

**DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Woods Hole, MA
May 18-19, 2010**

Meeting Minutes

Executive Summary

The Deep Submergence Science Committee (DESSC) met on May 18-19, 2010 at Woods Hole Oceanographic Institution (WHOI). The meeting included agency reports from the National Science Foundation (NSF), Navy, and National Oceanic and Atmospheric Administration (NOAA). Representatives of the National Deep Submergence Facility (NDSF) provided reports on vehicle operation summaries, NDSF data management and archives, NDSF upgrades, and deep submergence scheduling in 2010 and beyond. Summaries of the NDSF user debrief interviews were reported. WHOI provided a summary of proposed corrective actions to the issues raised by the users. The meeting included focus discussions on incorporating *Sentry* into the NDSF and the Alvin Upgrade Project.

Action Item List

- 1) ***Sentry***: DESSC will consider *Sentry* for inclusion in NDSF after receipt of the following additional information from WHOI:
 - Salaries and personnel budget and deployment plan.
 - More detailed explanation of the Misc. supplies budget.
 - How WHOI will insure sustainable operations of *Sentry*, without complete reliance on the participation of particular personnel. WHOI should develop, implement and report on a formal training plan which insures that several people - including non-science staff- are capable of operating and repairing *Sentry*.

Request that WHOI provide this information within two weeks (by 6/5). DESSC will review the material and comment via email.

- 2) **Imaging for the *Alvin* Upgrade Vehicle** – Details about the imaging capabilities for the upgrade *Alvin* vehicle are requested from NDSF.
 - a. NDSF will draft a community survey on imaging requirements.
 - b. DESSC will review the draft survey and provide comments to Susan Humphris by June 2nd.
 - c. Bill Lange will prepare a white paper on the imaging capabilities along with examples.
- 3) **LARS**:
 - DESSC should review the LARS options (additional information may be needed from Matt)
 - Determine if a 2000 lb lift capability is sufficient?
 - Provide DESSC feedback to Matt by September

- 4) **Alvin Upgrade Information** – DESSC requests additional information from WHOI (The information should also be provided to RHOC)
 - Bottom time calculations from the PEP.
 - Graphic renditions of the views from viewports.
 - Vehicle drawings with science outfitting installed
- 5) **Copyright and Attribution:**
 - WHOI should work to develop a process that insures that users of the NDSF receive proper attribution. It can be in the form of a website. Chief Scientist would be requested to complete the web form with metadata about the video/images collected. The onus of deciding attribution resides with the chief scientist. The de facto is that -if they don't fill out the web form, the default is WHOI.
 - Evaluate the processes used by other agencies/organizations (OOI, ODP, NASA/JPL).
- 6) **Sphere Ergonomics** – DESSC members are encouraged to provide any comments regarding the sphere arrangements to Chris German.
- 7) **Elevator Flotation** - NDSF is requested to present options/costs to replace the elevator glass spheres with syntactic foam. This will be on the agenda for the next DESSC meeting.
- 8) **Revisit Alvin “video frame grab”** topic at the next DESSC meeting.
- 9) **Ship Time Demand Decline** - DESSC is requested to send Annette comments/anecdotes regarding ship time demand decline.
 - Encourage UNOLS to conduct a Survey. It should include demographics.
 - Compile trend data
 - Explore the facts
- 10) **Alvin Downtime** – NDSF is requested to create a timeline that shows HOV downtime through 2012. This would include the Alvin overhaul period and the conversion period. Any NDSF scheduling details or constraints would be of interest. This information can be presented at the December DESSC meeting.
- 11) **STCI Workshop** – DESSC members should contact Stace Beaulieu if interested in participating in the STCI workshop.
- 12) **DESSC Membership** –
 - Annette will draft a Call for Nominations.
 - Ask DESSC for membership suggestions.
- 13) **DESSC Winter Meeting** – The DESSC meeting will take place on Sunday, December 12, 2010 (the day before the fall AGU meeting) in San Francisco, CA.

Appendices

I	Agenda
II	Participant List
III	NSF Report
IV	NOAA Report
V	UNOLS Report
VI	WHOI Introduction – Rob Munier
VII	NDSF Vehicle Operations Summary
VIII	Data Management
IX	Alvin User Debriefs and WHOI Response
X	Jason User Debriefs and WHOI Response
XI	Sentry User Debrief and WHOI Response
XII	Alvin Hull Inspection Issues
XIII	NDSF 2010 Schedule and Beyond
XIV	Replacement of ABE with Sentry
XV	Upgrades to NDSF
XVI	HD Camera Upgrade Status
XVII	Launch and Recovery System (LARS) Update
XVIII	Alvin Upgrade Project
XIX	NDSF Video and Archive policy
XX	STCI Proposal Status and Timeline
XXI	Data Management and R2R
XXII	OOI Facility Planning – Coastal and Global Nodes
XXIII	The Future Size of the UNOLS Fleet and Implications for NDSF
XXIV	Sphere Arrangement Survey

Meeting Minutes:

Tuesday, May 18, 2010 - Carriage House

Introductory Remarks - Deb Kelley opened the DESSC meeting at 8:30 am and introduced the new DESSC Chair, Pete Girguis. Pete welcomed the group and expressed his appreciation for the support that he has received. The meeting agenda is included as *Appendix I* and the meeting participant list is included as *Appendix II*. The DESSC minutes from December 2009 meeting were accepted.

Agency and UNOLS Reports

National Science Foundation (NSF) – Brian Midson provided the report. His slides are included as *Appendix III*.

The NSF Geosciences Directorate received an 8 percent budget increase this year. New money often comes with new initiatives and this year there were five new initiatives all related to climate change.

Brian spoke about the Frontiers in Earth System Dynamics (FESD) initiative (details are included in his slides).

Many important scientific questions lie at the boundaries between traditional disciplines - mechanisms are needed to facilitate interdisciplinary research in these areas. Progress often requires teams of investigators for large, complex projects beyond the scope of those typically funded by GEO's core programs. There is a need to train the next generation of geoscientists in multidisciplinary and interdisciplinary approaches.

The *goals for FESD are to:*

- Foster an interdisciplinary and multi-scale understanding of Earth's dynamic systems;
- Catalyze research in areas poised for a major advance in understanding;
- Improve modeling capabilities to more realistically simulate complex dynamic Earth systems, couple across scales, and better forecast disruptive events;
- Improve understanding of the resilience of Earth systems.

FESD is a GEO-wide program involving AGS, EAR and OCE. It will complement science funded through GEO's core programs and provides support for 'mid-sized' activities that fall between core program and STC/MREFC scales. The FESD program budget plans are for \$28M per competition with three competitions (FY11, FY13, and FY15).

The FESD solicitation is expected to be released on July 1, 2010 and pre-proposals are due on October 1, 2010. There will be a panel review to select invited full proposals. Full (invited) proposals are due March 15, 2011. *Criteria for evaluating the proposals are included in the slides.*

Discussion:

- Pete Girguis – How will the new program interact with RIDGE and Margins? Brian – RIDGE is winding down and Margins is re-evaluating itself.
- Jeff Karson – Will the review process for proposals be the same as before. Brian – Every proposal will be subjected to a double tier of review. PIs can only be on one proposal.
- Deb Kelley – Will there be any broader impacts? Brian – There will likely be an NSF wide data management plan requirement. They will enforce this. Other broader impacts will not change.

National Oceanic and Atmospheric Administration (NOAA) – Karen Kohanowich provided the NOAA report. Her slides are included as *Appendix IV*.

Craig McLean is acting as the director of research. Rick Spinrad has retired as the head of research. An announcement for the open position should be on the street soon. NOAA is holding daily meetings on the BP oil spill in the Gulf of Mexico. They are focusing on the research.

The report included a summary of the Okeanos Explorer operations. The vessel's maiden

research voyage will be on June 8 – Aug 23, 2010. There will be White House/OSTP participation and the cruise operations include mapping, ROV ops, and telepresence. The cruise will use Bob Ballard's ROV. The new Phoenix ROV is at URI and will come on-line next year. In 2011, the vessel will return to Hawaii and NOAA will work to get scientists more involved with the operations.

Karen summarized the "Lophelia II: Deepwater Coral Expedition: Reefs, Rigs, and Wrecks" project, which is in the Gulf of Mexico. NOAA is partnering with MMS. There is \$1M of *Jason* time associated with the project.

On March 30, 2010, the OER Strategic Plan was posted in the Federal Register. It will be up for comment until September 2010. Karen encouraged everyone to contribute. There should be an acting director appointed to OER in June. It has been about 5 years since NURP and OE merged to form OER. In other OER Headquarters news, a Cooperative Institution (CI) was awarded to HBOI/FAU. A competition for a west coast CI is expected in FY11-12.

Karen reviewed the Ocean Exploration and Research budgets. In 2010, the NURP budget decreased by \$1.2M to \$8.8M, but is expected to increase by \$4M in 2011 to a total of \$9.2M. The OE budget has remained level at \$18.6M.

Discussion:

- Deb Kelley – What is the relationship of the Bob Ballard's vessel *Nautilus* with NOAA.
Karen – NOAA is just staying in touch with Ballard's group. NOAA doesn't fund *Nautilus*.

Office of Naval Research (ONR) – Tim Schnoor participated in the meeting via teleconference and provided the ONR report. WHOI and Scripps Institution of Oceanography (SIO) have been selected as the operators of the new Navy vessels, AGOR 27 and AGOR 28, which are currently in design.

In terms of deep submergence, the Navy still holds title to *Alvin*. ONR is working with NAVSEA and NSF to evaluate the option of Navy certification of the *Alvin* Upgrade vehicle.

Recently *Alvin* passed its hull inspection. The lead inspector from NAVSEA had many complimentary things to say about *Alvin*. Hats off to Pat Hickey and the NDSF team for their efforts.

ONR's deep submergence support has been very limited. Most of the ONR Research Facilities budget support ship operations.

UNOLS – Annette DeSilva provided the UNOLS report. Her slides are included as *Appendix V*.

2010 UNOLS priorities and activities include:

- UNOLS and OPP - Exploring the relationship of working with NSF's Office of Polar Programs to coordinate support for Antarctic Research Vessels.
- Greening the Fleet – Exploring how to make the present and future fleet more environmentally sustainable.

- A proposed new UNOLS Standing Committee: - Ocean Observatories Science Committee
- Exploring options for a UNOLS mentoring, education, and outreach program

The UNOLS mentoring/education/outreach initiative is in part in response to a recent sharp decline in UNOLS ship time demand. The current sea-going science community is aging. New Chief Scientists could benefit by an orientation program. The goals of a mentoring program would be to:

- Provide user orientation to increase cruise effectiveness and success of the cruise
- Lesson the load on support groups
- Lower boundaries, encourage ship time requests

There was considerable DESSC discussion on the possible causes of the ship time demand (poor funding climate, discouraging remarks from program managers, administrative burden associated with grants, the time commitments associated with proposal preparation, etc.)

Annette requested the DESSC members to send her comments/anecdotes regarding possible causes for the ship time demand decline.

As an action item, DESSC encourages UNOLS to conduct a survey, compile trend data, and explore the facts. The survey should include demographics.

National Facility Operators Report

WHOI Personnel Changes/Introductions and Pilot Status - Rob Munier introduced himself (see *Appendix VI*). Rob has spent 33 years in ocean related pursuits. He has professional expertise in ocean energy, undersea system installation & maintenance, and specialized vessels and vehicles.

NDSF Vehicle Operations Summary - Rick Chandler (WHOI) provided the summary report. His slides are included as *Appendix VII*.

Alvin has completed two cruises and 33 dives. There are four cruises remaining with 75 dives at Juan de Fuca, Oregon Margin, and Gulf of Mexico. No dives lost. The average dive duration is 7.71 hours and the average bottom time is 5.19 hrs.

Jason completed one cruise at NW Rota op with 10 lowerings. *Kilo Moana* was the support vessel. Some of the highlights included:

- USBL integrated
- Schilling Titan 4 manipulator integrated
- HD camera integration in June
- Reson multibeam integration in June
- Fiber optic upgrade in June

Next Rick summarized the *Sentry* operations. There has been on cruise in the Galapagos with 22 lowerings. There was over 205 survey hours and 502 kms surveyed. Operations were off of the *Atlantis*. Some of the highlights included:

- Automation of bathymetry processing to provide initial map of good quality
- *Sentry* bathymetry provided to *Alvin* as a navigation underlayment for use in *Alvin* and in Top Lab during a dive
- •Science identified possible hydrothermal vents from high-resolution bathymetry (two vents found this way). Several other vents located with onboard sensors.
- •Speed increased to ~ 1 m/s (2 knots) up from ~ .75 m/s (1.5 knots)
- •Bathymetric coverage ~ 0.7km²/hr. Nighttime surveys provided ~ 7 km² coverage
- •Recovered from leak into main pressure housing to make 5 more dives

NDSF Data Management report - Andy Bowen provided the report. His slides are included as *Appendix VIII*.

Atlantis now has a permanently installed Sonardyne USBL system. It has been in use since Sept 2009. *Jason* and *Sentry* have portable systems. The advantages are:

- Time savings vs. transponders
- Digital communications between ship and beacon-carrying vehicle

The disadvantages:

- Less accurate as depth increases
- Usage requires ship remain above beacon

The *Alvin* at-sea group has improved integration of the *Atlantis* systems with Sonardyne.

Andy reported on the multibeam status on *Alvin* and there are many activities in progress:

- Development of automatic multibeam processing scripts
- Treatment of USBL information
- Update of navigation processing pipeline
- LBL is currently supported
- Survey of sonar head position and attitude/heading
- Relation of sphere and frame dynamics during survey
- Education of users
- SJM exercised system on Dive #4607
- Draft of primer completed
- Published version by July
- Bottom classification tools
- License for Fledermaus Pro (Geocoder) for science use

Andy reported on the overlays on *Jason* video feeds. *Jason*'s current overlay system supports composite and S-video signals. This is sufficient for the current and near-future standard recording pipeline.

Vicki Ferrini's group at LDEO developed a prototype metadata search engine. A WHOI-based port of this engine has been completed. Now they are working on data ingestion tools prior to going public. They are collaborating with WHOI Ocean Informatics group to develop more functionality.

RAID Mirror of Archived Data status:

- All cruise data files (not video) since April 2008
- Redundant mirror was assembled and populated with data in 2009
- Mirror hardware was moved to WHOI Quissett campus in 2010

In conclusion, Andy reviewed the Archives revenue report. They have invoiced \$54k and received \$47k. Income from HD video is \$19k

Discussion:

- Deb Kelley – There was a discussion on the older film being converted to digital. Billy – It is on-going. Brian – It has not been prioritized, it is in the request system.
- Pete Girguis – What is the status of the pilots? Pat Hickey – The at sea group is 6. There are 4 pilots. He feels they are in good shape.
- Annette – With Phil Fortes move to THE A-4500 project will he be replaced on ROV team? Matt – The Jason team is heavy on mechanical expertise, so instead of advertising they will reassess what is needed.

Break

NDSF Vehicle Debrief Interviews

Feedback from recent *Alvin* cruises - Mike Tryon summarized the *Alvin* user debrief interviews. His slides along with the WHOI's response are included as ***Appendix IX***.

The debriefs covered seven *Alvin* cruises for 91 dives. All the PIs were very satisfied with their *Alvin* experience and felt that their scientific goals were all met or exceeded. These were both new and repeat users of the facility. All personnel from Captain to deck crew, Expedition Leader, pilots, and engineers were at various times singled out for praise. The *Alvin* team was universally praised for its professionalism.

Some of the issues/comments from the debrief interviews are included below. The full list of comments can be found in Appendix IX. WHOI's response to the issues was provided by Andy Bowen and is also reported below.

Pre-Cruise Planning:

- Juan de Fuca work required complex planning due to multiple programs occurring in the area during the short weather window. This will likely continue for many years and will need continued close attention.
- The on-line pre-cruise planning survey only allows a single study area. This needs changing/improving.
- As advice to PIs: All cruise participants need to bring passports and PIs need to have up-to-date passport information for all participants.

Mobilization/Demobilization - The ability to get on-board ship two days in advance of the cruise was noted and much appreciated by all PIs.

Operations – Vehicle:

- A 6-week layup before one cruise resulted in the sub's batteries consistently underperforming throughout the cruise. This resulted in 0.5-1 hour reduced bottom times and needs paying attention to if *Alvin* is going to be "laid up" at sea again. WHOI is looking at the possibility of having 1-2 crew ride the ship during non-diving legs to maintain batteries and run sub systems; however, it depends on bunk space. This will also be based on available personnel. A complete new set of batteries has been ordered for delivery in June. The last set of batteries were purchased in 2004 batteries and used about 550 to 600 cycles.
- *Alvin* seemed to be suffering from numerous faults on one cruise:
 - On the 1st dive, the ground detector switch broke and the pilot had to come up with a work-around to continue the dive. WHOI is modifying the ground detector so that a spare system will be plug-and-play.
 - On the 3rd dive, there was an electrical fault. WHOI reported that there is a periodic maintenance schedule to mitigate faults.
 - On all of dives there seemed to be issues with ballasting the vehicle correctly. WHOI has found and fixed the problem with the VB system flow control valve.
 - On two dives the vehicle was launched late due to hydraulic oil leaking from the manipulators. WHOI reported that there is a periodic maintenance schedule to mitigate problems.

Operations - NDSF Equipment

- Navigation worked well throughout. USBL reported to be as good or better than LBL and all navigation was best ever.
- USBL and LBL are precise but there are offsets between them of 10-15m. Andy explained that the systems use totally different methods for calculating position so there will always be offsets.
- The framegrabber software needs updating to incorporate USBL. Andy responded that the in-hull software needs to be updated and pre-cruise checks will ensure correct navigation is getting to overlays and Framegrabber.
- Camera and lighting worked well. One PI strongly suggests three handheld cameras in the ball, one for each person. Andy replied that all hand-held video and digital still cameras were recently upgraded or replaced. NDSF can plan to acquire a third camera.
- The Reson data pipeline needs to be automated so it can be used in the same manner as on *Sentry*. Andy reported that NDSF is working toward automated scripts that will be applicable to *Alvin*.
- Elevator floats failed on one deployment and it was suggested that there be a switch to syntactic foam? Andy explained that syntactic flotation is extremely expensive but it makes sense to move away from glass spheres.

Data Hand-Over:

- On one cruise the DVD copier became unreliable. This seemed to be remedied on later cruises but the process remains slow and time consuming.
- PIs are now typically bringing large external hard drives for data transfer which is proving to be much more efficient.

User Recommendations

- The ship's IT system is showing its age – updating some computers is recommended. Andy reported that computers were upgraded in early 2010.
- Maintain multibeam data onboard *Atlantis* for at least the commonly visited sites so it is available for dive planning.
- The PIs who used both *Alvin* and *Sentry* could not emphasize enough the merits of using them together. They also expressed confidence that *Sentry* was ready for adoption into NDSF.
- The use of elevators is an excellent way to overcome limitations in the payload of *Alvin* and scientific users should take better advantage of this.
- The functionality of *Alvin* could be greatly enhanced – perhaps doubled – if an ability to transmit images from the seafloor acoustically were implemented as has been done routinely, for more than a decade, with *Shinkai*. The ability to confer with scientists on deck would greatly enhance the capabilities of *Alvin*. Andy reported that implementation of this would greatly degrade the navigation because of time/bandwidth requirements to send video frame grabs through the water to the surface – something like 5–10 minutes per picture depending on resolution.
 - Annette – Won't the A-4500 vehicle have a capability to use the micro-fiber for communications? Susan Humphris – Yes, but not in the initial phase of the upgrade. Dolly – This feature was part of the *Nereus* proposal.
- One PI wondered whether there should be a special “Latin America” advisory issued to inexperienced PIs to warn them against likely pitfalls – e.g. shipping by sea whenever possible to minimize chances for things going astray or fouling in internal-to-Mexico (or other nation) complications. WHOI advises PIs on the best way to ship equipment on a case-by-case basis, depending on the port and the quantity and contents of equipment.
- Two PIs had various problems with the ship's agent for Central America, including failure to follow through on hotel bookings and consistently raising the asking prices for services between when they are offered and delivered. This is a recurrent issue.

Discussion:

- Deb Kelley – At Endeavor Site there is a marine protected area. One person's request to do work in the area was denied this year. Liz and Deb will follow-up on this.
- Andy – Some of the issues that were raised are not unique to NDSF, they are broader issues, like the passport issue. Maybe UNOLS should include a note about the passport requirement on the ship time request form.
- Brian – He would like WHOI to commit to a timeframe for knowing the USBL/LBL offset and when the frame-grabber updates will take place. Bruce Strickland – The USBL just came on line. Pat Hickey – Hopefully by the next meeting the offset will be known.

Feedback from recent *Jason* cruise - Bill Chadwick summarized the *Jason* user debriefs. His slides are included as *Appendix X*.

Major problems were experienced when operating *Jason* from R/V *Kilo Moana*:

- Two dives were lost to ship problems:
 - The new CTD winch/crane system had a catastrophic electrical failure
 - Damaged ship's bow-thruster controller (and spare on board did not work)
- Eight of 9 dives were conducted without bow-thruster

- *Jason* worked exceptionally well on most dives. Two dives were lost due to *Medea/Jason* problems, but last dive saved due to heroic repair at sea

Navigation - USBL was excellent.

Issues for community feedback:

- What is the HDTV upgrade plan and has there been user feedback solicited?
- How will HD video be accessible for science?
- *ROPOS* solution: real-time recording of MPEG2 compressed HD video (~50 Mbit/s) to hard disk using a rack-mounted computer system

Bill reported that he is aware that *Jason* is getting an HD upgrade, but doesn't know how this will be accessible to the community. He feels that DESSC and the community should have a much bigger opportunity for input.

Matt Heinz reported that the *Medea* thruster checked out fine, but it turned out to be a chafed wire. It is difficult to determine which items should be included in the spare parts. The transmission box is now in that category. As a fly-away system it is difficult transporting everything.

Feedback from recent *Sentry* cruise - Jeff Karson provided the summary of the *Sentry* user debriefs. His slides are included as *Appendix XI*.

There was only one cruise to report and it involved a *Sentry* and TowCam night program with *Alvin* dives. The comments included the following:

- Pre-cruise planning with WHOI was very good but the web-based form needs refinement and clarification. The main problem with the form is that only one site can be entered.
- There were hardware problems for first dive but these were quickly fixed. A leak in the housing and fire damage required a heroic rebuild, which was outstanding effort.
- No one noticed that backscatter sensor was not recording for part of the cruise.
- The USBL was very good but still in transition; not reliable on framegrabber
- There was good turn-around time on multibeam maps (hours), but this worked well because the science party helped with processing
- Data handover was all done at sea
- Overall *Sentry* is excellent and considered ready for the NDSF.

Discussion:

- Andy Bowen – There is need for a better user manual for *Sentry*.
- Dana Yoerger – The vehicle is always tested for a couple days while in the well. There are always a few things that they discover and things break during shipping.
- Deb Kelley – What was the size of the *Sentry* support team? Dana – Four plus one student when they were full. They were down to four when they left the pier due an accident. Having a member of the science party help with the data is very useful.
- Bill Chadwick – when did the *Sentry* team ramp up to 4-5? Dana – They are using five as part of the transition effort. Chris – A few meetings ago it was reported that a 4-person team would be needed to support 24-hour operations.

Lunch Break

Alvin Hull Inspection Issues – Pat Hickey reported on *Alvin*'s recent hull inspection. His slides are included as ***Appendix XII***.

A hull inspection is now required every two years for *Alvin* since finding the hull anomalies in 2006. The 2008 hull inspection ultrasonic testing (UT) procedure found no changes in known acceptable flaws. The 2010 UT procedure detected 4 new indications in an area which had previous acceptable flaws. The new indications were further characterized using a CTD (Crack Tip Deflection) technique. The results of these inspections were evaluated by Carderock Facility.

On May 14 WHOI received a call from the Navy informing us that three of the minor flaws were being considered one flaw because of their proximity to each other, making this flaw unacceptable at the present time. The Navy will require the original hull construction documentation to evaluate the welding technique and they have directed WHOI that additional testing be done on the new flaws using a different standard and more sensitive equipment, which might lead to reclassifying the flaw as a minor defect.

As a *result*, *Alvin* cannot dive until the hull issue is resolved. WHOI is investigating the earliest opportunity they can get an inspector onto the *Atlantis* for the additional testing requested. WHOI is attempting to find additional documentation on the original hull construction. *Jason* is on standby to do the Cowen *Alvin* leg if needed.

Deep Submergence Scheduling: 2011 and Beyond - Liz Caporelli provided the scheduling report. Her slides are included as ***Appendix XIII***.

In 2010 there are a total of 152 *Alvin* days scheduled (151 NSF days and 1 ONR day). Additionally, *Atlantis* supported a couple of non-*Alvin* cruises for a total operating year of 321 days. The 2010 *Jason* schedule includes 123 days (NSF 55, NOAA 52, and 16 other). The 2010 *Sentry* schedule includes 97 days.

Liz reviewed the list of 2011 NDSF vehicle requests by PI. The total requests (funding and pending) include 256 days. In 2012, there are a total of 188 days funded or pending for *Alvin/Jason/Sentry*.

Liz discussed the implications of *Alvin*'s recent inspection issues. The *Jason* schedule might be able to pick-up some of the *Alvin* work if there are delays in the Navy inspection.

Maps of the NDSF vehicle request areas were presented (see slides). Although the NDSF vehicle requests are down for 2011, *Alvin* will be out of service because of its overhaul. *Alvin* must be overhauled by April 2011.

NDSF UAVs - ABE and Sentry - The criteria for incorporating new assets into the NDSF <http://www.unols.org/committees/dessc/CRITERIADOCUMENT_062206.PDF> requires a

review of operations after a year in service. The criteria also specify the information that the NDSF operator should provide to DESSC so that the Committee can evaluate the readiness of the asset (in this case *Sentry*) for incorporation into the NDSF. WHOI provided a written report and *Sentry* documentation prior to the meeting.

Chris German provided a summary report on the status of *Sentry*. His slides are included as *Appendix XIV*.

Criterion 4 requires that vehicles included in the NDSF must be robust. In June 2009, Ian MacDonald used *Sentry* and the vehicle was not operational at the outset of the cruise. 66% of the planned science was achieved. In September 2009, Dave Valentine used *Sentry* with no obvious problems. The operations included mapping, photography and *in situ* sensing. The multibeam processing was still very labor intensive for the AUV team. Greater than 100% of the planned science was achieved. In March-April 2010, John Sinton used *Sentry* for mapping and *in situ* sensing. The multibeam processing was within hours (2-4h) using automated scripts. The science party was readily able to import the data into a variety of tools and process further. The team was able to repair a serious leak in the main pressure housing in less than 72 hours. Greater than 100% of the planned science was achieved.

NDSF requested a recommendation from DESSC to UNOLS that *Sentry* be formally adopted into the National Deep Submergence Facility. Upon adoption, NDSF will update the user-guide web pages at www.whoi.edu to reflect the capabilities of *Sentry* as the NDSF AUV. UNOLS in turn, will update the ship time request form so that PIs are able to request *Sentry* through NDSF. The goal would be to have everything in place prior to the August 15, 2010 NSF proposal deadline.

Discussion:

- Bill Chadwick – What is *Sentry*'s dive duration? Dana – 14 hours.
- Bill Chadwick – If you are using USBL navigation with *Sentry*, the ship must stay on station. If you use LBL, the transponders would need to be deployed. What are the navigation options? Dana – LBL and USBL are the options. It depends on whether the PI wants to watch the vehicle continuously (USBL) or if the PI wants to check in on it occasionally? Or do you want to put it in the water and leave it (LBL).
- Pete – How easy is it for a PI to select USBL or LBL? Dana – It is easy and the PI can do this during the pre-cruise planning.
- George Luther – What type of sensors does *Sentry* have? Chris – It has all the sensors that ABE had and then some. George – The community must know the sensors that are available.
- Deb Kelley – what is the status of putting *Sentry* to sleep on the bottom? Dana – They can do it on the next cruise.
- What happened to ABE? Rod Catanach – They think that a glass sphere(s) imploded, causing other neighboring spheres to implode. This can be avoided by using syntactic foam.
- George Luther – What is the day rate? Reply - About \$13K
- Rod – NDSF would encourage users to utilize the basic suite of *Sentry* instruments. But they are willing to allow users to bring on their own sensors.

Upgrades to National Deep Submergence Facility - Andy Bowen began the report on the NDSF upgrades. His slides are included as *Appendix XV*. Some of the upgrades underway or planned include:

- New Reson SeaBat sonar for *Jason*
- *Sentry* side scan and sub-bottom profiler from Edgetec
- *Jason* Launch and Recovery System (LARS)
- UBSL with post-processing upgrade (all vehicles)
- *Jason* manipulator
- *Jason* fiber optic multiplexer
- HDTV for *Alvin* and *Jason*
- Reson SeaBat sonar processing tool development (all vehicles)

HD Camera Upgrade status - Bill Lange provided the status report on the HD camera upgrade. His slides are included as *Appendix XVI*.

The HDTV operational prototype was successfully deployed on the Resing and Chadwick cruises in 2009 and 2010.

Installation of the HDTV is planned on *Jason* in June 2010 and on *Alvin* in October 2010. The installation schedules were determined by availability of the vehicles and support personnel on the cruises.

The current status of the upgrade is: Both camera optics and electronics have been bench tested. The camera control box prototype is built and the lens control box is built. The frame capture software is being written. The re-processing software will be ported to the frame capture system once the final acquisition software is completed. The *Alvin* data buffer prototype is built and being programmed. The camera systems are assembled and ready for pressure testing (once the glass recertification is completed).

During pressure testing, the glass domes for both cameras were found to be out of specification. WHOI is looking at the options and expect a solution shortly. Delays have also been incurred in obtaining the flash memory devices for the *Alvin* data buffer, but have finally been delivered.

Bill reported that they are doing a study on the best way to record the images. They are trying to get away from tape-based players, but there are archive issues. Everything will have to be compatible with the archives. They want to have the quality levels required by outreach efforts.

Discussion:

- Chris German – We need to have good community buy-in. It might be good to have another community survey to get their feedback on imaging/recording needs.
- Bruce S – What is the display in the sub? Bill – 7”
- Bill Chadwick – When will the player solution be in place? Chris – There is no funded proposal to support acquisition of new players.
- Pete Girguis – There are a lot of questions in the community. It would be good to be clear on these issues.

- Deb Kelley – What are the costs of the new cameras for *Alvin* and *Jason*? Bill Lange – The prototype camera cost \$270K. The cameras for *Jason* and *Alvin* should be \$150K each. They are frame grabbing in full resolution.
- Marsh – There must be adequate lighting. Has any thought been given to this area?
- Bill Lange – Once there is a recording solution they can move forward on these other areas. They would also like to get community input before submitting a proposal.
- Brian Midson – We also need to know what will be needed for the new vehicle. This should be included in the new vehicle’s Final Design Review (FDR). A white paper has been requested from WHOI. Bill Lange – In addition to the white paper, they would like to also provide a sample of what can be achieved. They are further behind because they are waiting for compression mode.
- The timeline for the recorder won’t be known until after the FDR in September.

Launch and Recovery System (LARS) for *Jason* - Matt Heintz reported on options for a new LARS for *Jason*. His slides are included as *Appendix XVII*.

The goals for a new LARS would be to

- Increase safety
- Increase weather limit
- Reduce number of people required to launch and recover
- Decrease turn around time (TAT)
- Retain or increase heavy lift for Ocean Observatory Initiative (OOI)

The current system includes a two-body ROV system (*Jason* and *Medea*) connected via 65m neutrally buoyant, weighted and buoyed tether forming an ‘S’ catenary providing a 100+m watch circle. *Medea* decouples ship motion and cable torque from *Jason* and keeps the cable weighted during transits. *Medea* is an independent platform with cameras, lights, sonar, sensors, etc. It provides a heavy lift capability (4,000 lb to 3,000m, 1,000 lb to 6,000m) via drop hook from *Medea* and lift through *Medea*’s frame.

Matt reviewed the LARS options. One option utilizes the two-body system with a swing arrestor added to the crane and a tether management system added to *Medea*. This meets some of the goals, but still requires nine people with the same turn around time.

Another option utilizes a single body system with the current cable led through a swing arrestor on the crane or A-frame. This option meets the proposed goals with the exception that it drastically reduces the heavy lift capability due to cable strength.

Other single body options include:

- Single body, new 4 km stronger cable led through swing arrestor on crane or A-frame – All the gains of a single body, and retains heavy lift through *Jason* frame to 3 km; water weight of cable reduces deeper lifts
- Single body with 4 km foam pack, current cable led through swing arrestor on crane or A-frame – Meets all goals with reduced heavy lift capability (2000 lb)

The preferred option is a single body system that retains the current .681 fiber optic cable led through the swing arrestor. Other features include:

- Custom articulated crane with swing arrestor for more vessel layout variability
- New shallow foam pack (approx. 1,000 lb lighter)
- 2,000 lb lift capability direct through *Jason's* frame
- USBL transponder (with attitude sensor) on the cable
- Hall sensor in floating bullet to attach cable
- Retain *Medea* and deep foam block for deep ops which require heavy lift capability
- Considering motion compensation

The custom articulated crane saves space and can be adapted to smaller vessels (Ocean Class, *Kilo Moana*, etc.). Other features of the system are included in the slides.

Discussion:

- Marsh Youngbluth – What are other ROV operators using? Matt – The French have a 2-body system for their 6,000m vehicle.
- The single body system would reduce the number of people required for LAR from 9 people to 6 people (total involved) on deck. It won't change staffing overall.
- Pete Girguis - What are the most important questions regarding the preferred LARS option? Matt – Would 2000 lbs lift be adequate for OOI?
- Deb Kelley – What Sea state can the system operated in? Matt – SS4 to SS5, maybe SS6. Operations would be safer.
- Matt recommends that the custom articulated cranes be installed on the new Ocean Class R/Vs (OCRV). Deb Kelley – The OCRVs have limited bunk space and this could be an issue in accommodating the science party and the ROV team.

Some of the Pros and Cons of the single-body system are:

Cons:

- Limited decoupling from ship
- Generate torque issue
- We lose the “eye in the sky” feature offered by *Medea*

Pros – Increased safety and shorter turn-around times.

Matt requested the DESSC to provide him with feedback on the LARS options.

Replacement HOV Project: Susan Humphris and Kurt Uetz provided a report on the *Alvin* Upgrade project. Their slides are included as *Appendix XVIII*.

In the *Alvin* Upgrade Project, WHOI was to develop a concept for an upgrade to *Alvin* using the 6500m depth-rated personnel sphere now in production. They were to try to satisfy as many original replacement HOV design goals as possible and leverage replacement HOV design efforts already undertaken. The effort was in response to the need for reducing the total project costs.

The Alvin Upgrade is a two phase process. At the end of the Phase I, Alvin would still have a 4500 m depth rating, but at the completion of Phase II, the depth rating would be increased to 6500 m.

The Preliminary Design Review (PDR) was completed in December 2009 and the Final Design Review (FDR) is planned for September 2010. The current schedule, call for the new sphere to be delivered to WHOI in March 2011 and *Alvin* would be delivered to WHOI in April 2011. Assembly of the upgraded vehicle would begin in July 2011 and sea trials would be in September 2011. A Science Shakedown Cruise is tentatively planned for November 2011.

Charts showing the capabilities, upgrade options and associated costs are provided in the slides.

For the Final Design Review on 21-23 September 2010, WHOI is to provide a Hazards Analysis that articulates how operational hazards will be eliminated, mitigated or accepted. WHOI will also be required to reassess the project schedule, budget and risk.

Images of the personnel sphere construction were presented. A sketch of the interior ergonomics was provided. There were over 100 community survey responses to the sphere arrangements and Chris German will review these later in the meeting. Purchase orders for some of the electrical and fiber optic penetrators are in place.

The syntactic foam will have a density of 36 lb/cubic foot. It is produced in 0.5 cubic foot blocks that will each be pressure tested before shaping. There are two companies that produce the foam: CMT and Trelleborg/Emerson and Cuming. In early June, a PO for 100 cubic feet will be issued to each company.

Kurt reviewed the ABS Classification status. *The* variable ballast spheres package has been submitted. An alternative arrangement request for bathtub combing height was also submitted. A meeting is planned with ABS at WHOI in July. WHOI will present the overall upgrade plan. They will present the systems that will be cross-decked (all packages are ready for submittal). WHOI will also present designs of new components/systems. There has been some discussion that the Navy might also be interested in certifying the vehicle.

Sketches of the manipulator arrangement were provided.

Plans for the Science Shakedown Cruise were discussed. Post-FDR, NSF will issue a “Dear Colleague” letter requesting participation in the cruise. The cruise would take place in November 2011. The cruise is expected to be about 30-days and begin out of Bermuda. There will likely be 10-12 days of transit to accommodate diverse scientific areas and terrain types. Some of the dive sites should be close to port. Some of the capabilities to be tested to include:

- Navigation
- Data logging & science access to data
- Seafloor mapping
- Lighting & imaging
- Sampling (variety)
- User-provided equipment interface

- Elevator use
- Ergonomic design

Visit the Sphere Mock-Up – The DESSC meeting participants visited the sphere mock-up in the Smith Building.

Day 1 Adjourned and the DESSC held an executive session.

Day Two: Wednesday, May 19 – Clark South, Room 271

Day-2 Introductory Remarks - Pete Girguis opened Day-2 of the DESSC meeting at 8:30 pm.

Replacement HOV Project (continued) – Susan Humphris continued her discussion on the Alvin Upgrade project. Her slides are included as *Appendix XVIII*. She showed a chart of the original project goals. The items with green dots indicate that they will be achieved, while the red dots indicated that we won't get them.

A list of the science equipment that is planned for the vehicle is included in the slides. The internal cameras include two Observer DSC Canon Power Shot G7 cameras, one Nikon D1 SLR DSC, and two Sony HDR-HC9 MiniDV HiDef video cameras. The Profiling Sonars include a Reson 7125 SeaBat multi beam sonar, one (spare) Imagenix 881 profiling sonar, a Sun West CTFM fwd scanning sonar, and one (spare) Tritech Seaking S8540 dual frequency scanning sonar.

The planned Imaging System components include to the:

- Lighting System
- Camera Systems
- Telemetry Systems
- Control Systems
- In-Hull Video Plant
- Recording Systems

The goal will be to double the illumination level of current Alvin lighting. The lighting can be arranged in a variety of con configurations. The primary cameras will include two HDTV cameras mounted on pan & tilt systems. The existing pressure housings will be used. The manipulator science cameras will be two HDTV or higher resolution cameras. There will be high optical resolution.

The camera systems for piloting and situational awareness will be standard definition. The location and number are to be determined.

The Mosaic Cameras will be 1-2 motion/still cameras; color/BW. They will be synced to a strobe LED array. These cameras are planned for Phase II (due to budget limitations). The infrastructure will be in place to support mosaic cameras in case someone brings their own.

In-Hull Video System will call for all video signals to be digital and conform to the SMPTE serial digital interface specification. There will be five HD video monitors (1 for piloting, 4 for observers).

With the increased size and weight of the upgraded vehicle, dive time is expected to decrease after Phase I by about 25 minutes.

The A-4500 HOV estimated cost of the preferred design With Escalation and Contingency is \$35,174,894.

Discussion:

- Jeff Karson – Are there any areas that will not be better than *Alvin*. Susan - The upgraded vehicle will be heavier and we will lose bottom time. The dive time reduction estimate is a potential decrease of about 25 minutes of bottom time.
- Brian Midson – Are the calculations that were made to determine the bottom time available? Susan – Yes, she will send them to DESSC.
- George Luther – Will the vehicle drag change? Rod Catanack – The vehicle will be more streamline. It will have to carry more weight for ascent/descent.
- Marsh Youngbluth – Is there an image available with all of the outfitting and imaging on the vehicle. Rod –They are behind in this area, but are working on creating the sketch. Susan – This is a critical area and they want to get it right. It is important not to obstruct the viewport. Rod – A WHOI graphic artist has created animations of views from the viewports. Pete – When it is available, it would be good for the DESSC to get the images.
- Pete Girguis – The science basket is larger. Will scientists still arrange it as before? Pat Hickey – They are still working on this and they might model it after *Alvin*'s basket, just larger. The basket will be able to carry 400 lbs. Kurt – Everytime they make a change, it impacts the weight and balance calculations and it has to be redone. It also impacts safety.
- Marsh – Where will the cameras be placed? Bill Lange – port and starboard.
- Craig Young – One disadvantage of the design is that the cameras on the manipulators have to be controlled by the pilot. It would be better to have a pan and tilt that can be controlled by the observer.
- Pete Girguis – It would be useful to circulate these slides to the RHOC with the calculations on bottom time.
- Dolly Dieter – What is the vehicle rescue plan? Susan – The observation vehicle is being constructed will be in the plan.
- Dolly – Will there be new protocols for the science users? Deb – The side viewports could be a concern. Susan – There will be protocols and temperature gages.
- Brian Midson – How will WHOI prepare for the FDR. Will RHOC be involved? What level of input do you expect from RHOC? Susan – It would be useful if RHOC could review the project documentation.

NDSF Image, Film, Data, and Archive Issues - WHOI's NDSF Archive Policy: <http://www.whoi.edu/page.do?pid=11037> was revisited. Pete Girguis lead a discussion on video access policy and WHOI copyright policy. Slides are included as **Appendix XIX**.

The issues:

- Long standing community concerns about the availability and use of images collected during
- NSF funded programs
- Scientists' concerns about WHOI's commercial use of images
- Concerns about their own commercial /non-commercial use of images- video taken with use owned equipment on NDSF vehicles belongs to whom?
- Concerns about copyright - Why WHOI?
- Concerns about PIs NOT being acknowledged in photos AND video

Pete reviewed the current policy:

WHOI maintains an archival system for oceanographic data and samples, as well as visual and digital information, obtained using the vehicles and sensors of the National Deep Submergence Facility (NDSF). The federal funding agencies that support WHOI's Deep Submergence Group (DSG) provide funding to help support these archives. This archiving policy is intended to allow the WHOI/DSG to fulfill its commitment to properly document and archive these data for future scientific and educational use, without compromising the Principal Investigator's (PI) right to sole use of the data for scientific purposes during the first two years of the project following the observational period.

Because there will be changes and improvements in imaging technology, recording media, and operational characteristics of the NDSF facilities in the future, details of this archiving policy may be revised from time to time. WHOI, as Operator of the NDSF, will provide the funding agencies and the DESSC with periodic updates on the status of WHOI-archived NDSF data as part of normal WHOI facilities reports during DESSC meetings, together with any suggestions for improvements.

Video Imagery - On each dive or lowering of Alvin and Jason, two video channels are recorded, one on each of two master recorders. These video data are duplicated at sea and first-generation copies are provided to the scientific party. The original videotapes are archived at WHOI.

Electronic Digital Still Camera Imagery and Sonar Data - Digital images collected using electronic still cameras are recorded and processed at sea as standard image format files. The original media and a copy of the processed standard image format files are archived at WHOI, and a copy is provided to the scientific party.

Access to and use of Archived Data- During a proprietary period following the cruise, archived data may be accessed only by the Chief Scientist, or by others documented by the Chief Scientist in writing, as noted under Protocols, above. The length of this proprietary period is ... normally 2 years after the acquisition of the field data during the cruise for NSF and ONR funding. At the end of the proprietary period, all data are available for general use by scientists and educators, and for public outreach. Access to deep submergence data is viewed as important and every effort will be made to facilitate access to this information via the WHOI Archives and the News Office. Data will be made available to non-commercial users for the nominal cost of reproduction and distribution.

Archived data are the property of WHOI, and rights for commercial use of the imagery data are vested in WHOI. Exceptions may be negotiated on a case-by-case basis if warranted. Such negotiations are to be conducted well in advance of the cruise on which the data will be collected. Otherwise the above policy will apply. Fees to be charged to commercial users of NDSF imagery will conform to industry standards and will keep in mind the importance of disseminating this type of information and providing the public with access to the results of deep submergence science and technology.

Principal Investigators may use their discretion in distributing archivable images and data directly to the scientific and educational communities and to the news media for noncommercial use, or they may refer outside requests for such material to WHOI. Principal Investigators must insist that appropriate funding agency and institution acknowledgments accompany all such distributed material.

The preceding policies do not apply in cases involving U.S. Government classified material. Such material will be archived at WHOI only by direction of the sponsoring agency.

The NDSF will provide an accounting of all commercial income generated from deep submergence data as part of the annual Operator's report to the DESSC. All proceeds from the commercial use of NDSF data or images are to be used to support the NDSF and the archiving of data from NDSF vehicles.

QUESTIONS

- Should the policy be changed? If so, how? Should PIs be allowed to financially benefit from commercial sales of images and video? Should they be required to use these funds for research, education, etc?
- Video taken with use owned equipment on NDSF vehicles belongs to whom?
- The policy suggests that images taken with the vehicles are in the purview of WHOI. Opinions?
- Concerns about copyright -Why WHOI? Co –copyright is ugly. If not WHOI, then whom?
- Concerns about PIs NOT being acknowledged in photos and video: In Pete's opinion this must be changed. It is both easy and appropriate. This responsibility should lie with the Chief Scientist and Co-PIs of each expedition. If they don't provide a "photo credit" list, then it defaults to WHOI.
- Bruce -What happens when a PI brings their own camera in sub? Should it go into the archive? Brian – Any images taken from the sub, user owned or not, it must be included in the archives. Then it will be subjected to release after 2 years.
- Deb Kelley – NDSF PIs should fill out a form that could be used as metadata. It can be used to identify the cruise and the credit info. The metadata would be very helpful. Pete – Yes, and if no form, credit will go to WHOI.
- Andy Bowen – This a broad issue. It should be consistent across the Fleet and ocean sciences - OOI, ODP, etc.
- Brian – We still need to answer the question of what is the best format for archiving.

STCI Proposal Status and Timeline - Stace Beaulieu reported in plans for a proposed workshop for NDSF Cyberinfrastructure. Her slides are contained as *Appendix XX*.

Stace reported on the current state of the NDSF imagery. Much of the imagery is at-risk as the recording media ages. The imagery is not readily accessible to scientists and other data (e.g., nav data) are separated from imagery.

WHOI proposes a workshop for NDSF cyberinfrastructure. The objectives would be to:

- Inform and engage the deep submergence science community in cyberinfrastructure efforts in the larger community of environmental observing systems and networks
- Share state-of-the-art for online access to video
- Explore technology challenges of very large (petabyte-scale) datasets
- Include discussion of challenges more specific to the NDSF dataset, such as digitization of many media types, processing of underwater imagery, and geo-referencing to underwater navigation

If WHOI's proposal for a workshop is awarded, the workshop will be held during the summer 2010. DESSC members would be invited. The workshop is intended to strengthen the STCI proposal on how to move forward.

NDSF Data Management and how that will need to change to be compatible with R2R - Andy Maffei provided a presentation from the WHOI Ocean Informatics Team: "NDSF Data Archive Image Conversion Proposal." His slides are contained in *Appendix XXI*.

Andy described the R2R program to DESSC. R2R provides NSF's data management plan for UNOLS routine underway data from all the Fleet ships. The NDSF data is not currently included and this is inspiring a re-look at WHOI shipboard data policy and procedures. They R2R URL is <http://rvdata.us/>.

Currently there is no data management agreement between R2R and NDSF. There are some WHOI people and resources in common between these programs. Successful R2R tools and ideas may be adopted by NDSF

Future Directions:

OOI Facility Planning – Can the current ROV assets meet OOI and non-OOI demands in terms of capabilities and availability?

Regional Scale Nodes (RSN) – Deb Kelley provided a presentation on OOI's RSN. The primary nodes weigh about 4,000 lbs. The upload can be from the ship or from the ROV. The weather window is from June through October. There will be 40 ROV days required for O&M each year. The backbone cable will be installed next summer. The Medium Power J-box is 2500 lbs. The extension cables will be laid by ROVs.

In 2013, the sensors will be deployed and in 2014 the moorings will be installed. The system will be commissioned in 2014.

Discussion:

- Bill Chadwick – Can the same ROV be used for installation and O&M. Deb - Yes.
- Rob Munier – What will you use for the ROV operations. Deb – Existing vehicles.
- Bill – Is ROPOS the only ROV that can handle the work? Deb – MBARI’s system could also support the operations, but it isn’t fly-away and the support ship is small.
- Matt Heinz – It looks like all of the heavy lift is thru the frame. He thinks that *Jason* could support operations, but it would be through *Medea*. Is there a preference to do the lifting through the frame? Deb – They feel that it is safer to directly couple the system to the vehicle. It saves having to attach and remove floats.

OOI Coastal Arrays - Al Pluddeman provided a report on the Coastal Arrays. His slides are included as ***Appendix XXII***.

The Pioneer Array is a Multi-platform, multi-scale array. There are fixed and mobile assets and it is integrated with regional observing assets. The Endurance Array is also multi-platform and multi-scale with fixed and mobile assets. There are cross-shelf arrays at Newport and Grays Harbor. The Oregon Line is cabled to RSN. See additional details in Al’s slides.

There are a few potential arrays where ROVs might be needed. It is plausible that the node would have to be connected with an ROV. Docking options are being explored. Also, PIs might want to plug in with ROV sensors.

Question:

- Chris German – For the Global moorings, would the entire mooring be brought up on the ship’s deck for servicing. Al – yes.

Break

The future size and make-up of the UNOLS Fleet – Implications for NDSF - Rob Munier provided the presentation. His slides are included in ***Appendix XXIV***.

His presentation included charts on:

- Replacement of UNOLS Fleet
- Retirement UNOLS Fleet
- Future UNOLS Fleet
- Evolution of UNOLS Fleet
- WHOI Vessels and their 2010 track lines.
- WHOI Vessel Utilization 2007 – 2011

The Navy will build two new oceanographic research vessels. They will be the “Ocean” class: ~220 feet, 40 day endurance, and 25 scientists. WHOI and Scripps were selected as the operators. Science operations will begin in 2014. The agencies will likely accelerate retirement of *Knorr*, *Oceanus*, and *Melville*.

Review community survey response on sphere configuration - Chris German reviewed the community response to the sphere configuration. His slides are included as ***Appendix XXIV***.

The slides include a very nice summary of responses by question. There were 111 responses to the survey. In response to the question “Will you be writing future Alvin proposals?” 56% = Yes and 44% = No. Most people considered comfort at the sea floor very important. The comfort of the Pilot was a high priority. Most people wanted the ability to both lie flat and kneel as an observer on the sea floor.

Updates past DESSC Discussion Topics:

NDSF Vehicle Turnaround Times and Mode of Operation for Jason Watches – Science users appreciate the increased flexibility regarding turnaround times.

Compile Inventory of Homer Beacon IDs – Karen Bemis has developed an inventory of beacons and is working to keep all parties informed.

Hawaii Mapping Research Group (HMRG) Future – Brian reported that there is no NSF support planned for HMRG...

HROV *Nereus* Update – *Nereus* operations were supported by *Cape Hatteras* at the Cayman trench in search of vent sites. Work focused on AUV operations. They deployed the vehicle in ROV-mode, but did not find the vents. British have since found the vents. This exercise showed that *Nereus* could be operated at 5,000m from a modest size vessel.

Other business:

DESSC Membership - Craig Young, Bill Chadwick, and Jeff Karson are all completing their second term on DESSC.

- Andy Bowen – The input from this committee has been extremely valuable.
- Chris – New debrief friends will be needed.
- The UNOLS Office will send out a call for nominations.

Winter meeting dates - Sunday before the fall AGU meeting

DESSC members and meeting participants were welcome to report on items of interest:

- Tim Schnoor – He has asked Mike Prince to work with Matt Heinz regarding the LARS and how it might impact ship design efforts that are currently underway. He would like to make sure that NDSF, not short-circuit the DESSC and UNOLS process for providing input for the SMRs.

Review Meeting Action Items – The meeting action items were reviewed and are included at the beginning of these minutes.

DESSC Adjourn