Appendix A

History of the R/V Alpha Helix

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The R/V Alpha Helix was designed by Glosten Associates and constructed by J. M. Martinac Shipbuilding Corporation in Tacoma, Washington. It was launched in 1965. The vessel is 133 ft long with a 31-foot beam. It is 433 gross tons based on the International admeasurements system. The National Science Foundation (NSF) is its owner and also funded the vessel's construction.

Scripps Institution of Oceanography, University of California in San Diego, initially operated the vessel under agreement with NSF. The vessel was originally designed to meet the needs of experimental marine biology and was specifically built to conduct this research along the Australian Great Barrier Reef, the Amazon River and Bering Sea. To meet the latter requirement, the vessel's hull was ice strengthened to allow it to operate around the ice edge and in ice conditions. In 1966 and 1967, the vessel operated in tropical waters of the Great Barrier Reef and Amazon River. In 1968 it proceeded to the Bering Sea for operations. It was soon learned that the vessel lacked the power to penetrate deeply into the ice pack unless escorted by icebreaker. Its shortcomings pointed out the need for a larger more capable icebreaking research and this was the initial impetus to the design of the ARRV.

In 1980 the vessel was transferred to the University of Alaska Fairbanks where it replaced the 80-foot R/V Acona that the University had operated since 1964. To operate in this new environment, the Alpha Helix underwent extensive modifications to convert it from a primarily biological research vessel to a more diverse oceanographic vessel. This included modernizing labs, preparing the vessel for extended cold weather operations, and locating deep-sea oceanographic winches below decks. The vessel was also brought up to American Bureau of Shipping classification standards. These modifications provided the University of Alaska with a deep-sea research vessel capable of long-range deployments in a very hostile marine environment.

Since its arrival, the vessel has conducted studies in waters surrounding Alaska, western Russia and into the Arctic Ocean. It provided a systematic description of the Alaska Coastal Current from British Columbia to where it empties into the Bering Sea at Unimak Pass. This current is a major factor in why the Alaskan waters contain a highly productive fishery. The results of this study were also used to predict the path of the oil spilled during the Exxon Valdez disaster in 1989.

The vessel also has participated in major studies of the oceanographic mechanisms of the rich Bering Sea fisheries. The results of these studies are compared to present day studies that indicate the Bering Sea is undergoing substantial ecosystem changes that will have a direct effect on Alaska's sport, subsistence and commercial fisheries. It has studied how the Gulf of Alaska's marine ecosystem varies in response to climate forcing. Understanding these changes can make possible both more accurate weather predictions and the impact of these changes on agriculture and other natural resources. Other studies in which the vessel were involved included investigating of the tectonically active Aleutian Island area, examining the water exchange between the Bering Sea and North Pacific Ocean along the Aleutian Island chain, studies of the ecology and behavior of seabirds, sea otters, whales and other marine mammals, and investigating

the sedimentary history and dynamics of the Gulf of Alaska shelf, Glacier Bay and other Alaskan areas.

The R/V Alpha Helix provided adequate oceanographic operations through the early 1990s. At that time, the shortfalls in the vessel's capability surfaced as the oceanographic community's research programs moved to multi-disciplinary programs with large scientific parties. The Helix's size limits the number of scientists it can carry to fifteen. Its lack of cargo space for holding science equipment also limits the size of science parties plus its small work deck space cannot handle some of the large oceanographic mooring systems now in use. It also lacks hull space to house some of the more sophisticated science equipment now in use. It was also observed that a need existed for a vessel with more capability to independently penetrate deeper into the ice and safely exit from it. Additionally, its rough riding characteristics limited its operations from November through mid-March when severe weather conditions historically exist in its operating area.

Because of its length, the vessel was classified by UNOLS as a small regional vessel. This was always a misleading designation. While regional in nature, its large operating area in a remote region of the world with very hostile weather conditions, forced it to operate more as an intermediate and, at times, large classed vessel. Long deployments away from homeport with little local logistical support were a common operational mode. Additionally, lack of ports made logistics demanding. During one season in the mid 1990s, the vessel actually traveled over 25,000 miles; slightly further then the earth's circumference. These type operations taxed the vessel and crew's ability to operate safely and effectively. On the whole, the vessel responded admirably to these demands but the need for a larger, more stable, ice capable vessel was obvious.

During 1981 to 2004, while operating in Alaska, the R/V Alpha Helix averaged over 151 sailing days per year in support of science (3,629 total days). Figure 1 shows how the sailing days were distributed during the vessel's Alaskan life. It is of interest to note the sinusoidal form of this graph with an approximate cycle of 3 – 5 years. This results when funded multi-year programs expire and insufficient new initiatives are funded to totally replace the expired programs.

Funding for the R/V Alpha Helix science missions between 1981 to 2004 was primarily from NSF, which supported 76.4% of the science days. NOAA was next supporting 10.8% and JAMSTEC, a Japanese research institution, was third at 4.9%. Figure 2 below is a pie chart showing the funding distribution.

The major ocean bodies in which the vessel sailed from 1981 to 2004 are shown below:

Area of Operations	Total Days	Percentage
Bering Sea/Chukchi Sea/Arctic Ocean	2,390	65.8
Gulf of Alaska/Prince William Sound	907	25.0
Southeast Alaska	187	5.2
Outside Alaska Region	145	4.0
Total	3,629	100.0

Figure 1

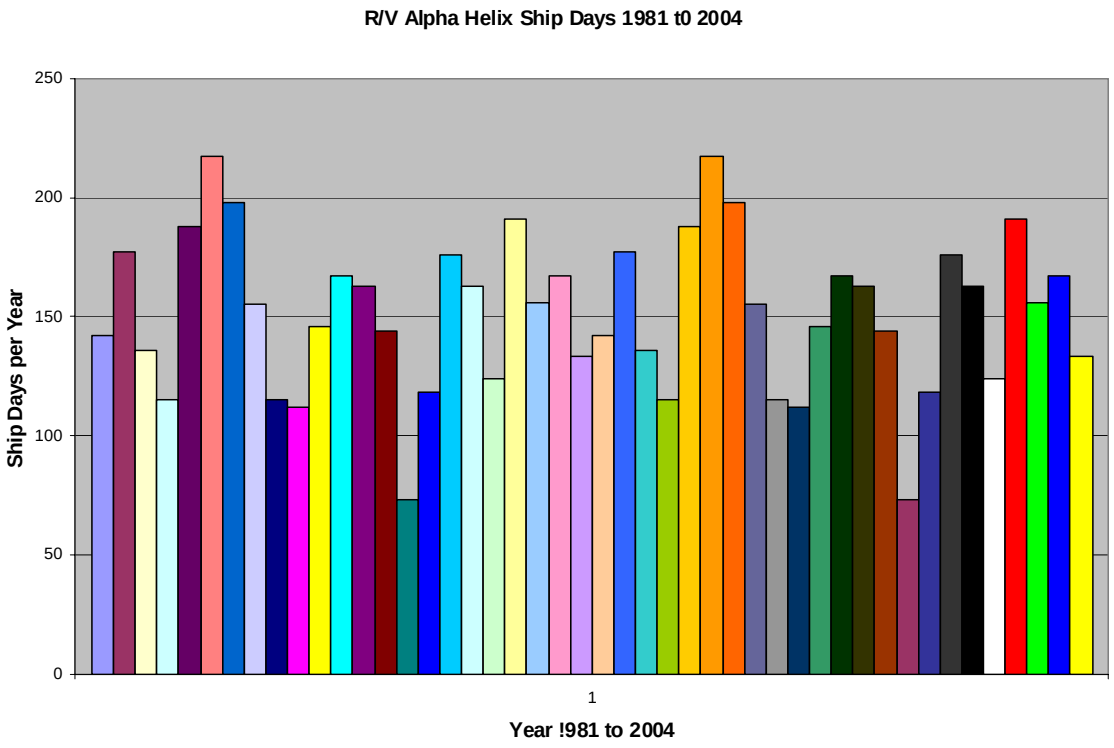
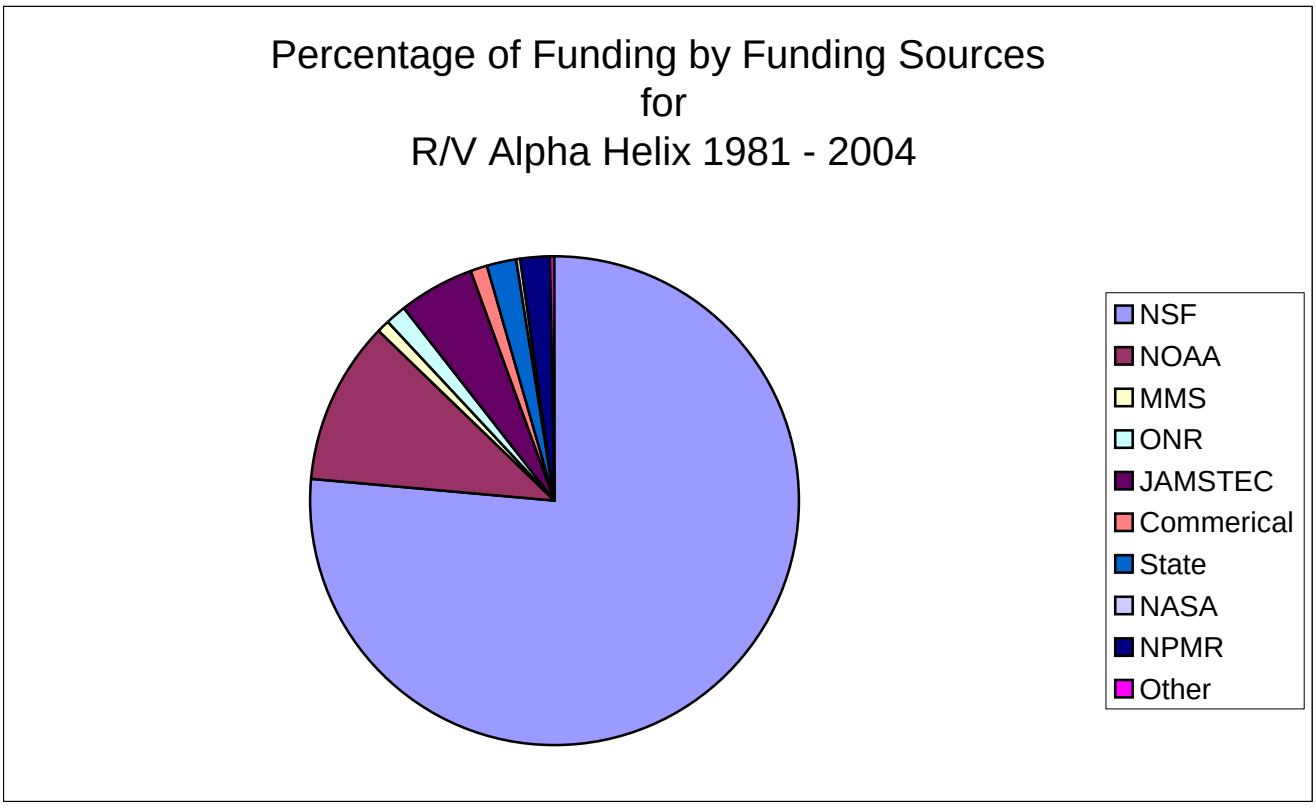


Figure 2



While the above totals are of interest, they are also somewhat misleading. They fail to show the shift in scientific emphasis that has occurred over the years. As an example, comparing the 2000 to 2004 time period versus the 1981 to 2004 average, we observe that NOAA has become a much larger user of Helix sailing days. This supports their claim that they will be a major user of the ARRV. During the past 5 years the percentage of NOAA science days support for R/V Alpha Helix is to 46.8 % versus the10.8% Alaskan life-cycle average. NSF support for the same 5-year period is only 42.2% versus its 76.4% life-cycle average. Utilization by other sources dropped to 6.0% versus the 13.5% average. JAMSTEC no longer uses the Alpha Helix because JAMSTEC had a new research vessel become operational that was larger and more capable than the Helix.

Similar to the shift in funding support, there has also been a shift in area of operations during the 2000 to 2004 period. During this time span, the vessel spent 46.6% of its science days in the Bering Sea, 52.2% in the Gulf of Alaska and only 1.2% in southeast Alaska. No time was spent outside the Alaskan region. The increases in science days in the Gulf of Alaska are attributable to studying El Nino occurrences and global warming type studies. Depending on future shifts in scientific interest, we can expect similar changes to occur. The recent concerns over the Arctic environment suggest a shift to this area. Several large multi-discipline programs are planned. Each will definitely require a larger, more ice capable vessel than the R/V Alpha Helix for support.