P1.16 THE OVERTON MARINA MOVE – A BENIGN WEATHER HIGH IMPACT EVENT

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1. INTRODUCTION

For decades, the primary focus of National Weather Service (NWS) operations has been to provide timely, accurate warning information for weather events that threaten life and property. Accordingly, a considerable amount of operationally-oriented research has concentrated on improving the understanding and predictability of severe or extreme weather episodes (e.g., Johns and Doswell, 1992; Doswell, Brooks and Maddox, 1996; Changnon, 2003; Klemp and Lilly, 1975; Roberts, Burgess and Meister, 2006, among numerous others). Inasmuch as this function lies at the core of the NWS mission, this focus on severe weather warnings will not, and should not, change.

Some routine forecast services provided by NWS offices are associated with less obvious impacts, more closely related to enhancing the economy than to safeguarding life. For example, while a 5000 foot cloud ceiling in a TAF would be considered a favorable "VFR" condition, it represents a critical threshold for influencing arrival rates at some pacing airports. Ground delays induced by these conditions have serious implications on air traffic flow, sometimes costing the industry millions of dollars in a single day.

Occasionally, opportunities to address mission-related needs come in the form of user requests for unique support services. Such was the case for NWS Las Vegas in early 2007, when the National Park Service (NPS) requested NWS collaboration and decision support for a physical move of two massive marinas across the Lake Mead National Recreation Area (LMNRA).

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2. THE MARINA MOVE

In January and February of 2007, NWS Las Vegas was called upon to provide forecast support for four projects by the National Park Service (NPS) in which potentially high impact could have been posed by relatively benign weather conditions. The most dramatic event was a complex move of two large marinas during which mission success required two full days of fair weather and light wind. Aside from the personal safety risks, tens of millions of dollars in personal and government property were at stake during these moves.

By January 2007, concerns over lowering water levels on Lake Mead caused the NPS to determine it was necessary to relocate the two marinas located at Overton Beach, Nevada (Fig. 1 & 2). To accomplish this, a total of 185 slips, some as large as 75 feet in length and many with boats still lodged in them, had to be floated more than 40 miles across Lake Mead and re-anchored in the deeper water ports of Callville Bay and Temple Bar. Two flotillas, each powered by 12 large resort boats with a combined force of approximately 6000 HP, would push the marinas across the lake at approximately one (1) mph.

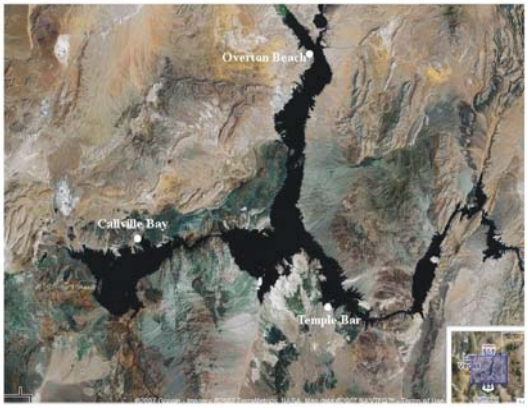

Fig. 1 - Satellite image of the Lake Mead National Recreation Area with locations involved in the January 2007 Marina Move highlighted. (Image Source: Google Earth)

Weather, especially wind, was a critical planning factor for the success of this project. Encountering a wind speed of as little as 10-15 mph would have rendered the flotillas uncontrollable, resulting in a multi-million dollar disaster. In order to mitigate a potentially catastrophic loss, the NPS employed the services of NWS Las Vegas to provide daily Internet weather briefings for a week in advance of the move. Indeed, due to a forecast of adverse wind and wave conditions, the original launch date was delayed 48 hours. The adjusted dates proved to be favorable, and a successful move was accomplished.

Fig. 2 - Zoomed aerial view of the two marinas anchored off Overton Beach on Lake Mead - about 60' of the beach is newly exposed. (Image Source: Google Earth)

Undertaking a customized support role such as this was permissible for the NWS because the NPS is also a federal agency (under the auspices of the Department of Interior) and the operation involved safeguarding life and property. The initial request was simply to provide guidance for a "go, no go" decision. Once the potential economic and safety impacts were understood, the NWS offered to conduct a detailed daily briefing of expected conditions via the Internet.

Each day at noon, for six consecutive days, a planning briefing was conducted with participants logging in from four separate locations around the LMNRA (the NPS regional office in Boulder City, Overton Marina, and the two destinations: Callville Bay and Temple Bar). Commercial Internet meeting software was utilized to provide access by all participants to imagery being displayed on the computer screen of the NWS meeting host. A conference call line was then activated for audio.

Briefing format consisted of a simple sequence of: (1) initial conditions from satellite imagery and observations (see Figs. 3 & 4 as examples), including an array of mesonet sensors (not shown);(2) mesoscale model guidance, primarily plan view graphics of cloud and wind based on the operational NCEP 12-km WRF model using the NMM physics core (see Figs. 5 & 6), and a locally run version of WRF at 4-km resolution using the ARW physics core; (3) commentary on forecaster confidence in the numerical guidance, including where and why the actual weather might differ from the model output, and (4) a specific forecast for the planned flotilla move (Figs. 7 & 8).

Local expertise was a crucial factor in terms of the value NWS Las Vegas offered to the NPS decision makers. Experience amassed through years of producing mesoscale spot forecasts and storm scale warnings in the NWS Las Vegas service area armed forecasters with unique insight into how wind currents on the lake would likely respond to forcing predicted by the models.

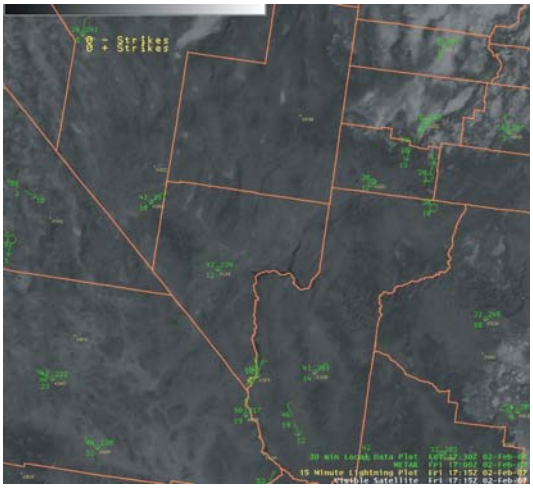

Fig. 3. Slide from 2 Feb 2007 Overton "Go, No Go" Briefing: GOES 1-km visible image depicting clear skies over Southern Nevada and Lake Mead.

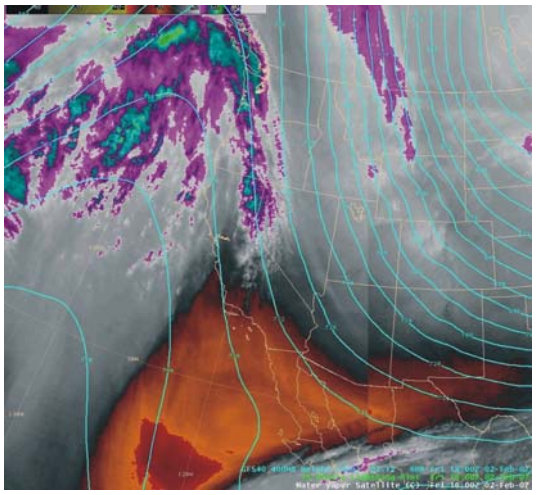

Fig. 4. Slide from 2 Feb 2007 Overton "Go, No Go" Briefing: GOES 8-km (6.7 micron) water vapor image overlaid with 400mb heights from GFS-40..

It quickly became apparent that original plans to launch on the morning of Wednesday, January 31 would have to be delayed due to the low threshold for wind. High confidence in the development of a north wind in the 10-15 mph range for a period of at least 3-6 hours was responsible for the delay. The window for favorable weather extended into the weekend, forcing the NPS to commit overtime funds to the project. The cost-benefit of that decision was easily justified and the final launch was set for the early evening hours of Friday, February 2.

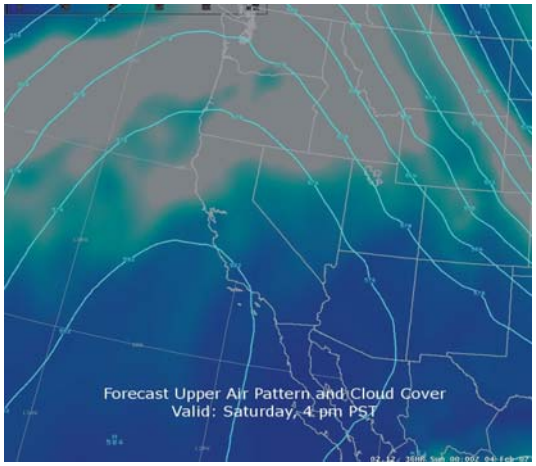

Fig. 5. Slide from 2 Feb 2007 Overton "Go, No Go" Briefing: Cloud cover and upper air pattern forecast (500mb geopotential heights) for Saturday afternoon.

During the final "go, no go" briefing at noon on February 2, choppy waters and white caps, associated with gusty north winds, were still being observed on the section of the lake known as the Overton Arm. However, it was clear the pressure gradient was relaxing quickly, and surface winds were expected to decouple from the lower boundary layer after sunset. Marina launches were underway around 5 pm.

Emergency contact numbers were exchanged to ensure 24/7 communication was possible between NWS and the NPS flotilla crews. In addition, arrangements were made to disseminate nowcast information via NOAA Weather Radio

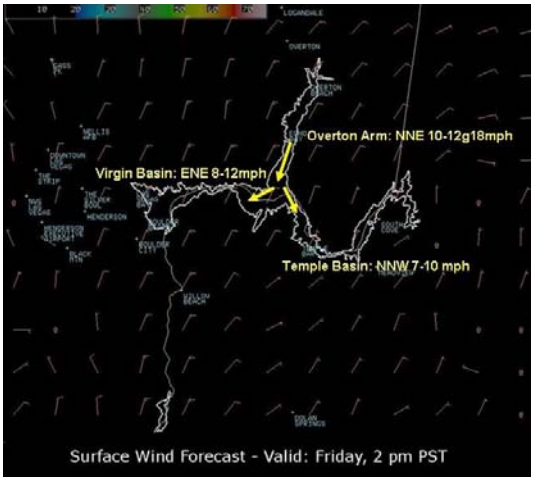

Fig. 6. Slide from 2 Feb 2007 Overton "Go, No Go" Briefing: Surface wind forecast superimposed on 12-km NAM graphic, valid for Friday afternoon.

(NWR) since there were at least two segments of the route known to have NWR reception but no cell phone coverage.

Tension peaked Saturday night when the Callville crew had to negotiate a constricted canyon known as the Narrows. Winds tend to accelerate as they are funneled through this region. Even a relatively light north or northeast component tends to produce an unfavorable tail wind for such large, unwieldy craft. To complicate matters further, the flotillas had only 12-17 feet of clearance for more than a mile as they traversed the Narrows.

Fig. 7. Slide from 2 Feb 2007 Overton "Go, No Go" Briefing: Mission forecast for Friday afternoon and evening.

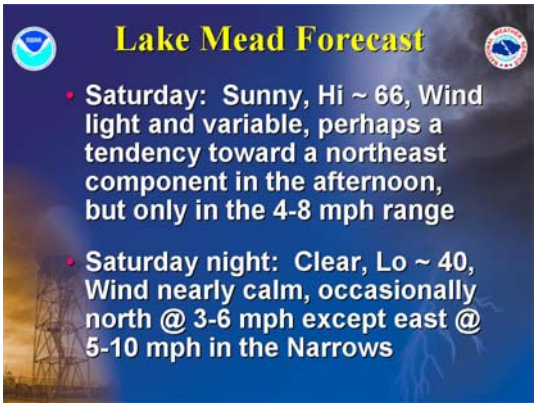

Fig. 8. Slide from 2 Feb 2007 Overton "Go, No Go" Briefing: Mission forecast for Saturday, 3 Feb 2007.

At approximately 9:00 am PST on Sunday, February 4, the lead flotilla landed at Temple Bar without incident. Two hours later, word was received from the captain of the second team that they had anchored safely in Callville Bay, ending a successful mission to physically reposition two large marinas and dozens of commercial and pleasure boats valued in the tens of millions of dollars.

3. SUMMARY

The prime NWS mission of "protecting life and property" is traditionally associated with providing information which enables constituents to avoid or mitigate the effects of a severe weather hazard, such as a tornado, severe thunderstorm, hurricane or flash flood. Projects like the Overton Marina move illustrate the fact that a broad spectrum exists for which important services may be offered to assist key partners and customers in making risk assessment decisions that protect human safety and minimize economic impacts associated with weather, water and climate concerns.

By understanding user needs, impacts and decision points, we build and maintain a culture of quality customer service, which is crucial to the relevance, success and vibrancy of any organization.

4. REFERENCES

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Disclaimer: The views expressed in this paper are those of the author and do not necessarily represent those of the National Weather Service.

5. OVERTON MARINA LAUNCH PHOTOS

Fig. 9. Photo of Overton Marina #1, approximately 20 minutes prior to launch.

Fig. 11. Photo from on board Overton Marina #2, moments before launch.

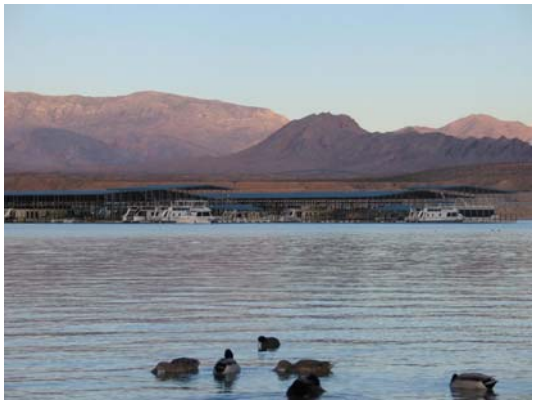

Fig. 10. Photo of Overton Marina #1 approximately 15 minutes after launch.

Fig. 12. Photo of both marinas under way, about 45 minutes after launch.