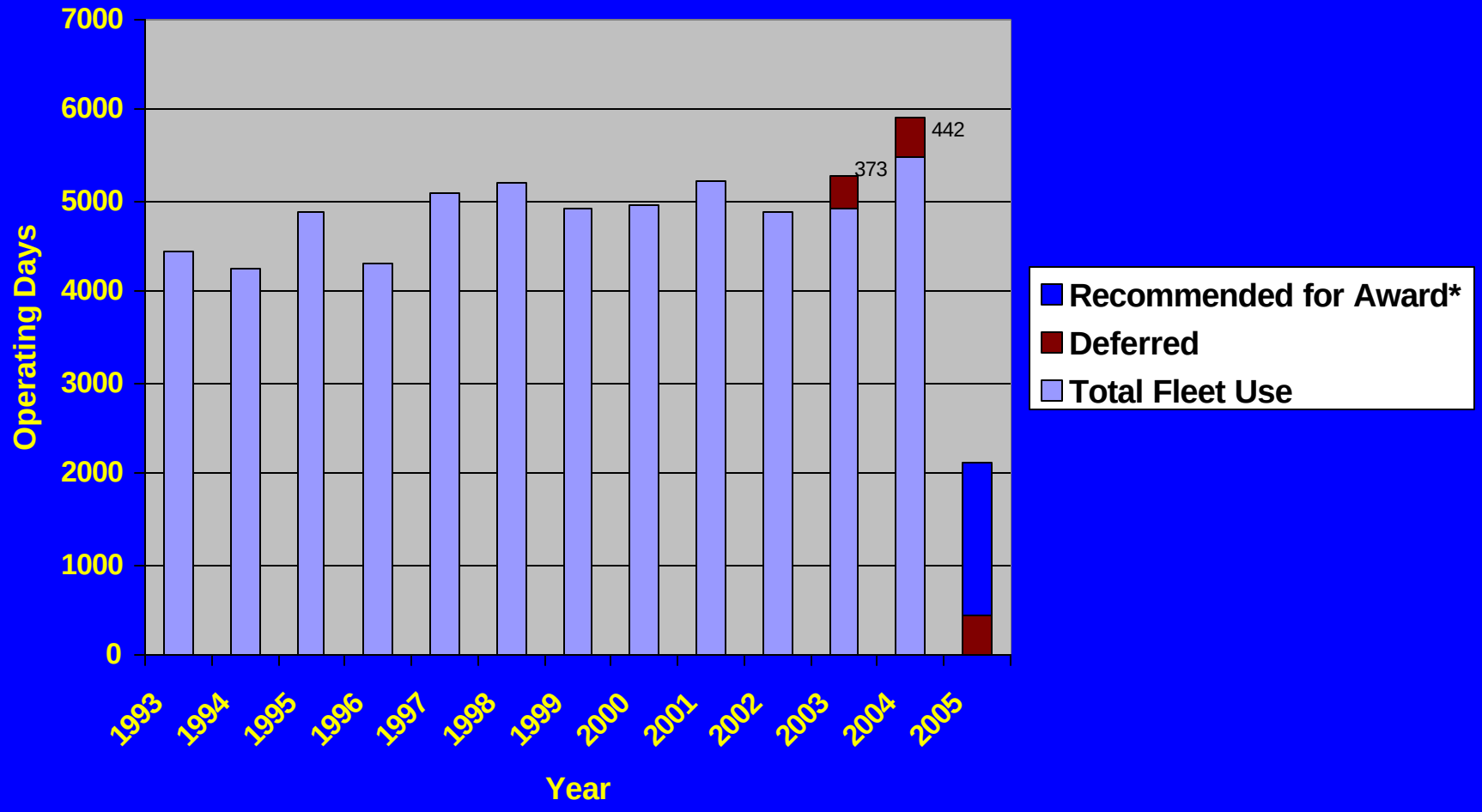
- **Dave Hebert, Chair (URI)**
- **Al Suchy (WHOI)**
- **James Cochran (LDEO)**
- **Tim Cowles (OSU)**
- **Charles Flagg (BNL)**
- **Gary Hitchcock (U. Miami)**
- **Bob Knox (SIO)**

UNOLS Fleet Utilization

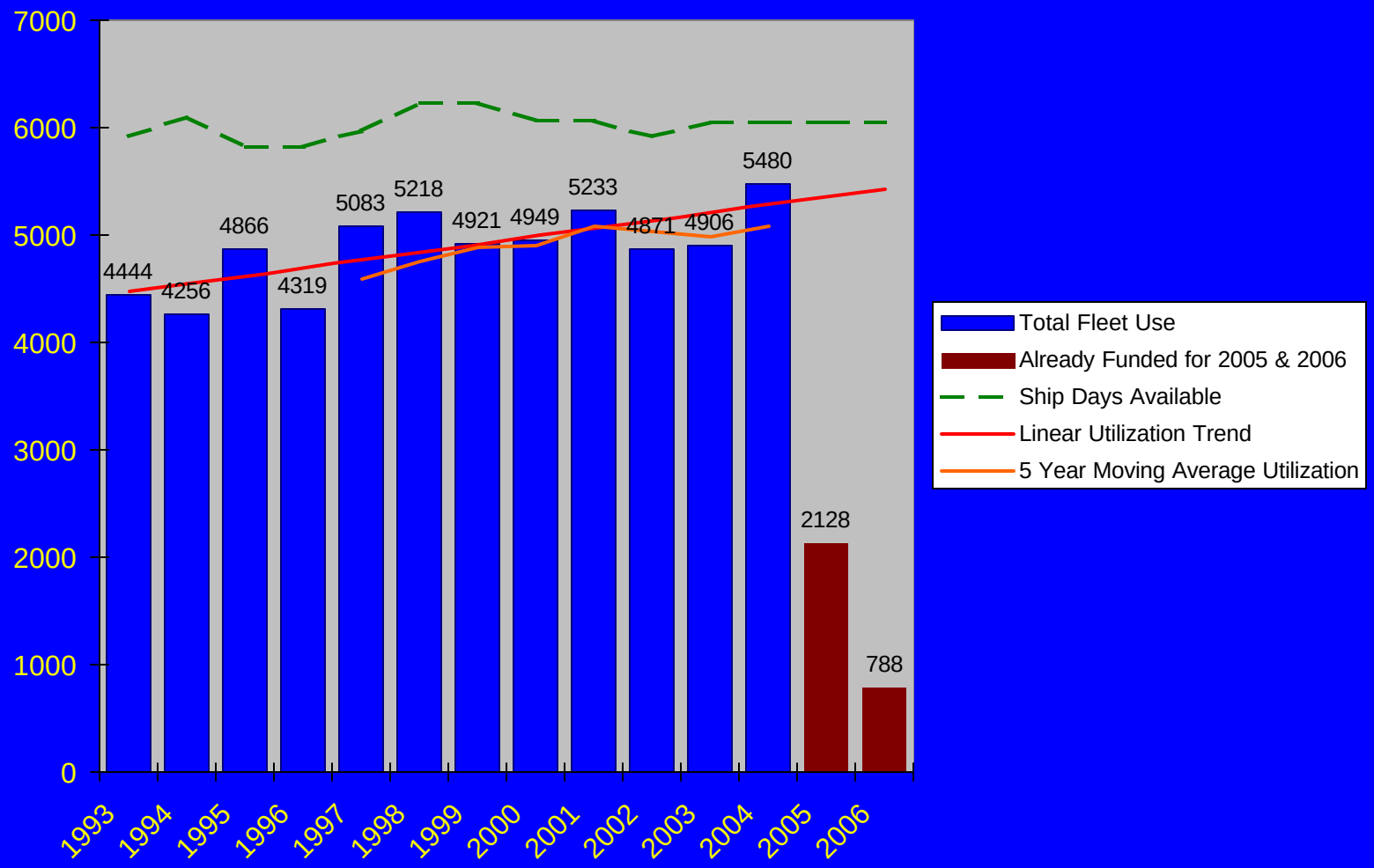
Trends and Projections

March 2004

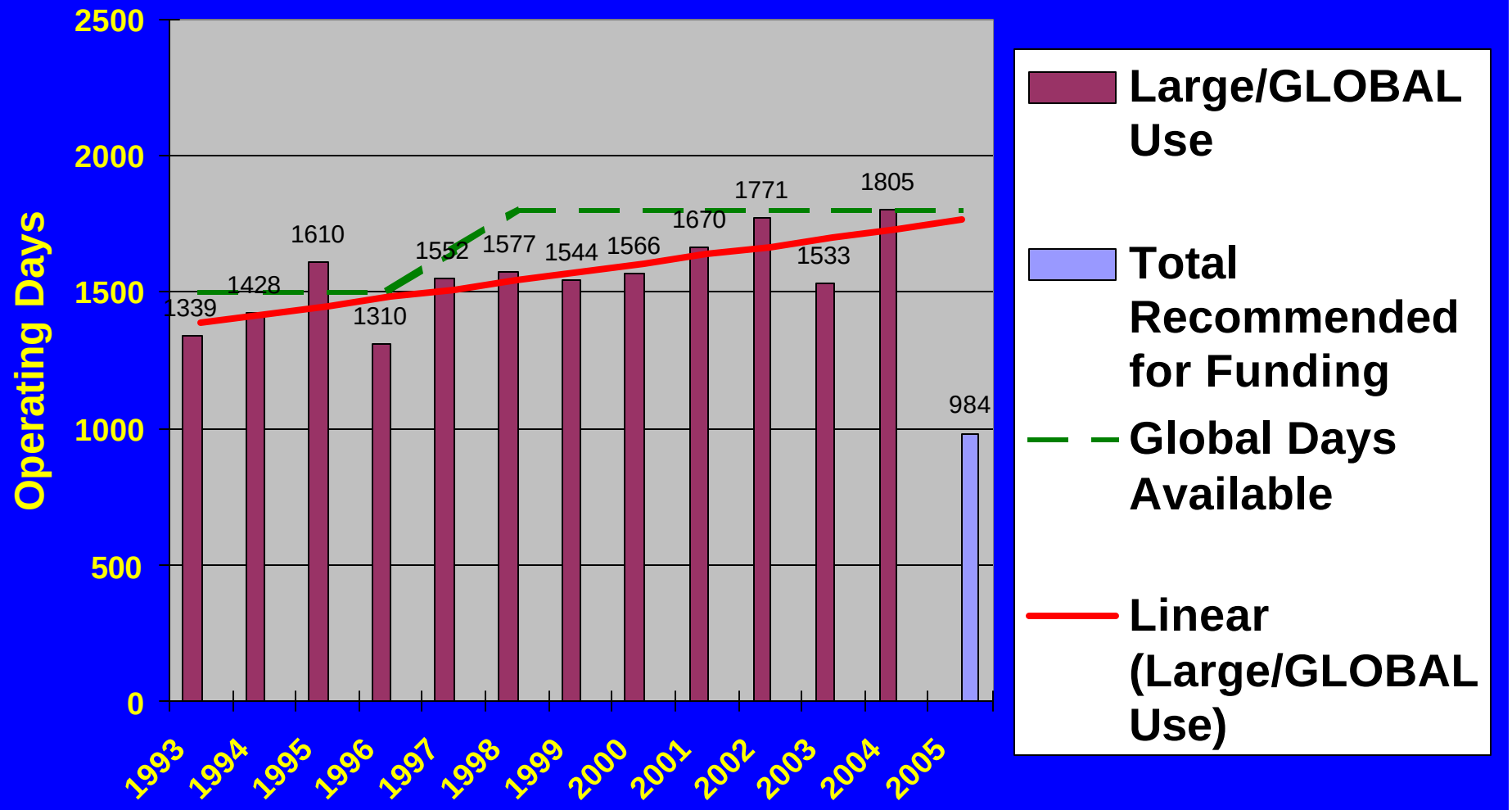
Fleet Use and Projected Use: 1993 - 2005



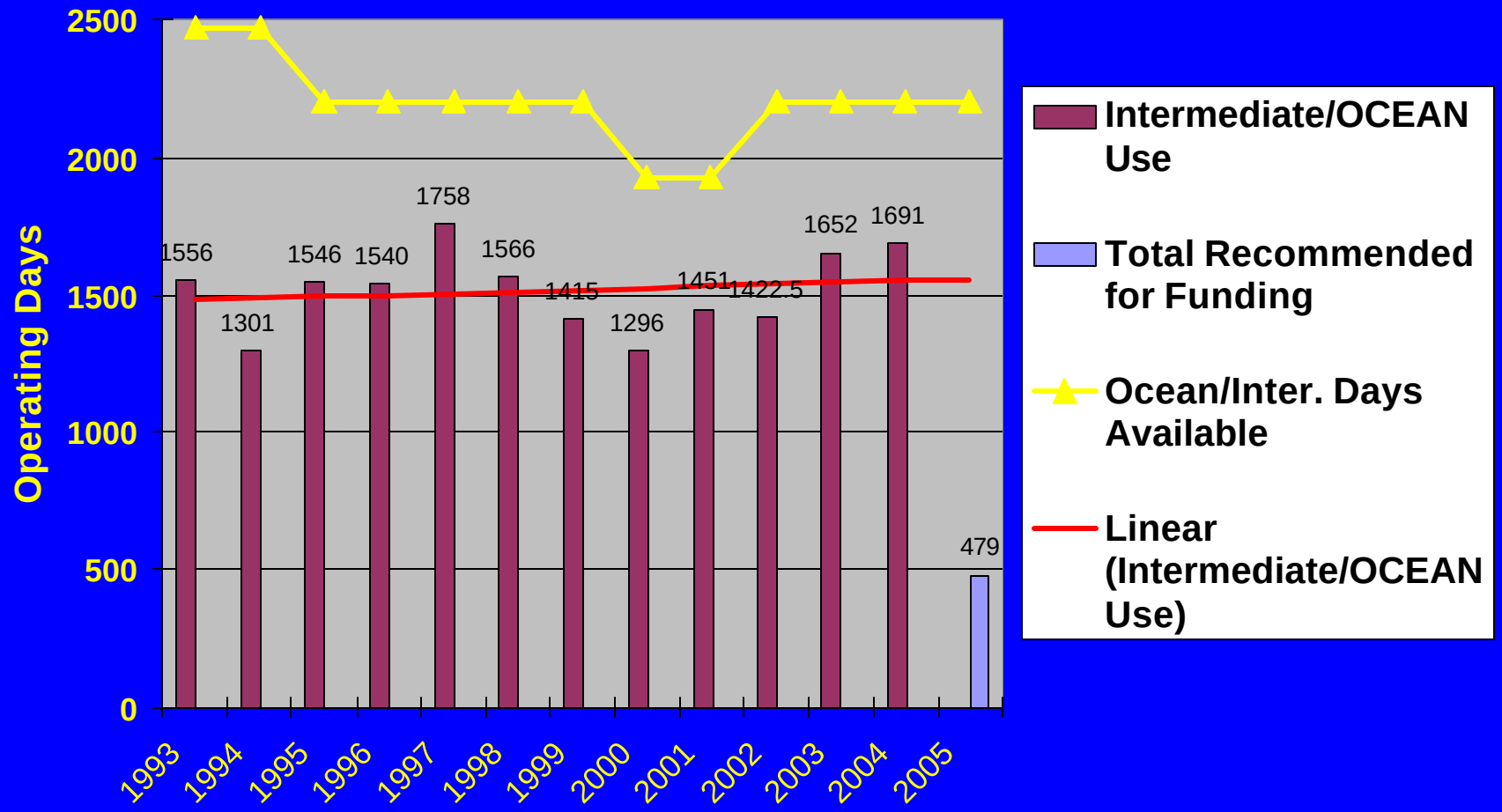
Fleet Utilization Trends



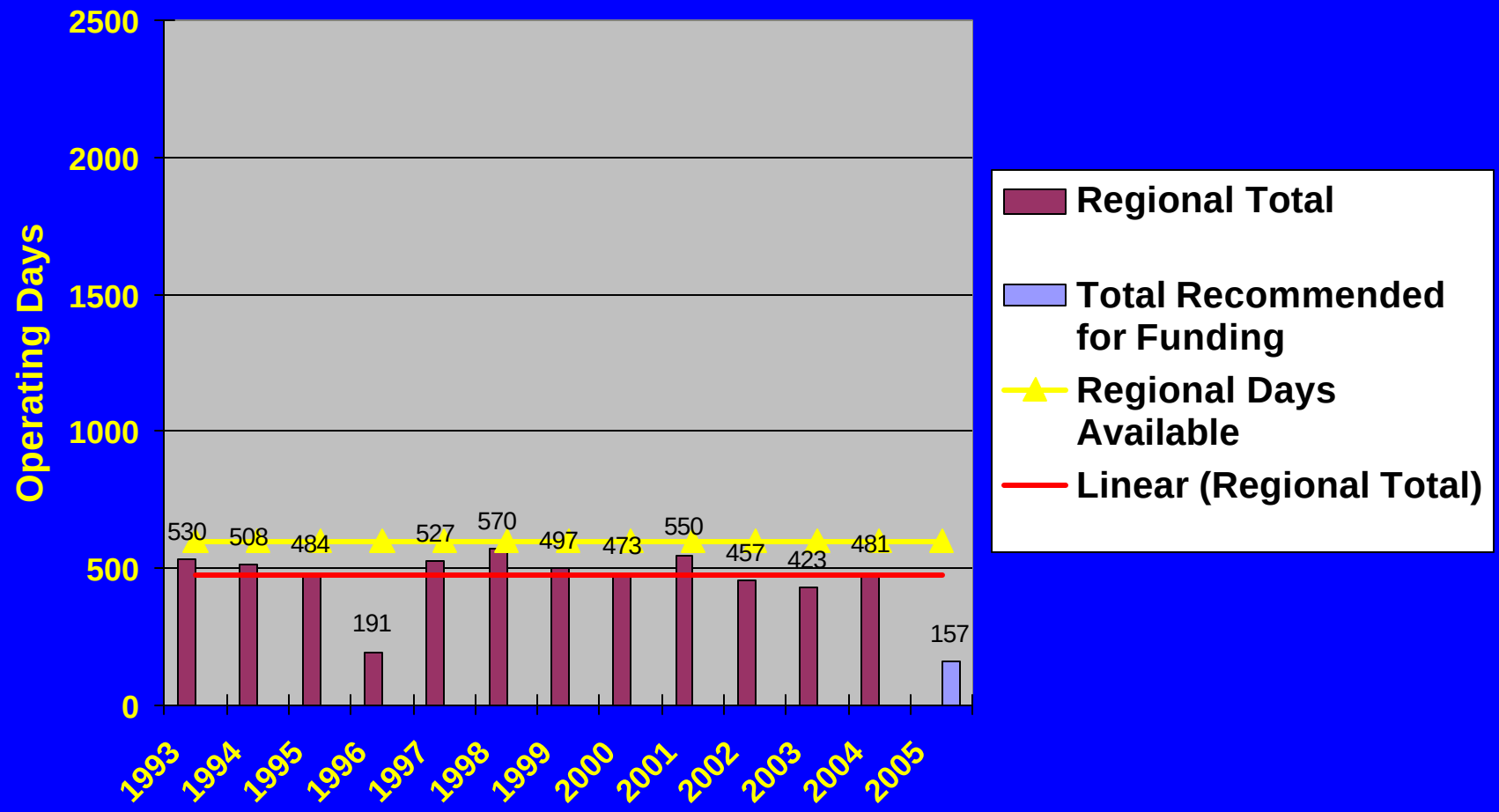
Global Utilization Trends



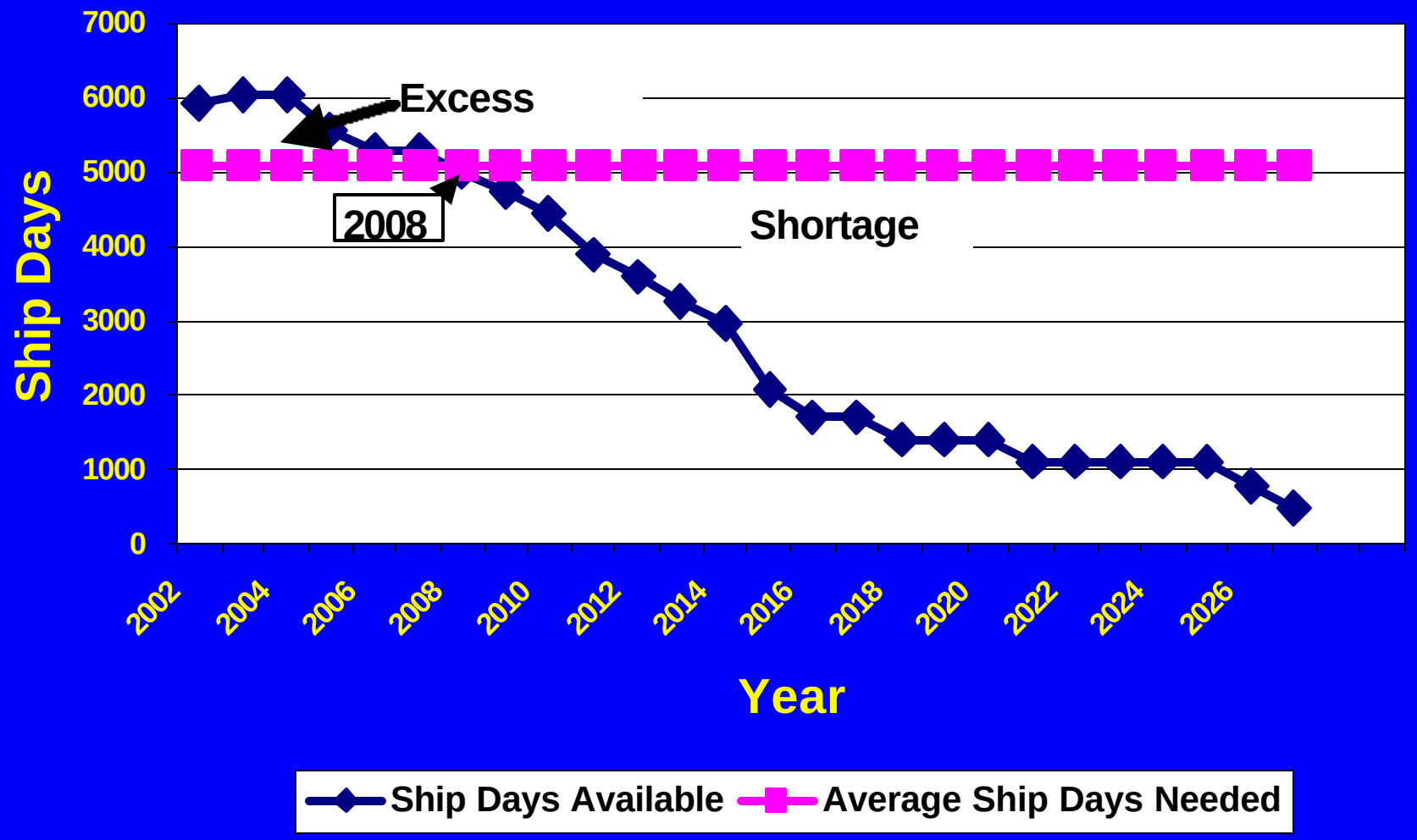
Intermediate/Ocean Class Utilization



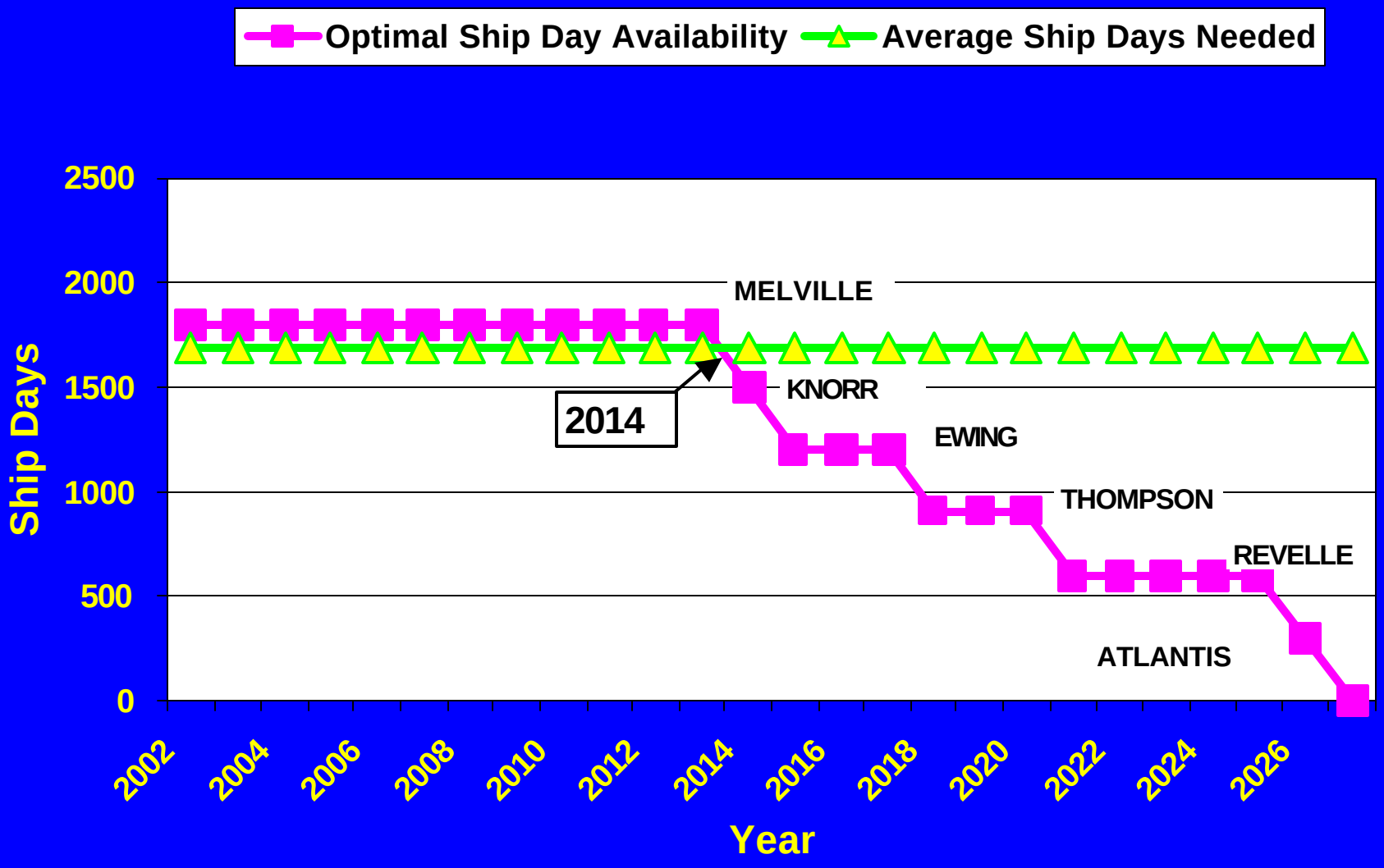
Regional Class Utilization



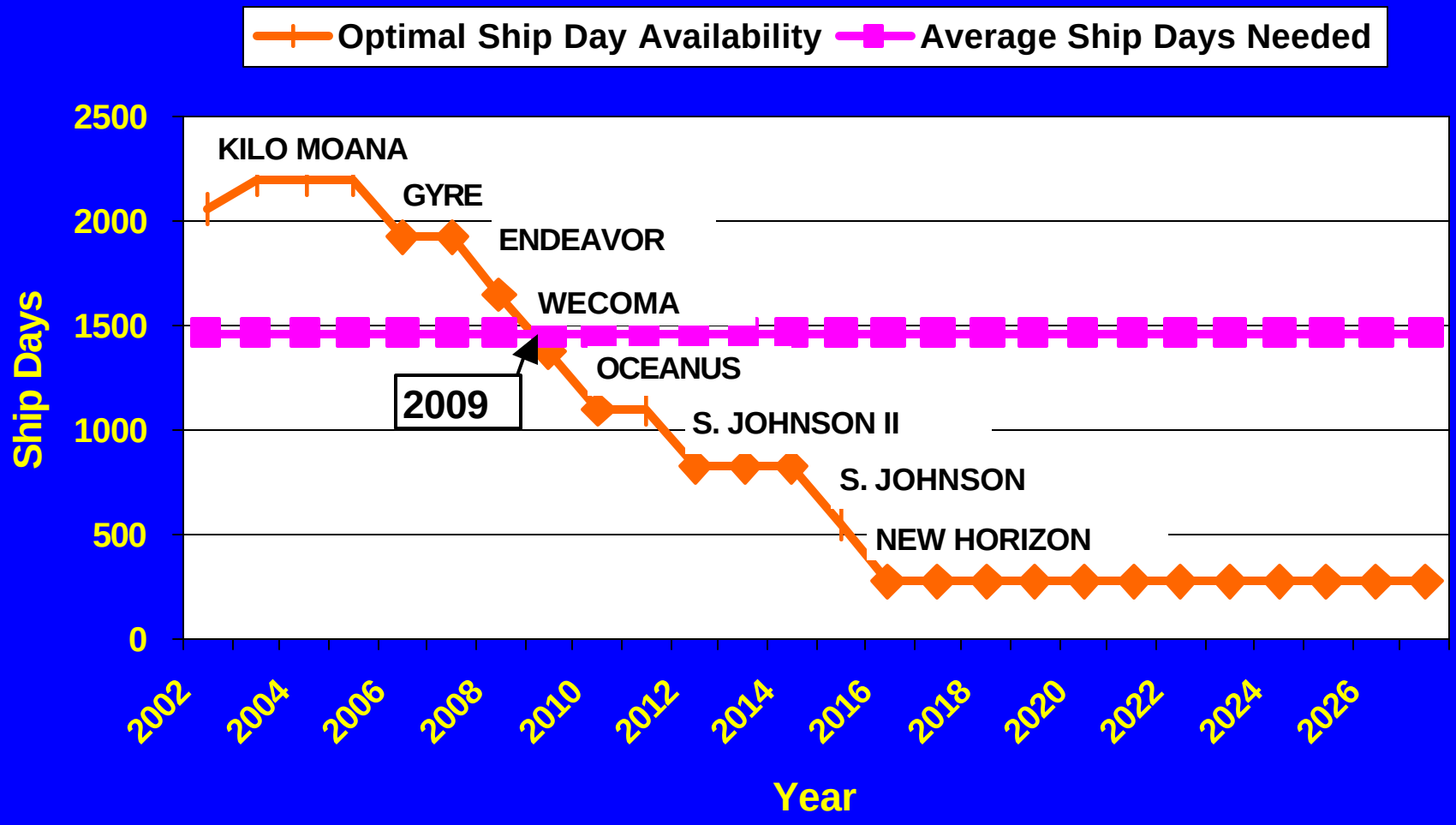
Total Ship Days Available vs Average Ship Days Needed



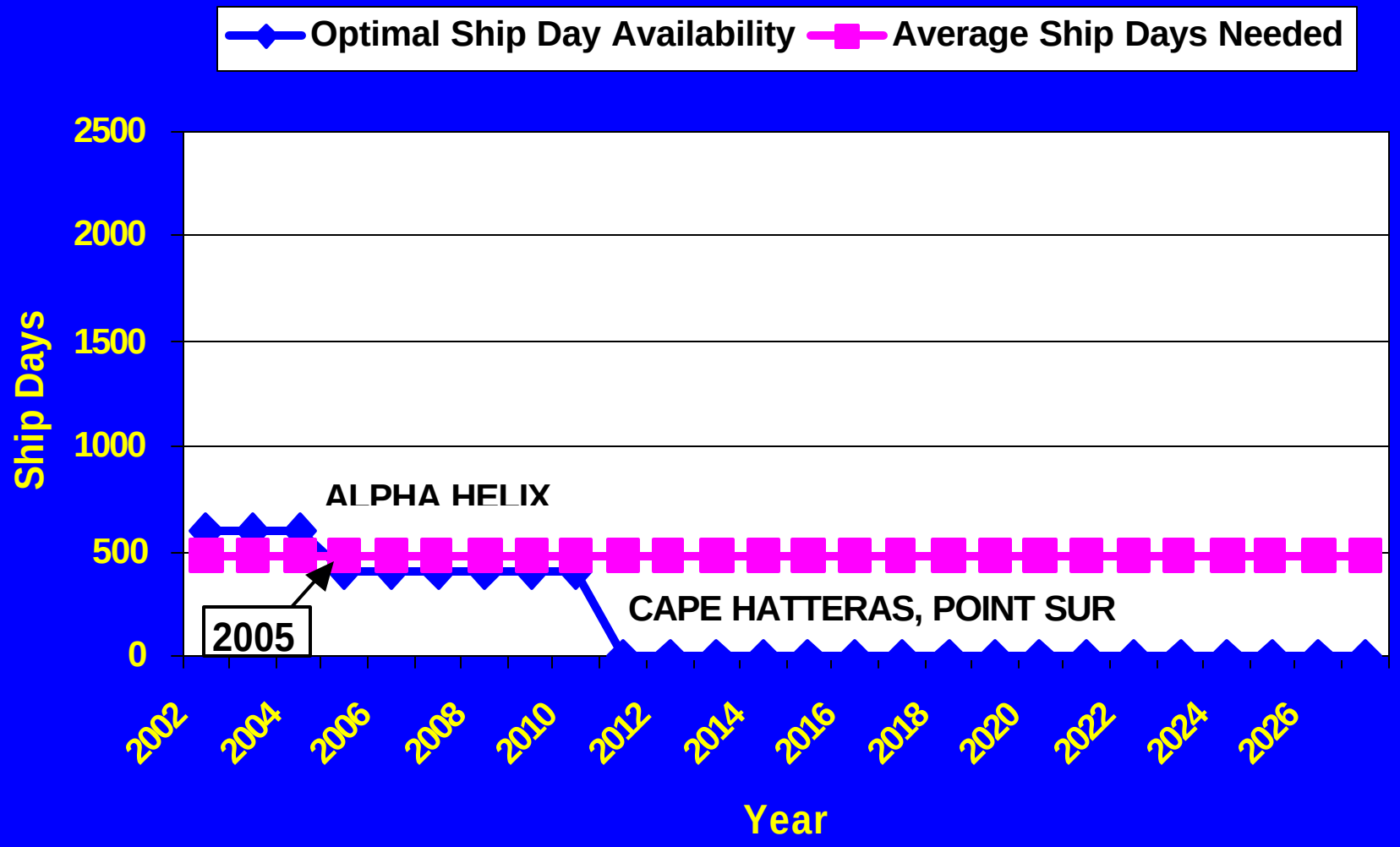
Global - Optimal Ship Days vs Average Days Needed



Ocean Class - Optimal Ship Days vs Average Days Needed



Regional Class - Optimal Ship Days vs Average Days Needed



Local Class - Optimal Ship Days vs Average Days Needed

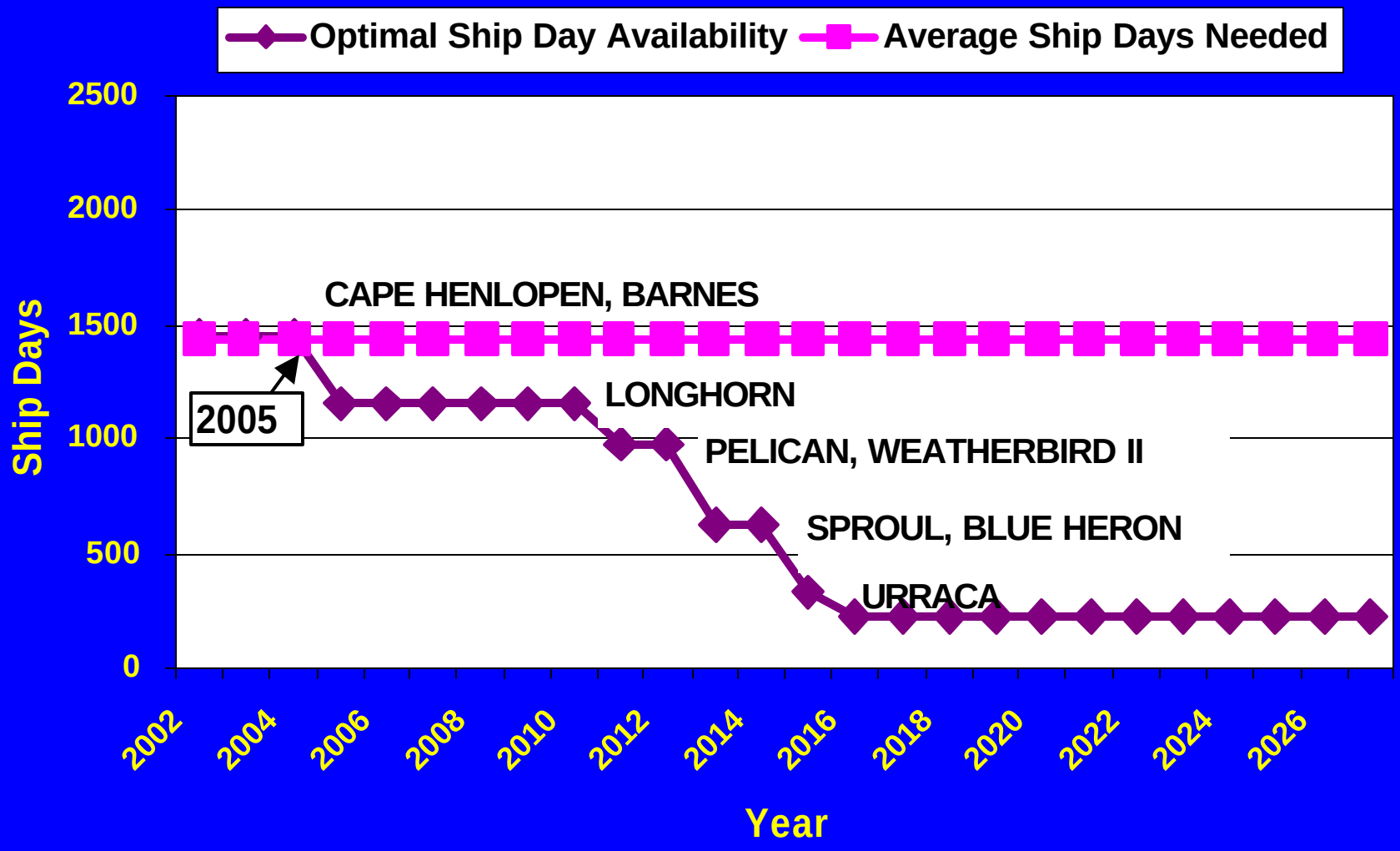
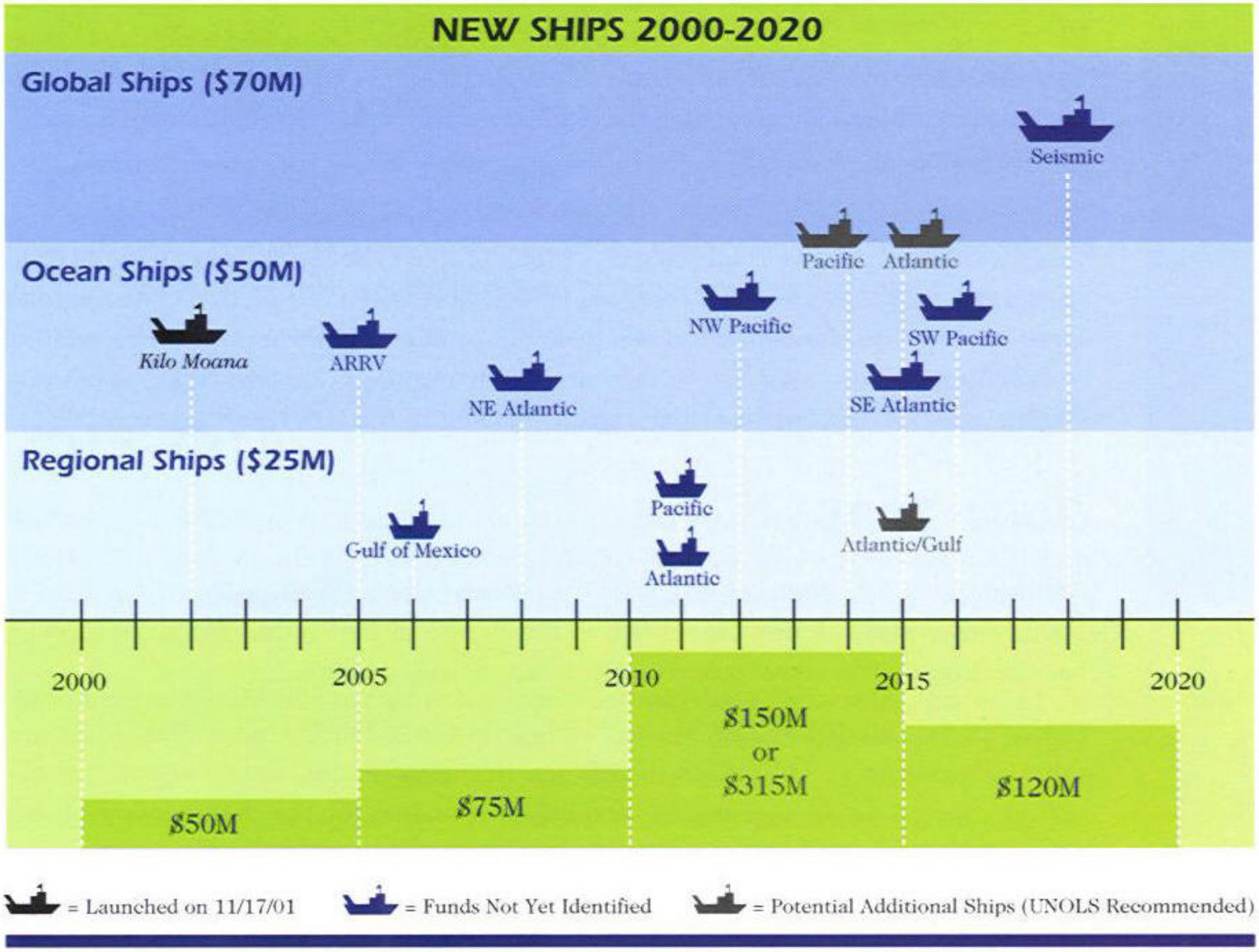


Figure 17. Proposed schedule for new construction.



	Vessel Class	Retire Date	Revised Date	Begin Service	Revised Date
NE Atlantic					
KNORR	Global	2015			
ENDEAVOR	Intermediate	2008			
OCEANUS	Intermediate	2009			
Ocean	Ocean			2008	
Atlantic					
Regional	Regional			2011	
SE Atlantic					
SEWARD JOHNSON	Intermediate	2015			
SEWARD JOHNSON II	Intermediate	2012			
CAPE HATTERAS	Regional	2011			
Ocean	Ocean			2015	
Gulf of Mexico					
GYRE	Intermediate	2006			
Regional	Regional			2006	

	Vessel Class	Retire Date	Revised Date	Begin Service	Revised Date
NW Pacific					
T.G. THOMPSON	Global	2021			
WECOMA	Intermediate	2010			
ALPHA HELIX	Regional	2005			
Ocean	Ocean			2012	
ARRV	Ocean			2005	
Pacific					
Regional	Regional			2011	
SW Pacific					
MELVILLE	Global	2014			
R. REVELLE	Global	2026			
NEW HORIZON	Intermediate	2016			
POINT SUR	Regional	2011			
Ocean	Ocean			2016	
Hawaii					
KILO MOANA	Ocean	2032			
Special Purpose					
ATLANTIS	Global	2027			
Ewing	Global	2018			
Seismic	Global			2018	
Observatory Support??					

FIC Membership

- **David Hebert, URI (Chair) – [at-large, 9/05] PO**
- **Newell Garfield, SFSU – [Non-op, 9/06] PO**
- **Chris Measures, U. Hawaii – [at-large, 9/04] CO**
- **Niall Slowey, TAMU – [Operator, 2/05] GO**
- **Terry Whitledge, U Alaska – [Operator, 9/04] BIO/Chem**
- **Clare E. Reimers, OSU – [Operator, 1/06] Chem**
- **Ron Benner, USC – [Non-Operator, 1/06] Bio / Chem**
- **Bauer, Jim, VIMS – [Non-Operator, 9/06] Chem/Bio**
- **Marc Willis, RVTEC Rep (ex-officio)**
- **Al Suchy, RVOC Rep (ex-officio)**